The U.S. Global Change Research Program (USGCRP) released the draft Fourth National Climate Assessment (NCA4), Volume II for public comment from 03 November 2017 to 31 January 2018, concurrent with review by a special committee convened by the National Academies of Sciences, Engineering, and Medicine (NASEM, 03 November 2017 - 12 March 2018).

The NASEM panel evaluated the draft NCA4 Vol. II and published a document that captured consensus responses to questions posed within a carefully designed Statement of Task. The final report can be accessed here and an acknowledgment generated by USGCRP leadership here. This memo explains actions taken by the NCA4 Vol. II writing team to accommodate the expert judgment of the committee. In addition to the narrative review provided by the NASEM penal, each chapter writing team considered any chapter-specific line-by-line comments made by the panel, noted edits and rationale, and revise the report. The annotation to these line-by-line comments from the NASEM panel can be accessed here.

A Federal Register Notice publicized the Public Comment Period and a web-based system collected input from the general public and external disciplinary experts. Chapter writing teams considered each comment, noted edits and rationale, and revised the report. The Public Comment Period annotation can be accessed here.

Independent Review Editors (RE) were chosen by the NCA4 Federal Steering Committee from a pool of eternal experts solicited through an open call publicized via Federal Register Notice (20 July 2017 – 08 September 2017). Each chapter was assigned an RE to evaluate author responses to both the NASEM review and public comments, and the revised chapter drafts themselves, to confirm that the chapter writing teams had given due consideration to all review comments prior to submission for final agency review and clearance.

Names and affiliations of participants in the NCA4 Vol. II Public Comment Period were withheld from the authors, Review Editors, Federal Steering Committee, and staff throughout review and revisions. Anonymity helped preserve integrity of the drafting process. During registration, all reviewers consented to have their names associated with relevant comments once the report was published. The full report underwent several additional rounds of review after these responses were generated and, therefore, edits may have been made that are not part of the attributed set of comments included on the following pages.
Thank you for your comment. We have added a reference to the figure of this paper to explain the difference.

Thank you for your comment. We have added another reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for your comment. We have added a reference to this report to provide more context.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.

Thank you for the comment. The text has been revised.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>Start Line</th>
<th>End Page</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14-0892</td>
<td>00. Front Matter</td>
<td>6</td>
<td>19</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td>I am a bit confused by the ordering here— it makes it seem as if the climate and sea level changes are driving the population changes—which seems strange for the demographic aspect. I also wonder if &quot;migration&quot; is the right word here— that makes it seem as if people are moving to some attractive location when actually I would suspect what is meant is forced relocation, so perhaps it would be better to say &quot;dislocation&quot; or &quot;forced migration&quot; or something. Are and not the land use changes also driven in part by the changes in climate? Again, a schematic chart might help here as it was, this is a pretty complex paragraph for the general reader (even for the technical reader), especially given its in the front matter.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14-0893</td>
<td>00. Front Matter</td>
<td>6</td>
<td>16</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td>I need to explain the basis for this grouping. Is it in order that these were analytical outcomes of the various emissions scenarios, or as a whole sequential event? If so, I think if one removed the scenarios as I suggested, then saying that one is associating various outcomes with the FIF scenario, FF phasedown, and FF phasedout was much clearer for the reader (as, much more sea level rise and dislocation associated with the FIF scenario than the FF phasedout scenarios. Otherwise, it would be useful to describe at this higher level excerpt that one really didn't see the whole discussion of scenarios is pitting too clear to anyone without some schematic diagrams and/or tables.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14-0894</td>
<td>00. Front Matter</td>
<td>6</td>
<td>16</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td>For the whole analysis framework it is rather unclear. There are issues associated with the scenarios and costs, and would be all of the proposed scenarios, both in terms of the impacts that result for the environment and society and also for the impacts and risks associated with having a particular policy with or without sea level rise or dislocation (i.e., you can't just pick high prices for energy or limited supplies, etc.)</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14-0895</td>
<td>00. Front Matter</td>
<td>6</td>
<td>14</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td>It is for the reason that I was confused about having population and demographics (and even some of the land use aspects included in the 4L2 scenario) and then the climate and sea level products are completely different than the origins of the population, demographic and land use products, I would suggest not having them listed together on lines 23-27 and have a schematic diagram showing their different origins here.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14-0896</td>
<td>00. Front Matter</td>
<td>6</td>
<td>14</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td>Have the developments really in parallel? I thought the subjective facing profiles were done fine and then the SSIs were developed to come out with that result? At least here, it's unclear where we're going in parallel in the Ste of the Carbon report, it mistakenly said the social and economic analysis led to the RCP, which was, as I vaguely recall, true for the SRES scenarios but not the RCPs.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14-0897</td>
<td>00. Front Matter</td>
<td>6</td>
<td>14</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td>There is really not very clear here— we are saying &quot;These products&quot; would be a bit brevity. How about specifically here mentioning that, as the basis for the assessment, the climate- and sea level-related results for various scenarios for GHG-related emissions (which were developed by the physical and biological science communities) were brought together with a set of population/demographic-related products that were the drivers of the energy technology scenarios that led to the RCP-related emissions scenarios (which were developed by the economic- and social science communities). So, basically, better spell out the inputs and then perhaps indicate that the assessment looks at how each set of products might further affect the other set of products and together they will provide plausibility projections for what we're ahead gives alternative policy choices. If suggest while the language may be complicated, showing the linkages in a schematic diagram might be the easiest way to convey all this information.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14-0898</td>
<td>00. Front Matter</td>
<td>7</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>And this is where it is indicated what works for what and the text has not indicated what works for what.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14-0899</td>
<td>00. Front Matter</td>
<td>7</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>Having some sort of schematic diagram or chart to help convey such information would really be helpful. I also want to say that referring to the different choices by what is happening in FF (e.g., lower population and upper bound SS1) is helpful (so please do for FF emissions), I would note, however, that you presumably mean &quot;lower growth in population&quot; and not literally &quot;lower population&quot; so maybe &quot;lower POP&quot; or &quot;faster POP&quot; where it is for population growth.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14-0900</td>
<td>00. Front Matter</td>
<td>7</td>
<td>3</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td>Here are no &quot;degrees of certainty&quot;— just take the definition of certainty from a dictionary and apply it to various objects in such a way that it makes sense in all. Please do not complicate things in this area or by linguistic by talking about certain having degrees. Uncertainty and confidence can both be expressed in the form of having degrees of certainty, but not certainty. The recent Carbon Cycle Report draft was quite inconsistent about this, so I pointed out in a number of comments. Here, if you want to have a word for the combination of confidence and likelihood, about replacing &quot;degree of certainty&quot; with something drawn from the following: overall, possibility, conviction, agreement, dependability, trustworthiness, or even certainty. But please don't create &quot;degrees of certainty.&quot;</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14-0901</td>
<td>00. Front Matter</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td>The definitions of terms here, and I want to commend you for the numerical way of expressing &quot;footnote&quot; in an approach most preferable to the overly precise approach that has often been used by IPCC (e.g., range from 67 to 95%, etc.), and one that I have been advocating for almost two decades. Just a couple of specific comments. I am confused by the equal sign under &quot;As likely as not&quot; and then nothing on the other entries. It seems to mean it would be better for all of the entries to have the &quot;approximate&quot; sign. As I pointed out, however, you presumably mean &quot;lower growth in population&quot; and not literally &quot;lower population&quot; so maybe &quot;lower POP&quot; or &quot;faster POP&quot; where it is for population growth.</td>
</tr>
<tr>
<td>Achard</td>
<td>Luneck</td>
<td>14-0949</td>
<td>00. Climate Science Findings</td>
<td>16</td>
<td>6</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td>There is a need for a paragraph: The global climate changed rapidly, compared to the pace of natural variations in climate that have occurred throughout the Earth’s climatic history. The global average temperature increased by about 0.7°F from 1901 to 2016. For this amount of warming, observational evidence does not support any credible natural variations. Instead evidence supports human activities as the dominant cause, especially the emissions of greenhouse gases in heat trapping gases.</td>
</tr>
<tr>
<td>Achard</td>
<td>Luneck</td>
<td>14-0950</td>
<td>00. Climate Science Findings</td>
<td>16</td>
<td>11</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td>Replace paragraph with: Assuming emissions remain the same or increase, the Earth’s climate will continue to change over this century and beyond. After 2050, the magnitude of climate changes will depend primarily on global emissions of greenhouse gases and on the response of Earth’s climate system. Assuming significant reductions in emissions, the global temperature increase could be limited to 3.6°F (2°C) or less. Without significant reductions, annual average global temperatures could increase by 5.8°F or more by the end of this century.</td>
</tr>
</tbody>
</table>

The text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.
Robert Kopp 241158 2nd Region 06 07 16 11 15 31 31 At least several inches” describes global mean sea level rise between 2000 and 2010, but not “in the next fifteen years” (where sea level rise in the Low scenario would be 4.5 mm).

The referenced information is a direct quotation from NCA4 Volume 1, which summarizes the scientific understanding of sea level rise as summarized in the peer-reviewed literature found in NCA4 Volume 1. The text in this summary is a direct quotation from that document, which has been approved and was published in November 2017. We refer the reviewer to Volume 1, particularly Chapter 12, for more information on the scientific basis for this statement, including relevant citations.

Robert Kopp 241158 2nd Region 06 07 16 11 15 31 31 At least several inches” describes global mean sea level rise between 2000 and 2010, but not “in the next fifteen years” (where sea level rise in the Low scenario would be 4.5 mm).

The referenced information is a direct quotation from NCA4 Volume 1, which summarizes the scientific understanding of sea level rise as summarized in the peer-reviewed literature found in NCA4 Volume 1. The text in this summary is a direct quotation from that document, which has been approved and was published in November 2017. We refer the reviewer to Volume 1, particularly Chapter 12, for more information on the scientific basis for this statement, including relevant citations.

Robert Kopp 241158 2nd Region 06 07 16 11 15 31 31 At least several inches” describes global mean sea level rise between 2000 and 2010, but not “in the next fifteen years” (where sea level rise in the Low scenario would be 4.5 mm).

The referenced information is a direct quotation from NCA4 Volume 1, which summarizes the scientific understanding of sea level rise as summarized in the peer-reviewed literature found in NCA4 Volume 1. The text in this summary is a direct quotation from that document, which has been approved and was published in November 2017. We refer the reviewer to Volume 1, particularly Chapter 12, for more information on the scientific basis for this statement, including relevant citations.
Ross McKitrick

Para 2 lines 9-11. We disagree with this comment. The referenced information represents the scientific understanding of climate as summarized in the peer-reviewed literature found in NCA4 Volume 1. The text in this summary is a direct quotation from that document, which has been approved and was published in November 2017. We refer the reviewer to Volume 1, particularly Chapter 2 and 3, for more information on the scientific basis for these statements, including relevant citations.

Para 21 lines 19-24. We disagree with this comment. The referenced information represents the scientific understanding of climate as summarized in the peer-reviewed literature found in NCA4 Volume 1. The text in this summary is a direct quotation from that document, which has been approved and was published in November 2017. We refer the reviewer to Volume 1, particularly Chapter 4, for a much longer discussion of the scientific basis for this statement, including relevant citations.

Ross McKitrick

The referenced statement is a brief summary of the scientific understanding of climate as summarized in the peer-reviewed literature found in NCA4 Volume 1. This document was published in November 2017 and is too text not subject to change.
Michael MacCracken

144004

White Chapter

Climate Science Findings

16 16 16

The faster rate since 1993 should be mentioned here. It is an important development, as it affects the future projections as well as adaptation/resilience measures and decisionmaking. The role of ice sheets could not be raised briefly. Also, the link between emissions reduction and lower SIR rates in the second half of the century would be a real highlight (like it was mentioned in finding 2). I'd suggest changing this phrase to "the amounts and patterns of changes in temperature, sea level, and other climate variables".

We appreciate the suggestion; however, the test in the high-level climate science summary is a verbalt ext from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.

Michael MacCracken

144002

White Chapter

Climate Science Findings

16 16 14 14

Regarding the phrase “magnitude of climate changes,” it seems to me this needs to be changed. We are actually pretty clear on the "magnitude"—it will be degrees—and this is pretty much for all scenarios. If inferring to "climate" it meant to include more variables than temperature, their "magnitude"—if the term is used, needs to be plural. And I am confused why changes is plural here? I'd suggest changing this phrase to "the amounts and patterns of changes in temperature, sea level, and other climate variables".

We appreciate the suggestion; however, the test in the high-level climate science summary is a verbalt ext from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.

Michael MacCracken

144003

White Chapter

Climate Science Findings

16 16 15

I would suggest saying "cumulative global emissions of greenhouse gases in the decades ahead" in order to get across the point that just bringing down future emissions is not what matters, but the path also matters.

We appreciate the suggestion; however, the test in the high-level climate science summary is a verbalt ext from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.

Michael MacCracken

144005

White Chapter

Climate Science Findings

16 16 18 15

Paragraph 10. Regarding T4Δx: Self-reinforcing cycles within the climate system (Δx) in Paragraph 3 your argument depends on the claim that natural variability is known to be minimal on all time scales because it (a)随手Δx manifest itself in climate models, therefore modern warming can only be anthropogenic. Yet in this paragraph you claim the climate is prone to large, persistent natural variations that models can't reproduce, which contradicts your earlier claim. You stated that models have a "systematic tendency to underestimate temperature change during past warm periods" which obviously implies that they could systematically underestimate natural warming during the present period as well; yet nine paragraphs earlier your assertion required you to assume this could not be the case. You can't Δx have it both ways.

We disagree with the reviewer's comment as it conflates natural variability over decadal timescales, which is the topic of NCA4 Vol. 1 Chapter 2, with the response of the Earth's climate system to long-term warming over centuries to millennia, which is the topic of NCA4 Vol. 1 Chapter 15. For a comprehensive discussion of natural influences on climate, we refer the reader to these chapters of NCA4 Volume 1, which is available at www.esrin2017.globalchange.gov.

Michael MacCracken

144006

White Chapter

Climate Science Findings

16 16 19

While I presume the "primarily" on line 14 is intended to cover natural influences and changes in aerosol precursors, I'd just note that apparently any chance of either carbon dioxide removal or climate intervention playing a role is also implicit in this term. I don't wonder if this is appropriate—might be that at least possibly all of carbon dioxide removal needs to be mentioned here, or perhaps saying somewhere something quite general with a phrase such as "without the development of as yet unproven interventions that might attempt to offset some of the forcings or responses" or something similar. It seems to me that given the increasing discussion about potential interventions, including proposed federal legislation and even some state actions, that something might need to be said somewhere.

We appreciate the suggestion; however, the test in the high-level climate science summary is a verbalt ext from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.

Michael MacCracken

144007

White Chapter

Climate Science Findings

16 21

Saying "98%" is quite precise given uncertainties of a range of kids. How about saying "over 90%"? This would also be more consistent with the sentence then saying "more than a quarter" which seems much more precise than "98%" and so indicating there is a good deal of uncertainty.

We appreciate and acknowledge this suggestion; however, the test in the high-level climate science summary is a verbalt ext from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144008</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>16</td>
<td>23</td>
<td>23</td>
<td>I'd suggest deleting &quot;unusually&quot; as this implies every year is more than a quarter, and I'm not sure that is true. The statement is true over averages, but is it the case every year? I don't think that is directly established. We appreciate the recommendation; however, the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144009</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>16</td>
<td>27</td>
<td>27</td>
<td>I'd suggest changing &quot;locations&quot; to something like &quot;coastal regions&quot; or something not implying very specific places—this result is for regional size areas and not specific sites. We appreciate the suggestion; however, the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144010</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>16</td>
<td>29</td>
<td>29</td>
<td>There is one &quot;Global Sea Level&quot;—the global average. So, the global average is rising [I'll note the subject of the first sentence of this point is singular, and the bold font part also needs to be singular. Also, I thought the 7-8 inches was the amount during the 20th century, and it has risen more since. We appreciate the reviewer's suggestion; however, we felt the wording is accurate and grammatically correct, and in addition the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144011</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>16</td>
<td>32</td>
<td>32</td>
<td>It seems to me that associating this possibility with a cause would make it more clear that this could happen. So perhaps, &quot;Recent accelerated loss of ice from the Greenland and Antarctic ice sheets suggest that a real [I'll generally, I think it really helps in communicating to the public if one can link the point to something specific that is happening and that is in the news. We appreciate the reviewer's suggestion; however, the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144012</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>16</td>
<td>35</td>
<td>35</td>
<td>I'd suggest changing &quot;in late summer&quot; to &quot;for most of the summer&quot; as this change is occurring quite rapidly and the quality of ice in mid-summer now is really getting quite poor [thin and breaking up]. In making this change, perhaps change &quot;Arctic&quot; to &quot;most of the Arctic Ocean&quot;—so talking about most of the area and also about the Arctic Ocean and not also referring to the land area. We appreciate the reviewer's suggestion; however, the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144013</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>17</td>
<td>13</td>
<td>13</td>
<td>Agree, need to think about singular and plural. &quot;Annual average temperature across the Arctic has increased [I'll note the subject of the first sentence of this point is singular, and the whole paragraph given in the singular. Perhaps change heading to &quot;Increasing Temperatures Across the U.S.&quot;— and then somehow say that these would contribute to the rise in the average temperature across the US. We appreciate the reviewer's suggestion; however, the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144014</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>17</td>
<td>16</td>
<td>16</td>
<td>I'd suggest changing &quot;to late summer&quot; to &quot;for most of the summer&quot; as this change is occurring quite rapidly and the quality of ice in mid-summer now is really getting quite poor [thin and breaking up]. In making this change, perhaps change &quot;Arctic&quot; to &quot;most of the Arctic Ocean&quot;—so talking about most of the area and also about the Arctic Ocean and not also referring to the land area. We appreciate the reviewer's suggestion; however, the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144015</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>17</td>
<td>19</td>
<td>19</td>
<td>Change &quot;carbon&quot; to &quot;carbon dioxide&quot; and change &quot;but it [I'll have. Also perhaps say &quot;global warming&quot; instead of &quot;just warming&quot;—or even better, say &quot;global warming and associated climate-induced impacts&quot;. We appreciate the suggestion; however, the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144016</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>17</td>
<td>23</td>
<td>23</td>
<td>Don't you mean &quot;subtropics&quot; instead of &quot;tropics&quot;? And perhaps, for clarity, say &quot;the dry subtropics&quot;. I don't know of any significant discussion of the tropics expanding. We disagree with the reviewer on this comment. This text refers to the following statement from NCA4 Vol. 1 Chapter 5, which reads: &quot;Evidence continues to mount for an expansion of the tropics over the past several decades, with a poleward expansion of the Hadley cell and an associated poleward shift of the sub-tropical dry zone.&quot; We refer the reviewer to Vol. 1, Chapter 5 for further discussion, as well as citations and references for this statement.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144017</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>17</td>
<td>23</td>
<td>23</td>
<td>I'd suggest changing &quot;increases in greenhouse gases&quot; to &quot;Climate warming caused by the rising concentrations of greenhouse gases&quot; as it is not the greenhouse gases (or the air pollution) that are directly causing the rise in the average temperature across the US. We appreciate the reviewer's suggestion; however, the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144018</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>17</td>
<td>31</td>
<td>31</td>
<td>I'd suggest changing &quot;Northwest&quot; to &quot;coastlines of northwestern North America&quot;, the plural to account for the Western Gulf of Mexico as well. We appreciate the reviewer's suggestion; however, the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144019</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>17</td>
<td>34</td>
<td>34</td>
<td>This sentence would make more sense and be more convincing if it were explained somewhere in a box that the statistical distribution for most climate variables is a bell-shaped curve and that a shifting of the average towards a greater Bluefish or intensity tends to lead to a very small disproportional increase in extreme conditions/outcomes. We appreciate the reviewer's suggestion and are familiar with the graphic they describe; however, the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144020</td>
<td>Text Region</td>
<td>D1a. Climate Science Findings</td>
<td>35</td>
<td>17</td>
<td>39</td>
<td>39</td>
<td>The word &quot;decades&quot; needs to be deleted, or at least changed to &quot;centuries&quot; or even &quot;many centuries&quot;. It might be useful to say with respect to mid-20th century conditions. We appreciate the reviewer's suggestion; however, we felt the wording was accurate. NCA4 Vol. 3 Chapter 4 describes a commitment scenario where equilibrium temperature stabilizes over decades (recognizing of course that other impacts continue to play out over centuries to millennia). In addition, the text in the high-level climate science summary is a verbatim extract from the Climate Science Special Report which serves as Volume 1 of the Fourth National Climate Assessment. This document was published in November 2017 and its text is not subject to change. We refer the reader to Vol. 1, Chapters 4 and 5 for more information on the origin of &quot;decades to centuries&quot;.</td>
<td></td>
</tr>
</tbody>
</table>

Response
The report should remove the unsupported major claim in that... emissions of greenhouse gases, are the dominant cause of the observed warming... The claim that CO2 causes global warming is unsupported and a valid method has been properly published and peer reviewed. If report authors believe there is a valid method published anywhere to support this claim, then please put the citation/reference number for that method at end of the key sentence, so the supporting logic/method can be easily and unequivocally located, and properly checked. If no proper reference can be located, then the claim that CO2 causes global warming should be removed from the Executive Summary and throughout the report text. The report's key claim - that CO2 increases causes global warming - is so important that it should be covered by its own chapter in the report, which should clearly state the method used to support the claim. What method was used (to show that CO2 causes global warming), who did the research, where is this documented (clear citation), who did the review? Does this alleged supporting document actually state the conclusion and describe the method and analysis used to reach the conclusion about CO2? What method was used? To my knowledge, no one (not IPCC, EPA, MFA, NOAA, NAS, etc) has ever cited the proper reference for this key claim because the proper scientific research has never been done - no funding agency ever sought to fund research using the scientific method to test (i.e., attempt to falsify) the hypothesis that CO2 causes warming... Because that would be political heresy... So, the correct method for testing the hypothesis has been ignored, and instead an undocumented or unvalidated method has been used. Despite these multiple federal agencies spending over $7 billion/year of the public's money on research... none of the scientists studied had the good sense to actually apply the scientific method or to ever ask: What is the best way to test this hypothesis? https://www.gao.gov/key_issues/climate_change_funding_management/issue_summary. Although the Report is not clear about what method the authors believe justifies their major statement that... emission of greenhouse gases, are the dominant cause of the observed warming... the reader can make a guess. The chapter starts with two possible reasons (both invalid) for why the authors would believe in their claim that CO2 increases cause global warming: (a) "It's just physics" and (b) The models say so. "It's just Physics." The author's "belief" is shown by the sentence at end of CSSR Chapter 4: The first statement regarding additional warming and its dependence on human emissions and climate sensitivity has high confidence, as understanding of the radiative properties of greenhouse gases and the evidence of both positive and negative

The reviewer appears to be unaware of the vast body of literature on detection and attribution that has been published to date. The reviewer also appears to be unaware that this document is a summary of the Fourth National Climate Assessment Volume 1, which was published in November 2017 and can be accessed at science2017.globalchange.gov. The text in this summary is a direct quotation from that document, which provides the context, and cites the review that the reviewer of the peer reviewed literature. We refer the reviewer to Volume 2, in particular Chapters 2 and 3, for more information on the scientific understanding of climate forcing and the scientific basis for the attribution of observed climate change, including relevant citations and references.

The reviewer also appears to be unaware of the vast body of literature on detection and attribution that has been published to date. The reviewer also appears to be unaware that this document is a summary of the Fourth National Climate Assessment Volume 1, which was published in November 2017 and can be accessed at science2017.globalchange.gov. The text in this summary is a direct quotation from that document, which provides the context, and cites the review that the reviewer of the peer reviewed literature. We refer the reviewer to Volume 2, in particular Chapters 2 and 3, for more information on the scientific understanding of climate forcing and the scientific basis for the attribution of observed climate change, including relevant citations and references.
Events that lead to disruption and damage can result in more frequent and longer-lasting health conditions, certain occupations, tribal communities, etc.?

Any reason the other populations of concern were omitted here? People with disabilities, people with pre-existing health conditions, certain occupations, tribal communities, etc.

The existing text reflects Key Message 2 in the health chapter. The full list of populations in concern in that chapter is a full paragraph and is too long for inclusion here; we have included only those reflected in their high-level messaging. We have changed the text to move "population including..." so that it would set population in context. In this sentence, the term "the list is not intended to be exhaustive."

We have revised the second sentence to read: "Changes in temperature and precipitation drive by climate change increase air quality risks from additive, global-level ozone (smog), and allergens."  

The frequency and severity of allergic illnesses, including asthma and hay fever, are expected to increase a result of a changing climate. 

This section has been edited to read: "Adaptation strategies, including prescribed burning to reduce fuel for wildfire, creation of safe havens for important species, and control of invasive species, are being implemented to address emerging impacts of climate change on valued ecosystems and natural resources. However, many of these strategies that account for changing climate conditions can help prepare the Nation for present and future risks to water security, but implementation of such practices remains limited." This text is consistent with findings of the Water chapter, and offers a perspective on adaptation that is specific to the water sector.

We have deleted the text, as suggested in this comment.

We have revised the first sentence of this supporting paragraph to read: "More frequent and intense extreme events will continue to damage infrastructure, ecosystems, and social systems that provide essential goods and services to communities." We have replaced the last sentence of the paragraph with "Promoting adaptation actions for the most vulnerable populations would contribute to a more equitable future within and across communities, and global action to mitigate greenhouse gas emissions will substantially reduce climate-related risks for these populations."

We have deleted the text, as suggested in this comment.

We have introduced the term "carbon" with "greenhouse gas" here and the three other instances in the Report Findings section, where it was appropriate to do so.

We have deleted the test, as suggested in this comment.

We have deleted the text, as suggested in this comment.

This section has been edited to read: "Adaptation strategies, including prescribed burning to reduce fuel for wildfire, creation of safe havens for important species, and control of invasive species, are being implemented to address emerging impacts of climate change on valued ecosystems and natural resources. However, many of these strategies that account for changing climate conditions can help prepare the Nation for present and future risks to water security, but implementation of such practices remains limited." This text is consistent with findings of the Water chapter, and offers a perspective on adaptation that is specific to the water sector.

We have deleted the text, as suggested in this comment.

We have deleted the test, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have replaced the term "water" with literally every other sector in the report and this sentence would remain the same. Adaptation already covers it.

We have deleted the test, as suggested in this comment.

We have replaced the term "carbon" with "greenhouse gas" here and the three other instances in the Report Findings section, where it was appropriate to do so.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.

We have deleted the text, as suggested in this comment.
null
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144027</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>19</td>
<td>19</td>
<td>15</td>
<td>15</td>
<td>Might be also be helpful here to also mention &quot;agricultural and industries&quot; and not leave those uses implictly in &quot;humans&quot;.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144028</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>19</td>
<td>17</td>
<td>12</td>
<td>12</td>
<td>Change &quot;in doing&quot; to &quot;in doing&quot;.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144029</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>19</td>
<td>18</td>
<td>14</td>
<td>14</td>
<td>MacCracken added &quot;and cost&quot; to the text to address the first part of the comment, but in the interest of keeping this high-level Report Findings concise, we did not indicate mention of some of the examples given at the end of this comment.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144030</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>19</td>
<td>19</td>
<td>16</td>
<td>16</td>
<td>We have not changed the text. The use of &quot;risk&quot; here captures both current and future in a concise way. Moreover, it's not just the &quot;food&quot; or &quot;occurrence&quot; of drought, but also the extent, severity, duration, etc. &quot;risk&quot; captures all of these elements.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144031</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>19</td>
<td>19</td>
<td>15</td>
<td>15</td>
<td>We have revised the text to reflect this suggestion.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144032</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>20</td>
<td>20</td>
<td>28</td>
<td>28</td>
<td>I'd suggest changing &quot;interaction...is to &quot;interactions...are&quot;</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144033</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>20</td>
<td>20</td>
<td>24</td>
<td>24</td>
<td>Good type of concluding sentence for each of the various points--indicate what can be done, give some hope and reason to act.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144034</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>20</td>
<td>20</td>
<td>18</td>
<td>18</td>
<td>It is not just &quot;risk of drought&quot; but &quot;Adoption and occurrence of drought--droughts are happening now, not just presenting a risk of occurrence.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144035</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>21</td>
<td>21</td>
<td>14</td>
<td>14</td>
<td>It is not just &quot;risk of drought&quot; but &quot;Adoption and occurrence of drought--droughts are happening now, not just presenting a risk of occurrence. We have added text on changes in the vulnerability of particular agricultural enterprises in regions. While the agricultural chapter discusses the higher vulnerability of rural communities due to limited infrastructure and services, neither the Agricultural chapter nor the applicable regional chapters address relative economic effects on individual farmers versus the larger sector.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144036</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>21</td>
<td>21</td>
<td>14</td>
<td>14</td>
<td>Are crop yields really going down? Is it not happening that various adaptation measures and technological improvements are keeping crop yields up? It is the case that it is going to be whether such efforts can keep up with climate change. When such changes have been occurring on local to variability and regional change, adaptation has been able to moderate and overcome adverse impacts, but with change going on everywhere, this is going to become increasingly difficult.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144037</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>21</td>
<td>21</td>
<td>15</td>
<td>15</td>
<td>Is it not the agricultural economy in the US really booming? What is threatened are the small farmers who are facing conditions that are making it impossible for them to make ends meet. The overall economy does well, but individual farmers suffer. I think this is what we come up with in the first national assessment--and it is a real distinction to make. When individual farmers tend to keep to their practices, they end up becoming too poor (through successive bad years) to have the resources to change to new practices, so they go broke and suffer and some newcomers come (perhaps for a big company) and takes over and starts up with different methods until they too get overcome by the changes. So, the economy does okay, but the individual farmers suffer.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144038</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>21</td>
<td>21</td>
<td>13</td>
<td>13</td>
<td>The text has been edited and now reads: &quot;Without aggressive reductions in global greenhouse gas emissions, transformative impacts on some ecosystems will occur. Some ecosystems, such as coral reef and sea ice ecosystems, are already experiencing transformational changes.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144039</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>21</td>
<td>21</td>
<td>17</td>
<td>18</td>
<td>I'd suggest changing &quot;to stop&quot; to &quot;to sustain and enhancing crop...&quot; more literal. I'd also suggest changing &quot;...to something like &quot;economic health&quot; or &quot;economic viability&quot; something to indicate this is about the well-being and economic strength of rural communities and not about individual health (of course, depression about the worsening situation may lead to opioid use and other physical health, but I don't think just is what is meant here).</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144040</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>21</td>
<td>21</td>
<td>20</td>
<td>20</td>
<td>It is not just &quot;risk of drought&quot; but &quot;Adoption and occurrence of drought--droughts are happening now, not just presenting a risk of occurrence.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144041</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>21</td>
<td>21</td>
<td>24</td>
<td>24</td>
<td>It is not just &quot;risk of drought&quot; but &quot;Adoption and occurrence of drought--droughts are happening now, not just presenting a risk of occurrence. We have added text on changes in the vulnerability of particular agricultural enterprises in regions. While the Agricultural chapter discusses the higher vulnerability of rural communities due to limited infrastructure and services, neither the Agriculture chapter nor the applicable regional chapters address relative economic effects on individual farmers versus the larger sector.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144042</td>
<td>ited Region</td>
<td>DBL. Report Findings</td>
<td>21</td>
<td>21</td>
<td>15</td>
<td>15</td>
<td>The change has been implemented.</td>
<td></td>
</tr>
</tbody>
</table>
| Michael  | MacCracken | 144043    |ited Region | DBL. Report Findings | 21 | 21 | 16 | 16 | "The existing text does not state that crop yields are growing downward. However, for greater clarity about future impacts this sentence has been edited to read "Climate change presents numerous challenges to sustaining and enhancing crop productivity, livestock health, and the economic health of rural communities."

The existing text does not state that crop yields are growing downward. However, for greater clarity about future impacts this sentence has been edited to read "Climate change presents numerous challenges to sustaining and enhancing crop productivity, livestock health, and the economic health of rural communities."
141651 First Name Kopp Last Name Ristroph Comment Type End Region DBL, Report Findings Page 22 Figure/Table 00b. Report Findings Start Line 24 End Line 29 Change "is expected to" to "are expected to"

141652 First Name Kopp Last Name Ristroph Comment Type End Region DBL, Report Findings Page 22 Figure/Table 00b. Report Findings Start Line 22 End Line 27 Needs a period after "tourism" - or maybe say "tourism and more." Then start a new sentence.

141655 First Name Kopp Last Name Ristroph Comment Type End Region DBL, Report Findings Page 22 Figure/Table 00b. Report Findings Start Line 21 End Line 26 This text has been removed and we have added a map on U.S. sea level rise projections.

141656 First Name Kopp Last Name Ristroph Comment Type End Region DBL, Report Findings Page 23 Figure/Table 00b. Report Findings Start Line 23 End Line 28 This text has been removed and we have added a map on U.S. sea level rise projections.

141657 First Name Kopp Last Name Ristroph Comment Type Whole Chapter DBL, Report Findings Page 00b. Report Findings Start Line 9 End Line 9 National security is mentioned in the "Interconnected Impacts Finding." There is also reference to DoD vulnerability assessment and adaptation activities in sections 3.1 and 4.1 of the Overview. No change.

141632 First Name Jon Last Name Barrett Comment Type End Region DBL, Report Findings Page 45 Figure/Table 00b. Report Findings Start Line 45 End Line 46 The sentence states we may expect 1 to 4 feet of sea level rise but does not provide the corresponding time references. For example "by 2100." This text has been removed and we have added a map on U.S. sea level rise projections.

141691 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 22 Figure/Table 00b. Report Findings Start Line 22 End Line 27 The sentence states we may expect 1 to 4 feet of sea level rise but does not provide the corresponding time references. For example "by 2100." This text has been removed and we have added a map on U.S. sea level rise projections.

141692 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 26 Figure/Table 00b. Report Findings Start Line 26 End Line 27 The sentence states we may expect 1 to 4 feet of sea level rise but does not provide the corresponding time references. For example "by 2100." This text has been removed and we have added a map on U.S. sea level rise projections.

141693 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 33 Figure/Table 00b. Report Findings Start Line 33 End Line 34 This text has been removed and we have added a map on U.S. sea level rise projections.

141694 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 34 Figure/Table 00b. Report Findings Start Line 34 End Line 35 This text has been removed and we have added a map on U.S. sea level rise projections.

141695 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 37 Figure/Table 00b. Report Findings Start Line 37 End Line 38 This text has been removed and we have added a map on U.S. sea level rise projections.

141696 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 38 Figure/Table 00b. Report Findings Start Line 38 End Line 38 This text has been removed and we have added a map on U.S. sea level rise projections.

141697 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 20 Figure/Table 00b. Report Findings Start Line 20 End Line 20 This text has been removed and we have added a map on U.S. sea level rise projections.

141698 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 14 Figure/Table 00b. Report Findings Start Line 14 End Line 15 This text has been removed and we have added a map on U.S. sea level rise projections.

141699 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 15 Figure/Table 00b. Report Findings Start Line 15 End Line 16 This text has been removed and we have added a map on U.S. sea level rise projections.

141711 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 20 Figure/Table 00b. Report Findings Start Line 20 End Line 20 This text has been removed and we have added a map on U.S. sea level rise projections.

141710 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 6 Figure/Table 00b. Report Findings Start Line 6 End Line 6 This text has been removed and we have added a map on U.S. sea level rise projections.

141701 First Name Robert Last Name Elizaveta Barrett Comment Type End Region DBL, Report Findings Page 25 Figure/Table 00b. Report Findings Start Line 25 End Line 26 This text has been removed and we have added a map on U.S. sea level rise projections.
methodology of the assessment is not as important as the messages of the assessment for the larger public. The call-out box described on this page does not need to be highlighted within the earlier pages of the overview, readability of this section. Simply breaking up the long sentences into shorter, complete sentences would increase the overall strength and of information presented, particularly the graphs. It would be better if this figure could be broken up by not common knowledge and "long lifetime" is a subjective number that could range from 6 months to centuries. confidence in models and climate science moved to earlier in the report, such as the first or second paragraph of the entire chapter, to set the stage for confidence in models and climate science. The phrase "climate models have proven remarkably accurate" is a strong, confident statement and should be moved to earlier in the report, such as the first or second paragraph of the entire chapter, to set the stage for confidence in models and climate science. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States. The extreme events listed here appear outdated given the intense hurricanes, fires, and winters of late 2017 and snowfall experienced in the northeastern and southeastern United States, and intense wildfires of Western United States.

The call-out box described on this page does not need to be highlighted within the earlier pages of the overview, where valuable space can be used to highlight the compelling messages included later in the chapter. This call-out box would be better towards the end of the chapter for people who have made it further into the text, as the methodology of the assessment is not as important as the messages of the assessment for the larger public.

The first sentence referenced has been deleted. This text has been added: "Where changes occur too quickly for species to adapt, local extinctions can happen.”
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
</table>
| There are 141986 long-term warming trends observed over the past century, and accelerated these last decades, can only be explained by the fact that 25-1 is a key finding in climate science: 30-2 the impacts of human activities on regional and local climate, and especially emissions of greenhouse gases and aerosols from burning fossil fuels and clearing 35-2 forests, have had an impact on the climate. In accordance with the physical principles of superposition, the range of natural variability becomes more and more negligible in the face of the contribution of human activity of negative flavour.

Dear colleague,

In this report, we have highlighted several key findings:

1. Human activities have significantly impacted the climate, leading to increased temperatures and altered weather patterns.
2. The long-term warming trend observed over the past century has accelerated, and this trend is likely to continue.
3. Human activities, particularly emissions of greenhouse gases, are the primary drivers of climate change.

We appreciate this feedback. Please let us know if you have any further comments or suggestions.

Best regards,

[Signature]
Allison
Crimmins
412089
White
Chapter
01. Overview / Executive Summary
Figure/Table/Number
Start Page
End Page
End Line
Comment

We appreciate the feedback and have made significant revisions to the Overview to reduce redundancy and focus on the main conclusions from this volume of the assessment, resulting in a more targeted summary with greater emphasis on the graphics from the underlying report.

As the underlying climate science is essential to understand what is driving the observed and projected changes, we have retained the climate science section to provide a summary of what is Volume I of the 4th National Climate Assessment - the Climate Science Special Report. That said, we have pared back the section and provide balance between: observations, attribution, and future projections. Section 4.1 (Future projections) has been combined with section 1.2 (Observations and attribution), and some climate science content represented in Chapter 2 has been removed.

We have completely rewrote the middle part of the Overview to pivot away from the "current risk" and "future risk" construct from the public comment draft to something that more closely mirrors the Report Findings.

Section 1.5 has been eliminated and content on sectoral interdependencies, multiple stressors, complex systems, and vulnerable populations has been integrated throughout the revised Section 1.3. A short box on "interconnected impacts" has been added.

Based on comments from the National Academies of Sciences, Engineering, and Medicine as well, the risk-framing box has been rewritten to more accessible language, and some of the more technical content referring to risk framing has been moved to the Front Matter.

We are referring to extreme heat and labor impacts that is redundant to text in the revised section 1.3 has been removed from the Response section.

The mitigation and adaptation sections have been rewritten to reduce redundancies.

Allison
Crimmins
412099
Text Region
01. Overview / Executive Summary
17 37 11 15
This is a good change in highlighting example of uncertainty. This implies that we just need to treat the worst, or adjust it, or make it better and then we'll have the "right" answer. This is not an appropriate analogy, but a dangerous one. Please see another example-we make decisions in our life under uncertainty all the time—deciding who to be friends with or marry, deciding what school to go to or what job to take, even who to vote for this watch is a representation of pressure, not uncertainty.

Allison
Crimmins
412100
Text Region
01. Overview / Executive Summary
17 39 12 14
This text box would be greatly strengthened by deleting everything from page 37 line 12 through page 38 line 21, as well as the best sentence on one subject: computer modeling, and don't confuse the reader with a lot of redundant information on uncertainty (and definitely not an inappropriate analogy of uncertainty). This information on uncertainty is repeated in a later text box in this same chapter. But the computer model paragraphs are well-written and stand on their own. And they are actually the best in the box.

Do not use these "upstream" and "downstream" terms. They may mean something to the USGCRP people who designed these two reports, but they mean nothing to the reader, and they are jargon-y distractions. Also note that much of the information on page 54 lines 10-29 is redundant to the front matter.

Allison
Crimmins
412101
Text Region
01. Overview / Executive Summary
12 02 9 9
This sentence says that frequency and severity of ALLEGED illnesses will increase. The authors may want to be more careful with their wording. It may not be that more people who never had allergies before now have allergies. Maybe, but maybe not that is still emerging science. It is more likely that people who already have allergies (and other respiratory issues) will experience symptoms. It is also curious to see the literature that the severity of those illnesses increases. I can see more people needing medication, or more people needing to go to the hospitals, especially, as allergen season lengthens or higher concentrations push someone over a tipping point. But I'm wondering if there is any scientific literature that measures how the severity of a person's allergy response has changed because of climate change.

This text has been removed.

Allison
Crimmins
412102
Text Region
01. Overview / Executive Summary
12 46 24 27
Why are there quantified values and economic dollar signs in the weather and climate section, but not in these three sentences?

This text has been removed.

We have removed this example and have added the example of a GPS-based phone application that estimates local time.

Allison
Crimmins
412103
Text Region
01. Overview / Executive Summary
14 09 1 11
Don't understand this call out box. It says it's about why risk framing is a useful tool for decision-makers, but then it doesn't explain that in the actual text. I don't know what this framing is, or how it is a tool, or how it is used, or how it is not a risk. It seems to me mostly an Troy for the NGA. The first paragraph could be cut out just faking out the NGA process. I'm not sure why that is in here. The paragraph on page 48 lines 23-34 seems completely incongruent—now we are suddenly talking about complex systems—how is that relevant at all? Telling me what "NGA insiders" is not helpful. Telling me what you thought when you considered this would be, but that is missing. Why would telling me there were case studies in this report help me understand the usefulness of risk-based frameworks (whatever that is)? This just seems like a lot of back-patting for the authors who are familiar with this jargon, but not a text box that actually describes something for the intended audience. Suggest deleting the text box. The paragraph on page 53 lines 23-25 does a better job explaining this than this entire text box, and it would be better to say it just once in this chapter, rather than both places.

We have retained this box based on other comments and input from review of the National Academies of Sciences, Engineering, and Medicine. However, the text that was in this box has been greatly simplified and expanded. We now know more about the NGA process have been removed. We have moved some of the more technical language from this box to the Front Matter, while other elements have been re-written and included in new boxes 1.2 - Evaluating Risks to Inform Decisions.

Allison
Crimmins
412104
Text Region
01. Overview / Executive Summary
24 52 12 12
Please do not use these "spatial" and "spatially" terms. They may mean something to the USGCRP people who designed these two reports, but they mean nothing to the reader, and they are jargon-y distractions. Also note that much of the information on page 54 lines 10-29 is redundant to the front matter.

This language has been removed.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allison</td>
<td>Crumina</td>
<td>142105</td>
<td>Whole Chapter</td>
<td>01. Overview / Executive Summary</td>
<td></td>
<td>31</td>
<td></td>
<td></td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>David</td>
<td>Peterson</td>
<td>142403</td>
<td>Whole Chapter</td>
<td>01. Overview / Executive Summary</td>
<td></td>
<td>1450</td>
<td></td>
<td></td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142347</td>
<td>Site Region</td>
<td>01. Overview / Executive Summary</td>
<td></td>
<td>24</td>
<td></td>
<td></td>
<td>95</td>
<td>96</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142498</td>
<td>Site Region</td>
<td>01. Overview / Executive Summary</td>
<td></td>
<td>24</td>
<td></td>
<td></td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142949</td>
<td>Whole Page</td>
<td>01. Overview / Executive Summary</td>
<td></td>
<td>29</td>
<td></td>
<td></td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142450</td>
<td>Figure</td>
<td>01. Overview / Executive Summary</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142451</td>
<td>Figure</td>
<td>01. Overview / Executive Summary</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>94</td>
<td>95</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142452</td>
<td>Figure</td>
<td>01. Overview / Executive Summary</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>121</td>
<td>122</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142453</td>
<td>Figure</td>
<td>01. Overview / Executive Summary</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>134</td>
<td>135</td>
</tr>
<tr>
<td>Ross</td>
<td>McKirdy</td>
<td>143109</td>
<td>Whole Page</td>
<td>01. Overview / Executive Summary</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>Ross</td>
<td>McKirdy</td>
<td>143109</td>
<td>Site Region</td>
<td>01. Overview / Executive Summary</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td>25</td>
<td>26</td>
</tr>
</tbody>
</table>

The use of natural factors cannot explain observed rapid changes. Yet a few pages earlier (p. 17 para 12) you said that natural factors cannot explain observed rapid changes. If you cannot explain the mechanisms and dimensions of natural variability, how can you say that it doesn’t account for recent changes? I’m not asserting that it does, I’m just reiterating the point that you keep making unqualified assertions about things you don’t actually know to be true. Your language needs to reflect the actual state of knowledge and a realistic assessment of your own uncertainty. The uncertainty in the climate’s multi-decadal response to past externally forced changes does not invalidate the conclusion that no known natural forcing factors could be responsible for the observed warming. In order for this to be so, you need to have addressed two problematic aspects: (1) the natural variability and (2) the climate’s response to such changes by order(s) of magnitude and, in some cases, have gotten the sign wrong. This conclusion is at odds with paleoclimate evidence. While this section has been significantly re-written, the fundamental conclusions have not changed.
You say: “It’s important to note that climate model projections are, broadly speaking, not designed to directly capture every annual or even decadal variation in a historical record. Rather, since “climate” is defined as the long-term (seasonal and longer term) climate systems - even on long time scales. The authors commented: “This implies that the current climate models are ill-equipped to produce observable climate system feedbacks (e.g., Flato et al. 2013). There is no better framework for understanding the future climate.”

Climate models have been extensively tested and evaluated (the reader is directed to Chapter 2 of the report, as well as Chapter 4 of NCA4 Volume I (Climate Science Special Report) for more detail on climate model performance and evaluation; the reader is directed to Chapter 2 and NCA4 Volume I - Climate Science Special Report (specifically Chapter 4.3). Figure 1.2 has been moved to Ch. 2 as it is more technically the desired level of the divergence.

You say: “Climate models have proven remarkably accurate in projecting and evaluating the climate change signal.”

You say: “You say this is the level GCMs work best at. They also did no better over larger and larger regional scales. The authors concluded that there is no basis for the claim that climate models are well-suited for long term predictions over large regions.”

First, you have assumed that the models are accurate representations of climate processes, which is an unsafe assumption. There is a large literature on climate model testing which you have completely ignored. A recent review is Bebbington, Reingewertz and Paldor (2016) “Testing the historical tracking of climate models’ projections: Observed versus modelled forecasting” (www.sciencedirect.com/science/article/pii/S003442571730283X). This paper points out that if a model’s match to target observations is genuine rather than spurious, hindcast errors must be statistically independent and exhibit a mean-reversion property. But the difference between climate model predictions of future temperature and the observed GISTEM values (from GISS) is in fact non-stationary and non-mean reverting. That paper also reviews related literature on this question from a variety of sources applying a variety of methods, with the recurring result that climate models fail to reproduce key statistical features of target observations, which means they are not suitable as forecasting tools. The implication is that you cannot boast about how good your models are when they have systematic problems reproducing essential properties of the target variables.

The same sort of decomposition is shown as in your Figure 1.2, except in more detail, showing vertical layers by latitude band. In most cases the observational layer was exactly the same as the model, and the CMIP5 only and combined model results are almost identical. Chapter 4.10 of the IPCC 5th report (AR5) states on page 8: “The scientific basis for the report is based on the best available science, including the most recent results from the Intergovernmental Panel on Climate Change (IPCC).”

You say: “Extreme weather events expose vulnerabilities and present similar hazards to those we can expect in a warmer world.”

You say: “You cannot claim that the colored lines are “observational” because they are not. Doing so conflates observational and model outcomes. Authors who do so have systematically underestimated the errors associated with model-generated outputs. You are confusing model-generated outputs with observations of the climate system.”

You say: “You are placing a great deal of weight on this diagram, which is a very weak form of argumentation. While it is a superficially persuasive picture, there are at least three problems with the argument.

First Name Last Name Comment ID Comment Type Chapter Figure/Table/Number Start Page End Page Start Line End Line Comment Response
Ross McKitrick 143111 First name / Executive Summary 01. Overview 10 21 3 16 It is misleading to say “no combination of natural factors is found in the observational record that would account for the current warming trend.” You are referring to Figure 1.2 which does not show observations (except for the 1930s) but rather model-generated outputs. You can claim that the model decomposes observed changes into such-and-such a way based on the way forcings are represented in the model and the way natural variability is represented. This decomposes the complex signals that greenhouse gases play such-and-such a role. But you should acknowledge that the validity of the decomposition rests on the assumed validity of the climate model. You cannot claim that the colored lines are “observational” because they are not. Doing so conflates observational and model outcomes.

Ross McKitrick 143112 First name / Executive Summary 11 32 1 27 Why does the red shading end 7 years before the black line? You say this is the level GCMs work best at. They also did no better over larger and larger regional scales. The authors concluded that there is no basis for the claim that climate models are well-suited for long term predictions over large regions. As well as Chapter 2 of this report and NCA4 Vol I (Climate Science Special Report) discuss the reasons why climate models have been extensively tested and evaluated (the reader is directed to Chapter 2 of the report, as well as Chapter 4 of NCA4 Volume I - Climate Science Special Report (specifically Chapter 4.3). Climate models have been extensively tested and evaluated (the reader is directed to Chapter 2 of the report, as well as Chapter 4 of NCA4 Volume I - Climate Science Special Report (specifically Chapter 4.3). Climate models have been extensively tested and evaluated (the reader is directed to Chapter 2 of the report, as well as Chapter 4 of NCA4 Volume I - Climate Science Special Report (specifically Chapter 4.3). The same sort of decomposition is shown as in your Figure 1.2, except in more detail, showing vertical layers by latitude band. In most cases the observational layer was exactly the same as the model, and the CMIP5 only and combined model results are almost identical. Chapter 4.10 of the IPCC 5th report (AR5) states on page 8: “The scientific basis for the report is based on the best available science, including the most recent results from the Intergovernmental Panel on Climate Change (IPCC).”

You say: “You cannot claim that the colored lines are “observational” because they are not. Doing so conflates observational and model outcomes. Authors who do so have systematically underestimated the errors associated with model-generated outputs. You are confusing model-generated outputs with observations of the climate system.”
After listing countless impacts (among for a moment that they seem to be twinned towards the high end, you conclude “Each of these avoided impacts represent domestic economic benefits of mitigation on the order of trillions of dollars per year.” No they don’t! Domestic mitigation and even global mitigation on a scale like the Kyoto and Paris treaties would not even tip the three part of the equation. There are no policy proposals on the table that would substantially change the rate of accumulation of GHGs in the atmosphere. You need to point out that your figures are, at best, “gross” benefits since you are not taking account of the costs of the policies necessary to achieve the mitigation. Rather are you discounting those benefits to the present, which is important since the impacts warned of in the 3rd NCA have unfolded for more than 30 years, and this will likely be true of your edition as well, meaning the effects of GHGs emissions won’t be incurred until a century or more down the road. Hence, the discounted gross benefits you describe are tiny and far in the future, and (to put them in perspective) are dwarfed many times over by recent annual variations in the US federal budget deficit, and stock market fluctuations.

Social Science Coordinating Committee 14.2755: Union of Concerned Scientists

The discussion of drivers of climate change in this section reflects contributions from natural science research (such as observations, modeling). The discussion can also consider to incorporate understanding of anthropogenic drivers of climate change from the social science perspectives. For example, the IPCC AR5 WGIII has a chapter on drivers of climate change (Barno et al. 2014). More recently, the USGCRP Social Science Coordinating Committee has coordinated three White Paper Social Science Perspectives on Climate Change which includes one paper on “Drivers of and Responses to Climate Change” (USGCRP 2018 - upcoming). The paper discusses the underlying drivers of climate change, including demography, economy, politics, social stratification and inequality, technology, infrastructure, and land use, and how these factors interact dynamically over space and time.

Maya Ndolf 14.2426: Union of Concerned Scientists

The opening paragraph of the introduction fails to appropriately convey the magnitude of current and proposed damage caused by climate change, and fails to convey an appropriate sense of urgency and seriousness about the need for action. The first sentence “Earth’s climate is now changing faster than at any point in human history” uses the neutral word “change” and fails to attribute this change to its primary cause: greenhouse gas pollution from the burning of fossil fuels. The opening sentence must make clear that the primary cause of climate change is human activities, primarily burning oil, gas, and coal, rather than a vague statement. Similarly, the second sentence uses the neutral words “impacts” and “effect” rather than “damage” or “harm” or “negative impacts.” It is also unclear what “Americans are responding” means. Many Americans are limited in their ability to “respond” or cope with climate change - especially the elderly, young, sick, poor, and some communities of color. The final sentence of the opening paragraph implies that Americans are handling climate change and that everything will be okay at current response levels: “Americans are responding to change in ways that can reduce climate-related risks, bolster resilience, and improve livelihoods.” Nothing could be further from the truth. Although some states and local communities are undertaking mitigation and adaptation actions, current US climate policy is completely inadequate to avoid dangerous levels of atmospheric GHG concentrations and associated dangerous impacts from warming, extreme weather events, sea level rise, ocean acidification, species extinction, glacier/ice sheet/sea ice loss and the like. The US must take much stronger, bold, and urgent action to reduce GHG pollution to avoid unacceptable damage, and this message should be clear from the very first paragraph onward. We strongly recommend that you change the opening paragraph so that it accurately represents the current state of climate change damage and risks. For example: “Earth’s climate is now changing faster than at any point in human history, and the primary cause is greenhouse gas pollution created by burning oil, coal, and natural gas. Negative impacts of global climate change are underway across the United States and are disrupting people’s lives, their communities, natural systems, and the economy...”

Union of Concerned Scientists 14.2972: Union of Concerned Scientists

It would be helpful if the “Call Out Box” to further emphasize that through the public comment process, the NCA provides an opportunity for the entire American public to weigh-in. It would be helpful in the “Call Out Box” to further emphasize that through the public comment process, the NCA provides a platform for diverse perspectives to engage in the assessment, and in light of the evidence base and the points raised by the diverse reviewers, provides the scientific consensus on the topics explored in the report. The NCA provides an opportunity for the entire American public to weigh-in.

Union of Concerned Scientists 14.2973: Union of Concerned Scientists

We have undertook a large rewrite of this section, which has resulted in this specific text being deleted.

Union of Concerned Scientists 14.2975: Union of Concerned Scientists

We have reviewed the first sentence to reflect the fact that the obtained changes are being driven primarily by human activities. We did not revise the second sentence because - as the assessment shows - not all impacts in the US are negative. We have also revised the final sentence to reflect the conclusion that while Americans are responding, much of what we care about is still at serious risk without additional action.

Union of Concerned Scientists 14.2978: Union of Concerned Scientists

We have included the following text in the revised Section 1.2: “Greenhouse gas emissions from human activities are the only factors that can account for the observed warming over the last century; there are no conceivable alternative human or natural explanations supported by the observational evidence. Without human activities, the influence of natural factors alone would actually have had a slight cooling effect on global climate over the last fifty years.”

Union of Concerned Scientists 14.2980: Union of Concerned Scientists

The text has been removed.

Union of Concerned Scientists 14.2981: Union of Concerned Scientists

Any links to benefits to NIP should also be mentioned here as well.

First Name Last Name Comment ID Comment Type Chapter Figure/Table Number Start Page End Page Start Line End Line Comment Response

Karin First Name 14.2155: Union of Concerned Scientists 01. Overview/Executive Summary 10 50 7 18 After listing countless impacts (among for a moment that they seem to be twinned towards the high end, you conclude “Each of these avoided impacts represent domestic economic benefits of mitigation on the order of trillions of dollars per year.” No they don’t! Domestic mitigation and even global mitigation on a scale like the Kyoto and Paris treaties would not even tip the three part of the equation. There are no policy proposals on the table that would substantially change the rate of accumulation of GHGs in the atmosphere. You need to point out that your figures are, at best, “gross” benefits since you are not taking account of the costs of the policies necessary to achieve the mitigation. Rather are you discounting those benefits to the present, which is important since the impacts warned of in the 3rd NCA have unfolded for more than 30 years, and this will likely be true of your edition as well, meaning the effects of GHGs emissions won’t be incurred until a century or more down the road. Hence, the discounted gross benefits you describe are tiny and far in the future, and (to put them in perspective) are dwarfed many times over by recent annual variations in the US federal budget deficit, and stock market fluctuations.

Social Science Coordinating Committee 14.2755: Union of Concerned Scientists

The discussion of drivers of climate change in this section reflects contributions from natural science research (such as observations, modeling). The discussion can also consider to incorporate understanding of anthropogenic drivers of climate change from the social science perspectives. For example, the IPCC AR5 WGIII has a chapter on drivers of climate change (Barno et al. 2014). More recently, the USGCRP Social Science Coordinating Committee has coordinated three White Paper Social Science Perspectives on Climate Change which includes one paper on “Drivers of and Responses to Climate Change” (USGCRP 2018 - upcoming). The paper discusses the underlying drivers of climate change, including demography, economy, politics, social stratification and inequality, technology, infrastructure, and land use, and how these factors interact dynamically over space and time.

Maya Ndolf 14.2426: Union of Concerned Scientists

The opening paragraph of the introduction fails to appropriately convey the magnitude of current and proposed damage caused by climate change, and fails to convey an appropriate sense of urgency and seriousness about the need for action. The first sentence “Earth’s climate is now changing faster than at any point in human history” uses the neutral word “change” and fails to attribute this change to its primary cause: greenhouse gas pollution from the burning of fossil fuels. The opening sentence must make clear that the primary cause of climate change is human activities, primarily burning oil, gas, and coal, rather than a vague statement. Similarly, the second sentence uses the neutral words “impacts” and “effect” rather than “damage” or “harm” or “negative impacts.” It is also unclear what “Americans are responding” means. Many Americans are limited in their ability to “respond” or cope with climate change - especially the elderly, young, sick, poor, and some communities of color. The final sentence of the opening paragraph implies that Americans are handling climate change and that everything will be okay at current response levels: “Americans are responding to change in ways that can reduce climate-related risks, bolster resilience, and improve livelihoods.” Nothing could be further from the truth. Although some states and local communities are undertaking mitigation and adaptation actions, current US climate policy is completely inadequate to avoid dangerous levels of atmospheric GHG concentrations and associated dangerous impacts from warming, extreme weather events, sea level rise, ocean acidification, species extinction, glacier/ice sheet/sea ice loss and the like. The US must take much stronger, bold, and urgent action to reduce GHG pollution to avoid unacceptable damage, and this message should be clear from the very first paragraph onward. We strongly recommend that you change the opening paragraph so that it accurately represents the current state of climate change damage and risks. For example: “Earth’s climate is now changing faster than at any point in human history, and the primary cause is greenhouse gas pollution created by burning oil, coal, and natural gas. Negative impacts of global climate change are underway across the United States and are disrupting people’s lives, their communities, natural systems, and the economy...”

Union of Concerned Scientists 14.2972: Union of Concerned Scientists

It would be helpful if the “Call Out Box” to further emphasize that through the public comment process, the NCA provides a platform for diverse perspectives to engage in the assessment, and in light of the evidence base and the points raised by the diverse reviewers, provides the scientific consensus on the topics explored in the report. The NCA provides an opportunity for the entire American public to weigh-in.

Union of Concerned Scientists 14.2973: Union of Concerned Scientists

We have moved much of the content from this box to the Front Matter and Process Appendix. The specific suggestion made in this comment has been incorporated into the Process Appendix.

Union of Concerned Scientists 14.2975: Union of Concerned Scientists

We have undertaken a large rewrite of this section, which has resulted in this specific text being deleted. However, we have made great efforts to present the most up-to-date data in Fig 1.1.

Union of Concerned Scientists 14.2978: Union of Concerned Scientists

We have included the following text in the revised Section 1.2: “Greenhouse gas emissions from human activities are the only factors that can account for the observed warming over the last century; there are no conceivable alternative human or natural explanations supported by the observational evidence. Without human activities, the influence of natural factors alone would actually have had a slight cooling effect on global climate over the last fifty years.”

Union of Concerned Scientists 14.2980: Union of Concerned Scientists

This text has been removed.

Union of Concerned Scientists 14.2981: Union of Concerned Scientists

Any links to benefits to NIP should also be mentioned here as well.
Michael MacCracken 144079 Med Region 01. Overview/Executive Summary 15 35 14
A phrase very much like "no detectable change", which really means we don’t have evidence yet that gives us 90% confidence that a change has occurred, was at the root of the extensive controversy over the statement in the IPCC Second Assessment Report regarding detection of a discernible human influence. Basically, the phrase is obscuring how there has been a choice (traditional in the statistical and physical science community, but not generally in the public or government decision-making arena). This "choice" is really a value-based decision (indicating that there is a prediction of scientists in making decisions not to being that needs to be made apparent to the public/made. To really convey what is understood, I’d suggest re-wording the sentence to say: "Because the observational record is limited to only ~100 years and because the occurrence of drought is irregular, high statistical confidence that droughts are becoming more likely has not yet been possible to achieve, but there is strong evidence that the higher temperatures resulting from human influences are leading to deeper surface moisture deficits, which is a closely related indicator of drought-like conditions."
While the intent behind this comment has merit, the proposed revision to the text is quite lengthy and adds a level of technical detail that is not consistent with the rest of the Overview. We have retained the text as is and direct readers interested in more detail to see Chapter 8 of NCA4, Vol 1 “The Climate Science Special Report” (https://science2017.globalchange.gov/chapter/8/) which cover "Droughts, Floods, and Wildfires."
Michael MacCracken 144080 Med Region 01. Overview/Executive Summary 15 35 17 17 I’d suggest changing “around” to “depending on”
Michael MacCracken 144081 Med Region 01. Overview/Executive Summary 15 35 10 10 I’d suggest changing this to plural, or “interactions etc.” as there is a bit more than one type of interaction.
Michael MacCracken 144082 Med Region 01. Overview/Executive Summary 36 36 26 26 Rather than “about 99%”, which is too fine a precision, it would be saying “very 99%”
Michael MacCracken 144083 Med Region 01. Overview/Executive Summary 17 37 31 31 It might be useful in this paragraph to make the point that the leaf-scaled distribution changes (no sea-level rise) here this leads to a disproportionate increase in the likelihood of events that exceeded a particular recent level, so a quite large increase in the likelihood of flooding even if the increase in sea level is not that large.
While the intent behind this comment has merit, the proposed suggestion would have required a somewhat lengthy additional text and would provide a level of technical detail not consistent with the rest of the Overview. We have retained the text as is and direct readers interested in this topic to Chapter 12 of the NCA4 Vol. 1, Climate Science Special Report (https://science2017.globalchange.gov/chapter/12/) “Sea Level Rise.”
Michael MacCracken 144084 Med Region 01. Overview/Executive Summary 17 37 35 I think this example of wet-seasons is a better one—wet-seasons are generally better, even mechanical ones. If these occur 10% or even know what such a watch is. In many cases, the example really indicates a bias, not really uncertainty. How about using a GPS travel-time estimate, where can be more or less, depending on conditions, etc.
We have removed this example and have added the example of a GPS-based phone application that estimates travel time.
Michael MacCracken 144085 Med Region 01. Overview/Executive Summary 39 39 3 3 I think it would be useful if the models have proved accurate in looking at decades to multi-decadal shifts and changes in response to changes in climate forcing. They also show skill in predicting the weather out to a week or so to the very detailed evolution of the weather. They do not show skill in predicting seasonal to internal variability of natural cycles that are related to such aspects as ENSO time-events, but do show some skill in predicting the system response on their time scales in response to major volcanic eruptions.
This text has been added to the projections section in the rewritten 1.2: “Climate models representing our understanding of historical and current climate conditions are often used to project how our world will change under future conditions (see box 2.7). "Climate" is defined as weather conditions over multiple decades, and climate model projections are generally not designed to capture annual or even decadal variability in climate conditions. Instead, climate model projections are intended to capture long term changes, such as how the climate system will respond to greenhouse gas levels over centuries. Scientists test climate models by comparing them to current observations and historical changes. Confidence in these models is based, in part, on how well they reproduce these observed changes. Climate models have proven remarkably accurate in simulating the climate change we have experienced to date, particularly in the past 60 years or so when we have greater confidence in observations (see CSR 4.1.6). The observed signals of a changing climate continue to become stronger and clearer over time, giving scientists increased confidence in their findings even since the Third National Climate Assessment was released in 2014.”
Michael MacCracken 144086 Med Region 01. Overview/Executive Summary 39 39 17 17 It’s not the long lifetime of a CO2 molecule in the atmosphere that is the problem, which is how some will read this sentence. What is long-living is the perturbation to the long-term atmospheric concentration because, while air-sea and air-air processes exchange a lot of carbon among the active reservoirs, the processes that ultimately move the injected CO2 to the ocean sediments and long-term storage in carbon held long-term in the ground are very slow compared to the rate of CO2 injection.
Text clarifying the relationship between CO2 emissions, CO2 atmospheric residence time, and natural CO2 removal processes has been added.
Michael MacCracken 144087 Med Region 01. Overview/Executive Summary 39 39 26 26 I’d urge also allowing the amount of warming in Celsius.
This is the U.S. National Climate Assessment and Fahrenheit is the standard unit for temperature in the U.S. I use Fahrenheit as the default temperature metric throughout this report. In some instances (i.e., where relevant for policy making such as by invoking commonly-cited international goals, like 2 deg C), we do use Celsius.
Michael MacCracken 144088 Med Region 01. Overview/Executive Summary 39 39 32 32 As I have noted in other comments, I think using these scenario names is too "inside the Beltway," and would prefer a more straightforward description of what the scenarios imply, i.e., for RCP3 and for RCP4, and then maybe RCP5 (possibly for RCP7). Higher anchors are just not helpful, and it is not clear what technology and policy might allow one to do.
We had extensive internal discussions over how best to name the RCPs to make a parameter that would provide sufficient context to the reader, while making sure the information was clear. Calling any of them something pegged to a particular technology pathway (e.g., “Fossil Fuel forever” or “Fossil Fuel Healthcare”) would be misleading as these RCPs could result from scenarios that are completely independent of future FF use (i.e., if carbon-dioxide removal technologies were to be come widespread, for example). As a result, we have retained “higher scenario” for RCP5 and “lower scenario” for RCP3.5 and direct the reader to the Front Matter and Appendix 3 (Data Tools and Scenario Products) for additional information.
Michael MacCracken 144089 Med Region 01. Overview/Executive Summary 40 40 1 2 This is the case for the temperature in the result of an overly simple analysis (appropriately using only GWP-100) and not accounting separately for the radiative forcing of methane and other short-lived species that tend not to persist more than a decade or two. IT IS IMPORTANT TO MENTION THAT THIS RESULT IS DUE TO OVERSIMPLIFICATION OF THE ANALYSIS.
We have revised the text to acknowledge the role that short-lived species such as methane, carbonyl in driving near-term temperature reductions through heavy mitigation of these substances. However, it remains fundamentally true that we are locked in to decades of additional warming even if all GHGs (short-lived and otherwise) were to go to zero tomorrow given the long-lifetime of CO2.
Michael MacCracken 144090 Med Region 01. Overview/Executive Summary 40 40 3 3 Why here use a separate baseline period? This gives a quite misleading (and different) message about what the impact of warming is that of concern.
This sentence has been removed.
Michael MacCracken 144091 Med Region 01. Overview/Executive Summary 40 40 4 4 Is not just “not done if we are to focus much of the attention on limiting methane emissions, etc.
This sentence has been edited to read: The effects of potential carbon dioxide emissions reductions on global temperature became evident around 2000, when temperature...
Michael MacCracken 144092 Med Region 01. Overview/Executive Summary 40 40 10 I think it is really important to explain that cutting emissions of short-lived species can significantly change this near-term aggressive cutting of emissions of short-lived species can cut the projected warming from 2030 to 2050 in half if long and short-lived species are treated separately.
This addressing emissions of short-lived species has been added.
Michael MacCracken 144093 Med Region 01. Overview/Executive Summary 45 45 9 9 The sentence does not give a time when the rise might reach 4-6 feet. It is 2100, this needs to be said.
The text has been revised and we have added a map on U.S. sea level rise projections.
Michael MacCracken 144094 Med Region 01. Overview/Executive Summary 49 49 15 15 It’s “mitigation” reduction of emissions, and/or removal of concentrations as indicated here. If the latter, then this means that mitigation would include all forms of carbon dioxide removal, including planting more forests, fertilizing the oceans, scrubbing CO2 from marine ocean. Is this the choice? If so, the wording here needs to be changed.
This consistent with the Mitigation chapter (Chapter 20) as well as the USGCRP Glossary (globalchange.gov/glossary), we have clarified the text as it now reads: “... in terms of mitigation to reduce emissions of greenhouse gases from the atmosphere and adaptation...”
Michael MacCracken 144095 Med Region 01. Overview/Executive Summary 50 50 10 10 I’d suggest changing “concludes” to “indicates”
We have revised the text to reflect this proposed change.

the graphs in many of the tables are too small and various differences in color will be difficult for those with color blindness to distinguish.

The set-up of this table, in particular, contains too much information in too small a space. This table is also referenced several pages past this point, which reduces the effectiveness of the information. The full analysis of the importance of the information in these graphs should immediately follow the graphs in order for the audience to fully grasp the concepts presented.

The information in the graphs is incredibly important and interesting. Making this information accessible to the audience will greatly improve the likelihood that they will continue on in their active comprehension of the information.  The information in the graphs is incredibly important and interesting. Making this information accessible to the audience will greatly improve the likelihood that they will continue on in their active comprehension of the information.

A reference to Bakker et al. (2016) reference. I also suggest to add text describing the important findings from Bakker et al. (2016) such as...meltwater fluxes from the Greenland ice sheet is Bakker et al. (2016), however, comes to a similar conclusion.

A suggestion for a follow-up after the assessment is published; track the research that is published following the assessment. This would be useful especially for the long-term readers of the research.

The information in the graphs is incredibly important and interesting. Making this information accessible to the audience will greatly improve the likelihood that they will continue on in their active comprehension of the information.

The beginning section begins with a synopses of the status and extent of climate change. These facts are not irrelevant and should most definitely be included in the Executive Summary. However, the beginning section begins with a statement that is not relevant to the main conclusions and recommendations of the report.

To human health and safety. The tone of the overview gives the impression that this is one of the primary reasons for national and international concern and action. However, the beginning section begins with a statement that is not relevant to the main conclusions and recommendations of the report.

The figures have been moved into a full 2-page spread to be more accessible and more clearly illustrate how the indicators fit together.

It's not clear where this comment is intended to be directed at the Overview as the cited page and the numbers do not address "two main advances in this NCA." That said, we have built upon the strong convoy of "vulnerable populations" presented in NCAs and have made a concerted effort to be re-iterate the Overview to integrate equity / vulnerable population considerations throughout the text.

We have completely re-visited the middle sections of the Overview based on this and other comments, and included a number of new graphics, as well. The Overview now provides an introduction, a summary of climate science (as presented in NCA Vol. I – Climate Science Special Report) as observations, attribution, and implications before moving to a more societally-focused middle section that now mirrors the human-focused Report Findings before concluding with the sections of Responses (i.e., Adaptation and Mitigation). This structure more clearly mirrors the assessment as a whole and responds to this comment's call for greater clarity in purpose and redundancy.
Comment: This entire Message states a clearly false claim. The scientific literature is full of discussions of possible natural causes for the observed changes. Moreover, there are numerous studies that suggest that these changes are well within the range of natural variability. In fact at least half of the temperature increase since 1951 was caused by human influence on climate (high confidence). The likely contributions of natural forcing and internal variability to global temperature change over the last century, and we find no convincing evidence for any credible natural explanations for this amount of warming; instead, the evidence maximizes the "quality, objectivity, utility, and integrity of information disseminated by the agency." This text probably violates the Information Quality Act requirement that federal agencies ensure and maximize the "quality, objectivity, utility, and integrity of information disseminated by the agency." This text probably violates the Information Quality Act requirement that federal agencies ensure and maximize the "quality, objectivity, utility, and integrity of information disseminated by the agency." This text probably violates the Information Quality Act requirement that federal agencies ensure and maximize the "quality, objectivity, utility, and integrity of information disseminated by the agency." This text probably violates the Information Quality Act requirement that federal agencies ensure and maximize the "quality, objectivity, utility, and integrity of information disseminated by the agency." This text probably violates the Information Quality Act requirement that federal agencies ensure and maximize the "quality, objectivity, utility, and integrity of information disseminated by the agency."
Comment: This text falsely asserts speculative computer projections as though they were established physical facts. That human
issued warming exists and will continue in this extreme fashion has yet to be determined and is increasingly unlikely. Converting ocean warming to human emissions is false speculation at this
point.

This statement is inconsistent with the findings of NOAA Volume 1 as summarized in Chapters 1 through 4. The
referenced key Message represents the scientific understanding of climate as summarized, and grounded in,
the peer-reviewed literature found in NOAA Volume 1 which meets the requirements of the Information
Quality Act. The text in this Key Message is a direct quotation from that document, which has been approved
and was published in November 2017. We refer the reviewer to Volume 1, in particular Chapter 4, for more information
on the scientific basis for this statement, including relevant citations.

Comment: The entire Message falsely asserts an established physical claim. That human
issued warming exists and will continue in this extreme fashion has yet to be determined and is increasingly unlikely. Converting ocean warming to human emissions is false speculation at this
point.

This statement is inconsistent with the findings of NOAA Volume 1 as summarized in Chapters 1 through 4. The
referenced key Message represents the scientific understanding of climate as summarized, and grounded in,
the peer-reviewed literature found in NOAA Volume 1 which meets the requirements of the Information
Quality Act. The text in this Key Message is a direct quotation from that document, which has been approved
and was published in November 2017. We refer the reviewer to Volume 1, in particular Chapter 4, for more information
on the scientific basis for this statement, including relevant citations.

Comment: The entire Message falsely asserts an established physical claim. That human
issued warming exists and will continue in this extreme fashion has yet to be determined and is increasingly unlikely. Converting ocean warming to human emissions is false speculation at this
point.

This statement is inconsistent with the findings of NOAA Volume 1 as summarized in Chapters 1 through 4. The
referenced key Message represents the scientific understanding of climate as summarized, and grounded in,
the peer-reviewed literature found in NOAA Volume 1 which meets the requirements of the Information
Quality Act. The text in this Key Message is a direct quotation from that document, which has been approved
and was published in November 2017. We refer the reviewer to Volume 1, in particular Chapter 4, for more information
on the scientific basis for this statement, including relevant citations.
The present text says this:

- Additional increases in annual average temperature of about 2.5°F (1.4°C) are expected over the next few decades regardless of future emissions, and increases ranging from 3°F to 4°F (1.6°C to 2.2°C) are expected by the end of the century, depending on whether the world follows a higher or lower future scenario, with proportionally greater changes in high-temperature extremes.

- Comment: These supposed "expectations" falsely assert speculative computer projections as though they were established physical facts, which they are not. These projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have these negative impacts has yet to be determined and appears increasingly unlikely.

Assertions that global climate models are not useful or adequate for making climate projections at appropriate spatial scales do not accurately represent the scientific understanding of climate change or the assessment of the peer-reviewed literature as presented in NCA4 Vol. 1, NCA4 Vol. 3, which provides the underlying scientific basis for the impacts analyses in Vol. 2, addresses observations of past trends in climate, including severe weather events, the ability of global climate models to reproduce those trends, and the projections of future changes in climate and the models used to make those projections.

On models in general, it states: "Confidence in the usefulness of the future projections generated by global climate models is based on multiple factors. These include the fundamental nature of the physical processes they represent, such as radiative transfer or geophysical fluid dynamics, which can be tested directly against measurements or theoretical calculations to demonstrate that model approximations are valid. They also include the vast body of literature dedicated to evaluating and assessing model abilities to simulate observed features of the earth system, including large scale modes of natural variability, and to reproduce their net response to external forcing that captures the interaction of many processes which produce observable climate system feedbacks (e.g., Faloon et al. 2013)." (Chapter 4)

Regarding the specific performance of global climate models in reproducing observed trends, on extreme precipitation, for example, Vol. 1 concludes: "The frequency and intensity of extreme heat and heavy precipitation events are increasing in most continental regions of the world (very high confidence). These trends are consistent with expected physical responses to a warming climate. Climate model studies are also consistent with these trends, although models tend to underpredict the observed trends, especially for the increase in extreme precipitation events (very high confidence for temperature, high confidence for extreme precipitation)." (Chapter 1)

And over longer time-scales, Vol. 1 concludes that: "While climate models incorporate important climate processes that can be well quantified, they do not include all of the processes that can contribute to feedbacks, compound extreme events, and abrupt and/or irreversible changes. For this reason, future changes outside the time periods analyzed in these projections should be assessed with due caution." (Chapter 1)
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
</table>
| Christen | Armstrong | 241032     | Text Region  | 02: Our Changing Climate | 10         | 14      | 2         | 7       | Present text:  

8. Artic-wide glacial and sea ice loss is expected to continue; by mid-century, it is very likely that the Artic will nearly free of sea ice in summer. Permafrost is expected to continue to thaw over the coming century as well, and the carbon and methane released will have the potential to amplify human-induced warming, possibly significantly.

Comment: These supposed "expectations" likely assert speculative computer projections as though they were established physical facts, which they are not. These projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have these negative impacts has yet to be determined and appears increasingly unlikely. |

 assertions that global climate models are not useful or adequate for making climate projections at appropriate spatial scales do not accurately represent the scientific understanding of climate change or the assessment of the peer-reviewed literature as presented in NCA4 Vol. I. NCA4 Vol. I, which provides the underlying scientific basis for the impacts analyses in Vol. 2, addresses observations of past trends in climate, including severe weather events, the ability of global climate models to reproduce those trends, and the projections of future changes in climate and the models used to make those projections. |

| David | dePillis | 211333     | Text Region  | 02: Our Changing Climate | 11         | 15      | 2         | 8       | Present text:  

26. Key Message B: Human-induced change is affecting atmospheric dynamics and contributing to climate processes that can be well quantified, they do not include all of the processes that can contribute to feedbacks, compound extreme events, and abrupt and/or irreversible changes. For this reason, future changes outside the range projected by climate models cannot be ruled out (very high confidence). Moreover, the systematic review of the peer-reviewed literature, which NCA has clearly chosen to ignore. This test probably violates the information Quality Act requirement that federal agencies ensure the "quality, objectivity, utility, and integrity of information disseminated by the agency." These controversial claims exhibit neither quality, objectivity, utility or integrity. To begin with there is neither objectivity nor integrity. As a result there is no quality or utility.

Assertions that global climate models are not useful or adequate for making climate projections at appropriate spatial scales do not accurately represent the scientific understanding of climate change or the assessment of the peer-reviewed literature as presented in NCA4 Vol. I. NCA4 Vol. I, which provides the underlying scientific basis for the impacts analyses in Vol. 2, addresses observations of past trends in climate, including severe weather events, the ability of global climate models to reproduce those trends, and the projections of future changes in climate and the models used to make those projections. |

11. From thawing permafrost has potential to amplify human-induced warming, possibly significantly. Climate model studies are also consistent with these trends, although models tend to underestimate the observed trends, especially for the increase in extreme precipitation events (very high confidence for temperature, high confidence for extreme precipitation). |

Regarding the specific performance of global climate models in reproducing observed trends, on extreme precipitation, for example, Vol. I concludes: "The frequency and intensity of extreme heat and heavy precipitation events are increasing in most continental regions of the world (very high confidence). These trends are consistent with expected physical responses to a warming climate. Climate model studies are also consistent with these trends, although models tend to underestimate the observed trends, especially for the increase in extreme precipitation events (very high confidence for temperature, high confidence for extreme precipitation)." |

And over longer time scales, Vol. I concludes that: "While climate models incorporate important climate processes that can be well quantified, they do not include all of the processes that can contribute to feedbacks, compound extreme events, and abrupt and/or irreversible changes. For this reason, future changes outside the |
Climate 02. Our Changing Climate

Vuuren et al. (2011, doi:10.1007/s10584-011-0152-3) if/how the 1.5/2 C targets compare to the RCPs. This is a critical piece of information for decisionmakers. Given this paragraph begins with "Which scenario is more likely?" consider referring to specific scenarios in the subsequent text, something like "...the higher future scenarios (RCP+6 or RCP+8.5)...". In particular explain why the +2.6 scenario is "lower" than the +2.6 scenario.

Quere et al. (in review, doi:10.5194/essd-2017-123) and Peters et al. (2017, doi:10.1038/s41558-017-0013-9). "lower" than the +2.6 scenario.

Fahreinheit is written as 0.65 degree Celsius.

Just a minor observation.

It is far more likely that climate change will be beneficial.
MELTING SEA ICE AND ITS GENERAL EFFECTS

This chapter discusses the effects of climate change on Arctic sea ice and the potential consequences for the United States, focusing on the role of the Arctic Ocean and the surrounding regions. It highlights the importance of understanding the factors that contribute to the melting of sea ice and the implications of these changes for coastal communities, ecosystems, and the economy.

Chapter 2: Our Changing Climate

1. The mandate of NCA4 Volume 1 and NCA4 Volume 2 Chapter 2 is to describe changes to the physical climate system at both the relevant global and the national scales, recognizing that global change affects the United States. This chapter fulfills that mandate.

2. Chapter 2 has been specifically organized to present global changes first, then national ones.

3. Each section combines observations with future projections for the same variable, removing the organization of NCA4 Volume 1. The reviewer is directed to NCA4 Volume 1 for a clear delineation of what is new relative to NCA4 Volume 1 Chapter 14 for more information.

4. The terminology used in this box is that of the scientific community and the references to global emissions are relevant because these are what determine climate: not those of the US alone. The reviewer is directed to NCA4 Volume 1 Chapter 14 for more information.

5. We appreciate the reviewer’s opinion but the title of the chapter cannot be changed at this time.

ANKA Moore

Chapter 2: Our Changing Climate

The chapter was very interesting, since it describes how much humans are really contributing to climate change. Without the direct mention of humans, the chapter becomes very dry and loses its relevance. Thank you for the kind comment.

Jeff Bakus

Chapter 2: Our Changing Climate

The jet stream is mentioned for the first time in this chapter and referenced several times elsewhere, but a sufficient explanation may be lacking. Respectfully ask consideration of adding language to make the references more clear. (The warming of the Arctic could contribute to the weakness of the polar jet stream, which has great impact on the rest of the world.) It has been dubbed, Arctic Amplification and (2) the Jet Stream. Thus, the Jet Stream has responded to this arctic warming, the strength of the stream being influenced by the magnitude of the temperature gradient (pre-and post-industrial Revolution), potentially weakening it, as well as causing it to deviate.

We appreciate the comment. In NCA4 Volume 1, on which this chapter is based, we used a low confidence statement: “Polar jet stream warming involves a weakening of the polar jet stream (which is important to our climate system) due to increased sea ice in the Arctic.” This wording is confusing. Does it mean that in one specific future late summer the Arctic will be free of sea ice? Or, does it mean that over the next few decades the Arctic will no longer have any sea ice, and then in the winter and colder months ice will form again? Is there any significance that the water will be saltier than fresh water? Clarification of this point would be very helpful in concluding Key Message 7.

Regarding their comments on sea ice (which is within the purview of this chapter), the below Key Message 7 has been expanded to explain that the “ice-free” threshold would be crossed in late summer; that the metric is a measurement of likelihood of the threshold being crossed for the first time in 25 million years; and that sea ice will continue to form each winter. Clarification was added regarding how loss of sea ice affects sea upwelling and distribution in the ocean, further enhancing sea ice loss in subsequent years. Note that the fact that the loss of sea ice is freezing simply lowers the freezing temperature, we do not consider this of sufficient significance to point out. Other chapters (Chapter 9: Oceans and Marine Resources and Ch. 26: Alaska) discuss in more detail the impacts of sea ice loss to coastal communities and ecosystems.

Response
Chapter 2: Our Changing Climate

There is voluminous research discussing the global warming, and particularly in the 21st century, the 
set of 20 to 30 years after the previous strong El Niño 1998-2014, only ended after the most recent 
upturn in global temperature in 2015-2016. While the background trend is clearly warming, the 2016- 

temperature anomalies are consistent with the strong El Niño over the 0.2-degrees Celsius, similar but larger than the 0.15°C jump in 2015/2016 over 1900-1910 years ago. This 
level 23 are not entirely representative of the ongoing research into the North Atlantic and the 

inclusion of the LeBauer et al. (2016) reference suggests this document is hedging the climate 

response of the North Atlantic SST. The warming for short-term global warming variability, 

Additionally, the Kiehl et al. (2015) paper includes arguably questionable data methodology choices and a 

better reference exists using the ERSSTv5 (Huang et al. 2017). These definitions are needlessly imprecise; 

“from a few years to a decade or so” and should replace the exact information about the length of previous 

North Atlantic SST warming. The recent publication of Yn et al. (2020) in Geophysical Research 

Letters on the 

June 2016-2017 Related to Unusually Large Oceanic Heat 

Releases [Huang et al. 10(6): 1001.2017:676560] is a useful reference as it provides an explanation for the observed 

warming. Much of the discussion here is not a good look and will not engender trust in future predictions of warming especially when leading climate scientists like James Hansen are predicting another decade-long North Atlantic SST 

[http://www.columbia.edu/~jeh1/mailings/2018/20180118_Temperature2017.pdf] by weaving a narrative to swept the recent warming hiatus under the rug, questions are raised about the 

sections to achieve the Federal Data Quality Act as the misleading and imprecise nature of the analysis is 

Key Message 7: This entire section on Arctic amplification needs to be completely rewritten or excluded due to 

an inadequate level of analysis. Simply listing references with competing theories or contradictory conclusions is 


Michelle Tigchelaar 14-0002 Text Region 02: Our Changing Climate 64 68 10 20 This comment was prepared after discussions by subgroups of the University of Washington Program on Climate Change and the Public Comment Project in Seattle, WA. Among those who participated in discussions, the following wished to be named: Mary Fisher, Annie Cowley, Dr. Michelle Tigchelaar, Dr. Cecilia Bitz, Dr. Richard Gammon.

Key Message 4 includes the statement that a rise of 6 to 10 feet by 2100 is physically possible. We agree that it is important to acknowledge and address the low probability, high risk of sea level rise projections, but we think that by eliminating this to a Key Message, greater confidence is implied than may be warranted. The assessment in the Trenberth and Pershing section around this statement is that it has low confidence, and it is based on only one study (Di Lorenzo and Pollard, 2016), which uses a low-order dynamics ice sheet model as a relatively untested new parameterization scheme to make future ice sheet projections. We suggest the authors either remove this statement from the Key Message, or use existing literature to present a more consensus view on the extreme projections for 2100. In Chapter 8, page 304, line 11-13, for example, the following references are cited: Kopp et al., 2014; Jackson and Jevrejeva 2016; Sweet et al., 2017; Kopp et al., 2017.

The assessment presented in this statement is phrased as being a Whole Chapter comment. Nonetheless, we will deal with each of the comments one by one.

This comment should have been broken into separate comments about various sections of Chapter 2 rather than being a Whole Chapter comment. Nonetheless, we will deal with each of the comments one by one.

The first comment is that there is a need to further discuss the so-called hiatus. The sentences relating to the 

Key Message 4 are not mentioned. We agree. However, we have also clearly referenced the extensive discussion on 

the hiatus found in Chapter 1 of NCA4 Volume I, including the connections to changes in heat uptake during the 

period of the hiatus. A number of studies are referenced here, and others are also discussed in Volume I. The 

next major comment relates to Key Message 8. This section is by necessity quite short, but the extensive 

discussion the reviewer wants to see on the Arctic can be found in Chapter 11 of NCA4 Volume I. Early in the 

chapter we state that the readers should see NCA4 Volume I for extensive discussion on the topics 

addressed in Chapter 11 of NCA4 Volume I. The reviewer makes a reference that has been added.

The reviewers wish to see more discussion on Arctic warming, and is actually more consistent with the rest of the box, which does not call out specific observing systems such as satellites.

This comment should have been broken into separate comments about various sections of Chapter 2 rather than being a Whole Chapter comment. Nonetheless, we will deal with each of the comments one by one.
This comment was prepared after discussions by subgroups of the University of Washington Program on Climate Change and the Public Comment Project in Seattle, WA. Among those who participated in discussions, the following wished to be named: Mary Fisher, Annie Crawley, Dr. Michelle Tigchelaar, Dr. Cecilia Bitz, Dr. Richard Sermon.

The text has three issues. (1) There is little sinking in the Arctic Ocean, (2) the freshwater budget of the Arctic is not described correctly, and (3) ocean heat loss is by far the largest contribution to the sinking rate, not freshwater melt. Melting sea ice causes no significant annual source of freshwater to the Arctic Ocean. Instead, owing to a large export of sea ice out of the Fram Strait, there is actually a serious of freshwater from net annual growth in the Arctic Ocean. The major sources of freshwater to the Arctic Ocean are direct precipitation, land runoff, and import of fresh Pacific water. Presumably this text should be altered to describe the sinking in the North Atlantic and its freshwater budget. Consider replacing the text with, "The role of sinking in the northern North Atlantic depends on heat loss from the ocean to the atmosphere as well as freshwater input to the surface. Freshwater sources include runoff from melting ice, fresh meltwater, direct precipitation, and export of sea ice and freshwater from the Arctic ocean into the northern North Pacific. For decades scientists have been concerned that the sinking rate could slow as atmospheric warming impedes ocean heat loss and raises direct precipitation and meltwater runoff from land (x%."
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Region</th>
<th>Chapter</th>
<th>Figure/Table/Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>End Line</th>
<th>Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rebecca</td>
<td>Laurent</td>
<td>140992</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>60</td>
<td>34</td>
<td>32</td>
<td></td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144099</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>17</td>
<td>57</td>
<td>23</td>
<td>25</td>
<td></td>
<td>This chapter follows the same naming conventions that apply to the entire NCA4.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144100</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>8</td>
<td>58</td>
<td>2</td>
<td>2</td>
<td>Also revised as suggested.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144101</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>10</td>
<td>50</td>
<td>11</td>
<td>11</td>
<td>This is a pretty optimistic statement—given how slow the response has been to cut emissions. PM’s E DODD is 5.1. Chad all emission pathways having large overshoots. I think it needs to be made clearer here that the emissions cutbacks need to do this at the much greater than nature’s have committed to do, much less are not to actually do, per the Paris Accord.</td>
<td>This chapter, as written, is based on the much more extensive discussion of the issue of 2 climate. E (including 1.5 C) found in NCA4 Volume 1 Chapter 14, as well as the supplementary text provided in Box 2-4, which will appear near the statement in the final product. The statement does not refer to the Paris Accord, just to the extensive decrease in emissions that would need to be met. The reviewer is referred to Vol. 1 Chapter 14 for more detail.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144102</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>60</td>
<td>14</td>
<td>13</td>
<td>144102</td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144103</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>60</td>
<td>24</td>
<td>24</td>
<td></td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144104</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>60</td>
<td>26</td>
<td>26</td>
<td></td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144105</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>60</td>
<td>31</td>
<td>31</td>
<td>“What is” in the amount to be clearer and a bit more formal.</td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144106</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>61</td>
<td>3</td>
<td>22</td>
<td></td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144107</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>61</td>
<td>24</td>
<td>23</td>
<td>As noted elsewhere, I would urge changing “about 50%” to “over 50%” to better recognize that there are uncertainties that really, don’t just giving to too figure precision. While the reviewer’s points are well made, this specific number is that given in NCA4 Volume 1 on which this chapter is based.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144108</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>62</td>
<td>7</td>
<td>6</td>
<td></td>
<td>While the reviewer’s points are well made, this specific number is that given in NCA4 Volume 1 on which this chapter is based.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144109</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>62</td>
<td>7</td>
<td>7</td>
<td></td>
<td>While the reviewer’s points are well made, this specific number is that given in NCA4 Volume 1 on which this chapter is based.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144110</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>62</td>
<td>4</td>
<td>7</td>
<td></td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144111</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>62</td>
<td>14</td>
<td>12</td>
<td></td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144112</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>62</td>
<td>14</td>
<td>13</td>
<td></td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144113</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>62</td>
<td>30</td>
<td>31</td>
<td></td>
<td>We appreciate the comment. More information on the derivation and source of this information is provided in NCA4 Volume 1 Chapter 14.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144114</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>62</td>
<td>31</td>
<td>31</td>
<td></td>
<td>The Paris objectives refer to global mean temperature (GMT) including both ocean and land. This paragraph only section is limited to the ocean only. Discussing the Paris objectives here would confuse the readers as SST and GMT are two different albeit related quantities. Key message #1 puts the Paris targets into perspective with current GMT change.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144115</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>62</td>
<td>36</td>
<td>38</td>
<td></td>
<td>We agree, both metric and imperial units are now listed in N4M.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144116</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>63</td>
<td>4</td>
<td>4</td>
<td></td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144117</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>63</td>
<td>5</td>
<td>5</td>
<td></td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144118</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>63</td>
<td>7</td>
<td>7</td>
<td></td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144119</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>63</td>
<td>14</td>
<td>16</td>
<td></td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144120</td>
<td>First Region</td>
<td>01</td>
<td>Our Changing Climate</td>
<td>40</td>
<td>63</td>
<td>22</td>
<td>24</td>
<td></td>
<td>The scenarios are not necessarily emission scenarios so we follow official guidance here in referring to them simply as future scenarios.</td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
<td>Response</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>-------------------</td>
<td>------------</td>
<td>----------</td>
<td>------------</td>
<td>----------</td>
<td>----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144121</td>
<td>Figure</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>The flattening of this graph does not really seem a good way to convey how much sea level rise is being projected. By my calculation, the vertical scale is reduced by something like a factor of 28 compared to reality. It is likely reducing this to something more like a factor of 10, and then perhaps indicate this in the caption.</td>
<td>We agree, this figure has been revised and updated.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144122</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>Something happened in the caption says the units are inches where as the figure shows feet and meters. Agree this graph is just too flat.</td>
<td>This figure has been revised and updated to add both of these issues.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144123</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>I would not use the word &quot;bound&quot;--get a West Antarctic ice sheet collapse and the ice could be greater. Fine to say the various curves cover a range of what present understanding suggests is plausible, but given the limits of knowledge and arbitrary assumption by DoConte and Pollard on limit of how rapidly could occur, I'd avoid using the word &quot;bound.&quot; I would also urge adding a sentence to the caption indicating that sea level rise would be likely to keep rising at a high rate after 2100 because once the melting process is begun, it will become more and more difficult to stop.</td>
<td>We have re-worded accordingly.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144124</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>Every time a nesting block was, you have the periods bold in the wording.</td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144125</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>I wonder if it might be useful here to indicate that at least some of the extra warmth was the result of poor land use practices that tended to strip the land of vegetation, which in turn reduced evapotranspiration. The present warming, it might be noted, is occurring even in the presence of much more rigorous land use practices, greater vegetation cover and soil moisture, and higher humidities (an indication of evaporative cooling).</td>
<td>The text has been revised to incorporate this suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144126</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>Seven variability, might be better to say &quot;much more common&quot; instead of &quot;common&quot;--I'd also try to be bit cautious in using the word common. Given current NOAA practice of updating the &quot;normal&quot; every decade to the most recent three decades, weather forecasters will tend not to be saying that the warm periods are as unusual as it implied here. While the wording here is actually comparing the years instead of the future, what is really being missed is that if one considers the changing likelihood since the mid 20th century when a lot of infrastructure was put in place following World War II, the extremely warm conditions becoming typical are 1 to 2 or more standard deviations above the 1951-80 normal—so actually, it is a few million type of occurrences for infrastructure built in the mid 20th century (and forests that were growing then). This updating of normals that NOAA does is far if the underlying climate is not changing and for aspects of the economy that are continually adapting to the then current climate, but for anything that was built tied to some previous climate, the degree of change is way beyond design factors used for a large portion of the infrastructure that we depend on.</td>
<td>We believe the word &quot;common&quot; is sufficiently descriptive, so the text remains the same.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144127</td>
<td>Figure</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>What about for the Caribbean island component of the US?</td>
<td>Long-term, bias-corrected temperature records are not available for the Caribbean Islands. See NCA4 Vol 1 Chapter 6.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144128</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>10</td>
<td>In talking about the increase in heat waves, it also needs to be mentioned that the absolute humidity will also be higher, and that the discomfort index will be increasing even more than the temperature. Basically, the situation is going to become intolerable for working and exercising outdoors during much of the year.</td>
<td>The purpose of this paragraph is to summarize Chapter 8, which focuses on changes in temperature (vs. humidity).</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144129</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>7</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>During what period of time have these changes occurred?</td>
<td>The text has been revised to say &quot;Since the beginning of the last century.&quot;</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144130</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>7</td>
<td>7</td>
<td>10</td>
<td>12</td>
<td>It might be noted that this is consistent with the expansion of the subtropics, which is a feature associated with warm induced climate change.</td>
<td>A comment to this effect has been added.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144131</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>7</td>
<td>7</td>
<td>16</td>
<td>16</td>
<td>Change &quot;increases&quot; to &quot;precipitation increases.&quot; Well, actually, it is quite surprising that in the sentence that goes from line 12 to line 18 the word &quot;precipitation&quot; does not get mentioned until line 17—it needs to be mentioned earlier.</td>
<td>Two mentions of precipitation have been added to this paragraph.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144132</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>7</td>
<td>7</td>
<td>22</td>
<td>22</td>
<td>I'd prefer &quot;stronger&quot; to &quot;weaker.&quot;</td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144133</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>7</td>
<td>7</td>
<td>24</td>
<td>26</td>
<td>Delete &quot;future&quot;—&quot;projected&quot; means future.</td>
<td>Revised as suggested.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144134</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>7</td>
<td>7</td>
<td>28</td>
<td>28</td>
<td>Change &quot;average&quot; to &quot;projected average&quot; as changes have not yet occurred—and the precision is being overused—how about saying &quot;about 40%&quot;.</td>
<td>The reviewer is mistaken; the numbers they reference are clearly indicated to be observed, not projected.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144135</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>7</td>
<td>7</td>
<td>30</td>
<td>31</td>
<td>What the basically says is models are doing what the theory inherent in them indicates is likely—suggested might suggest they are too connected to be relevant. What is perhaps more important is that they continue observed trends.</td>
<td>The reviewer is mistaken; the models they reference are clearly indicated to be observed, not projected.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144136</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>7</td>
<td>7</td>
<td>34</td>
<td>34</td>
<td>That this is the case could be explained by mentioning the greater variability makes it difficult to identify trends in this region.</td>
<td>The existing sentence fully explains the lack of clear trends from floods, and additional information is provided in NCA4 Volume 1, Chapter 8. No changes needed.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144137</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>8</td>
<td>8</td>
<td>4</td>
<td>5</td>
<td>Delete the word &quot;future&quot;—these are present projections. The word projection includes saying that one is looking ahead in time.</td>
<td>We revised the relevant text and did not feel any changes were necessary.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144138</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>7</td>
<td>Again, delete the word &quot;future&quot;—these are scenarios that we have now and that they are scenarios includes meaning they are about the future.</td>
<td>Scenarios can be past or future; the word &quot;future&quot; makes it clear that these are the latter.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144139</td>
<td>Text Region</td>
<td>02</td>
<td>Our Changing Climate</td>
<td>8</td>
<td>8</td>
<td>16</td>
<td>16</td>
<td>By eliminating the potential for evaporative cooling, drought itself leads to warming and so the simultaneously mentioned here. What happened in those years was that changes in the atmospheric circulation led to less precipitation and then drying and then warming while also bringing warmer air to start with into the region.</td>
<td>Thank you for this comment. Chapter 6 of NCA4 Vol 1 expands on this point in some detail.</td>
</tr>
</tbody>
</table>
This is a very cautious projection about sea ice retreat. Given its deteriorated state in mid-summer now, it will suggest what is proposed here is likely by no later than 2030 and possibly 2050 most of the Arctic is likely to be ice-free by most of the summer. The model simulations are tending to lag behind the observed change, indicating a systematic bias (perhaps due to small problems in what the forcing is due to sulfates and other pollutants or for other reasons): in any case, the statement here seems very cautious.

As this is an assessment, key findings statements require a solid and typically broad quantitative basis in the literature and, as such, lend toward being conservative in their assertions. Although it is certainly possible that this statement is overly conservative, it is based on the best data currently available to project future sea ice trends. Some of the recent models have been enhanced by natural variability simplifying the results and/or being driven by processes (e.g., circulation changes) that will not necessarily be maintained over the coming decades. Thus, simple extrapolation is a robust basis for predicting with very high confidence when the Arctic is likely to be ice-free by end of summer. As such, the Key Message has been left unchanged, but the supporting text following the RM has been revised to read: “It is very likely that by mid-century we will see, for the first time in approx. 2 million years, an Arctic Ocean almost entirely free of sea ice at the end of the annual melt season (i.e., late summer)” (Collins et al., 2013; Scape and Forster, 2014; as models have tended to underpredict recent sea ice loss (e.g., Stevne et al., 2005). In this case it will happen before mid-century.”
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>Start Line</th>
<th>End Page</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144166</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>17 77</td>
<td>1 1</td>
<td>Suggest changing &quot;is may be more likely to be underestimating than overstating long term future change.&quot;</td>
<td>The proposed text is too wordy and does not add to the clarity of the key message.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144167</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>17 77</td>
<td>2 2</td>
<td>The reasoning in this sentence needs some clarification.</td>
<td>Agreed; more information and references have been added.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144168</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>17 77</td>
<td>12 12</td>
<td>What about saying &quot;comprehensive&quot; instead of &quot;complex&quot;--they are useful because they are comprehensive even if they are complex.</td>
<td>Not as suggested.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144169</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>17 77</td>
<td>13 13</td>
<td>Change to &quot;simulate&quot; something like &quot;to represent the effects of the processes that contribute to climate change&quot; -- otherwise it seems to me this is saying we just represent the results in the models, not the processes that lead to the results.</td>
<td>Not as suggested.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144170</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>17 77</td>
<td>12 12</td>
<td>Change &quot;cycles&quot; to &quot;feedbacks&quot; or &quot;processes&quot;--noise. A cycle takes one somewhere and then back again whereas a process can take one there without bringing one back.</td>
<td>Any reference to feedbacks as self-reinforcing cycles in both NCA4 Volumes 1 and 2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144171</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>17 77</td>
<td>14 15</td>
<td>This sentence seems a bit isolated--as a reader I would be expecting there would be some examples given and explained.</td>
<td>This sentence is amplified in the remainder of this paragraph as well as the paragraph that follows.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144172</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>17 77</td>
<td>23 23</td>
<td>Change &quot;not quantified&quot; to something like &quot;have not yet been quantitatively successfully&quot; - in what, there is no reason that they cannot be quantified at some point and things do improve with better resolutions/better computers.</td>
<td>Revised as suggested.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144173</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>17 77</td>
<td>26 29</td>
<td>Again, it needs to be said that the models do not yet represent these processes, although this is changing as development continues. Most of the processes not yet included have been thought to be only very slowly changing over time, so have been assumed to be relatively constant. An example is the flow of the ice streams in the Greenland and Antarctic ice sheets. The models have long had the ice sheets themselves and the relatively fast acting surface processes--just not the movement of the ice streams. Well, this is now changing. Same with respect to permafrost. So, I think it would be helpful to include the main reason for the processes not being included--namely that in the baseline climate, these changes were not really happening, so observations were plugged and used. This is no longer a valid assumption--even what were very slow changing aspects in the past are now changing.</td>
<td>The point has been added to the time line section above, and the interested reader is referred to NCA4 Volume 1 Chapters 4 and 15 for more detail.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144174</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>14 78</td>
<td>5 5</td>
<td>They are really &quot;projections of future changes,&quot; not &quot;future projections of changes&quot;--need to be more precise about things.</td>
<td>We reviewed the relevant text and did not find the proposed change made the sentence clearer.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144175</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>18 79</td>
<td>14 22</td>
<td>This is wrong--even with perfect observations, the chaotic behavior of nonlinear systems makes prediction of climate variations over the period of seasons to perhaps two decades mostly not possible (not to mention one or two unexpected forcings like volcanic eruptions). Saying the problem is observations leads to offends focusing all attention on observations--while we need more observations, even with them there is no real indication that useful forecasts could be made. For forecasts up to seasonal and perhaps a bit longer, ocean conditions are critical, but, despite some hints, there is no indication yet that such predictions can be made out much longer.</td>
<td>While we do not agree that this is wrong, we agree the issue is more nuanced than the text implies. To address this point, the text has been revised as follows: &quot;How will global--and even more importantly, regional--climate change over the next few decades? The actual state of the climate is always a superposition of natural variability and anthropogenic climate change. At the decadal scale, the magnitude of these two factors are equivalent (Easterling and Wehner 2009). At longer time scales (at least 3 decades for global measures of the climate), the anthropogenic influence dominates (Carver et al 2011). Our ability to predict the climate at the seasonal to decadal scale is limited both by our imperfect ability to model the initialization conditions of the state of the ocean and the chaotic nature of the interconnected earth system (Kirtman and Teng 2012; Davis et al. 2012b). Further into the future, as the anthropogenic forcing exceeds natural variability, uncertainty in how human activities will evolve becomes increasingly important in projecting the magnitude and patterns of future global warming. Naturally variability will continue to be a factor, but most of the difference between present and future climates will be determined by choices that society makes today and over the next few decades that determine emissions of carbon dioxide and other heat-trapping gases, as well as any potential large-scale interventions as discussed in CSR Chapter 14 (De Nobili et al. 2017). The further out in time we look, the greater the influence of these human choices on the magnitude of future warming.&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144176</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>18 78</td>
<td>21 21</td>
<td>Capitulate &quot;Earth&quot;</td>
<td>The chapter text will be reviewed to conform with the grammatical standards of the entire NCA4 document.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144177</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>18 78</td>
<td>11 11</td>
<td>If suggest changing &quot;Earth is warming&quot; to &quot;the Earth's climate is changing&quot;--given variables being looked at are not just temperature. The title might also say indicating that human activities are the dominant cause.</td>
<td>We reviewed the relevant text and did not find the proposed change made the title clearer.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144178</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>19 79</td>
<td>29 29</td>
<td>Change &quot;Arctic&quot; to &quot;Arctic Ocean&quot;</td>
<td>The chapter text will be reviewed to conform with the grammatical standards of the entire NCA4 document.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144179</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>40 80</td>
<td>4 4</td>
<td>Change &quot;future climate projections&quot; to &quot;projections of future changes in climate&quot;</td>
<td>Revised as suggested.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144180</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>40 80</td>
<td>14 14</td>
<td>The parenthetical terms being used are based on a policy perspective of what might be reasonably done in the future--they are not scientific judgments and so should not be used here. As I have suggested elsewhere, I think it would be much more informative to give an indication of what each scenario includes with respect to fossil fuel emissions, and in doing this one might well add a more rapid phaseout option. My suggestions were thus for something like: replace RCP8.5 by FF8.5 as defined above, and RCP4.5 by FF4.5, and RCP2.6 by FF2.6. Perhaps then call RCP1.0 FF0.0 (and maybe for some RCP6.0 FF6.0). For something like that and call it FFFluorinated. Doing this would basically I think be much more informative than having to remember what each of the RCP numbers mean, doing so having no real understanding of what radiative forcing is.</td>
<td>This point has been added to the sea level rise section above, and the interested reader is referred to NCA4 Volume 1 Chapters 4 and 15 for more detail.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144181</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>60 80</td>
<td>24 24</td>
<td>It would be helpful to the reader to add a phrase to the effect &quot;much less restore the climate to conditions near those of the mid- to late-20th century&quot;.</td>
<td>The point is already implicit, and MAR adds the question of stabilization.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144182</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>60 80</td>
<td>14 14</td>
<td>Seems to me there is a good chance the increase in global average temperature relative to preindustrial will be above 1.5 C by 2030 and 2 C before 2050. Given climate inertia, I don't see any scenario that will get anywhere near 2050 would keep the warming below the Paris Accords objectives. The statement here in lines 25-27 just seems to me far from what is most likely, especially if one also includes the reductio ad absurdum concluding that is also likely to occur. There is no reference indicating such a protracted wait to act can keep the warming below 2.5 or 3 C.</td>
<td>Agreement has been modified to say &quot;substantial reductions,&quot; which is in line with the finding in Chapter 14 of the NCA4 Volume 1. The sentence here is simply intended to be an introduction to the issue; we have included references to relevant chapters (14 and 14) from Vol 1 and the interested reader is referred to those chapters for more detail.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144183</td>
<td>Text Region</td>
<td>02: Our Changing Climate</td>
<td>60 80</td>
<td>28 29</td>
<td>There is no basis at all for including the words &quot;decades&quot; in the time scale at a minimum in centimeters unless climate intervention is begun very soon.</td>
<td>We disagree; as NCA4 Volume 1 Chapter 4 shows, if GHG concentrations were stabilized, the resulting increase in global temperature would largely (though not entirely) stabilize over decades.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The text needs to say, "about 800 GtC since preindustrial times". And, I would note, even assuming this number is right, this means 25 years at current emissions rates and then zero thereafter. How is this consistent with the NCA statement on the 26 year time period for net emissions reductions before 2040? By then one has to be at zero. And if one sets the objective to be 1.5°C, then one has to be at zero much sooner. I would also note that 1.5 and 2°C stabilization levels would have tremendous impacts. The objective needs to be to peak at lower than the 1.5 or 2°C and get back to 1.5°C as soon as possible.

In response to the first part of the comment, we have revised the text as suggested. The new text is "Stabilizing global average temperature at or below long-term warming targets would require significant reductions in net global carbon emissions relative to present-day values well before 2040, and Bolivia would require net emissions to become zero or possibly negative later in the century. The warming and associated climate effects from continued accumulation of greenhouse gases will persist for decades to millennia (Ciais et al., 2012; Lenton et al., 2013). Accounting for emissions of carbon as well as other greenhouse gases and particles with lifetimes from weeks to centuries, cumulativeanthropogenic carbon emissions would likely need to stay below about 800 GtC since the preindustrial era in order to provide a two-thirds likelihood of preventing 1.5°C (2°C) of warming, implying that approximately 230 GtC more could be emitted globally in order to meet that target." In response to the second part of the comment, it is not our role to recommend or advocate for specific policy choices or targets.

We have replaced it with "design life" which is a more commonly used term in engineering design and operation.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erica</td>
<td>Brown</td>
<td>142047</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>135</td>
<td>135</td>
<td>13</td>
<td>13</td>
<td>the references cited do not support the estimate of four trillion dollars. This sentence appears to cite an AWRA report on a one trillion dollar cost. Furthermore, the other citations for this sentence reference publications about dams, and not other types of water infrastructure.</td>
<td>The text has been revised to clarify. The phrase “risk to society” has been changed to say risk of failure. Text has also been added listing the types of water infrastructure the statement refers to. The reference to 4 trillion dollars was not based on a single reference, but rather an aggregated cost across multiple types of infrastructure based on information from multiple sources. To simplify, the text has been revised to be more general, referring to costs aggregated across infrastructure as being in the “billions of dollars.” Additional references on the construction and maintenance of levees and other water infrastructure have also been added as the sources for this information.</td>
</tr>
<tr>
<td>Erica</td>
<td>Brown</td>
<td>142048</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>135</td>
<td>135</td>
<td>13</td>
<td>13</td>
<td>“The ‘Meadord, 2017’ citation should read “Meadord, 2017.””</td>
<td>The type has been corrected.</td>
</tr>
<tr>
<td>Erica</td>
<td>Brown</td>
<td>142049</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>135</td>
<td>135</td>
<td>11</td>
<td>11</td>
<td>“Risk to society” should be defined. The nature of risk and factors used in assessing risk to society should be specified in Key Message 2 to provide examples of interconnected systems.</td>
<td>The text has been revised. The phrase “risk to society” has been changed to say risk of failure. Text has also been added listing the types of water infrastructure the statement refers to. We have included one example: water-energy infrastructure including dams used for storage and flood control and also energy generation.</td>
</tr>
<tr>
<td>Erica</td>
<td>Brown</td>
<td>142050</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>136</td>
<td>136</td>
<td>24-26</td>
<td>24-26</td>
<td>Key Message 2 should provide examples of interconnected systems.</td>
<td>Thank the reviewer for the good suggestion. The text was revised accordingly.</td>
</tr>
<tr>
<td>Erica</td>
<td>Brown</td>
<td>142051</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>134</td>
<td>134</td>
<td>10</td>
<td>10</td>
<td>Water providers manage the risk of water-quality impacts as regulated by the Safe Drinking Water Act, but it may cost more. A follow-up sentence should address the fact that utilities will continue to comply with existing regulations and that higher costs may be required due to climate change adaptation and mitigation.</td>
<td>Please thank the reviewer for the comment. This seems like a likely outcome, but we do not have any literature references to substantiate the claim.</td>
</tr>
<tr>
<td>Erica</td>
<td>Brown</td>
<td>142052</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>137</td>
<td>137</td>
<td>1</td>
<td>1</td>
<td>It is an important point (though, there are institutional structures that constrain innovation, planning and infrastructure design. Support also adding these structures can confront adaptation as well.</td>
<td>Thank the reviewer for the suggestion. The text was revised accordingly.</td>
</tr>
<tr>
<td>Erica</td>
<td>Brown</td>
<td>142053</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>137</td>
<td>137</td>
<td>18</td>
<td>18</td>
<td>“The paragraph regarding the wrong estimator with a better descriptor—possibly ‘input’ rather than ‘levee’ or ‘levee’—is well placed.”</td>
<td>This has been revised as suggested.</td>
</tr>
<tr>
<td>Erica</td>
<td>Brown</td>
<td>142054</td>
<td>Whole Chapter</td>
<td>03: Water</td>
<td></td>
<td>135</td>
<td>136</td>
<td>24</td>
<td>24</td>
<td>Water infrastructure should be defined within the first page or two of the chapter, as currently drafted it’s not until page 134 lines 10-12 that the authors mention all the types of infrastructure. Also there is a typo in that whereas should be listed, and not levels.</td>
<td>We agree that the definition would be helpful, and have made the addition.</td>
</tr>
<tr>
<td>Erica</td>
<td>Brown</td>
<td>142055</td>
<td>Whole Chapter</td>
<td>03: Water</td>
<td></td>
<td>135</td>
<td>136</td>
<td>20</td>
<td>20</td>
<td>Given the underlying costs and required effort for necessary local climate change adaptation and mitigation measures, there is an inevitable need for finance mechanisms to support such water sector efforts on a large scale. This is especially important since additions, cities and regions with light budgets might not be able to finance adaptation on their own and therefore rely on additional support to make climate change adaptation and mitigation sustainable. The NCA4 (or by does not sufficiently address this issue.</td>
<td>This very much fulfills these helpful comments. We have now defined what we meant by water infrastructure in the beginning, and elaborated on the concern in the description of the associated key message. We appreciate the reference to the WUCA-co-authored report. The examples there are excellent and we note this report and briefly discuss it in the adaptation key message, KM3. Key Message 3 ties the WUCA report and some specific examples from WUCA members. This is now also mentioned in the Summary section.</td>
</tr>
<tr>
<td>Misses</td>
<td>McRitchie</td>
<td>142059</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>135</td>
<td>135</td>
<td>3</td>
<td>3</td>
<td>In general, the key messages for the water chapter are on point. However, the text and description elaborating on these key messages misses the mark in two areas in particular: First, key message 2 discusses how climate risk is compounded by aging infrastructure and the fact that infrastructure design and regulation do not account for climate change. This is true, however stating that therefore “much of the U.S. water infrastructure poses a risk to society” is an overstatement (per AMWA’s comment noted on line 26). What’s more, it’s not clear what part of “water infrastructure” is being discussed here. The types of water infrastructure should be defined. In addition key message 2 notes that infrastructure “financing principles” are not aligned with this climate risk, but the issue is not explained or discussed in the text. Another example, key message 5 notes, that there are “positive examples of promising directions to manage climate vulnerabilities” yet no examples are provided in the text. While it would be impossible for NCA4 to provide every example out there, there are certainly several good ones from which the authors could point to, e.g., the 2015 report by WUCA, AWWA, AMWA and WRF “Embracing Uncertainty A Case Study Examination of How Climate Change is Shifting Water Utility Planning” <a href="https://www.wucaonline.org/assets/pdfs/ysds-uncertainty.pdf">https://www.wucaonline.org/assets/pdfs/ysds-uncertainty.pdf</a></td>
<td>This is an important point to make; there are institutional structures that constrain innovation, planning and infrastructure design. Support also adding these structures can confront adaptation as well.</td>
</tr>
<tr>
<td>Misses</td>
<td>McRitchie</td>
<td>142058</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>135</td>
<td>136</td>
<td>24</td>
<td>24</td>
<td>Given the underlying costs and required effort for necessary local climate change adaptation and mitigation measures, there is an inevitable need for finance mechanisms to support such water sector efforts on a large scale. This is especially important since additions, cities and regions with light budgets might not be able to finance adaptation on their own and therefore rely on additional support to make climate change adaptation and mitigation sustainable. The NCA4 (or by does not sufficiently address this issue.</td>
<td>Thank you for the comment. While we agree this is an important issue, the topic of infrastructure financing/funding is beyond the scope of the Water chapter. NCA4 Chapter 28 (Adaptation) includes a general discussion of finance.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142106</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>128</td>
<td>128</td>
<td>17</td>
<td>17</td>
<td>The third key finding would be improved by making it more relevant and specific to the water impacts outlined in key findings one and two. Right now, I could replace the word “water” with any other chapter (e.g., forests, agriculture, climate, etc.) and the message would stay the same. This demonstrates the vagueness of the message the authors aim to convey. What water strategies are you talking about? How would they work, who would do them, what impacts would they avoid? What impacts can’t be avoided? Just the notion that adaptation strategies exist and someone is doing something but it’s hard isn’t very compelling or informative, and neither is the idea that you’re just顺应 the ecosystem.</td>
<td>The text has been revised to better highlight the key message 3. The authors of this report have identified that a comprehensive assessment of how climate change is shifting water utility planning. It’s not clear what the approach is or what examples there are from which the authors could point to, e.g., the 2015 report on weather utility planning. The examples there are excellent and we note this report and briefly discuss it in the adaptation key message, KM3. Key Message 3 ties the WUCA report and some specific examples from WUCA members. This is now also mentioned in the Summary section.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142107</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>128</td>
<td>128</td>
<td>19-20</td>
<td>20</td>
<td>Water systems have water risk? I think maybe you need to drop that second “water”</td>
<td>The text has been revised and clarified.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142108</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>128</td>
<td>128</td>
<td>19-20</td>
<td>20</td>
<td>If you have a comprehensive assessment has been conducted, but are there even best-guess estimates from the Army Corps of Engineers?</td>
<td>Thank you for the comment. We are not aware of credible, published reports and papers that provide the information requested. Even if “best-guess estimates” or informal estimates are available, these are not acceptable for including in the National Climate Assessment.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142109</td>
<td>Figure/Table Number</td>
<td>03: Water</td>
<td></td>
<td>129</td>
<td>129</td>
<td></td>
<td></td>
<td>Interesting that certain areas, like in Arizona, see a decrease in groundwater depletion rates. This may be worth mentioning in the caption, which only notes that supplies have been decreasing in major regional aquifers. While the declining groundwater level is true over certain regions, this cannot be generalized at the national level. Hence, we would like to have the caption as such.</td>
<td>The comments point to the generality of key Message 3. It’s true that the message may apply to other sectors as well, but in terms of a summary, we believe it accurately reflects the state of the water sector (and other sector, as noted). Additional details are provided later in the chapter, and the space constraints limit the ability to answer the questions raised in this initial summary section.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142110</td>
<td>Fact Region</td>
<td>03: Water</td>
<td></td>
<td>130</td>
<td>130</td>
<td>14</td>
<td>14</td>
<td>The paragraph skips around a bit. It jumps from per capita, to operational considerations, back to water quality, then back to adaptation without discussing water quality. I’d consider ending the paragraph after line 24 or maybe line 25. If you discuss adaptation later (line 28) then don’t waste valuable space in your chapter to say something else.</td>
<td>The text has been revised in suggested to simplify this paragraph. The material on water quality was redundant and has been deleted, making the paragraph more concise.</td>
</tr>
</tbody>
</table>
In all sectors - I'm not sure what sectors you're talking about here. All water sectors? Sectors meaning, like, agriculture and health? Or the economic sector? Really, all sectors have seen efficiency increases? You've in the last 30 years this is true, but your statistics from 2014, which will be at least if your statistics this comes out. Will that still be true for all sectors?

The reference has been added as suggested.

The text has been revised to incorporate the reference, listed as U.S. EPA 2016a.

The text has been revised to include a concrete example of impacts for Caribbean and Pacific Islands.

The text has been revised to show updated data for the full calendar year 2017, to delete hazards not directly water related (e.g., wildlife), and to improve the legibility of gray and black lines shown on the graphic.
This is a good run-down of all of the findings and outlooks. Well done. I would have liked a bit more description of the evidence base itself - are these findings well known, been around for decades, well-established? Are there some emerging, contentious, uncertain? Are any thing known for sure, often wrong and we’re still working out the true story? There is strong consensus, or do things vary wildly depending on location? We appreciate the comments. The details that support KM3 are in the tail of the chapter. We feel that the studies we reference provide an appropriate context for KM1. The base consensus is in reference to the water attributes - quantity and quality - not on precipitation. For clarity, we changed the “high uncertainty” to “Uncertainty”.

The section needs rephrasing as it seems to be directly contradicting the CSSR. For instance, it says precipitation of temperature is medium confidence, whereas the CSSR has high or very high confidence. There is medium confidence in the CSSR about precipitation, but here you say high uncertainty. This is not correct. CSSR also has very high confidence for drought. This is not only very confusing, but it doesn’t seem to line up with what is in the chapter or even the text above it in this traceable account, which says climate change has predictable impacts on water quality (line 9). If you then say page 143 lines 2-2, you say changes in water quality are associated with high uncertainty? I would suggest cutting or revising the uncertainties that are not present in this chapter (e.g. the findings from the CSSR) and focusing more on the uncertainty on impacts, as the latter half of this paragraph does.

Again, this uncertainty wording doesn’t match the CSSR. You say there is high uncertainty in precipitation, but the CSSR finds medium uncertainty. I don’t know what you mean by saying there is high uncertainty in emissions scenarios. There is no certainty in emissions scenarios, because they are scenarios, not predictions. Also, it seems very inappropriate to not mention the confidence and likelihood of water quality/quantity impacts to have a sentence about investment in water infrastructure (lines 10-11), unless you are strictly telling the reader this would alter the confidence/likelihood. Saying “could be better addressed” sounds policy prescriptive, not an establishment of confidence for KM3 based on the literature. We thank the reviewer for the comments. The key message and the confidence statements are based on the guidance by the GSECRR. Further, the key message is based on the published literature, hence we are comfortable in having it as such.

I am very confused about what the confidence rankings are for this key message. In the key message itself on lines 27-33 there is 5 “high” and 1 “medium”. But the table below in the Major Uncertainties and Description of Confidence and Likelihood scenarios does not bear this out. Moreover in these scenarios, truly high confidence, but instead says high uncertainty, lots of mediums, and low confidence. This key message needs to be evaluated for consistency with uncertainty language guidance and the CSSR. We thank the reviewer for the comment. The chapter reflects the view of how the historical record will remain an essential element of water resources planning and risk management. However, it is not sufficient. In KM5, where adaptation is directly addressed, the recommended approach is described as one that performs well in a range of climate conditions, not only the historical record. The chapter has been revised to make that message clear.

This section is really well-written. Would be a good model for the other key message traceable account sections on Description of the Evidence Base. We thank the reviewer for the comment. Over the chapter, this involves the use of the historical record will remain an essential element of water resources planning and risk management. However, it is not sufficient. In KM5, where adaptation is directly addressed, the recommended approach is described as one that performs well in a range of climate conditions, not only the historical record. The chapter has been revised to make that message clear.

This section is a bit weak and flabby. Should be a good model for the other key message traceable account sections. I don’t think these are actually traceable. For example, the confidence level in the figure above is 143 lines 21-23. This is not traceable. We appreciate comments. The finding that is traceable on page 143, line 11 is that “changes in water quality are associated with high uncertainty.” For clarity, we changed the “high uncertainty” to “Uncertainty”. We also have very high confidence for drought. This is not only very confusing, but it doesn’t seem to line up with what is in the chapter or even the text above it in this traceable account, which says climate change has predictable impacts on water quality (line 9). If you then say page 143 lines 2-2, you say changes in water quality are associated with high uncertainty? I would suggest cutting or revising the uncertainties that are not present in this chapter (e.g. the findings from the CSSR for precipitation) and focusing more on the uncertainty on impacts, as the latter half of this paragraph does.

This section needs editing or clarification, as it seems to be directly contradicting the CSSR. For instance, it says low snowpack impacts in this NW regional roll up since the 2015 snow drought had a significant impact on this region. The text has been revised to incorporate this perspective, it now mentions the significant disruption of water and power services following Hurricanes Maria and Irma.

This text does not acknowledge that most water providers will manage the risk of water quality impacts as required by the Safe Drinking Water Act, but it may cost them more. Support changing text to: “These changes are costly to water utilities and require actions to assure future water supplies, public health, and aquatic ecosystems. Even where risk to water quality can be managed by drinking water suppliers, additional treatment needs may end up costing significantly more.” We appreciate this comment and it makes a good point, but to include this statement in the text we need literature references to substantiate it. Although these effects are likely, we don’t have studies to reference at this point.

This text has been revised to suggest that the effects of low snowpack, as in 2015, is a climate stressor affecting salmon in the Pacific Northwest.

We appreciate the comments. This finding that is traceable on page 143, line 11 is that “changes in water quality are associated with high uncertainty.” For clarity, we changed the “high uncertainty” to “Uncertainty”. We also have very high confidence for drought. This is not only very confusing, but it doesn’t seem to line up with what is in the chapter or even the text above it in this traceable account, which says climate change has predictable impacts on water quality (line 9). If you then say page 143 lines 2-2, you say changes in water quality are associated with high uncertainty? I would suggest cutting or revising the uncertainties that are not present in this chapter (e.g. the findings from the CSSR for precipitation) and focusing more on the uncertainty on impacts, as the latter half of this paragraph does.

We appreciate the comments. This finding that is traceable on page 143, line 11 is that “changes in water quality are associated with high uncertainty.” For clarity, we changed the “high uncertainty” to “Uncertainty”. We also have very high confidence for drought. This is not only very confusing, but it doesn’t seem to line up with what is in the chapter or even the text above it in this traceable account, which says climate change has predictable impacts on water quality (line 9). If you then say page 143 lines 2-2, you say changes in water quality are associated with high uncertainty? I would suggest cutting or revising the uncertainties that are not present in this chapter (e.g. the findings from the CSSR for precipitation) and focusing more on the uncertainty on impacts, as the latter half of this paragraph does.

We appreciate the comments. The key findings that support KM3 are in the tail of the chapter. We feel that the studies we reference provide an appropriate context for KM1. We thank the reviewer for the comment. The key message and the confidence statements are based on the guidance by the GSECRR. Further, the key message is based on the published literature, hence we are comfortable in having it as such.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140218</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>13</td>
<td>10</td>
<td>16</td>
<td></td>
<td>We agree and we have reworded the sentence.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140219</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>13</td>
<td>14</td>
<td>18</td>
<td></td>
<td>We feel the reviewer for the comment. We agree, but resilience has to consider the variability of extreme events and the recovery from them. So, if you are interested in resilient infrastructure, it has to be considered as well as performance under extreme events that become more frequent.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140220</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>13</td>
<td>20</td>
<td>24</td>
<td></td>
<td>We are quite clear that the point of the sentence we have is that the larger extremes in the past are not necessarily in water management practice. This effectively says that even if the climate were not to change, we have a problem to deal with. The next sentence says that climate change presents an increasing risk to water security in the United States, so we think we are reasonably clear in maintaining a narrative that we have not adequately addressed climate risk based on the larger paleo record, and that we expect things to get worse.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140221</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>13</td>
<td>24</td>
<td>25</td>
<td></td>
<td>The text has been revised to be suggested.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140222</td>
<td>Figure</td>
<td>01 Water</td>
<td></td>
<td>12</td>
<td>132</td>
<td></td>
<td></td>
<td></td>
<td>The text has been revised to include “using their increased evaporation rates”.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140223</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>131</td>
<td>10</td>
<td>11</td>
<td></td>
<td>The key messages are summaries of some of the major points in the chapter. Not all effects of temperature on the water cycle are included in this chapter or in the key messages.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140224</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>131</td>
<td>17</td>
<td>21</td>
<td></td>
<td>The text was revised to include “using their increased evaporation rates”.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140225</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>131</td>
<td>21</td>
<td>26</td>
<td></td>
<td>To address this point we have revised the text to include “promoting water conservation and reducing distribution losses”.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140206</td>
<td>Whole Page</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>131</td>
<td>23</td>
<td></td>
<td></td>
<td>This chapter focuses water quantity and quality issues due to climate under natural systems as opposed to policy issues arising locally in engineered systems. Hence, we would like to leave it as is.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140227</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>134</td>
<td>2</td>
<td>3</td>
<td></td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140228</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>134</td>
<td>3</td>
<td>5</td>
<td></td>
<td>This is a good point. We have revised the text to include “given that different agencies often govern water quantity and quality issues.”</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140229</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>134</td>
<td>6</td>
<td>24</td>
<td></td>
<td>We agree; there is a missing “and” in the sentence.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140230</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>131</td>
<td>5</td>
<td></td>
<td></td>
<td>The text has been revised with cross-references to the regional chapter key messages relating to water to address this comment.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140231</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>135</td>
<td>13</td>
<td>15</td>
<td></td>
<td>We suggest revising the regional chapter key messages relating to water treatment and collection systems.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>140232</td>
<td>Credit Region</td>
<td>01 Water</td>
<td></td>
<td>13</td>
<td>135</td>
<td>18</td>
<td>19</td>
<td></td>
<td>We agree, we have listed wastewater treatment and collection systems.</td>
</tr>
</tbody>
</table>

While we acknowledge that extreme events often cause the most damage, slow changes to baselines and overall trends can also contribute to declining resilience.

We thank the reviewer for the comment. We agree, but resilience has to consider the variability of extreme events and the recovery from them. So, if you are interested in resilient infrastructure, it has to be considered as well as performance under extreme events that become more frequent.

The list of water infrastructure should also include wastewater treatment and collection systems.

We agree, we have listed wastewater treatment and collection systems.

An example should be given to this statement to help to understand why current legal regimes in the water sector can be a significant challenge for integrated water resource management (in particular in the western half of the US). For example overallization of water rights in combination with poor allocation volume tracking and verification has been reported to be a problem in California (https://watershed.ucdavis.edu/files/content/news/WaterRights_UCDavis_etal_2019.pdf). Further it should be mentioned that the institutional challenges also go beyond water quantity. Water quantity decisions can be a significant source and cause of water quality impairment, while water quality protections can upset water usage and infrastructure development. Quantity and quality management is often regulated by different agencies which increases the risk of siloed planning and decision making. (https://www.elo.org/sites/default/files/4/s/0/b/2/3/0/1.pdf)

We agree and we have reworded the sentence. Unclear what is meant by the phrase climate risks to existing infrastructure systems are misspecified.

We need critical issues related to quality and quantity are highlighted from the literature. Additional water quality issues are discussed in the regional water issues section.
Could these numbers be put into context? Most people can’t fathom amounts that large. Give them a reference. For example, you could say: Capital improvement needs of public water systems been estimated at $85.2 billion, which is more than the GDP of France in 2016, for projects related to infrastructure, water, wastewater, and drinking water. If you go one more step, you could note that this number is already a 50% increase over 2010 numbers! We appreciate the suggestion. However, the space is very limited and we have tried to be as concise as possible. Also, this chapter and other chapters include different dollar values and for consistency across $85.2 billion, which is more than the GDP of France in 2016, for projects related to infrastructure, water, wastewater, and drinking water. This number is already a 50% increase over 2010 numbers!

We appreciate the suggestion. However, the space is very limited and we have tried to be as concise as possible. Also, this chapter and other chapters include different dollar values and for consistency across $85.2 billion, which is more than the GDP of France in 2016, for projects related to infrastructure, water, wastewater, and drinking water. This number is already a 50% increase over 2010 numbers!

We appreciate the suggestion. However, the space is very limited and we have tried to be as concise as possible. Also, this chapter and other chapters include different dollar values and for consistency across $85.2 billion, which is more than the GDP of France in 2016, for projects related to infrastructure, water, wastewater, and drinking water. This number is already a 50% increase over 2010 numbers!
Chapter 3, Page 131. Lines 1-7: This discussion lays out the need for dynamic planning techniques. However, it does not mention that some water utilities are already beginning to look for ways in planning for uncertain future conditions. The Water Utility Climate Alliance (WUCA) working with AWWA and other organizations has outlined practices for water utilities to use when planning for multiple possible futures (see https://www.wuca.org/wuca-work/index.html) as well as examples of how some utilities are addressing these issues. This chapter also has created the Climate Resilience Evaluation and Awareness (CREAT) tool to help water utilities adapt to long term extreme weather and climate conditions and analyze the costs and benefits of risk reduction strategies. These items should be mentioned as the current discussion covers the need to address the issues but does not mention the progress that has been made in finding strategies to address it. Although some of these resources are mentioned later in the chapter, it is appropriate to at least mention the efforts underway in this summary.

Chapter 3, Page 131. Lines 8-9: The statement on these lines suggests that a changing climate plus %Sphanumeric% water infrastructure%Snumeric% is a %Snumeric%critical challenge%Snumeric% Although it is true that both factors are of serious concern, as worded the implication is a negative one that makes it appear that little to no action is being taken, and possibly that low options exist to address these concerns. We recommend a revised phrasing such as %Snumeric%Adapting infrastructure presents an opportunity for reinvestment to develop more adaptive and resilient water systems designed to meet plausible climate-related challenges%Snumeric% This wording is more general, referring to several references, including AWWA%apos;S 2012 Buried No Longer report. This line also states that %Snumeric% and other flood management infrastructure failed during extreme events in South Carolina in 2015. We recommend elaborating on the nature of these dams and levee failures and what the consequences of these failures were. Were there spillways? Was the dam or levee itself damaged or destroyed, and/or was other property destroyed or lives lost resulting from the failure (as opposed to from other effects of the event)? What were the factors that caused their inability to operate properly beyond the extreme precipitation? This is important to recognize as many failures could be unforeseen or particularly related to climate issues, which is vitally contextual information when discussing this type of event.

Chapter 3, Page 132. Lines 1-7: The text has been revised to clarify. The phrase “risk to society” has been changed to say risk of failure. Text has also been added listing the types of water infrastructure the statement refers to. The reference to $4 trillion was not based on a single reference, but rather an aggregated cost across multiple types of infrastructure based on information from multiple sources. To simplify, the text has been revised to be more general, referring to costs aggregated across infrastructure as being in the “tens of billions”. Additional references on the construction and maintenance of levees and other water infrastructure have also been added as the sources for this information. The second comment: this report is syntheses of the existing publications and does not include new data analysis. We were not able to identify a published report comparing the required funding for maintenance with the recent historical expenditures. Hence, we cannot comment on the gap based on the past expenditures.

Chapter 3, Page 132. Lines 11-12: This line indicates a %Snumeric%contribution cost%Snumeric% for the water sector of %Snumeric%12.5 trillion%Snumeric% based on several sources including AWWA%apos;S 2012 Buried No Longer report. This line also states that %Snumeric%the aging U.S. water infrastructure poses a risk to society%Snumeric% which is a potentially misleading statement, especially when presented without additional context. We recommend that the draft be updated to be more specific about the implications of this issue.

Chapter 3, Page 132. Lines 17-18: The revised text now mentions there are existing tools, case studies and other information available that can be adopted into design standards and operation guidelines to account for future climate, and includes a reference for EPA%apos;S CREAT tool. We appreciate this suggestion, but we feel that the statement while appropriate, is too mild. Yes, it presents an opportunity, but we are ignoring the risk of catastrophic failure. The New Orleans%apos; Katrina event was largely based on the failure of a levee that did not overtop prior to failure, i.e., the climate event was not the significant aspect. It was the lack of the maintenance. The same is the case for the Oroville spillway failure in 2017. Yet in both cases these were spun out as climate stories that detect from the exogenous danger from aging infrastructure.

Chapter 3, Page 132. Lines 19-20: The revised text now mentions there is a critical issue that is appropriately mentioned in the current text. It is the need to integrate both climate and aging infrastructure resilience approaches to planning and design. This is appropriate to at least mention that efforts are underway in this summary.

Chapter 3, Page 135. Lines 1-12: This section states that %Snumeric%50 regulated dams and other flood management infrastructure failed during extreme events in 2015%Snumeric% We recommend elaborating on the nature of these dams and levee failures and what the consequences of these failures were. Were there spillways? Was the dam or levee itself damaged or destroyed, and/or was other property destroyed or lives lost resulting from the failure (as opposed to from other effects of the event)? What were the factors that caused their inability to operate properly beyond the extreme precipitation? This is important to recognize as many failures could be unforeseen or particularly related to climate issues, which is vitally contextual information when discussing this type of event.

Chapter 3, Page 135. Lines 17-20: We encourage updating the report to state the $4 trillion number was calculated, and specifically what expected infrastructure needs it does and does not include. Furthermore, the various reports this number comes from may or may not be over the same time period, and this information should clearly stated in the document. To further enhance this discussion, the report could also compare this recent historical expenditures to identify how much of a gap this represents.

Chapter 3, Page 135. Lines 31-37: This section states that %Snumeric%While there are no design standards or criteria addressing how this infrastructure should be designed and operated in the face of changing climate risk%Snumeric% This is an overly broad statement, implying that little to no information is available for addressing climate issues in infrastructure. Although it is true that climate-related issues have not been incorporated into all design standards (often because sufficient information to inform such a change has not been developed), there are numerous tools and some standards available to inform this type of planning. For example, AWWA%apos;S 100 Risk and Resilience Management of Water and Wastewater Systems (RMMATS) at https://www.awwa.org/store/products/4b6a.aspx?productid=21625 provides an %Snumeric%Risk-Based%Snumeric% approach to planning. Although it is not climate-specific, it can be utilized to plan for most of the impacts of climate change. Additionally, EPA%apos;S Climate Resilience Evaluation and Awareness Tool (CREAT) is available for utility planning. These are just two of many resources available. We recommend changing this statement to recognize that there are tools and resources, although they may not cover all types of infrastructure in all situations.

Chapter 3, Page 135. Lines 47-50: The statement in the chapter text argues that we do not have design standards and criteria for integrating climate change information in design and operational processes. We agree that there are some tools available. The revised text now mentions there are existing tools, case studies and other information available that can be adopted into design standards and operation guidelines to account for future climate, and includes a reference for EPA%apos;S CREAT tool.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenn</td>
<td>Carpenter</td>
<td>140196</td>
<td>Fed Region</td>
<td>03. Water</td>
<td></td>
<td>136</td>
<td>139</td>
<td>9</td>
<td></td>
<td>The statement that “statistical methods have been developed for climate risk and frequency analysis (CSA), but have not yet been incorporated into infrastructure design codes and operational guidelines” is an overly broad statement. Design codes and operational guidelines can and are updated as conditions change. In addition to resources previously mentioned (such as AWWA/ASCE &amp; ASCE/SEI Guidelines for Appropriate Management of Water and Wastewater Systems), several states (for example, Maryland) have set federal standards to elevate state-sponsored structures above predicted floodwaters, including those that will be impacted by sea level rise. In its report on Climate Risks to Water Utility Assets and Infrastructure, the Water Utility Climate Alliance describes utility responses to climate or extreme weather risk through planning, capital infrastructure, managing asset risk, and operations and maintenance, outlining how they are building new infrastructure, repairing or replacing assets, changing operations, and quantifying climate risks to assets. These are only a few of many more examples of addressing this issue.</td>
<td>We have added stating the health and productivity of aquatic and wetland ecosystems are also closely linked to the water sector. We also explicitly link to the Ecosystems Chapter. Effects on species are key and the scope of this new overview chapter.</td>
</tr>
<tr>
<td>Aimee</td>
<td>Deutch</td>
<td>140195</td>
<td>Whole Chapter</td>
<td>03. Water</td>
<td></td>
<td>145</td>
<td>148</td>
<td>5</td>
<td></td>
<td>The assessment and its clarion call for adaptation strategies to mitigate the threats to our water supplies, ecosystems, and infrastructure of many waterways across the U.S. is an overly broad statement. Design codes and operational guidelines can and are updated as conditions change. In addition to resources previously mentioned (such as AWWA/ASCE &amp; ASCE/SEI Guidelines for Appropriate Management of Water and Wastewater Systems), several states (for example, Maryland) have set federal standards to elevate state-sponsored structures above predicted floodwaters, including those that will be impacted by sea level rise. In its report on Climate Risks to Water Utility Assets and Infrastructure, the Water Utility Climate Alliance describes utility responses to climate or extreme weather risk through planning, capital infrastructure, managing asset risk, and operations and maintenance, outlining how they are building new infrastructure, repairing or replacing assets, changing operations, and quantifying climate risks to assets. These are only a few of many more examples of addressing this issue.</td>
<td>We have added stating the health and productivity of aquatic and wetland ecosystems are also closely linked to the water sector. We also explicitly link to the Ecosystems Chapter. Effects on species are key and the scope of this new overview chapter.</td>
</tr>
<tr>
<td>Aimee</td>
<td>Deutch</td>
<td>140196</td>
<td>Whole Chapter</td>
<td>03. Water</td>
<td></td>
<td>149</td>
<td>152</td>
<td>9</td>
<td></td>
<td>We appreciate your statement of concern and the support of the values with climate and water.</td>
<td></td>
</tr>
<tr>
<td>Aimee</td>
<td>Deutch</td>
<td>140187</td>
<td>Whole Chapter</td>
<td>03. Water</td>
<td></td>
<td>165</td>
<td>168</td>
<td>9</td>
<td></td>
<td>Most of the figures are groundwater depletion. While this is critical, it could be helpful to add figures showing some of the other key climate change impacts in the water sector, e.g., increased rain, changes in soil moisture, and/or extent of water quality issues.</td>
<td>We include figures showing groundwater depletion, flood and drought disaster and their impact, and anticipated imbalances in water supply and demand. After discussion, we think these are appropriate to support key messages in the water chapter.</td>
</tr>
<tr>
<td>Aimee</td>
<td>Deutch</td>
<td>140188</td>
<td>Fed Region</td>
<td>03. Water</td>
<td></td>
<td>175</td>
<td>178</td>
<td>9</td>
<td></td>
<td>This is a nice list of examples, but rather than a regional overview (that highlights the key overarching concerns for each region), it is more like a snapshot of great examples, organized by regions. Perhaps either (a) improve the introductory sentence to clarify that this is not meant to exhaustively represent problems within the region(s) or (b) remove the bulleted region titles at the front of each bulleted list to ensure that each covers the major water-related concerns for each region.</td>
<td>The text has been revised to explicitly include examples of the water infrastructure we refer to (e.g., dams, levees, aqueducts).</td>
</tr>
<tr>
<td>Aimee</td>
<td>Deutch</td>
<td>140189</td>
<td>Fed Region</td>
<td>03. Water</td>
<td></td>
<td>181</td>
<td>184</td>
<td>9</td>
<td></td>
<td>This is a nice list of examples, but rather than a regional overview (that highlights the key overarching concerns for each region), it is more like a snapshot of great examples, organized by regions. Perhaps either (a) improve the introductory sentence to clarify that this is not meant to exhaustively represent problems within the region(s) or (b) remove the bulleted region titles at the front of each bulleted list to ensure that each covers the major water-related concerns for each region.</td>
<td>The text has been revised to explicitly include examples of the water infrastructure we refer to (e.g., dams, levees, aqueducts).</td>
</tr>
</tbody>
</table>

Concerned Scientists of the U.S. Global Change Research Program (USGCRP) strongly believe that “no comprehensive assessment exists” is an overstatement. While it is true that the U.S. Global Change Research Program (NCA4) chapter, which recently mentions the effects of climate changes on aquatic species and biodiversity, despite the fact that the loss and degradation of wetland, stream and other aquatic habitats has been a major driver of species extinction, requiring action to prevent species extinction. For instance, of the 712 domestic animal species currently listed as “endangered” or “threatened,” nearly half are from states that depend on water resources for all or part of their life cycle, including 104 fish, 89 birds and mussels, 35 amphibians and 28 crustaceans. Many other listed taxa, including aquatic and terrestrial species, depend on aquatic environments: plants (algae, seagrasses and reed beds); insects (naucorids, dragonflies, damselflies and riffle beetles); and birds (shoebill crane, southwestern willow flycatcher, yellow-billed cuckoo, wood stork and clapper rails). In fact, thousands of rare, imperiled, and more common species depend upon seasonal or annual water sources. Many of these species are imperiled due to a wide range of legacy impacts on wetlands and waterways. Our climate change model projects a loss and degradation, warming and diversion, and an array of pollutants. Climate change will exacerbate and pose new threats on these systems. Considering the amount and timing of hydrospheric flow, altered scouring and sedimentation, changing levels of dissolved oxygen, and harmful algal blooms and the totality of pollutants. The idea that “no comprehensive assessment exists” seems in conflict with the preceding sentence. Explain why the $4 trillion estimate was not comprehensive (and what it did include). The statement that “statistical methods have been developed for climate risk and frequency analysis (CSA), but have not yet been incorporated into infrastructure design codes and operational guidelines” is an overly broad statement. Design codes and operational guidelines can and are updated as conditions change. The committee’s statement on the need to incorporate climate change analysis into infrastructure design codes and operating guidelines reflects the current need for increased adaptation in the water sector. This is not the first recommendation of its kind. The statement that “statistical methods have been developed for climate risk and frequency analysis (CSA), but have not yet been incorporated into infrastructure design codes and operational guidelines” is an overly broad statement. Design codes and operational guidelines can and are updated as conditions change. In addition to resources previously mentioned (such as AWWA/ASCE & ASCE/SEI Guidelines for Appropriate Management of Water and Wastewater Systems), several states (for example, Maryland) have set federal standards to elevate state-sponsored structures above predicted floodwaters, including those that will be impacted by sea level rise. In its report on Climate Risks to Water Utility Assets and Infrastructure, the Water Utility Climate Alliance describes utility responses to climate or extreme weather risk through planning, capital infrastructure, managing asset risk, and operations and maintenance, outlining how they are building new infrastructure, repairing or replacing assets, changing operations, and quantifying climate risks to assets. These are only a few of many more examples of addressing this issue. We have added stating the health and productivity of aquatic and wetland ecosystems are also closely linked to the water sector. We also explicitly link to the Ecosystems Chapter. Effects on species are key and the scope of this new overview chapter. | Our main point is that, in many regions, historical observations indicate change in statistics of extremes. However, methods developed for accounting the observed changes have not been integrated in infrastructure design codes and operational guidelines. We agree that this issue is mentioned in several publications, including the American Water Works Association’s (AWWA) report among others. However, AWWA’s report is not an official design code. |

January 31, 2018
Hooray, a specific example of why I always am urging that the word "Earth" be capitalized when referring to the planet, that they do not make that change here.

Another use of the word "may" that needs to be converted to the likelihood lexicon. For example, here "may" could be replaced by "will" or "very likely" or something similar.

The text has been revised as suggested.

The text has been revised as suggested.

The text has been revised to clarify that it refers to simultaneous flooding across a large area.

The text has been revised as suggested.

The text has been revised as suggested.

The text has been revised as suggested.

The text has been revised to simplify the specified sentence, including punctuation.

The text has been revised to shorten and clarify the specified sentence, including punctuation.

The text has been revised as suggested.

The text has been revised to clarify Earth, the planet, that they do not make that change here.

The text has been revised to shorten and clarify the specified sentence, including punctuation.

The text has been revised as suggested.

The text has been revised to clarify that it refers to simultaneous flooding across a large area.

The text has been revised to clarify Earth, the planet, that they do not make that change here.

The text has been revised to clarify Earth, the planet, that they do not make that change here.
In this section, there is a discussion of mitigation efforts that may or may not reduce the impacts of climate change. All this, the extent to which mitigation actions are introduced in this section, it appears there is an opportunity to be more specific on mitigation efforts and thus opportunities that energy efficiency and appliance standards could have to reduce emissions and adaptability reduce some risk to the grid. The section has been revised to better address how planning is moving forward despite the uncertainty, while acknowledging the uncertainty.

The section makes a speculative claim that is based primarily on speculative computer projections that are far too sensitive to human emissions. Asserting this speculative threat as an established physical fact is false. This text probably violates the Information Quality Act requirement that federal agencies ensure and provide a realistic assessment of the uncertainties and the quality, objectivity, utility, and integrity of information it disseminates. The text should be revised to correct this

The text has been revised as suggested.

Comment accepted and sentence modified.

Regarding this text: If increasing, the energy system is effected by 3 climate change and extreme weather events, threatening more frequent and longer-lasting 10 power outages. Comment: This text makes a speculative claim that is based primarily on speculative computer projections that are far too sensitive to human emissions. Asserting this speculative threat as an established physical fact is false. This text probably violates the Information Quality Act requirement that federal agencies ensure and provide a realistic assessment of the uncertainties and the quality, objectivity, utility, and integrity of information it disseminates. The text should be revised to correct this.
recommend maintaining or increasing the on-site fuel capabilities of certain generation facilities as a potential incident involving one coal plant in Northern Minnesota (Houser, Larsen, and Marsters, The Real Electricity; those customer-hours that were lost due to fuel supply disruption between 2012-2016 were related to a single units and 6% of its nuclear generating units were retired. The same period also featured two of the coldest. to generators appear to be virtually nonexistent. A mere 0.00007% of customer-hours lost to outage were deliverability challenges in the past (DOE 2017b). We strongly advise striking the above sentence as multiple resources is one way to improve fuel assurance, but most generation technologies have experienced fuel. It would also be useful to unpack this sentence to make it more accessible to increased transmission, and energy storage technologies are being explored as ways to enhance system and population that could be impacted by when electricity generation facilities or of infrastructure are down. Especially in regard to the range of sea level rise scenarios that are stated in the paragraph. It is advisable to unpack it and emphasize the increase in power prices driven by the increased demand for cooling as well as the strain on the reliability of the transmission system that the increased demand could cause. Here is a suggested revision: “Rising temperatures will drive more severe heat stress conditions, which in turn, widens the use of solar and wind as it keeps growing. It is surprising that the number of electricity generation facilities and oil refinery in the Southeast that could happen, the results will be severe and catastrophic. With this in mind, it would be very beneficial and helpful in terms of understanding and visualizing the impacts if there is a graph that shows the geographical area and "Dryer conditions may also increase the risk of wildfires and damages to energy systems." It would be useful to explain what is meant by energy systems, perhaps by enumerating an example of two. rising temperature will allow “...” seems somewhat complex for the general public to grasp. It is a drastic to unpack it and emphasize the increase in power prices driven by the increased demand for cooling as well as the strain on the reliability of the transmission system that the increased demand could cause. Here is a suggested revision: “Rising temperatures will drive more severe heat stress conditions, which in turn, widens the use of solar and wind as it keeps growing. It is surprising that the number of electricity generation facilities and oil refinery in the Southeast that could happen, the results will be severe and catastrophic. With this in mind, it would be very beneficial and helpful in terms of understanding and visualizing the impacts if there is a graph that shows the geographical area and "Dryer conditions may also increase the risk of wildfires and damages to energy systems." It would be useful to explain what is meant by energy systems, perhaps by enumerating an example of two. rising temperature will allow “...” seems somewhat complex for the general public to grasp. It is a drastic to unpack it and emphasize the increase in power prices driven by the increased demand for cooling as well as the strain on the reliability of the transmission system that the increased demand could cause. Here is a suggested revision: “Rising temperatures will drive more severe heat stress conditions, which in turn, widens the use of solar and wind as it keeps growing. It is surprising that the number of electricity generation facilities and oil refinery in the Southeast that could happen, the results will be severe and catastrophic. With this in mind, it would be very beneficial and helpful in terms of understanding and visualizing the impacts if there is a graph that shows the geographical area and "Dryer conditions may also increase the risk of wildfires and damages to energy systems." It would be useful to explain what is meant by energy systems, perhaps by enumerating an example of two. rising temperature will allow “...” seems somewhat complex for the general public to grasp. It is a drastic to unpack it and emphasize the increase in power prices driven by the increased demand for cooling as well as the strain on the reliability of the transmission system that the increased demand could cause. Here is a suggested revision: “Rising temperatures will drive more severe heat stress conditions, which in turn, widens the use of solar and wind as it keeps growing. It is surprising that the number of electricity generation facilities and oil refinery in the Southeast that could happen, the results will be severe and catastrophic. With this in mind, it would be very beneficial and helpful in terms of understanding and visualizing the impacts if there is a graph that shows the geographical area and "Dryer conditions may also increase the risk of wildfires and damages to energy systems." It would be useful to explain what is meant by energy systems, perhaps by enumerating an example of two. rising temperature will allow “...” seems somewhat complex for the general public to grasp. It is a drastic to unpack it and emphasize the increase in power prices driven by the increased demand for cooling as well as the strain on the reliability of the transmission system that the increased demand could cause. Here is a suggested revision: “Rising temperatures will drive more severe heat stress conditions, which in turn, widens the use of solar and wind as it keeps growing. It is surprising that the number of electricity generation facilities and oil refinery in the Southeast that could happen, the results will be severe and catastrophic. With this in mind, it would be very beneficial and helpful in terms of understanding and visualizing the impacts if there is a graph that shows the geographical area and "Dryer conditions may also increase the risk of wildfires and damages to energy systems." It would be useful to explain what is meant by energy systems, perhaps by enumerating an example of two. rising temperature will allow “...” seems somewhat complex for the general public to grasp. It is a drastic to unpack it and emphasize the increase in power prices driven by the increased demand for cooling as well as the strain on the reliability of the transmission system that the increased demand could cause. Here is a suggested revision: “Rising temperatures will drive more severe heat stress conditions, which in turn, widens the use of solar and wind as it keeps growing. It is surprising that the number of electricity generation facilities and oil refinery in the Southeast that could happen, the results will be severe and catastrophic. With this in mind, it would be very beneficial and helpful in terms of understanding and visualizing the impacts if there is a graph that shows the geographical area and "Dryer conditions may also increase the risk of wildfires and damages to energy systems." It would be useful to explain what is meant by energy systems, perhaps by enumerating an example of two. rising temperature will allow “...” seems somewhat complex for the general public to grasp. It is a drastic to unpack it and emphasize the increase in power prices driven by the increased demand for cooling as well as the strain on the reliability of the transmission system that the increased demand could cause. Here is a suggested revision: “Rising temperatures will drive more severe heat stress conditions, which in turn, widens the use of solar and wind as it keeps growing. It is surprising that the number of electricity generation facilities and oil refinery in the Southeast that could happen, the results will be severe and catastrophic. With this in mind, it would be very beneficial and helpful in terms of understanding and visualizing the impacts if there is a graph that shows the geographical area and "Dryer conditions may also increase the risk of wildfires and damages to energy systems." It would be useful to explain what is meant by energy systems, perhaps by enumerating an example of two. rising temperature will allow “...” seems somewhat complex for the general public to grasp. It is a drastic to unpack it and emphasize the increase in power prices driven by the increased demand for cooling as well as the strain on the reliability of the transmission system that the increased demand could cause. Here is a suggested revision: “Rising temperatures will drive more severe heat stress conditions, which in turn, widens the use of solar and wind as it keeps growing. It is surprising that the number of electricity generation facilities and oil refinery in the Southeast that could happen, the results will be severe and catastrophic. With this in mind, it would be very beneficial and helpful in terms of understanding and visualizing the impacts if there is a graph that shows the geographical area and "Dryer conditions may also increase the risk of wildfires and damages to energy systems." It would be useful to explain what is meant by energy systems, perhaps by enumerating an example of two. rising temperature will allow “...” seems somewhat complex for the general public to grasp. It is a drastic to unpack it and emphasize the increase in power prices driven by the increased demand for cooling as well as the strain on the reliability of the transmission system that the increased demand could cause. Here is a suggested revision: “Rising temperatures will drive more severe heat stress conditions, which in turn, widens the use of solar and wind as it keeps growing. It is surprising that the number of electricity generation facilities and oil refinery in the Southeast that could happen, the results will be severe and catastrophic. With this in mind, it would be very beneficial and helpful in terms of understanding and visualizing the impacts if there is a graph that shows the geographical area and "Dryer conditions may also increase the risk of wildfires and damages to energy systems." It would be useful to explain what is meant by energy systems, perhaps by enumerating an example of two.
The energy sector is undergoing substantial policy, market, and technology-driven changes. You do a very nice job describing the market and technology changes but you don’t explain what is meant by substantial policy changes.

The chapter refers to a climate ready energy system. In some instances a hyphen is used between climate and put more emphasis on the growing importance of these demand-side and storage technologies in enhancing grid flexibility as the optimal means of ensuring reliability and resilience (Chang, Aydin, Pfeifenberger, Spees, The Brattle Group has recently outlined in detail how RTOs and system planners are beginning to favor increased energy storage, demand response and renewable energy are better tools to meet our energy needs, New England and driving up prices: https://www.edf.org/sites/default/files/vertical-market-power.pdf), and pipelines (here’s a recent study on how withholding of gas pipeline capacity may be artificially limiting supply in New England and driving up prices: https://www.nrdc.org/features/default/files/commodity-markets-power.pdf.pdf).

Several other comments also touch on similar themes of broadening discussion beyond emphasis on infrastructure hardening including finance measures, storage, smart grids, and distributed generation. New language has been incorporated into the chapter to place greater emphasis on these points. The discussion under Key Message 1 was revised to include the key points and the reference provided by the commenter.

The BRITTLE GROUP has recently outlined in detail how RTOs and system planners are beginning to favor increased energy storage, demand response and renewable energy are better tools to meet our energy needs, New England and driving up prices: https://www.edf.org/sites/default/files/vertical-market-power.pdf.pdf), and pipelines (here’s a recent study on how withholding of gas pipeline capacity may be artificially limiting supply in New England and driving up prices: https://www.nrdc.org/features/default/files/commodity-markets-power.pdf.pdf).

Several other comments also touch on similar themes of broadening discussion beyond emphasis on infrastructure hardening including finance measures, storage, smart grids, and distributed generation. New language has been incorporated into the chapter to place greater emphasis on these points. The discussion under Key Message 1 was revised to include the key points and the reference provided by the commenter.

We strongly recommend the section authors refer to the comments to the recent DOE proposed Grid Resiliency Filing Rule, recently rejected by FERC available in the FERC docket number RM18-1, found at https://www.ferc.gov/industries/energy-markets-and-planning/market-operations-and-rates/demand-response/a2352435569912a6f-97c1-ea57-9556-8675f7d62217.pdf, where multiple groups reasonably argue that there is no evidence that fuel secure generation is linked to reliability, and that the vast majority of electric service disruptions in the U.S. are virtually all linked to transmission and distribution outages, not unscheduled generation outages. In particular, we would recommend consulting comments submitted by the following groups, and dealing with this particular issue: The Rhodium Group (found in the FERC docket mentioned above), and the ENSR Electric (also found here: http://www.ensr.com/energy/filing_COMMENT.pdf)

We thank the reviewer for this comment. We have added text at lines 2 and 5 on page 170, to make the role of the commentor clear.

The authors appreciate the comment about the FERC-reconsidering and believe that the major points made by the commenter have been addressed in the various sections of the chapter, including pointing out that coal and nuclear generation have not been shown to be more resilient than other sources, citing examples in which these generation failed to function during extreme weather events because the fuel supplies froze, flooded or were otherwise unavailable (see page 174). As well as points out that transmission issues, rather than generation issues, have historically been the principal cause of significant disruptions.

We thank the reviewer for this comment. We have added text at lines 2 and 5 on page 170, to make the role of the commentor clear.

We strongly recommend the section authors refer to the comments to the recent DOE proposed Grid Resiliency Filing Rule, recently rejected by FERC available in the FERC docket number RM18-1, found at https://www.ferc.gov/industries/energy-markets-and-planning/market-operations-and-rates/demand-response/a2352435569912a6f-97c1-ea57-9556-8675f7d62217.pdf, where multiple groups reasonably argue that there is no evidence that fuel secure generation is linked to reliability, and that the vast majority of electric service disruptions in the U.S. are virtually all linked to transmission and distribution outages, not unscheduled generation outages. In particular, we would recommend consulting comments submitted by the following groups, and dealing with this particular issue: The Rhodium Group (found in the FERC docket mentioned above), and the ENSR Electric (also found here: http://www.ensr.com/energy/filing_COMMENT.pdf)

We thank the reviewer for this comment. We have added text at lines 2 and 5 on page 170, to make the role of the commentor clear.

The authors appreciate the comment about the FERC-reconsidering and believe that the major points made by the commenter have been addressed in the various sections of the chapter, including pointing out that coal and nuclear generation have not been shown to be more resilient than other sources, citing examples in which these generation failed to function during extreme weather events because the fuel supplies froze, flooded or were otherwise unavailable (see page 174). As well as points out that transmission issues, rather than generation issues, have historically been the principal cause of significant disruptions.

We thank the reviewer for this comment. We have added text at lines 2 and 5 on page 170, to make the role of the commentor clear.

The book is divided into two parts: the first part provides a historical overview of the energy sector, while the second part focuses on specific technologies and their impact on grid resilience. New language has been incorporated into the chapter to place greater emphasis on these points.

We strongly recommend the section authors refer to the comments to the recent DOE proposed Grid Resiliency Filing Rule, recently rejected by FERC available in the FERC docket number RM18-1, found at https://www.ferc.gov/industries/energy-markets-and-planning/market-operations-and-rates/demand-response/a2352435569912a6f-97c1-ea57-9556-8675f7d62217.pdf, where multiple groups reasonably argue that there is no evidence that fuel secure generation is linked to reliability, and that the vast majority of electric service disruptions in the U.S. are virtually all linked to transmission and distribution outages, not unscheduled generation outages. In particular, we would recommend consulting comments submitted by the following groups, and dealing with this particular issue: The Rhodium Group (found in the FERC docket mentioned above), and the ENSR Electric (also found here: http://www.ensr.com/energy/filing_COMMENT.pdf)

We thank the reviewer for this comment. We have added text at lines 2 and 5 on page 170, to make the role of the commentor clear.

The authors appreciate the comment about the FERC-reconsidering and believe that the major points made by the commenter have been addressed in the various sections of the chapter, including pointing out that coal and nuclear generation have not been shown to be more resilient than other sources, citing examples in which these generation failed to function during extreme weather events because the fuel supplies froze, flooded or were otherwise unavailable (see page 174). As well as points out that transmission issues, rather than generation issues, have historically been the principal cause of significant disruptions.

We thank the reviewer for this comment. We have added text at lines 2 and 5 on page 170, to make the role of the commentor clear.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>Start Line</th>
<th>End Page</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patrick</td>
<td>Michaels</td>
<td>141320</td>
<td>Coordinating Committee</td>
<td>OK</td>
<td>Energy</td>
<td>172</td>
<td>131</td>
<td>19</td>
<td>43</td>
<td></td>
<td>This section discusses increases in energy demands. To what extent is there information on how changes in the built environment, e.g. more energy efficient homes, urban areas, etc. Can offset increases in energy use due to air conditioning? Can the box be deleted from the chapter on the built environment? Discussing what is known about links between changes in the built environment and energy demands, and how they interact around adaptation issues could be useful.</td>
</tr>
<tr>
<td>wiping</td>
<td>Sohi</td>
<td>141389</td>
<td>Ted Region</td>
<td>OK</td>
<td>Energy</td>
<td>109</td>
<td>69</td>
<td>20</td>
<td>26</td>
<td>Here is the present text: 10 Key Message 3: Actions are being taken to enhance energy security, reliability, and resilience 10 with respect to the effects of climate change and extreme weather. This progress occurs 11 through improved data collection, modeling, and analysis to support resilience planning, and 12 the deployment of new, innovative energy technologies for hardening energy assets against 13 extreme weather hazards. Although barriers remain, opportunities exist to enhance energy 14 system resilience. The message is so vague that it is meaningless. However, the assumption seems to be that there are increased risks coming from climate change and extreme weather. This is speculation falsely asserted as established physical fact. There is no scientific message here. It is increasingly likely that what little human caused climate change there is will benefit. The fact that the CMIP5 models run hot is well known. See just as an example: “Late summering: The New Climate Science that Changes Everything,” Patrick J. Michaels and Paul C. Knappenberger, Cato Institute, June 2014. <a href="https://www.cato.org/publication/late-summering">https://www.cato.org/publication/late-summering</a></td>
<td>We thank the reviewer for their engagement. Given that the federal government is required to report to Congress under the Global Change Research Act of 1990, and that NCA4 is being prepared to comply with this directive, the suggestion appears to be outside the scope of this chapter and the NCA.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142400</td>
<td>Ted Region</td>
<td>OK</td>
<td>Energy</td>
<td>126</td>
<td>105</td>
<td>8</td>
<td>12</td>
<td>We recommend breaking up the second sentence in Key Message 1. In its current form it is easy for the reader to lose the message. For instance, change to: (Increasingly, the energy system is affected by climate change and extreme weather events, threatening more frequent and longer lasting power outages. Such outcomes affect critical energy infrastructure and create fuel supply and demand imbalances. Cascading impacts on other critical sectors could affect the Nation’s economic and national security. Supply and demand imbalances is suggested in place of availability and shortage imbalances because the term shortage already implies there is an imbalance, making the worst redundant. Alternatively, you could use availability and demand.</td>
<td>Comment accepted and sentence modified.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142401</td>
<td>Ted Region</td>
<td>OK</td>
<td>Energy</td>
<td>178</td>
<td>170</td>
<td>17</td>
<td>19</td>
<td>This sentence is a fragment. We recommend changing it to: ...enables modern electricity dependent critical infrastructures that support... to... enables modern electricity dependent critical infrastructures to support...</td>
<td>We thank the reviewer for the comment. We have adapted the recommendation.</td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142424</td>
<td>Ted Region</td>
<td>OK</td>
<td>Energy</td>
<td>170</td>
<td>170</td>
<td>19</td>
<td>19</td>
<td>The Suggested change was made.</td>
<td>The suggested change was made.</td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>141313</td>
<td>Whole</td>
<td>Energy</td>
<td>567</td>
<td>567</td>
<td>10</td>
<td>34</td>
<td>Add to this paragraph that the increase in temperature of the cooling water will decrease the generation of electricity. Two examples are cited in these articles: <a href="https://greenblogs.nytimes.com/2013/09/13/heat-shuts-down-a-coastal">https://greenblogs.nytimes.com/2013/09/13/heat-shuts-down-a-coastal</a>...</td>
<td>The text has been modified to refer to impact of both increases in air and water temperatures.</td>
<td></td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>141313</td>
<td>Whole</td>
<td>Energy</td>
<td>567</td>
<td>567</td>
<td>10</td>
<td>34</td>
<td><a href="https://www.scalablewatch.org/2015/08/pilgrim-in-hot-water/">https://www.scalablewatch.org/2015/08/pilgrim-in-hot-water/</a></td>
<td>The text has been modified to refer to impact of both increases in air and water temperatures.</td>
<td></td>
</tr>
<tr>
<td>off</td>
<td>Lukas</td>
<td>141389</td>
<td>Ted Region</td>
<td>OK</td>
<td>Energy</td>
<td>109</td>
<td>69</td>
<td>20</td>
<td>26</td>
<td>Here is the present text: 10 Key Message 2: Changes in energy technologies, markets, and policies are affecting the energy system. It is increasingly likely that climate change and extreme weather, among other factors, will impact the Nation’s economic and national security. The use of the term “likely” to describe these cost increases should be carefully justified. Almost any long term energy cost projection is highly uncertain and dependent on many factors such as technology development, urban adaptation, etc. You might be better to use, “under assumptions about technology development, etc.”. To indicate that the determination of “likely” is conditioned on the starting assumptions in the model.</td>
<td>We thank the reviewer for the comment. We have adopted the recommendation.</td>
</tr>
<tr>
<td>greater</td>
<td>clarity has been incorporated into the text.</td>
<td>Comment accepted and sentence modified.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>141320</td>
<td>Ted Region</td>
<td>OK</td>
<td>Energy</td>
<td>692</td>
<td>662</td>
<td>21</td>
<td>31</td>
<td>The section discusses increases in energy demands. To what extent is there information on how changes in the built environment, e.g. more energy efficient homes, urban areas, etc. Can offset increases in energy use due to air conditioning? Can the box be deleted from the chapter on the built environment? Discussing what is known about links between changes in the built environment and energy demands, and how they interact around adaptation issues could be useful.</td>
<td>We thank the reviewer for the suggestion. We have added text at line 5 on page 170 to address the general suggestion.</td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>141321</td>
<td>Ted Region</td>
<td>OK</td>
<td>Energy</td>
<td>668</td>
<td>688</td>
<td>14</td>
<td>16</td>
<td>Should condition these statements to reflect that emissions of other pollutants such as NOx and SO2 may be linked by current regulations, e.g. SO2 links and NOx limits required to meet national ambient air quality standards. As a result, any increase in energy demands will have to be met using technologies that do not increase emissions beyond regulated levels.</td>
<td>Comment accepted and sentence modified.</td>
</tr>
<tr>
<td>Socail Science</td>
<td>Coordinating Committee</td>
<td>141322</td>
<td>Ted Region</td>
<td>OK</td>
<td>Energy</td>
<td>688</td>
<td>678</td>
<td>14</td>
<td>17</td>
<td>The use of the term “likely” to describe these cost increases should be carefully justified. Almost any long term energy cost projection is highly uncertain and dependent on many factors such as technology development, urban adaptation, etc. You might be better to use, “under assumptions about technology development, etc.”. To indicate that the determination of “likely” is conditioned on the starting assumptions in the model.</td>
<td>Comment accepted and sentence modified.</td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>141323</td>
<td>Ted Region</td>
<td>OK</td>
<td>Energy</td>
<td>502</td>
<td>506</td>
<td>14</td>
<td>17</td>
<td>The potential drought is only one of the climate-related pathways that affect wildfire frequency, intensity, and areal coverage. What does the scientific evidence say about the overall risks to energy production from increased wildfire risks due to climate change?</td>
<td>We appreciate the reviewer’s thoughtful comment. We have added the text at line 5 on page 170 to address the general suggestion.</td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>141324</td>
<td>Ted Region</td>
<td>OK</td>
<td>Energy</td>
<td>171</td>
<td>171</td>
<td>15</td>
<td>20</td>
<td>The provision of a listing of actions that are being taken is increase resilience of the energy system. Does the scientific literature provide any assessments of the likelihood that these measures will be effective in addressing the climate-related risks under different climate scenarios? It will be very helpful to policymakers to know the scientific literature provide any assessments of the likelihood that these measures will be effective in addressing the climate-related risks under different climate scenarios? It will be very helpful to policymakers to know the</td>
<td>Comment accepted and sentence modified.</td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>141325</td>
<td>Ted Region</td>
<td>OK</td>
<td>Energy</td>
<td>171</td>
<td>171</td>
<td>14</td>
<td>20</td>
<td>We recommend breaking up the second sentence in Key Message 1. In its current form it is easy for the reader to lose the message. For instance, change to: (Increasingly, the energy system is affected by climate change and extreme weather events, threatening more frequent and longer lasting power outages. Such outcomes affect critical energy infrastructure and create fuel supply and demand imbalances. Cascading impacts on other critical sectors could affect the Nation’s economic and national security. Supply and demand imbalances is suggested in place of availability and shortage imbalances because the term shortage already implies there is an imbalance, making the worst redundant. Alternatively, you could use availability and demand.</td>
<td>Comment accepted and sentence modified. There is no scientific message here. It is increasingly likely that what little human caused climate change there is will benefit. The fact that the CMIP5 models run hot is well known. See just as an example: “Late summering: The New Climate Science that Changes Everything,” Patrick J. Michaels and Paul C. Knappenberger, Cato Institute, June 2014. We thank the reviewer for the suggestion. Given that the federal government is required to report to Congress under the Global Change Research Act of 1990, and that NCA4 is being prepared to comply with this directive, the suggestion appears to be outside the scope of this chapter and the NCA.</td>
</tr>
</tbody>
</table>
Page Reference Comment
163 fig. 19. I would be more in keeping with the standard practice to refer to the four components of the energy system—production, transmission, distribution, and consumption. Several references and DOE diagrams (carnations) use the nomenclature. Though it is somewhat address on page 176. It can be more explicitly stated. Several instances in several places, the text states "extreme weather and climate change". This can be more helpful and confusing. Climate change induces more frequent extremes. It would helpful to explain clearly that "Weather impacts the operations of energy components, while climate and climate change impacts the design of those components." Explain please that energy is the only commodity that is sold instant it is produced. Energy systems operate on a four second refresh cycle. Weather is the primary threat to the safe delivery of energy. Climate, on the other hand, is used for the design of future energy systems. Renewables energy is inevitable as the next step in the energy evolution. Whereas previous energy infrastructure was "one-way" from production to consumption, renewable energy production can be on the "consumption" or "end of the energy system. Two-way production to consumption is a new design criteria, not only accounting for the need to reduce CO2 emissions, but also accounting for the realities of local distributed production, at the point of consumption. Local production becomes more necessary in changing climate. 173 fig 15 Good point: "Because energy infrastructure is long lived, decisions about how to locate, expand, and modify will influence decades to come." Drove a parallel to climate. Decisions taken for infrastructure design, in the long term, require a project of the climate in which those infrastructure will operate. 172 Hardening Though the definition of "hardening" on line 12 is accurate, be more specific. "Hardening assets to climate" is common terminology for preparing energy systems for a severe weather event (or more frequent climate change induced extreme events). Make it more clear that power companies "harden" assets so that they can continue to function during a storm. Define assets: transformers, substations, switching boxes. State new assets tend to be in low-lying areas, coastal or not, they tend to be lot away from "prime" real estate. Define "hardening," e.g., installing new undergrounds around a substation. Make a distinction between "hardening" assets in place during a weather event (which may be more extreme and more frequent due to climate change) and RELOCATING assets. 173 key barriers A key barrier not mentioned is "hardening the role case". The ability of a utility to relocate an asset at the end of its life cycle is hindered by the physical constraints of the area. Comment accepted and sentence modified.

Line of Concerned Scientists 14.0003 Energy 04. Energy 164 K 5 The impact of climate on biofuels is briefly noted in a few areas, but it is not thoroughly discussed. For example, the competitor or climate change, and the possible impacts of changing climate & seasonality on suitability of land for biofuels (either current, or innovative future biofuels, which could theoretically be well-adapted to local climate, and improve climate change resilience). language has been added in response to the comment, including: "Research can also reduce the water needs of biofuel production and the possible impacts of changing climate on suitability of land for biofuel production, with innovative future biofuels that are adapted to local climates."

Comment accepted and sentence modified.

Line of Concerned Scientists 14.0004 Energy 04. Energy 163 N 5 The report should acknowledge the actions of deploying new innovative energy technologies that can both increase resilience and reduce emissions such as microgrids with wind, solar, biogas, storage and other low carbon technologies vs. focusing completely on hardening. We thank the reviewer for this comment. The proposed, broader topics are outside the scope of Vol. 2 of the NCA, which "analyzes the impacts of global change, as described in Volume 1 (Climate Science Special Report), on technologies vs. focusing completely on hardening."

Comment accepted and sentence modified.

Line of Concerned Scientists 14.0004 Energy 04. Energy 163 N 5 The report should acknowledge the actions of deploying new innovative energy technologies that can both increase resilience and reduce emissions such as microgrids with wind, solar, biogas, storage and other low carbon technologies vs. focusing completely on hardening. We thank the reviewer for this comment. The proposed, broader topics are outside the scope of Vol. 2 of the NCA, which "analyzes the impacts of global change, as described in Volume 1 (Climate Science Special Report), on technologies vs. focusing completely on hardening."

Comment accepted and sentence modified.

Line of Concerned Scientists 14.0004 Energy 04. Energy 163 N 5 The report should acknowledge the actions of deploying new innovative energy technologies that can both increase resilience and reduce emissions such as microgrids with wind, solar, biogas, storage and other low carbon technologies vs. focusing completely on hardening. We thank the reviewer for this comment. The proposed, broader topics are outside the scope of Vol. 2 of the NCA, which "analyzes the impacts of global change, as described in Volume 1 (Climate Science Special Report), on technologies vs. focusing completely on hardening."

Comment accepted and sentence modified.

Line of Concerned Scientists 14.0007 Energy 04. Energy 168 18 14 Heat waves could also be more destructive, cutting off cooling. We appreciate the suggestion but space is limited.

Comment accepted and sentence modified.

Line of Concerned Scientists 14.0008 Energy 04. Energy 170 170 4 10 This paragraph should mention microgrids as a new technology that can help improve resilience and reduce outages, particularly for critical infrastructure. We thank the reviewer for the comment, and have adopted the suggestion.

Line of Concerned Scientists 14.0009 Energy 04. Energy 171 171 5 5 It may be worth noting that stand-alone microgrids could help alleviate the escalation of outage impacts standalone microgrids are addressed in the chapter. No change to existing text.

Response
There are several issues raised in this set of comments. The authors modified the text to address many of the points including: hardening, key barriers, peak air temperatures. However a few comments were not addressed (please discuss any issues that are left unresolved).
<table>
<thead>
<tr>
<th>Year of Concerned Scientists</th>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union of Concerned Scientists</td>
<td>Jantarasami</td>
<td>LeBlanc</td>
<td>14-0101</td>
<td>Text Region</td>
<td>04. Energy</td>
<td>6.1</td>
<td>167</td>
<td>Recognizing that there is not much room for additional text in the Hydropower...</td>
<td>Comments accepted and text fixed and modified.</td>
<td></td>
</tr>
<tr>
<td>Union of Concerned Scientists</td>
<td>Jantarasami</td>
<td>LeBlanc</td>
<td>14-0042</td>
<td>Whole Chapter</td>
<td>04. Energy</td>
<td>Throughout the chapter and traceable accounts, the...</td>
<td>The authors believe this topic is out of scope for the chapter but is best addressed in the Mitigation and Adaptation Chapters.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Union of Concerned Scientists</td>
<td>Jantarasami</td>
<td>LeBlanc</td>
<td>14-0017</td>
<td>Text Region</td>
<td>04. Energy</td>
<td>173</td>
<td>173</td>
<td>He is an important conclusion sentence for the chapter, and it would be helpful to restate it more clearly.</td>
<td>Open reflection was determined that there was no need to distinguish between agricultural and hydrological drought, but didn’t modify it. The distinction in type of drought as it relates to the energy sector was determined not to be critical.</td>
<td></td>
</tr>
<tr>
<td>Union of Concerned Scientists</td>
<td>Jantarasami</td>
<td>LeBlanc</td>
<td>14-0027</td>
<td>Traceable Account</td>
<td>04. Energy</td>
<td>75</td>
<td>17</td>
<td>I suggest separating this bullet into two because climate change-related wildfire impacts is a complex issue...</td>
<td>Comments accepted and sentence modified.</td>
<td></td>
</tr>
<tr>
<td>Union of Concerned Scientists</td>
<td>Jantarasami</td>
<td>LeBlanc</td>
<td>14-0039</td>
<td>Traceable Account</td>
<td>04. Energy</td>
<td>174</td>
<td>180</td>
<td>The Traceable Accounts section could use a clearer link and overall editing to bring it up to level of some of the other chapters.</td>
<td>The authors appreciate the comment but in general believe that they have appropriately adapted and implemented the NRC guidelines for developing the traceable accounts.</td>
<td></td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>---------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144222</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>162</td>
<td>162</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144233</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>161</td>
<td>161</td>
<td>10</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144234</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>162</td>
<td>162</td>
<td>15</td>
<td>16</td>
<td>Should change “are more” to “are becoming more”</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144235</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>162</td>
<td>162</td>
<td>24</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144236</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>163</td>
<td>163</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144237</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>165</td>
<td>165</td>
<td>18</td>
<td>20</td>
<td>Should suggest another reason for additional energy demand related to transportation (electric cars, buses, etc.)</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144238</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>165</td>
<td>165</td>
<td>27</td>
<td>28</td>
<td>The problem is that the increased open water areas are often during the late fall to early spring when there can be lots of storm activity stirring up large waves. Indeed, the retreat of sea ice is allowing winds to stir up waves and enhance coastal erosion. In addition, with partial sea ice cover, the wind can move large sheets of sea ice around that can disrupt oil platforms and other operations. Indeed, this is why Russian is, so understandable, thinking it will be needing to have icebreakers around platforms to protect them from such wind-blown sea ice. I'd suggest at least indicating that there are also complications that can arise (even ignoring the consequences of software lacking upward from the sediments, etc.)</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144239</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>165</td>
<td>165</td>
<td>30</td>
<td>31</td>
<td>It's not just temperature that is rising--so is absolute humidity, and it takes something like 20 times as much energy to cool minds a degree as to cool dry air--so the energy demands of going to up-disproportionately at the wet bulb temperature rises. Taking actions to seal buildings and keep down interior moisture sources is thinking it will be needing to have icebreakers around platforms to protect them from such wind-blown sea ice. I'd suggest at least indicating that there are also complications that can arise (even ignoring the consequences of software lacking upward from the sediments, etc.)</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144240</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>165</td>
<td>165</td>
<td>31</td>
<td>33</td>
<td>It's an interesting change to be that the length and intensity of the heating season will tend to shrink and since a lot of home heating is by natural gas (or other liquid or gaseous fossil fuels), it would seem that D2 is more likely to keep rolling down in and lowering the cold season shrinking. So, saying just summer months is too narrow.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144241</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>166</td>
<td>166</td>
<td>3</td>
<td>5</td>
<td>It might help to say that comfort efficiency goes down due to warmer or being less dense--help the reader understand why. Could explain transmission problems in warmer weather--lines sagging, and so on.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144242</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>166</td>
<td>166</td>
<td>10</td>
<td>11</td>
<td>Again, would be good practice to avoid get rid of &quot;may&quot;</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144243</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>166</td>
<td>166</td>
<td>14</td>
<td>15</td>
<td>Don't you need to say it is increasing occurrence and intensity of extreme weather that is the principal contributor to the increase occurring because there is just more stuff out there that is vulnerable to extreme weather and/or why it is not being built to be more resilient than the earlier built infrastructure? In addition, it would be clearer the phrase of &quot;some automate wind farms&quot; was removed.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144244</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>166</td>
<td>166</td>
<td>17</td>
<td>18</td>
<td>Why understanding is the wind systems in Texas succumbed the recent hurricane better than the existing fossil energy systems--so why are renewable resources being highlighted here ahead of fossil systems, or at all? Indeed, reading the whole paragraph, most of the examples apply to fossil fuel facilities and not renewables, so why are renewables highlighted as problematic?</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144245</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>166</td>
<td>166</td>
<td>23</td>
<td>23</td>
<td>Why a good idea is to go underground high voltage direct current cable system for long distance transmission of electricity (just as done in Japan)</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144246</td>
<td>Figure/Table</td>
<td>04. Energy</td>
<td></td>
<td>157</td>
<td></td>
<td></td>
<td></td>
<td>If figure is going to appear missing? See my comments on some figure on earlier page.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144247</td>
<td>End Region</td>
<td>04. Energy</td>
<td></td>
<td>168</td>
<td>169</td>
<td>7</td>
<td>7</td>
<td>Not if, free level rise is as much as indicated, the demand will be down not to many people will have evaluated.</td>
</tr>
</tbody>
</table>
The following language addresses the comment: "Low lying energy facilities and systems located along inland waters or near the coasts are elevated risk of flooding from more intense precipitation, rising sea levels and the increased storm intensity." We thank the reviewer for the suggestion and have revised the sentence in line with suggestions.

The following sentence was added to the text in the chapter (Page 173 line 31): "Impediments to such action include the lack of a clear mitigation strategy, and where mitigation measures are pursued uncertainty concerning their actual effectiveness and timing of additional resilience investments.

We thank the reviewer for raising the question and suggestion a revision.

The following sentence was added to the text at page 173 line 11: "impediments to such action include the lack of a clear mitigation strategy, and where mitigation measures are pursued uncertainty concerning their actual effectiveness and timing of additional resilience investments.

We thank the reviewer for the suggestion and have revised the sentence in line with suggestions.

The following sentence was added to the text at page 173 line 11: "Impediments to such action include the lack of a clear mitigation strategy, and where mitigation measures are pursued uncertainty concerning their actual effectiveness and timing of additional resilience investments.

We thank the reviewer for the suggestion and have revised the sentence in line with suggestions.

The following sentence was added to the text at page 173 line 11: "Impediments to such action include the lack of a clear mitigation strategy, and where mitigation measures are pursued uncertainty concerning their actual effectiveness and timing of additional resilience investments.

We thank the reviewer for the suggestion and have revised the sentence in line with suggestions.

The following sentence was added to the text at page 173 line 11: "Impediments to such action include the lack of a clear mitigation strategy, and where mitigation measures are pursued uncertainty concerning their actual effectiveness and timing of additional resilience investments.

We thank the reviewer for the suggestion and have revised the sentence in line with suggestions.

The following sentence was added to the text at page 173 line 11: "Impediments to such action include the lack of a clear mitigation strategy, and where mitigation measures are pursued uncertainty concerning their actual effectiveness and timing of additional resilience investments.

We thank the reviewer for the suggestion and have revised the sentence in line with suggestions.
Focusing on keeping soil carbon pools in the soil.

The Amazon rain forest devastation is the cause of 50 ppm of the recent atmospheric CO2 rise. My report on this is here: https://www.journalofclimatechange.com/article/50ppmco2rise/.

The expectation stated is mere speculation, based mostly on questionable computer modeling that is well never occur.

50 ppm of the recent atmospheric CO2 rise. My report on this is here: https://www.journalofclimatechange.com/article/50ppmco2rise/.

The expectation stated is mere speculation, based mostly on questionable computer modeling that is well never occur.

The expectation stated is mere speculation, based mostly on questionable computer modeling that is well never occur.

The expectation stated is mere speculation, based mostly on questionable computer modeling that is well never occur.

50 ppm of the recent atmospheric CO2 rise. My report on this is here: https://www.journalofclimatechange.com/article/50ppmco2rise/.

The expectation stated is mere speculation, based mostly on questionable computer modeling that is well never occur.

The expectation stated is mere speculation, based mostly on questionable computer modeling that is well never occur.

The expectation stated is mere speculation, based mostly on questionable computer modeling that is well never occur.

The expectation stated is mere speculation, based mostly on questionable computer modeling that is well never occur.

The expectation stated is mere speculation, based mostly on questionable computer modeling that is well never occur.
The paragraph discussing the carbon balance dynamics of harvested wood products fails to prevent the complexity of this issue and the high level of uncertainty that remains regarding the long-term carbon pool created by wood products in the USA. This is problematic, as this area has received significant study in the intervening years. The sentence on this page may also be read as a call to action. The discussion on the net global impact of future forest management policies depends on a sustainable and growing rate of harvest removals—without presenting a counterpoint (i.e., that such increases in removals could have the consequence of increased stress on forests that are already contending with the impacts of climate change discussed in this chapter). Further, this paragraph should be revised for clarity. It is currently difficult to discern whether certain conclusions have to do with carbon balance issues (likely) or simply with wood product use questions.

We appreciate the review comments and have revised the language slightly to ensure consistency with the key message.

The paragraph discusses the role of uncertainty in decision-making, as illustrated in the figure, and carbon dynamics. The portion of the discussion was revised considerably to improve accuracy and clarify regarding carbon issues. The literature citations are highly relevant and accurately reflect the state of science.

The comment is consistent with the author team's thorough assessment of the science. Consistent with its Congressional mandate, this assessment is a technical report and does not include policy discussions of climate mitigation or adaptation.

We believe that this sentence is true and well-supported by scientific literature and management practice. No endorsement is provided—consistent with its Congressional mandate, this assessment is a technical report and does not include policy discussions of climate mitigation or adaptation.

The literature citations are highly relevant and accurately reflect the state of science.

This portion of the discussion was revised considerably to improve accuracy and clarify regarding carbon issues. The literature citations are highly relevant and accurately reflect the state of science.

We appreciate the review comments, and have revised the language slightly to ensure consistency with the key message.

We appreciate the review comments, and have revised the language highly to ensure consistency with the key message.

We agree that additional content would be helpful, and have added two sentences to clarify the historical context for insects and wildfire.

We appreciate the review comment and have added some examples to clarify the discussion.

We agree that additional content would be helpful.

We appreciate the review comments, and have added some discussion that addresses the uncertainty in response to climate change, plus an example (see response to comment 142890).

We agree that additional content would be helpful.

Author's view management for climate adaptation as important, it should be made more clear to what extent adaptation measures could be taken.

The literature citations are highly relevant and accurately reflect the state of science.

We appreciate the review comment, and have added some additional references to literature citations in the Figure 6.3 caption in order to clarify issues regarding area burned and fire severity.

We agree that additional content would be helpful. We also agree that additional content would be helpful.

The paragraph discussing the carbon balance dynamics of harvested wood products fails to prevent the complexity of this issue and the high level of uncertainty that remains regarding the long-term carbon pool created by wood products in the USA. This is problematic, as this area has received significant study in the intervening years. The sentence on this page may also be read as a call to action. The discussion on the net global impact of future forest management policies depends on a sustainable and growing rate of harvest removals—without presenting a counterpoint (i.e., that such increases in removals could have the consequence of increased stress on forests that are already contending with the impacts of climate change discussed in this chapter). Further, this paragraph should be revised for clarity. It is currently difficult to discern whether certain conclusions have to do with carbon balance issues (likely) or simply with wood product use questions.

We appreciate the review comments and have revised the language slightly to ensure consistency with the key message.

The paragraph discusses the role of uncertainty in decision-making, as illustrated in the figure, and carbon dynamics. The portion of the discussion was revised considerably to improve accuracy and clarify regarding carbon issues. The literature citations are highly relevant and accurately reflect the state of science.

We appreciate the review comments, and have revised the language slightly to ensure consistency with the key message.

We agree that additional content would be helpful, and have added two sentences to clarify the historical context for insects and wildfire.

We appreciate the review comment and have added some examples to clarify the discussion.

We agree that additional content would be helpful.

We appreciate the review comments, and have added some discussion that addresses the uncertainty in response to climate change, plus an example (see response to comment 142890).

We agree that additional content would be helpful.

We appreciate the review comment, and have added some additional references to literature citations in the Figure 6.3 caption in order to clarify issues regarding area burned and fire severity.

We agree that additional content would be helpful. We also agree that additional content would be helpful.

The paragraph discussing the carbon balance dynamics of harvested wood products fails to prevent the complexity of this issue and the high level of uncertainty that remains regarding the long-term carbon pool created by wood products in the USA. This is problematic, as this area has received significant study in the intervening years. The sentence on this page may also be read as a call to action. The discussion on the net global impact of future forest management policies depends on a sustainable and growing rate of harvest removals—without presenting a counterpoint (i.e., that such increases in removals could have the consequence of increased stress on forests that are already contending with the impacts of climate change discussed in this chapter). Further, this paragraph should be revised for clarity. It is currently difficult to discern whether certain conclusions have to do with carbon balance issues (likely) or simply with wood product use questions.

We appreciate the review comments and have revised the language slightly to ensure consistency with the key message.

The paragraph discusses the role of uncertainty in decision-making, as illustrated in the figure, and carbon dynamics. The portion of the discussion was revised considerably to improve accuracy and clarify regarding carbon issues. The literature citations are highly relevant and accurately reflect the state of science.

We appreciate the review comments, and have revised the language slightly to ensure consistency with the key message.

We agree that additional content would be helpful, and have added two sentences to clarify the historical context for insects and wildfire.

We appreciate the review comment and have added some examples to clarify the discussion.

We agree that additional content would be helpful.

We appreciate the review comments, and have added some discussion that addresses the uncertainty in response to climate change, plus an example (see response to comment 142890).

We agree that additional content would be helpful.

We appreciate the review comment, and have added some additional references to literature citations in the Figure 6.3 caption in order to clarify issues regarding area burned and fire severity.

We agree that additional content would be helpful. We also agree that additional content would be helpful.

The paragraph discussing the carbon balance dynamics of harvested wood products fails to prevent the complexity of this issue and the high level of uncertainty that remains regarding the long-term carbon pool created by wood products in the USA. This is problematic, as this area has received significant study in the intervening years. The sentence on this page may also be read as a call to action. The discussion on the net global impact of future forest management policies depends on a sustainable and growing rate of harvest removals—without presenting a counterpoint (i.e., that such increases in removals could have the consequence of increased stress on forests that are already contending with the impacts of climate change discussed in this chapter). Further, this paragraph should be revised for clarity. It is currently difficult to discern whether certain conclusions have to do with carbon balance issues (likely) or simply with wood product use questions.

We appreciate the review comments and have revised the language slightly to ensure consistency with the key message.

The paragraph discusses the role of uncertainty in decision-making, as illustrated in the figure, and carbon dynamics. The portion of the discussion was revised considerably to improve accuracy and clarify regarding carbon issues. The literature citations are highly relevant and accurately reflect the state of science.

We appreciate the review comments, and have revised the language slightly to ensure consistency with the key message.

We agree that additional content would be helpful, and have added two sentences to clarify the historical context for insects and wildfire.

We appreciate the review comment and have added some examples to clarify the discussion.

We agree that additional content would be helpful.

We appreciate the review comments, and have added some discussion that addresses the uncertainty in response to climate change, plus an example (see response to comment 142890).

We agree that additional content would be helpful.

We appreciate the review comment, and have added some additional references to literature citations in the Figure 6.3 caption in order to clarify issues regarding area burned and fire severity.

We agree that additional content would be helpful. We also agree that additional content would be helpful.

The paragraph discussing the carbon balance dynamics of harvested wood products fails to prevent the complexity of this issue and the high level of uncertainty that remains regarding the long-term carbon pool created by wood products in the USA. This is problematic, as this area has received significant study in the intervening years. The sentence on this page may also be read as a call to action. The discussion on the net global impact of future forest management policies depends on a sustainable and growing rate of harvest removals—without presenting a counterpoint (i.e., that such increases in removals could have the consequence of increased stress on forests that are already contending with the impacts of climate change discussed in this chapter). Further, this paragraph should be revised for clarity. It is currently difficult to discern whether certain conclusions have to do with carbon balance issues (likely) or simply with wood product use questions.

We appreciate the review comments and have revised the language slightly to ensure consistency with the key message.

The paragraph discusses the role of uncertainty in decision-making, as illustrated in the figure, and carbon dynamics. The portion of the discussion was revised considerably to improve accuracy and clarify regarding carbon issues. The literature citations are highly relevant and accurately reflect the state of science.

We appreciate the review comments, and have revised the language slightly to ensure consistency with the key message.

We agree that additional content would be helpful, and have added two sentences to clarify the historical context for insects and wildfire.

We appreciate the review comment and have added some examples to clarify the discussion.

We agree that additional content would be helpful.

We appreciate the review comments, and have added some discussion that addresses the uncertainty in response to climate change, plus an example (see response to comment 142890).

We agree that additional content would be helpful.

We appreciate the review comment, and have added some additional references to literature citations in the Figure 6.3 caption in order to clarify issues regarding area burned and fire severity.

We agree that additional content would be helpful. We also agree that additional content would be helpful.

The paragraph discussing the carbon balance dynamics of harvested wood products fails to prevent the complexity of this issue and the high level of uncertainty that remains regarding the long-term carbon pool created by wood products in the USA. This is problematic, as this area has received significant study in the intervening years. The sentence on this page may also be read as a call to action. The discussion on the net global impact of future forest management policies depends on a sustainable and growing rate of harvest removals—without presenting a counterpoint (i.e., that such increases in removals could have the consequence of increased stress on forests that are already contending with the impacts of climate change discussed in this chapter). Further, this paragraph should be revised for clarity. It is currently difficult to discern whether certain conclusions have to do with carbon balance issues (likely) or simply with wood product use questions.

We appreciate the review comments and have revised the language slightly to ensure consistency with the key message.

The paragraph discusses the role of uncertainty in decision-making, as illustrated in the figure, and carbon dynamics. The portion of the discussion was revised considerably to improve accuracy and clarify regarding carbon issues. The literature citations are highly relevant and accurately reflect the state of science.

We appreciate the review comments, and have revised the language slightly to ensure consistency with the key message.

We agree that additional content would be helpful, and have added two sentences to clarify the historical context for insects and wildfire.

We appreciate the review comment and have added some examples to clarify the discussion.

We agree that additional content would be helpful.

We appreciate the review comments, and have added some discussion that addresses the uncertainty in response to climate change, plus an example (see response to comment 142890).

We agree that additional content would be helpful.

We appreciate the review comment, and have added some additional references to literature citations in the Figure 6.3 caption in order to clarify issues regarding area burned and fire severity.
This is not a universally true statement. See 2011 Lundquist et al. (Lower forest density enhances snow retention in areas with warmer winters). Suggest modifying statement to either more specifically clarify the term or make it include exceptions to the generalized statement.

Paragraph implies that active forest management tools are the only available changes for climate mitigation for forests. In reality, active forest management tools are not always available or appropriate. Protection of intact forest ecosystems (i.e., limiting development and harvest) is also a valid and important tool for maintaining resilience in forest ecosystems in many places. Recommend including forest protection as a strategy for improving forest resilience and resiliency.

This paragraph is not applicable to all forest types and language needs to be added to clarify when and where, and in what forest types, such actions may be appropriate. For example, in old-growth PNW western Cascade and coastal forests, there is no evidence that density management or prescribed burning would be useful tools for reducing future risks from wildfire or insects. Using such tools to effectively reduce these disturbance risks in this forest type would fundamentally change the natural forest structure and function that provides the ecosystem services generated by these forests.

This section is critical both for the whole chapter in emphasizing how impacts to forests will be diverse and varied. It is important to acknowledge local forest conditions in influencing how climate change could affect wildfire or disturbance risk. Suggest highlighting this sentence in the executive summary of the chapter to emphasize the point.

This section of text should start by describing why water resources from forests are important and what users rely on them. Suggest starting the Water Resource text with the following sentence: Forested watersheds provide critical water resources for multiple purposes, including municipal water supplies, agriculture and irrigation, viticulture resources, and in-stream flows for endangered species and ecosystems health.

The Chapter authors must ensure that the statements are supported by the referenced citations, since this often is that in many areas, management may not be possible or desirable. For example, forest thinning requires cost-effective access (which may be limited in remote locations) as well as markets to sell the thinned products for forest restoration and conservation.

This text should acknowledge the heterogeneity in forest types, and therefore impacts. Suggest changing text to...understanding of the effects of climate change on different types of forests...

This section was revised considerably to improve accuracy and clarity; however, the appropriate references for the revised text did not include the Miegs reference. This section aims to provide more emphasis on the value of water supplies, as suggested.

This section was revised considerably to improve accuracy and clarity; however, the appropriate references for the revised text did not include the Miegs reference.

This section was revised considerably to improve accuracy and clarity; however, the appropriate references for the revised text did not include the Miegs reference.

This section was revised considerably to improve accuracy and clarity; however, the appropriate references for the revised text did not include the Miegs reference.

This text highlights the heterogeneity in forest types, and therefore impacts. Suggest changing text to...understanding of the effects of climate change on different types of forests...

This text highlights the heterogeneity in forest types, and therefore impacts. Suggest changing text to...understanding of the effects of climate change on different types of forests...

This section was revised considerably to improve accuracy and clarity; however, the appropriate references for the revised text did not include the Miegs reference.

This section was revised considerably to improve accuracy and clarity; however, the appropriate references for the revised text did not include the Miegs reference.

This comment does not appear to raise a question or suggest a revision.

This review comment is correct that we generally do not address animal species, although we do mention habitat for plants and animals, and include an example in the Terrestrial Accounts. Most information on animals is included in the Ecosystems, Ecosystem Services, and Biodiversity chapter and Regional chapters.

This comment does not appear to raise a question or suggest a revision.

This text highlights the heterogeneity in forest types, and therefore impacts. Suggest changing text to...understanding of the effects of climate change on different types of forests...

This review comment is correct that we generally do not address animal species, although we do mention habitats for plants and animals, and include an example in the Terrestrial Accounts. Most information on animals is included in the Ecosystems, Ecosystem Services, and Biodiversity chapter and Regional chapters.

This text highlights the heterogeneity in forest types, and therefore impacts. Suggest changing text to...understanding of the effects of climate change on different types of forests...

This review comment is correct that we generally do not address animal species, although we do mention habitats for plants and animals, and include an example in the Terrestrial Accounts. Most information on animals is included in the Ecosystems, Ecosystem Services, and Biodiversity chapter and Regional chapters.

This review comment is correct that we generally do not address animal species, although we do mention habitats for plants and animals, and include an example in the Terrestrial Accounts. Most information on animals is included in the Ecosystems, Ecosystem Services, and Biodiversity chapter and Regional chapters.
Natural disturbance processes are important for forest ecosystem health and must be placed in context. A key message of the chapter is that severe ecological disturbances — specifically, wildfires and insect outbreaks — will increase in frequency and magnitude, and pose risks to forest health and condition. However, the chapter should put current and projected levels of wildfire and insect outbreaks in context. The chapter should also discuss that (1) these ecological disturbances are natural components of forest ecosystems, and (2) wildfires and insect outbreaks in forests do not appear to be occurring at levels that exceed historical levels, nor are they necessarily projected to be. In discussing wildfire in forests, the chapter should acknowledge that (1) wildfire is a natural and necessary part of US forest ecosystems that is important for forest ecosystem health. Research has increasingly recognized the importance of biodiversity, ecologically significant, and unique “Complex early seral forest” — also called “fire-scarred forest habitat” — created by high-severity fire. Hands of scientific studies document the high levels of native biodiversity and wildlife abundance in complex early seral forest created when patches of high severity fire occur in mature conifer forest (and where this unique wildlife habitat not been subjected to common post-fire management, such as post-fire logging and artificial tree planting, and herbicide spraying). Many of the native wildlife species found in complex early seral forest are primarily or almost exclusively found in such habitat, due to the high abundance of snags (standing dead trees) and downed logs and/or the abundance of shrub patches and young natural regeneration of conifers and oaks. Complex early seral forests created by high-severity fire support some of the highest levels of native biodiversity found in temperate conifer forests (Hutto et al. 2008, Swanson et al. 2010, DeFries et al. 2014, Hutto et al. 2016).

The chapter should also acknowledge that (2) there is currently substantially less fire of all severities in the great majority of western U.S. mixed-conifer, mixed-evergreen, and yellow pine forests than there was historically, and that most western forests are experiencing a fire deficit compared with pre-settlement conditions (Mouillet and Field 2005, Stephens et al. 2007, Burton et al. 2012, Odion et al. 2014, Hansen et al. 2015). For example, Parks et al. (2015) concluded that “all forested areas in the western U.S. experienced a fire deficit from 1894 to 2012, body due to the exclusion by human activities.” Odion et al. (2014) similarly found multiple lines of corroboration evidence that there is currently much less high-severity fire in western...
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaye</td>
<td>Wolf</td>
<td>Shaye</td>
<td>Whole Page</td>
<td>06. Forests</td>
<td>223</td>
<td>8</td>
<td>9</td>
<td>222</td>
<td>222</td>
<td>In the context of climate change, logging can have detrimental effects on forest ecosystem services such as carbon storage. This should be acknowledged by the Chapter in the State of the Forest Sector section and adaptation section. Harvest of live trees from the forest not only reduces current standing carbon stocks, but also reduces the forest's future rate of carbon sequestration and its future carbon storage capacity, by removing trees that otherwise would have continued to grow and remove CO2 from the atmosphere. Numerous studies indicate that protection from logging increases forest carbon storage, while thinning forests to reduce fire activity decreases forest carbon stocks and results in increased carbon emissions to the atmosphere that can persist for decades. For example, Yom-Tov et al. (2012) found that, by 2050, the climate change scenario that most heavily emphasized protection of forests from logging (B1) resulted in the highest levels of forest carbon storage and rates of carbon sequestration, while the scenarios that emphasized forest cutting (A1B and A2) reduced the proportional contribution of federal forestlands to the national overall carbon storage levels (see Table 2). Similarly, a study by Dyrness et al. (2008) found that carbon storage in public forests is maximized when protection from logging is greatest (A1B), followed by timber harvest scenarios (A1T, A2T), while eliminating harvests on public lands resulted in an increase up to 45% over current sequestration levels on public lands, while moving to a more intense harvesting policy resulted in a significant decline in carbon sequestration. Campbell et al. (2013) concluded that thinning forests to avoid high-severity fire could actually reduce forest carbon stocks and increase overall carbon emissions. Because the probability of a fire on any given acre of forest is relatively low, forest managers must treat many more acres than would actually burn, and thinning ends up removing more carbon than would be released in a fire. The researchers estimated that thinning operations typically tend to remove about three times as much carbon from the forest as would be avoided in wildfire emissions. They cautioned that %ΔCCurrent claims that fuel-reduction treatments function to increase forest C sequestration are based on specific and sometimes unrealistic assumptions regarding treatment efficacy, wildfire emissions, and wildfire burn probability. %ΔC. The study concluded that %ΔC found little credible evidence that such efforts (fuel-reduction treatments) have the added benefit of increasing terrestrial C stocks.%ΔC and %ΔCMore often, treatment would result in a reduction in C stocks over space and time. %ΔC</td>
<td>The issue of relevance of logging and thinning has been clarified elsewhere in the chapter.</td>
</tr>
<tr>
<td>Shaye</td>
<td>Wolf</td>
<td>Shaye</td>
<td>Whole Page</td>
<td>06. Forests</td>
<td>231</td>
<td>8</td>
<td>9</td>
<td>222</td>
<td>222</td>
<td>The State of the Forest Sector section should acknowledge the dominant role of human activity in driving wildfire activity since this is critical for designing and implementing effective adaptation strategies. A study by Syphard et al. (2017) relating climate variables to fire activity across the US found that where human presence is more prominent, climate was less important in explaining fire activity meaning that %ΔCHumans may not only influence fire regimes but their presence can actually override, or swamp out, the effect of climate. %ΔC A study by Bell et al. (2017) found that human-started wildfires accounted for 88% of all wildfires, tripled the length of the fire season, and were responsible for nearly half of all area burned. These studies highlight the importance of understanding the human influence on fire activity when setting forest and fire management and policy. Bell, J.K. et al. 2017. Human-started wildfires expand the fire niche across the United States. PNAS 114: 2946-2951. Syphard, A.D. et al. 2017. Human presence diminishes the importance of climate in driving fire activity across the United States. PNAS 114: 2946-2951. %ΔCHuman presence diminishes the importance of climate in driving fire activity across the United States. PNAS 114: 2946-2951. Syphard, A.D. et al. 2017. Human presence diminishes the importance of climate in driving fire activity across the United States. PNAS 114: 2946-2951.</td>
<td>We assume that the reviewer refers to contemporary fires, not historical fires. In response, we added a sentence and literature citation that address human impacts on fire in the context of multiple stressors. A broader discussion of human influences is beyond the scope of the chapter.</td>
</tr>
<tr>
<td>Shaye</td>
<td>Wolf</td>
<td>Shaye</td>
<td>Whole Page</td>
<td>06. Forests</td>
<td>231</td>
<td>8</td>
<td>9</td>
<td>222</td>
<td>222</td>
<td>Key terms must be defined. On pages 222 and 223, the Chapter states %ΔC key challenge is to keep forests as forests, ensuring that the amount and health of forests will not decline significantly in the future. %ΔC While we support this statement, key terms like forest %ΔCHealth%ΔC should be defined. For example, many studies provide evidence that restoration of natural disturbance processes and keeping carbon circulating in the forest is essential for restoring forest health, rather than commercial logging that removes forest carbon and reduces resilience through fragmentation and degradation.</td>
<td>We appreciate this review comment and have revised the sentence to improve clarity.</td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment (ID)</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>--------------</td>
<td>--------------</td>
<td>---------</td>
<td>---------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------</td>
<td>---------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>Shaye</td>
<td>Wolf</td>
<td>14.0079</td>
<td>Text Region</td>
<td>06. Forests</td>
<td>225</td>
<td>227</td>
<td>12</td>
<td>15</td>
<td>15</td>
<td>The case study on tree mortality in the Sierra Nevada was revised considerably to ensure accuracy and clarity.</td>
<td></td>
</tr>
</tbody>
</table>

As one of its case studies, Box 6.1 highlights the recent tree mortality rates in the Sierra Nevada, which are projected to be even higher than in the past due to climate change. The study by Keane et al. (2009) documented a decline in tree density due to fire suppression, while the study by Doerr and Santin (2016) concluded that fire suppression has not led to a decrease in tree density in all forests.

Secondly, the Chapter asserts repeatedly that fire suppression has created overly dense forests that need density reduction treatments (see pages 227, 229, 231). The Chapter strongly implies that reductions in tree density due to natural processes such as beetles, fire, and drought have purely negative ecological consequences, while similar or greater reductions due to mechanical thinning operations are purely positive. The basis for this contradictory position is not clear.

Third, the Chapter misleads a series of claims about the consequences of Sierra Nevada tree mortality that are not supported by the cited studies. The Chapter on page 225 states: “This change in stand structure and composition has increased the likelihood of crown fires (fire lines that spread from trees to trees) and increased local hydrology (with more water availability, but also higher peak flows), and negatively affected ecosystem services (such as a reduction in long-term timber supply and decreased recreation opportunities)” citing Nicas 2012, Pitker 2011, Adria 2012. However, these statements are not supported by the references. The references include:

- DellaSala, D.A. et al. 2014. Complex early seral forests of the Sierra Nevada: what are they and how can they be managed for ecological integrity? In Natural Areas Journal 34:310-324.

We appreciate the review comment, and have added some additional text and literature citations in the Figure 6.3 caption in order to clarify issues regarding area burned and fire severity.

The chapter was corrected to be Keane et al. (2009) and added to the literature cited. The comment about California forests is very specific to one location, and while this might have been true for some California forests in some locations, especially those that were logged, it is certainly not true for most forests in the U.S., especially western forests. Therefore, we do not revise the existing text. We will move the section that discusses forest density from page 227 to page 225, and add the following text and literature citations.

---

The caption in Figure 6.3 states that it is likely that heavy snowfall has not changed during the past few decades. The Chapter should also discuss this important point in the text with supporting citations.

As indicated in the caption in Figure 6.3, fire severity does not appear to be increasing in US forests, and this is supported by scientific research. Most recently, Keyser and Wielgolaski (2017) tested trends for high fire severity occurrence for western United States forests, for each state and each month. The study found no significant trend in high severity fire occurrence during 1984-2014, except for Colorado. The study also found no significant increase in high severity fire occurrence by month during May through October, and no correlation between relative humidity and forest fire risk. The literature review by Oliver and Santini (2015) concluded: “...for the western USA, [current study] indicate little change overall (in high-severity fire trends), and also less area burned at high severity has overall declined compared to pre-European settlement...” Park et al. (2016) projected that even in hotter and drier future forests, there will be a decrease or no change in high severity fire effects in nearly every forested region of the western U.S. due to reductions in combustible understory vegetation over time.


We appreciate the review comment, and have added some additional text and literature citations in the Figure 6.3 caption in order to clarify issues regarding area burned and fire severity.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>Start Line</th>
<th>End Page</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaye</td>
<td>Wolf</td>
<td>14.0084</td>
<td>Text Region</td>
<td>Gl. Forests</td>
<td>230</td>
<td>231</td>
<td>15</td>
<td>15</td>
<td>The chapter fails to provide an accurate analysis of the scientific research on insect outbreaks and fire interactions. On page 230, the chapter states that % direct mortality associated with insect outbreaks increases production of dead fuels, which can influence wildfire intensity (and amount of heat energy released). The chapter then provides an example of fire intensity increasing short-term after beetle outbreak, citing a single study (Brock 2012). However, multiple studies have found that trees killed by beetles and drought do not increase fire severity or extent. High-severity fires reduce forest susceptibility to future beetle outbreaks, and widespread and severe beetle outbreaks restrict subsequent outbreaks. Several empirical studies that have investigated the effects of actual fires in areas with known pre-fire snag levels from recent drought and bark beetle, have found trees killed by bark beetles and drought do not influence fire severity or extent. Bond et al. (2009) was conducted in mixed-conifer and ponderosa/Jeffrey-pine forests of the San Bernardino National Forest in southern California, where fires occurred immediately after a large pulse of snag recruitment from drought/beetles. Bond et al. (2009) found no evidence that pre-fire tree mortality influenced fire severity. Hart et al. (2015) investigated whether there was a relationship between snag levels from drought/beetles and the rate of the spread in conifer forests across the western U.S. Hart et al. (2015a) found the following: % trees killed by fire were similar between red-stage and gray-stage stands during peak years of wildfire activity, which occurred for 40% of area burned during the 2010-2013 period. In other words, in both the initial stage of snag recruitment, when dead needles are still on the trees (%Snag-stage&gt;50%), and in the later stage, seven years later, after needles and some snags have fallen (%Snag-stage&lt;50%), fire spread was nearly identical regardless of snag levels (see Figure 10). We appreciate the review comment, but it is difficult to reconcile the comment with the information currently in the chapter. Although a wide range of additional literature could be discussed, we feel it is more effective to focus on specific issues related to mountain pine beetles, their effects, and the fire in the brief space that we have. We are confident that the statement in the chapter is correct. Note that we do not mention severity, only intensity. Much of the reviewer’s comment focuses on severity, which is not a component of the discussion in this chapter.</td>
<td></td>
</tr>
<tr>
<td>Shaye</td>
<td>Wolf</td>
<td>14.0085</td>
<td>Text Region</td>
<td>Gl. Forests</td>
<td>231</td>
<td>232</td>
<td>23</td>
<td>23</td>
<td>The section on forest carbon dynamics emphasizes that %Snag (snag density) will lead to a bias of forest soil carbon. The chapter should define which disturbances it is including, since logging and land conversion should be included in this list. This portion of the discussion was revised considerably to improve accuracy and clarity regarding forest density, which is not a component of the discussion in this chapter. Although a wide range of additional literature could be discussed, we feel it is more effective to focus on specific issues related to mountain pine beetles, their effects, and fire in the brief space that we have. We are confident that the statement in the chapter is correct. Note that we do not mention severity, only intensity. Much of the reviewer’s comment focuses on severity, which is not a component of the discussion in this chapter.</td>
<td></td>
</tr>
<tr>
<td>Shaye</td>
<td>Wolf</td>
<td>14.0086</td>
<td>Text Region</td>
<td>Gl. Forests</td>
<td>233</td>
<td>234</td>
<td>17</td>
<td>17</td>
<td>The section on forest carbon dynamics emphasizes that %Snag (snag density) will lead to a bias of forest soil carbon. The chapter should define which disturbances it is including, since logging and land conversion should be included in this list. This portion of the discussion was revised considerably to improve accuracy and clarity regarding forest density, which is not a component of the discussion in this chapter. Although a wide range of additional literature could be discussed, we feel it is more effective to focus on specific issues related to mountain pine beetles, their effects, and fire in the brief space that we have. We are confident that the statement in the chapter is correct. Note that we do not mention severity, only intensity. Much of the reviewer’s comment focuses on severity, which is not a component of the discussion in this chapter.</td>
<td></td>
</tr>
<tr>
<td>Shaye</td>
<td>Wolf</td>
<td>14.0087</td>
<td>Text Region</td>
<td>Gl. Forests</td>
<td>234</td>
<td>235</td>
<td>10</td>
<td>10</td>
<td>The Chapter should provide a detailed discussion of the role of disturbances on water resources in forests. The Chapter depicts the influence of wildfire on water resources as purely negative, for example, stating that %Snag (snag density) increases erosion and sedimentation in Western rivers. However, a recent study by Brinson (2016) found that removing a frequent, mixed severity regime to the Elbow Creek Basin in Yosemite National Park had numerous ecohydrological benefits, including increased soil moisture and streamflow, decreased drought stress, and increased landscape diversity. Moreover, the effects of an event following the fire typically short-term in contrast to the more persistent damage to waterways caused by logging and logging roads, including increases in erosion and sedimentation and degradation of water quality and aquatic habitats (Gustine et al. 2001, Trumbull and Freckleton 2000). Grazing also causes long-term damage to water resources. However, the chapter makes no attempt to discuss the effects of disturbances from logging and grazing on water resources. Brinson, G. 2016. Wildfire Effects on the Ecosystem of a Sierra Nevada Watershed. PhD Dissertation. University of California, Berkeley. Bolinbroke, G. et al. 2016. Managed wildfire effects on forest resilience and water in the Sierra Nevada. Ecosystems DOI: 10.1007/s10021-016-0049-1. Gustine, H. et al. 2001. Forest roads: a synthesis of scientific information. USFS RMRS-GTR-50. USFS Pacific Northwest Research Station, Portland. Trumbull, S.C. and C.A. Freckleton. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology Vol. 14-30. We appreciate the review comment, but it is difficult to reconcile the comment with the information currently in the chapter. Although a wide range of additional literature could be discussed, we feel it is more effective to focus on specific issues related to mountain pine beetles, their effects, and fire in the brief space that we have. We are confident that the statement in the chapter is correct. Note that we do not mention severity, only intensity. Much of the reviewer’s comment focuses on severity, which is not a component of the discussion in this chapter.</td>
<td></td>
</tr>
</tbody>
</table>
ShayeWolf14-6091TestRegion Or. Forests2342361111The Chapter/s46's claim that stand density management and surface fuel reduction will increase forest resiliency to increased temperatures, drought and disturbance is not supported by the scientific literature or the references cited. At 235 the Chapter states: "%sAmong ongoing practices that address existing forest management needs%s%sthe stand density management, surface fuel reduction, and control of invasive species%s%sthis also considered climate-smart because they help reduce risk by creating resilience to increased temperature, drought, and disturbance.s46% The %sFigure%s refers, for example, forest managers are considering greater reductions in stand density to increase forest resilience and resilience to fire, insects, and drought.s46% Figure 6.5 also states that adaptation options for %s%ssurface fuel reduction%sdrought severity and incidence of insect outbreaks%ss%sdon't reduce forest stand density to increase tree vigor.s46% However, the state of the science on this issue is more complex. Current research suggests that forest management treatments focused on thinning trees to increase resilience can be counter-productive, and many studies recommend revisiting natural disturbance processes to increase resiliency. Studies indicate that increased density does not necessarily equate to a lack of resilience, as measured by tree mortality and physiological stress levels. In the mixed-conifer forests of California/s46's Lake Tahoe Basin, a recent study found %s%soverlapping relationships between shading levels%sdensity%smortality and drought effects.s46% (Van Guri et al. 2016). In mid to upper-elevation forests, increased density was associated with increased probability of mortality, especially during wetter periods, whereas increased density was more associated with increased probability of mortality in lower elevation forests and other climate periods. The researchers suggested that %s%soverlapping single density-reduction%sfires management strategy will increase forest resiliency under all climate periods and in all forest types.s46% A study in the Douglas-s46's forests of northeastern Washington found that competition (i.e., higher density) did not affect tree responses to extreme drought (Carmack and Nakazono 2016). Importantly, trees with more competition from neighbors appeared to have higher drought resistance (i.e., a significantly higher proportion of exposed area in litterwood, which is a trait associated with drought resistance). The authors suggested that %s%soverlapping single density-reduction%sfires management strategy will increase forest resiliency under all climate periods and in all forest types.s46% We respectfully disagree with the reviewer's comment on this issue. Our references are based on hundreds of publications in the scientific literature, based on both empirical data and modeling, that demonstrate the effectiveness of stand density management, only a few of which are cited here. The scientific literature on climate change adaptation reinforces the value of stand density management. No change was made.

ShayeWolf14-6094TestRegion Or. Forests2352361414This was revised as suggested.

MichaelMacCracken24-0288TestRegion Or. Forests22322333Regarding the 130M acres in "urban areas", does this totally include "suburban" areas as well? Might this be the total of what are called Metropolitan Statistical Areas or something similar? This total just seems very large for what most people would call urban areas (New York City, LA, Boston, etc.). And what counts as a forest? Regarding the 130M acres in "urban areas", does this total really include "suburban" areas as well? Might this be the total of what are called Metropolitan Statistical Areas or something similar? This total just seems very large for what most people would call urban areas (New York City, LA, Boston, etc.). And what counts as a forest?

MichaelMacCracken24-0299Figure Or. Forests222224This is a good point to include evaporation or enhanced evapotranspiration or something, as a real key influence on forests will be a greater rate of evaporation. This is a good point to include evaporation or enhanced evapotranspiration or something, as a real key influence on forests will be a greater rate of evaporation. We appreciate the review comment, and have revised the figure to address evaporation.

MichaelMacCracken24-0590TestRegion Or. Forests2292292626But not the very extensive pine barrens of New Jersey? That seems to me a strange omission. But not the very extensive pine barrens of New Jersey? That seems to me a strange omission. We appreciate this review comment; however, southern pine barrens has historically been present in the New Jersey Pine barrens and so its presence is not likely attributable to warming.

MichaelMacCracken24-0592TestRegion Or. Forests2302303333Good practice is to avoid the use of the word "may" and use words from the literature, a practice that started with the First National Assessment, of which one of your authors was a major participant on (and best wishes to her). Good practice is to avoid the use of the word "may" and use words from the literature, a practice that started with the First National Assessment, of which one of your authors was a major participant on (and best wishes to her). We appreciate this comment, and have revised the language throughout the chapter where appropriate.

MichaelMacCracken24-0693TestRegion Or. Forests2312311111This was revised as suggested.
Chapter 06. Forests

Please review and include references from: https://www.fs.fed.us/sites/default/files/2015-Fire-Budget-Report.pdf

Many of the issues discussed in the suggested report are included in the chapter, but no direction is provided by the reviewer on which references they think should be included. No change made.

Please update to add data from the 2017 wildfire season. At this point, data from the 2017 wildfire season are preliminary. It might be possible to include these data prior to publication if they are confirmed as final.

We appreciate the review comment, but do not agree with the suggestion made.

Please add information on these additional costs/impacts of wildfires:

Please review and include references from: https://www.epa.gov/sites/production/files/2017-02/documents/2017_executive_summary.pdf

Many of the issues discussed in the suggested report are included in the chapter, but no direction is provided by the reviewer on which references they think should be included. No change made.

We appreciate the review comment on which references they think should be included. No change made.

Please review and include references from: https://www.epa.gov/sites/production/files/2017-02/documents/2017_executive_summary.pdf

Many of the issues discussed in the suggested report are included in the chapter, but no direction is provided by the reviewer on which references they think should be included. No change made.

We appreciate the review comment which suggests that many other issues could potentially be discussed in this section. The continued effort on the report is appreciated.

Chapter 06. Forests

Please add information on these additional costs/impacts of wildfires:

Please review and include references from: https://www.fs.fed.us/sites/default/files/2015-Fire-Budget-Report.pdf

Many of the issues discussed in the suggested report are included in the chapter, but no direction is provided by the reviewer on which references they think should be included. No change made.

Please review and include references from: https://www.epa.gov/sites/production/files/2017-02/documents/2017_executive_summary.pdf

Many of the issues discussed in the suggested report are included in the chapter, but no direction is provided by the reviewer on which references they think should be included. No change made.

We appreciate the review comment, which suggests that many other issues could potentially be discussed in this section. The continued effort on the report is appreciated.

Chapter 06. Forests

Please add information on these additional costs/impacts of wildfires:

Please review and include references from: https://www.fs.fed.us/sites/default/files/2015-Fire-Budget-Report.pdf

Many of the issues discussed in the suggested report are included in the chapter, but no direction is provided by the reviewer on which references they think should be included. No change made.

We appreciate the review comment which suggests that many other issues could potentially be discussed in this section. The continued effort on the report is appreciated.

Chapter 06. Forests

Please add information on these additional costs/impacts of wildfires:

Please review and include references from: https://www.fs.fed.us/sites/default/files/2015-Fire-Budget-Report.pdf

Many of the issues discussed in the suggested report are included in the chapter, but no direction is provided by the reviewer on which references they think should be included. No change made.

We appreciate the review comment which suggests that many other issues could potentially be discussed in this section. The continued effort on the report is appreciated.

Chapter 06. Forests

Please add information on these additional costs/impacts of wildfires:

Please review and include references from: https://www.fs.fed.us/sites/default/files/2015-Fire-Budget-Report.pdf

Many of the issues discussed in the suggested report are included in the chapter, but no direction is provided by the reviewer on which references they think should be included. No change made.

We appreciate the review comment which suggests that many other issues could potentially be discussed in this section. The continued effort on the report is appreciated.
### Comment/Response Table

**First Name** | **Last Name** | **Comment ID** | **Comment Type** | **Chapter** | **Figure/Table Number** | **Start Page** | **End Line** | **Start Line** | **End Page** | **Comment** | **Response**
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
David | Riplik | 141016 | Ecosystem, Ecosystem Services, and Biodiversity | 07 | 07 | 257 | 1 | 11 | The key message doesn't work well thought out. It seems like a lot of ideas in one key message. | We have made substantial changes to the key messages by expanding from 2 to 4 key messages and limited the scope of each message.

---

Rachel | Clevius | 141790 | Ecosystem Region | 06 | 06 | 241 | 7 | Please add an estimate of the CO2 emissions from US wildfires in recent years—for example, from the 2017 wildfires in California—to provide a sense of scale of these emissions, which themselves are contributing to climate change. | While large pulses of CO2 can be generated after large wildfires, trees regrow and take up carbon following disturbance. Hence, over a large enough spatial and temporal scale, fire is a small factor, especially compared to human CO2 emissions. No change.

---

Sally | Sims | 141505 | Ecosystem, Ecosystem Services, and Biodiversity | 07 | 07 | 262 | 34 | Projections suggest continued primary production increases over the next century under a higher scenario (21%±10% under RCP 8.5). I strongly disagree that this will be the case under RCP 8.5. The papers cited do not adequately take mortality from “hot drought” into account, especially under RCP 8.5 after about 2050. | We agree that there is large uncertainty in existing projections of terrestrial primary production. We have modified the text to emphasize this even more strongly and unequivocally. We also now specifically mention heat waves, drought, fire and insect effects with references, directing the reader to the Forest Chapter for more details. We must, however, acknowledge that existing model projections suggest an increase in primary production with the factors they do consider.

---

Sally | Sims | 141369 | Ecosystem, Ecosystem Services, and Biodiversity | 07 | 07 | 274 | 14 | There is robust uncertainty in how climate change will impact productivity (Shafir and Duk 2011; Kucharová and Durme 2011; Boggs et al. 2013, 2015). I strongly recommend that you state this uncertainty throughout the text. | We agree that there is large uncertainty in existing projections of terrestrial primary production. We have modified the text to emphasize this even more strongly (see response to comment above).

---

Sally | Sims | 141370 | Whole Page | 07 | 07 | 257 | 11-20 | After United States. Next sentence should read. Marine, terrestrial, and freshwater species are responding to climate change by expressing different traits, altering behaviors, shifting ranges, and changing the timing of biological events. Climate change will likely outpace the rate at which some species can adapt. | We agree that there is large uncertainty in existing projections of terrestrial primary production. We have modified the text to emphasize this even more strongly (see response to comment above).

---

Sally | Sims | 141371 | Whole Chapter | 07 | 07 | 259 | Marine, terrestrial, and aquatic (or freshwater) habitats. Use either freshwater or aquatic consistently. | We have updated our use of the term “aquatic” so that it refers to aquatic environments broadly (i.e., terrestrial and aquatic environments), and have used “freshwater” to distinguish from marine environments.

---

Sally | Sims | 141373 | Whole Page | 07 | 07 | 259 | marine, terrestrial, and aquatic (or freshwater) habitats. Use either freshwater or aquatic consistently. | We have updated this sentence to: Our understanding of climate change impacts and responses of biodiversity and ecosystems has improved since 2003, and the expected consequences of climate change will vary by region, species, and ecosystem type.

---

Sally | Sims | 141374 | Whole Page | 07 | 07 | 267 | Comments (7), page 267—Add text to key Messages and end of the section to discuss多 stakeholder initiatives to address mid- to large-scale ecosystem restoration and its overlap with connectivity and as a factor in restoring ecosystem health. For example, floodplain restoration meets multiple goals. Add regional approaches to the discussion of federal frameworks. (See suggested text, next paragraph.) Add text to Ch 7, page 267, line 12: Suggested text: Work on large-scale ecosystem restoration, habitat connectivity, and ecosystem services is building momentum through collaborations among federal, state, tribal, educational institutions, nongovernmental organizations, and partnerships (such as the USFS Regional Landscape Conservation Cooperatives). Large ecosystems such as the Great Lakes, Chesapeake Bay, Everglades, Connecticut River, Plateau River Basin, and others, and their embedded human communities are benefiting from evolving collaborations that engage traditional and new natural resource stakeholders in ecosystem restoration for multiple benefits [https://lccnetwork.org]. | We have updated our use of the term “aquatic” so that it refers to aquatic environments broadly (i.e., terrestrial and aquatic environments), and have used “freshwater” to distinguish from marine environments.

---

**Note:** The comment responses are provided in the 2020 draft. The final version may contain additional changes.
Comment:

- *moved Figure 7.1 to the Regional Roll up section and adding the case studies to the map with links to the change is impacting regional fisheries, see the Alaska and Northeast chapters). Authors could also consider*

- *the information contained in the Regional Roll up section does not add significantly to the chapter or the report and beginning the ‚“State of the Sector” section to avoid redundancy. In addition, the authors should consider using the ‚“Introduction” as written has run-on sentences and is not very clear, and should be revised. These include the fundamental nature of the physical processes they represent, such as radiative transfer or geophysical fluid dynamics, which can be tested directly against measurements or theoretical calculations to demonstrate that model approximations are valid. They also include the vast body of literature dedicated to evaluating and assessing model abilities to simulate observed features of the earth system, including large scale modes of natural variability, and to reproduce their net response to external forcing that captures the interaction of many processes which produce observable climate system feedbacks (e.g., Flato et al. 2013; Chap. 4). Regarding the specific performance of global climate models in reproducing observed trends, on extreme precipitation, for example, Vol. 1 concludes: “The frequency and intensity of extreme heat and extreme precipitation events are increasing in most continental regions of the world (very high confidence). These trends are consistent with expected physical responses to a warming climate. Climate model studies are also consistent with these trends, although models tend to underestimate the observed trends, especially for the increase in extreme precipitation events (very high confidence for temperature, high confidence for extreme precipitation)” –*
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table</th>
<th>Start Page</th>
<th>End Line</th>
<th>End Line</th>
<th>Start Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
</table>
| David   | Susanne | 41758    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 300 | | | | | In addition to Wren 2010, could cite this paper, documenting altitude changes in burble bee species in Colorado:  
Pyke, G. H., J. D. Thompson, D. W. Inouye and T. J. Miller. 2010. Effects of climate change on phenologies and distributions of burble bees and the plants they visit. Ecosphere 1(3): doi:10.1002/ecs2.1267. | Thank you for the comment, the citation was added. |
| David   |        | 41755    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 262-267 | | | | | Add period to "et al." | Thank you for the comment, a period was added. |
| David   |        | 41796    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 263 | 18 | | | | which should be "that" | Thank you for the comment, the sentence was rewritten. |
| David   |        | 41787    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 264 | 25 | | | | are should be "are" | Thanks for the comment, the paragraph was rewritten. |
| David   |        | 41788    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 264 | 26 | | | | Delete the second semicolon | Thanks for the comment, the paragraph was rewritten. |
| David   |        | 41789    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 269 | 15 | | | | Compound adjective is missing a hyphen: "climate-induced" | Thanks for the comment, the text was rewritten. |
| David   |        | 41790    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 264 | 14 | | | | which should be "that" | Thanks for the comment, the word "which" is not contained in line 24 or in the lines immediately before or after. |
| David   |        | 41791    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 263 | 37 | | | | The same issue of late spring frosts also impacts wildfires in the Rocky Mountains. E.g.,  
Inouye, D. W. 2008. Effects of climate change on phenology, frost damage, and florabundanceof montane wildfires. Ecology 89:353-360. | Thank you for the comment, the reference to the adaptive capacity section and mentioned the role of both plasticity and biological adaptation in response to climate change. |
| David   |        | 41792    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 270 | 13 | | | | This study was able to partition the adaptive response to climate change by a wildflower into plasticity and evolutionary components:  
Anderson, J. T., D. W. Inouye, A. McKinney, and T. Mitchell-Olds. 2012. Phenotypic plasticity and adaptive evolution contribute to advancing flowering phenology in response to climate change. Philosophical Transactions of the Royal Society 279(1743): 8643-8653. | Thank you for the comment, we agree that this is an important aspect of changing phenology. We have added text to reflect this example, although we determined that more relevant and recent citations are available to support this idea. |
| David   |        | 41793    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 271 | 31 | | | | Add hyphen: under-predicted | Thanks for the comment, a hyphen was added. |
| Louise   | Mosen | 41794    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 269 | 24 | | | | Here and a few other places, e.g., Page 270 line 23, there are split infinitives. | Thank you for the comment, we think that split infinitives are fine. |
| Christian | Armstrong | 41800    | Whole Page | | | | | | | Shouldn't you include a discussion of complete loss of certain iconic habitats? Like coral reefs? And how will this affect ecosystem? | Coral reefs, which provide shoreline protection and support fisheries and recreation, are also threatened by ocean warming and acidification. The loss of recreational/benefits associated with coral reefs in the U.S. is projected to be $140 billion by 2030 (CO. Oceans). We have added the citation to the adaptive capacity section and mentioned the role of both plasticity and biological adaptation in response to climate change. |
| David   | Klopf  | 41801    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 264 | 365 | 8 | | | Cross reference Chapter 9 which also covers heat waves | We have changed this section significantly so this comment is no longer relevant. |
| David   | Peterson | 42307    | Whole Page | 07: Ecosystems, Ecosystem Services, and Biodiversity | 300 | | | | | This chapter has an ambitious, perhaps impossible scope, covering a broad range of issues. The generation is historical based, in that most of the effects of climate change are interpreted in a negative, rather than a neutral, context. This could be remedied by including a broader range of scientific literature that supports positive and neutral outcomes, rather than the current focus on only the literature that supports negative outcomes. Note especially the use of the word "climate-induced", rather than the more neutral "climate-effects". Perceptions of negative changes are possible only in the context of human values, a point that needs to be stated clearly and often. Unfortunately, the perspective of this chapter is not consistent with the more balanced perspective of nearly all other chapters in the report. | This comment is no longer relevant. |
| David   | Peterson | 42308    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 262 | 27 | | | | Listing thatrilinolent primary production has increased over the 20th century, due to the fertilizing effect of increasing atmospheric CO2 levels. is extremely speculative. The substantial literature on this topic includes positive, neutral, and negative perspectives about this topic. | As discussed in the Graven, Weretil, Zhu and Campbell references, there are multiple lines of evidence supporting a "global" terrestrial/primary production increase over the latter 20th/early 21st century. However, we now it more strongly note prominent regional exceptions to this trend: 2) back off the primary attribution of this to CO2 by instead noting it is only one of many factors potentially contributing to this trend. |
| David   | Peterson | 42309    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 263 | 32 | | | | Listing thatrilinolent primary production increases tends to be small of the literature. There is no consensus on this issue, and effects will almost certainly depend on both individual species responses and the limiting factors stated in the following lines. | We agree that there is large uncertainty in existing projections of terrestrial primary production. We have modified the text to emphasize this even more strongly. (see response to comment above). |
| David   | Peterson | 42300    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 265 | 34 | | | | Could not earlier onset of spring also create opportunities for agriculture, particularly the ability to grow different crop species and varieties, including longer-duration varieties that would have higher yields? The latter is already happening in the upper Midwest U.S., e.g., 60-day corn instead of 80-day corn. | Thanks for the comment, the sentence was rewritten. |
| David   | Peterson | 42301    | Text Region | 07: Ecosystems, Ecosystem Services, and Biodiversity | 271 | 9 | | | | What is meant by "soil important industries" here? Fisheries and forests are not industries, although the use of the term is common in this context. | Thanks for the comment, fishing and forestry are commonly referred to as "industries" but we see a benefit in using a more neutral, context. This could be remedied by including a broader range of scientific literature that supports positive and neutral outcomes, rather than the current focus on only the literature that supports negative outcomes. |
| Anna | Heath  | 42302    | Whole Page | 07: Ecosystems, Ecosystem Services, and Biodiversity | 264 | | | | | This is a very comprehensive assessment of ecosystem and biodiversity changes due to climate. It would be helpful to identify the specific species which human populations are most dependent on for economic resources and the extinction risks associated with those species. There should be more of a discussion on why biodiversity is important to maintain. The specific ecosystem services for all the species and regions discussed need to be presented, and all these changes by themselves have no meaning, the "why do I care" question needs to be answered for all the expected changes. | We have greatly expanded our discussion of ecosystem services and have included examples in all sections of the report and included a new key message specifically on ecosystem services. |
Shaye Wolf 14-6005 Whole Chapter 07. Ecosystems, Ecosystem Services, and Biodiversity

This chapter should include a section on observed and predicted climate-change-related population declines and extinctions. This is a major omission that must be corrected. This section should discuss the key point that US species are already experiencing climate-related population declines and local extinctions, and this is one of the most serious threats to biodiversity and ecosystem function.

Key studies that should be included are:
- Ghil et al. (2012) identified 136 studies which indicated that climate change was associated with local extinctions or declines. This study also identified the mechanisms by which species are threatened by climate change, some of which are missing from this chapter.

Weis (2016) found that climate-related local extinctions are already widespread and have occurred in hundreds of species, including almost half of the 976 species surveyed.
- Miles, J. 2013. Climate-related local extinctions are already widespread among plant and animal species, 14 Funct. Ecol. 30:1 (2016).

Pastor et al. (2017) estimated that nearly half of terrestrial/marine flying threatened mammals and nearly one-quarter of threatened birds may have already been negatively impacted by climate change in at least part of their distribution. The study concluded that 14% of species are already threatened by climate change, and 8% of conservation managers, planners and policy makers must take into account in efforts to safeguard the future of biodiversity.

Pastor, Nichol et al., Species’ traits influenced their response to recent climate change, 7 Nature Climate Change 2015 (2017).

Scheffer et al. (2016) meta-analysis reported that climate change is already impacting 42 percent of key ecological processes that form the foundation of healthy ecosystems and on which humans depend for basic needs.

Scheffer, Berth R. et al., The broad footprint of climate change from genes to biomes to people, 354 Science 719 (2014).

Added statement about climate change now being accepted nationally and internationally as a threat to species extinction, just before the regional roll up section.

Shaye Wolf 14-8606 Test Region 07. Ecosystems, Ecosystem Services, and Biodiversity

The Summary Overview and State of the Sector report confirms certain paragraphs verbatim. This is too repetitive, and we seem to be repeating other chapters.

Based on guidance from USGCRP, the Executive Summary (or which the Summary Overview is contained) is meant to be laconic and direct. It should be expanded or otherwise included in other chapters.

Shaye Wolf 14-8607 Test Region 07. Ecosystems, Ecosystem Services, and Biodiversity

The last sentence in the Changing Primary Productivity section is confusing and seems to state that climate change will lead to increased productivity at high latitudes and increased fisheries catch. This is not what the cited references suggest.

We have reviewed the source of information suggested by the comment and find that it does not meet the guidance to authors on Information Quality. This guidance assures that sources comply with Information Quality Act requirements for (1) utility, (2) transparency and traceability, (3) objectivity, and (4) integrity and security. Volume 1 of the Fourth U.S. National Climate Assessment was prepared and Volume 2 is being prepared in compliance with Section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (P. L. 106-554) and Information Quality guidelines issued by the Department of Commerce / National Oceanic and Atmospheric Administration pursuant to Section 515 (http://www.noaa.gov/services_programs/info_quality.html). For purposes of compliance with Section 515, these documents are deemed a “highly influential scientific assessment” (HISA) and contain expert assessments of the relevant scientific literature that are peer-reviewed by the National Academy of Sciences. The report graphics follows the ISO 16000-1 standard which includes the necessary information to achieve reproducibility.
Chapter 7 pp. 276-"References"
A large fraction of the citations are incomplete throughout. I hope you have staff completing these. It would take me the better part of a week to fix as much as I could, and I'm hoping be duplicating someone else's work.
Here are a few from a haphazardly chosen page toward the middle of the section (Chapter 7 p. 284):

Lines 2-4 read
Lauck (test, C. M. Vogt, N. Gruber, O. Aumont, L. Bopp, E. Buitenhuis, and C. Doney. 2015. Drivers and uncertainties of future global marine primary productivity. EOS 86, Suppl. 1). Complete citation
Lines 5-8 read

Lines 9-10 read
Levent, G. J., S. W. Sengstock. 2015. Climate-related range shifts ±1°O, a global multidimensional synthesis and

Chapter 7 pp. 276-"References"

The section on this chapter seems more focused on specific ecosystem services as they relate to biodiversity and species composition, rather than on ecosystems services and ecosystems as a whole.

We have updated this section significantly, and now have a map with example case studies, thus we will not go into as much detail here.

Lines 2-4 read:

Thank you for the comment. We have updated this section significantly, and now have a map with example case studies, thus we will not go into as much detail here.

Thank you for the comment. We have fixed the citations.

Thank you for the comment. We have included references to ocean acidification and linked out to the Oceans chapter which discusses OA in greater detail. Additionally, we mention OA under Key Message 1, Key Message 4 and provide some more detail in those sections.

Thank you for the comment. We have included references to ocean acidification and linked out to the Oceans chapter which discusses OA in greater detail. Additionally, we mention OA under Key Message 1, Key Message 4 and provide some more detail in those sections.

Thank you for the comment. We have fixed the citations.

Thank you for the comment. We have updated this section significantly, and now have a map with example case studies, thus we will not go into as much detail here.

Thank you for the comment. We have updated this section significantly, and now have a map with example case studies, thus we will not go into as much detail here.

Thank you for the comment. We have updated this section significantly, and now have a map with example case studies, thus we will not go into as much detail here.

Thank you for the comment. We have updated this section significantly, and now have a map with example case studies, thus we will not go into as much detail here.

Thank you for the comment. We have updated this section significantly, and now have a map with example case studies, thus we will not go into as much detail here.

Thank you for the comment. We have updated this section significantly, and now have a map with example case studies, thus we will not go into as much detail here.

Thank you for the comment. We have updated this section significantly, and now have a map with example case studies, thus we will not go into as much detail here.
Michael MacCracken 1440070002 Type: Atlantic Chapter
07. Ecosystems, Ecosystem Services, and Biodiversity
07. Ecosystems, Ecosystem Services, and Biodiversity
269 270 27 27
269 270 27 27
Another "may" to be replaced by a word from lexicon--so perhaps "will" need to be considered and at the end of the sentence adding a phrase such as "if the viability of the species is to be sustained." This section of text has been substantially reworded and no longer contains the reference to "may." However, the heart of this comment refers to the use of may generally. We have standardized the likelihood language and removed the use "may" where possible; however, there are many areas of ecology that are under researched and we were unable to ascribe strong confidence towards any likelihood language. In those instances we kept the word "may" as it accurately describes the lack of knowledge in terms of likelihood or timing.

Michael MacCracken 1440080001 Type: Atlantic Chapter
07. Ecosystems, Ecosystem Services, and Biodiversity
07. Ecosystems, Ecosystem Services, and Biodiversity
269 270 27 27
Two more instances of "may" to replace using words from the lexicon. Also page 270, lines 1, 8, 11, 16 -- would be good to do search of the chapter. This section of text has been substantially reworded and no longer contains the reference to "may." However, the heart of this comment refers to the use of may generally. We have standardized the likelihood language and removed the use "may" where possible; however, there are many areas of ecology that are under researched and we were unable to ascribe strong confidence towards any likelihood language. In those instances we kept the word "may" as it accurately describes the lack of knowledge in terms of likelihood or timing.

Michael MacCracken 1440090005 Type: Atlantic Chapter
07. Ecosystems, Ecosystem Services, and Biodiversity
07. Ecosystems, Ecosystem Services, and Biodiversity
269 270 27 27

Response

Michael MacCracken 1440070002 Type: Atlantic Chapter
07. Ecosystems, Ecosystem Services, and Biodiversity
07. Ecosystems, Ecosystem Services, and Biodiversity
266
266
The chapter will benefit by adding more text and explaining emphasis to the extent and effects of interactions of changes in climate with non-climate influences on species and habitat. For example, Most of the reduction in habitat and impacts to species are still due to non-climate influences. However, there are increasing observations of such impacts being exacerbated by various aspects of climate change, and a greater role for climate change effects is expected in the future under proposed increases in the rate and magnitude of changes in climate. An example is the Florida Keys, an area where natural communities already are greatly reduced and fragmented due to human development. Many species and subspecies of plants and animals there already are at high risk of extinction (and listed as threatened or endangered under the Endangered Species Act, for that reason). Effects of climate change, including sea level rise and associated storm surge, already are impacting much of the remaining native/habitat and freshwater aquifers, and these impacts are particularly great with extreme events, e.g., hurricanes that are of greater intensity as a result of changing climate. Regardless of the climate change scenarios used, the projections are for increasing sea level and storm surge over time, and given that two levels will continue for centuries, this is significant. The same challenges occur along parts of the Eastern and Gulf Coasts where human developments have already had impacts and climate change will exacerbate the effects on biodiversity and ecosystem services. Thank you for the comment. We have noted your suggestion and added text on cascading stressors to the chapter.

Michael MacCracken 1440080001 Type: Atlantic Chapter
07. Ecosystems, Ecosystem Services, and Biodiversity
07. Ecosystems, Ecosystem Services, and Biodiversity
266
266
The chapter implies a fairly general level of implementation of climate change adaptation with what appears to be occurring. Although there are examples of such implementation around the US, they are spotty at best and in many (perhaps most) locations there is little or no implementation of any such activity. Further, on the national level, there is no mechanism for tracking such work, and few states are likely to be able to track it. There is a need for long-term monitoring that is designed to determine the effects of climate adaptation efforts. Thank you for the comment. We have added a new section (SA) on adaptation and resource management to assess what has been done and the challenges that remain to incorporate climate adaptation planning into natural resource management and planning into natural resource management.

Atlantic Chapter 07. Ecosystems, Ecosystem Services, and Biodiversity
07. Ecosystems, Ecosystem Services, and Biodiversity
267 268 28
267 268 28
We disagree that in a way that does not make sense in the sentence. Although confidence has increased for many projected climate impacts, the consequences of climate change still vary by region and species. A suggested edit is to make these two separate sentences, and delete the word "still" in the second part because it implies that the consequences of climate change ought to be the same across regions and species, which is not logical since the consequences will continue to vary across regions and species, and even across populations within species. Thank you for the comment. We have updated the sentence to: Our understanding of climate change impacts and responses of biodiversity and ecosystems has improved since NCA3, and the expected consequences of climate change will vary by region, species, and ecosystem type.

Atlantic Chapter 07. Ecosystems, Ecosystem Services, and Biodiversity
07. Ecosystems, Ecosystem Services, and Biodiversity
258 258 26
258 258 26
The description of adaptive capacity (AC) needs to be edited to add the third main component of AC, which is movement/dispersal ability. Perhaps you consider this to be covered separately in the material on range shifts, and if that is the case then an edit is needed in the material on range shifts to acknowledge that movement, including range shifts, is one component of AC, and the AC section can be added to note that movement is a component of AC, and is covered under the range shift material. Some of the papers cited in the chapter describe the 3 components of AC, e.g., Glick et al. in 2012, (p. 22) and Beever et al. 2015 Note also that the discussion of AC pp. 252, line 3-4, mentions that dispersal ability is a “common indicator” of AC but the wording with confusion since dispersal ability is one of the three components of AC, and includes range shifts. Text on AC elsewhere in the chapter also needs to be edited. Thank you for your comment. We have edited the description of adaptive capacity to include dispersal ability.
null
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amanda</td>
<td>Dave</td>
<td>07</td>
<td>Ecosystems,</td>
<td>264</td>
<td>267</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandra</td>
<td>Sandra</td>
<td>07</td>
<td>Ecosystems,</td>
<td>266</td>
<td>267</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lindsie</td>
<td>Lindsie</td>
<td>07</td>
<td>Ecosystems,</td>
<td>266</td>
<td>266</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lindsie</td>
<td>Lindsie</td>
<td>07</td>
<td>Ecosystems,</td>
<td>266</td>
<td>266</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lindsie</td>
<td>Lindsie</td>
<td>07</td>
<td>Ecosystems,</td>
<td>271</td>
<td>275</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandra</td>
<td>Sandra</td>
<td>07</td>
<td>Ecosystems,</td>
<td>264</td>
<td>267</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandra</td>
<td>Sandra</td>
<td>07</td>
<td>Ecosystems,</td>
<td>266</td>
<td>267</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dave</td>
<td>White</td>
<td>07</td>
<td>Ecosystems,</td>
<td>264</td>
<td>267</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anwara</td>
<td>Anwara</td>
<td>07</td>
<td>Ecosystems,</td>
<td>296</td>
<td>296</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anwara</td>
<td>Anwara</td>
<td>07</td>
<td>Ecosystems,</td>
<td>297</td>
<td>297</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The section on emergent properties appears to be as good a place as any to more fully and directly discuss changes in community composition under a changing climate. Suggested citation: Fahey et al. 2016. Global and Regional Sea Level Rise Scenarios for the United States. NOAA Technical Report NOS CO-OPS 083. NOAA/NOS Center for Operational Oceanographic Products and Services; which concludes, among other findings, that the projections and results presented in several peer-reviewed publications provide evidence to support a physically plausible GMSL rise in the range of 2.0 meters (m) to 2.7 m, and recent results regarding Antarctic ice sheet instability indicate that such outcomes may be more likely than previously thought.

Thank you for the comment. The in-text verbiage has been amended to make this clearer.

The oceans are not doing anything faster than they have been doing for millennia. In fact, the oceans have been heating up at a much slower rate than the atmosphere has been warming.

Thank you for your comment. The author team reviewed the paper in question. It is about the participatory process, but does not relate specifically to equity which the subject of this text section. No change made.

The section on adaptation strategies will benefit from the addition of text on the need for changes in how adaptive management is designed and implemented, as the conventional approach was designed without due consideration of the socio-ecological context of the problem and the need to continue and spread some of the efforts made to date, as well as the need to develop new approaches to policy and shifts in budget priorities.

Thank you for the comment. We have added a new key message and expanded discussion of adaptation efforts and changes to natural resource management, both in terms of what is currently happening and areas of need. This includes some actions taken by federal agencies. However, we do not discuss the role of the federal government or any entity has in designing, implementing, or supporting efforts as that could/should be policy prescriptive, which is outside the scope of this report.

The section on adaptation strategies will benefit from the addition of text on the need for changes in how adaptive management is designed and implemented, as the conventional approach was designed without due consideration of the socio-ecological context of the problem and the need to continue and spread some of the efforts made to date, as well as the need to develop new approaches to policy and shifts in budget priorities.

Thank you for the comment. We have added a new key message and expanded discussion of adaptation efforts and changes to natural resource management, both in terms of what is currently happening and areas of need. This includes some actions taken by federal agencies. However, we do not discuss the role of the federal government or any entity has in designing, implementing, or supporting efforts as that could/should be policy prescriptive, which is outside the scope of this report.

The oceans are not doing anything faster than they have been doing for millennia. In fact, the oceans have been heating up at a much slower rate than the atmosphere has been warming.

Thank you for the comment. The author team reviewed the paper in question. It is about the participatory process, but does not relate specifically to equity which the subject of this text section. No change made.

The section on adaptation strategies will benefit from the addition of text on the need for changes in how adaptive management is designed and implemented, as the conventional approach was designed without due consideration of the socio-ecological context of the problem and the need to continue and spread some of the efforts made to date, as well as the need to develop new approaches to policy and shifts in budget priorities.

Thank you for the comment. We have added a new key message and expanded discussion of adaptation efforts and changes to natural resource management, both in terms of what is currently happening and areas of need. This includes some actions taken by federal agencies. However, we do not discuss the role of the federal government or any entity has in designing, implementing, or supporting efforts as that could/should be policy prescriptive, which is outside the scope of this report.

The oceans are not doing anything faster than they have been doing for millennia. In fact, the oceans have been heating up at a much slower rate than the atmosphere has been warming.

Thank you for your comment. The in-text verbiage has been amended to make this clearer.

The oceans are not doing anything faster than they have been doing for millennia. In fact, the oceans have been heating up at a much slower rate than the atmosphere has been warming.

Thank you for your comment. The in-text verbiage has been amended to make this clearer.

The oceans are not doing anything faster than they have been doing for millennia. In fact, the oceans have been heating up at a much slower rate than the atmosphere has been warming.

Thank you for your comment. The in-text verbiage has been amended to make this clearer.

The oceans are not doing anything faster than they have been doing for millennia. In fact, the oceans have been heating up at a much slower rate than the atmosphere has been warming.

Thank you for your comment. The in-text verbiage has been amended to make this clearer.

The oceans are not doing anything faster than they have been doing for millennia. In fact, the oceans have been heating up at a much slower rate than the atmosphere has been warming.

Thank you for your comment. The in-text verbiage has been amended to make this clearer.

The oceans are not doing anything faster than they have been doing for millennia. In fact, the oceans have been heating up at a much slower rate than the atmosphere has been warming.

Thank you for your comment. The in-text verbiage has been amended to make this clearer.

The oceans are not doing anything faster than they have been doing for millennia. In fact, the oceans have been heating up at a much slower rate than the atmosphere has been warming.

Thank you for your comment. The in-text verbiage has been amended to make this clearer.

The oceans are not doing anything faster than they have been doing for millennia. In fact, the oceans have been heating up at a much slower rate than the atmosphere has been warming.

Thank you for your comment. The in-text verbiage has been amended to make this clearer.

The oceans are not doing anything faster than they have been doing for millennia. In fact, the oceans have been heating up at a much slower rate than the atmosphere has been warming.

Thank you for your comment. The in-text verbiage has been amended to make this clearer.
This chapter has the potential to be a useful reference on the strategies that are being or could be used to adapt to or mitigate coastal climate change or their sufficiency.

Robert Kopp 441120 Coast Effects 8.1 33 34 34 Lacking in 2017 assesses the potential impact of sea-level rise on coastal flooding; it does not assess the scenarios being to adopt or mitigate coastal climate change. How is it there is virtually no difference in costs with adaptation between RCP 4.5 and RCP 8.5? It makes me seriously doubt the source. Adaptation to substantially greater amounts of SLR (RCP's diverge meaningfully after mid-century) has to cost more. The exploration in the caption of the different values at 2100 relative to each other doesn't help clarify for me.

Thank you for your feedback. The author team has verified that the numbers are accurate, but agree that the language is unclear as written. It has been revised to enhance clarity.

Robert Kopp 441175 Whole Chapter Coast Effects This chapter has the potential to be a useful reference on the strategies that are being or could be used to adapt to sea-level rise, but the current discussion of coastal adaptation is limited to 2 paragraphs, plus one figure and a box on North. It would be helpful to discuss the range of possible adaptation options currently practiced and under consideration in the text.

Thank you for your comment. This chapter has the potential to be a useful reference on the strategies that are being or could be used to adapt to sea-level rise, but the current discussion of coastal adaptation is limited to 2 paragraphs, plus one figure and a box on North. It would be helpful to discuss the range of possible adaptation options currently practiced and under consideration in the text.

Robert Kopp 441176 Traceable Account Coast Effects 113 313 14 25 Note that the meaning of the probability language in CSSR Chapter 12, which is offered by confidence language ("very high confidence in lower bounds; medium confidence in upper bounds for 2010 and 2020; low confidence in upper bounds for 2070"), is a bit different than the uncertainty language here. Given the limited degree of confidence, particularly in the upper bounds, it seems a bit awkward to cite these precise probabilities here. Note that, when these probabilities were presented in the CSSR and in Sween et al. 2017, they came with clear caveats. Per the Table 8.3 caption: "Probability of exceeding the GMSL anomaly in 2025 per Kopp et al. New evidence regarding the Arctics ice sheet, if confirmed, may significantly increase the probability of the intermediate-high, high, and extreme scenarios, particularly under the higher scenarios (CRCP 5%), but these results have not yet been incorporated into a probabilistic analysis." Note that, subsequent to the completion of the CSSR, Kopp et al. 2017 (doi: 10.1038/s41598-017-00188-5) conducted a more formal combination of Kopp et al. 2014 and DeConto and Pollard 2016. They found that DeConto and Pollard 2016 increased the central CRM of simulations for RCP 8.5 in 2100 from 0.5-1.2 m to 0.9-2.4 m (median increasing from 0.8 to 1.3 m); for RCP 4.5 from 0.3-1.0 m to 0.5-2.6 m (median from 0.6 to 1.2 m); and for RCP 2.6 from 0.3-0.8 m to 0.3-1.0 m (median from 0.3 to 0.6 m).

Thank you for your request. The text has been edited to reflect your concerns.

Robert Kopp 441177 Traceable Account Coast Effects 114 314 13 13 This statement could be falsely interpreted as meaning that we have high confidence in the magnitude of the rise as opposed to correctly stating that we have high confidence in the existence of the threat.

Thank you for your comment. The statement has been edited for clarity.

July Lims 441175 Whole Page Coast Effects 134 18-19: Adapting to degradation of habitat integrity and quality may enhance community and ecosystem resilience and decrease both direct and indirect impacts. The sentence above needs to be clarified. Not clear how adapting to degradation of habitat integrity and quality builds resilience. On you mean, build habitat quality where possible and adapt to changing conditions where not possible? What habitat degradation are you referring to: nutrient pollution, habitat and biodiversity loss, and overfishing?

Thank you for your comment. The text has been edited for clarity.

July Lims 441176 Figure Coast Effects 1.1 197 Data points are moving for the orange line, RCP 8.5 Costs with Adaptation.

Thank you for your comment. The author team has amended the figure caption to make the distinction between the two lines clearer.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Numbers</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susanne</td>
<td>Moser</td>
<td>141820</td>
<td>OB. Coastal Effects</td>
<td>309</td>
<td>306 12 4 8</td>
<td>309</td>
<td>306</td>
<td>12</td>
<td>4</td>
<td>Here is the text: 1 Key Message 2. Fisheries, tourism, human health, and public safety depend upon healthy coastal 3 ecosystems. However, coastal ecosystems are being transformed, degraded, or lost due to 4 climate change impacts, particularly sea level rise and higher numbers of extreme weather 5 events. Comment: This text falsely states precautionary measures as established physical facts. As indicated by 6 the references to IPCC scenarios, these precautionary measures are based primarily on questionable computer projects which are 7 far too sensitive to human activities, especially to CO2 increases. This referenced sea level rise may well be 8 due to natural sea level changes, not climate change. This test probably violates the Information Quality Act requirement that federal agencies ensure and maintain the “quality, objectivity, utility, and integrity of information disseminated by the agency.” This text exhibits 9 neither quality, objectivity, utility nor integrity. To begin with there is neither objectively nor integrity, as these errors 10 have been pointed out repeatedly during the previous series of National Assessments (references should 11 not be necessary), yet they persist. As a result there is no quality or utility. Thank you for your comment. The 12 author team has updated the language in question.</td>
<td></td>
</tr>
<tr>
<td>David</td>
<td>Wojick</td>
<td>141825</td>
<td>OB. Coastal Effects</td>
<td>303</td>
<td>303 8 8 4</td>
<td>303</td>
<td>303</td>
<td>8</td>
<td>4</td>
<td>Here is the text: 1 Key Message 2. Fisheries, tourism, human health, and public safety depend upon healthy coastal 3 ecosystems. However, coastal ecosystems are being transformed, degraded, or lost due to 4 climate change impacts, particularly sea level rise and higher numbers of extreme weather 5 events. Comment: This text falsely states precautionary measures as established physical facts. As indicated by 6 the references to IPCC scenarios, these precautionary measures are based primarily on questionable computer projects which are 7 far too sensitive to human activities, especially to CO2 increases. This referenced sea level rise may well be 8 due to natural sea level changes, not climate change. This test probably violates the Information Quality Act requirement that federal agencies ensure and maintain the “quality, objectivity, utility, and integrity of information disseminated by the agency.” This text exhibits 9 neither quality, objectivity, utility nor integrity. To begin with there is neither objectively nor integrity, as these errors 10 have been pointed out repeatedly during the previous series of National Assessments (references should 11 not be necessary), yet they persist. As a result there is no quality or utility. Thank you for your comment. The 12 author team has updated the language in question.</td>
<td></td>
</tr>
<tr>
<td>Laurie</td>
<td>Moser</td>
<td>141820</td>
<td>Whole chapter</td>
<td>306</td>
<td>306 8 9 8</td>
<td>306</td>
<td>306</td>
<td>8</td>
<td>9</td>
<td>Overall, it was refreshing reading this chapter compared to some of the others in NCA4, which are deeply 10 flawed. This one is quite good already, so I have only a few comments - generally, do a “may” worst check - the first two messages in particular include the vague language. We were not 11 allowed to use such words in NCA4. I would assume you can’t put that at the final review with the White 12 House either. Thank you for your comment. The author team has updated the language in question.</td>
<td></td>
</tr>
<tr>
<td>Laurie</td>
<td>Moser</td>
<td>141821</td>
<td>OB. Coastal Effects</td>
<td>303</td>
<td>303 8 9 9</td>
<td>303</td>
<td>303</td>
<td>8</td>
<td>9</td>
<td>The key message indicates a vague statement on how adaptation “may” decrease losses and cascading 10 economic impacts. But this is to be rather weak compared to the numbers given in Figure 8.1. BTW, please check the correctness of the take away message and of the numbers in the figure caption of 11 8.1. It seems to me the key message here is that stringent mitigation is the greatest cost saving of all. That seems 12 to make the difference between 3.6 trillion vs. 820 billion, no? And secondarily there are the cost savings/damages avoided if adaptation measures were taken. The 13 difference between no adaptation and with adaptation seems surprisingly small. Or am I missing something? Maybe the issue is that the two curves are really hard to distinguish. Anyway, there is something really weird about the graphic versus the text. Please check carefully and maybe extend the vertical scale to show 14 the curves more distinctly. Thank you for your comment. The sentence has been amended for clarity.</td>
<td></td>
</tr>
<tr>
<td>Laurie</td>
<td>Moser</td>
<td>141822</td>
<td>OB. Coastal Effects</td>
<td>297</td>
<td>297 1 0 3</td>
<td>297</td>
<td>297</td>
<td>1</td>
<td>0</td>
<td>Seems like citing the 2000 FEMA/Hunter Center study is not dated for making a statement about “the next ten 2 years” (i.e., to 2025, which have already passed). Thank you for your feedback. The author team has amended the language such that the timeline is more 3 appropriate.</td>
<td></td>
</tr>
<tr>
<td>Laurie</td>
<td>Moser</td>
<td>141823</td>
<td>OB. Coastal Effects</td>
<td>298</td>
<td>298 1 0 2</td>
<td>298</td>
<td>298</td>
<td>1</td>
<td>0</td>
<td>Comment: To have the table, but “In the NCA4 process venera - I would strongly urge you to have all these examples 2 referenced. Will make your chapter a lot stronger. Thank you for your comment. The final figure will be better sourced back to the NOAA regional chapters, which is 3 where this information was derived.</td>
<td></td>
</tr>
<tr>
<td>Laurie</td>
<td>Moser</td>
<td>141824</td>
<td>OB. Coastal Effects</td>
<td>308</td>
<td>308 4 3 8</td>
<td>308</td>
<td>308</td>
<td>4</td>
<td>3</td>
<td>The figure caption is unclear - you need to clarify which of the two concepts is visualized in which part of 4 the figure. Thank you for your comment. The figure has been amended to more clearly denote which is the “quality” 5 condition and which is the “equality” condition and how it directly relates to NAMM.</td>
<td></td>
</tr>
<tr>
<td>Laurie</td>
<td>Moser</td>
<td>141825</td>
<td>OB. Coastal Effects</td>
<td>309</td>
<td>309 12 12 17</td>
<td>309</td>
<td>309</td>
<td>12</td>
<td>17</td>
<td>I think it’s important that you back up this statement with additional examples from other places. It always 10 worries me that we limit “place attachment” and “culture” to Indigenous peoples, as if the rest of us hardwood 11 Louisiana (Indigenous and not a bayou culture); Mounta has a beach culture, as does California and southern 12 Maine. People don’t want to move from the Jersey shore as much as they don’t want to leave from Puget 13 Sound. Meanwhile the National Estuarine Research Reserve system has been in a pilot phase of developing Successful 14 Adaptation Indicators and Metrics; these efforts have not yet yielded publications, but the project is described at the 15 NERR Science Collaborative website [<a href="http://garnet.colorado.edu/media/fix/NGS-S41M.pdf">http://garnet.colorado.edu/media/fix/NGS-S41M.pdf</a>] and provides project description. 5 pilots have been completed. Thank you for your comment. The author team has added the climate resilience tools to the report, which 3 samples multiple resources including the DOI and NERR work.</td>
<td></td>
</tr>
</tbody>
</table>
Allison Crimmins
41027 En Region Coastal Effects 142148

Crimmins Brown
42035 Figure Coastal Effects 298


Thank you for your comment. The author team has accepted it and amended the language accordingly.

Thank you for your suggestion. The author team has reviewed the key message and your editorial suggestions. The team has decided to keep the language as written to provide the full context about the threats and actions that can mitigate them.

Thank you for your comment. The table was used for the public comment process only and will not be included in the final figure. The print version of the chapter will include a limited reference. The author team agrees that this facilitates readability.

Thank you for your feedback. The author team agrees and has added language about the specific mental health impacts of climate- and weather-related disasters to the summary and included the Dodgen et al. 2016 citation.

Thank you for your suggested edit. The author team has accepted it and amended the language accordingly.

Thank you for your comment. The author team has reviewed the key message and your editorial suggestions. The team has decided to keep the language as written to provide the full context about the threats and actions that can mitigate them.

Thank you for your comment. The figure and table will look substantially different once the NCA goes to production. The table was used for the public comment process only and will not be included in the final figure. The print version of the chapter will include a limited reference. The author team agrees that this facilitates readability.

Thank you for your comment. The author team has added citations to NOAA as appropriate citation support. While I like the three oceans you are talking about are the gulf of Mexico, great lakes, and estuaries. Not that you are in addition to the three oceans. Maybe replace with “as well as”.

Thank you for your suggestion. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained. Regarding citations: the information in the graphic was pulled from each of the regional chapters and will be cited as such in the final version.

Thank you for your suggestion. The author team agrees and has added language about the specific mental health impacts of climate- and weather-related disasters to the summary and included the Dodgen et al. 2016 citation.

Thank you for your comment. The author team has reviewed the key message and your editorial suggestions. The team has decided to keep the language as written to provide the full context about the threats and actions that can mitigate them.

Thank you for your comment. The author team has reviewed the key message and your editorial suggestions. The team has decided to keep the language as written to provide the full context about the threats and actions that can mitigate them.

Thank you for your comment. The author team has reviewed the key message and your editorial suggestions. The team has decided to keep the language as written to provide the full context about the threats and actions that can mitigate them.

Thank you for your comment. The author team has reviewed the key message and your editorial suggestions. The team has decided to keep the language as written to provide the full context about the threats and actions that can mitigate them.

Thank you for your comment. The author team has reviewed the key message and your editorial suggestions. The team has decided to keep the language as written to provide the full context about the threats and actions that can mitigate them.

Thank you for your comment. The author team has added the Climate Change Indicators Report (2016) as a citation to NOAA as appropriate citation support. Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained. Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained. Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained. Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained.

Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained. Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained.

Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained. Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained. Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained.

Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained. Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained. Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained. Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained. Thank you for your comment. The author team has reviewed the examples and consulted with the regional chapters to ensure that only the most relevant adaptation examples are retained.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142149</td>
<td>Text Effect</td>
<td>SE. Coastal Effects</td>
<td>305</td>
<td>308</td>
<td>15</td>
<td>18</td>
<td>Thank you for your suggestion. The author team has added the NRC citation since the new NIEG Evaluation Report does indeed build the case for the economic benefits. The first citation was not added because it was focused on financing options, which is beyond the scope of the chapter.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142150</td>
<td>Figure</td>
<td>SE. Coastal Effects</td>
<td>104</td>
<td>108</td>
<td>1</td>
<td></td>
<td>We've seen this image a million times on Facebook, and it's a good one. But I don't understand how it belongs in a figure for a separate chapter on Social Impacts, or perhaps a transition page between chapters. Or even in Chapter 1. But it applies to everything in this entire report, so it shouldn’t be stuck here. A different figure on coastal impacts/disasters experienced across different socio-economic groups (both income/race/education), or statistics in Puerto Rico from the hurricane would work better. It would also be nice to see some of the nuanced flooding images from the NCA's footnotes and/or EPA indicators report that showed observed and projected days with flooding (e.g. the north Carolina footnotes in your sentence).</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142151</td>
<td>Text Effect</td>
<td>SE. Coastal Effects</td>
<td>108</td>
<td>108</td>
<td>7</td>
<td>7</td>
<td>Thank you for your suggestion for additional citations; however this phrase has been deleted from the chapter and it talks about &quot;threat multipliers&quot; in a military rather than the social sense as captured in our sentence.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142152</td>
<td>Text Effect</td>
<td>SE. Coastal Effects</td>
<td>109</td>
<td>109</td>
<td>5</td>
<td>5</td>
<td>The example of migration after Katrina was in NCA. It would be worthwhile if the authors could find information on the diaspora of Puerto Ricans this year. Though it's early and there may not be final data yet, even reporting estimates would be eye opening.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142153</td>
<td>Text Effect</td>
<td>SE. Coastal Effects</td>
<td>110</td>
<td>110</td>
<td>75</td>
<td></td>
<td>Thank you for your comments. The National Climate Assessment is a scientific document that provides a basis for decision making, but does not prescribe policy or specific adaptation measures. Discussion of these topics is beyond the scope of the assessment. The wide range of costs, adaptation types, and communities affected make it impossible to go into detail in a chapter such as this one. You will find greater detail about particular projects in the regional chapters. The coastal effects chapter looks more at the broad trends that are facing all of the coastal regions.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142154</td>
<td>Whole Chapter</td>
<td>SE. Coastal Effects</td>
<td>110</td>
<td>110</td>
<td>23</td>
<td>25</td>
<td>Where are the citations for this statement At least for the &quot;hurry current&quot;?</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142155</td>
<td>Text Effect</td>
<td>SE. Coastal Effects</td>
<td>110</td>
<td>111</td>
<td>26</td>
<td>25</td>
<td>Thank you for your comments on the chapter. Given that Nortik is already featured in its own section, the chapter does not need a separate sub-section on the topic. The chapter agrees that it cannot be told from the name of the figure, so I'll suggest removing Nortik from the already very long text in the figure.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142156</td>
<td>Whole Chapter</td>
<td>SE. Coastal Effects</td>
<td>110</td>
<td>110</td>
<td>10</td>
<td>10</td>
<td>The text is, as Jodie lightly phrased it, right on the edge of Server page limits. The author team agrees that it cannot be told from the name of the figure, so I’ll suggest removing Nortik from the already very long text in the figure.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142157</td>
<td>Whole Chapter</td>
<td>SE. Coastal Effects</td>
<td>110</td>
<td>110</td>
<td>24</td>
<td>25</td>
<td>Thank you for your feedback on the chapter. The length is impacted by the委员 of the evidence cover page, executive summary, and table for figure 8.2. Once fully formatted, the length will meet USGCRP guidelines. The authors have considered your comments regarding changes to section 8.3 and have decided to retain this section to provide the necessary context for understanding the social, economic, and environmental impacts of sea level rise and flooding on the coasts and their communities. Likewise, the author team has concluded that the inclusion of figure 8.4 provides very important context for the concept of social equity.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142158</td>
<td>Password Account</td>
<td>SE. Coastal Effects</td>
<td>112</td>
<td>112</td>
<td>13</td>
<td>13</td>
<td>This is one of the better password account inserts. Anything else to add about author selection on decisions that the author team made regarding scope? For instance, are some topics covered in other chapter and so not covered here?</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142159</td>
<td>Whole Chapter</td>
<td>SE. Coastal Effects</td>
<td>112</td>
<td>112</td>
<td>3</td>
<td>3</td>
<td>Thank you for your comments. The password account has been updated to add additional information regarding author team selection, and the strategy and decision process regarding review scope. In particular for author team structure, please refer to “Appendix 1: Report Development Process,” where there is additional information about the options for author team structure. Note that there are additional full federal task chapters in the report.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142160</td>
<td>Password Account</td>
<td>SE. Coastal Effects</td>
<td>113</td>
<td>113</td>
<td>10</td>
<td>11</td>
<td>Because there is only one boxed condensed/briefed statement for this very very long key message filled with multiple topics and points, I am uncertain what exactly you have high confidence likely. Suggest adding more statements at the end of each point (e.g. regarding damages, economic impacts, transformation of coastal communities)</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142161</td>
<td>Password Account</td>
<td>SE. Coastal Effects</td>
<td>113</td>
<td>113</td>
<td>14</td>
<td>14</td>
<td>A little more ‘reiteration’ in the description of evidence base would be nice. Are these things well studied, with research dating back years and years, and everyone in consensus? Or is this new, emerging science? For example, noting that there are not many economic sector models that quantify damages under alternative climate scenarios (really, just folksy business and CMIP) wouldn't help in this box. Letting the reader know about the content over methodology for projecting sea-level and how those estimates have changed (not the numbers, but just that they changed with events scientific advancements) would also be helpful. This same sentence in KM2 is a good example.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142162</td>
<td>Password Account</td>
<td>SE. Coastal Effects</td>
<td>114</td>
<td>114</td>
<td>25</td>
<td>25</td>
<td>The lead authors say “very high confidence&quot;, but above in the key finding it was just “high confidence”. These should be made consistent, which would help if additional confidence levels were provided for each topic within the key message.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142163</td>
<td>Document Creation</td>
<td>SE. Coastal Effects</td>
<td>114</td>
<td>114</td>
<td>12</td>
<td>12</td>
<td>The author team wanted to express an overall confidence level for the Key Message in the chapter text. However, the traceable account includes a reference to a specific section of that Key Message in which the author team has very high confidence.</td>
<td></td>
</tr>
</tbody>
</table>
Coastal wetlands provide flood mitigation benefits as well, which should be referenced in this section. A recent study found that in Ocean County, New Jersey, existing coastal wetlands were responsible for $25.9 million in avoided flood damages during Hurricane Sandy. (See The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA, Nature Climate Change, August 2013.)

Thank you for your comment. The new citation has been added.

Constible, Karin 142478 Test-Region SE Coastal Effects 306 300 11 14 Coastal wetlands provide flood mitigation benefits as well, which should be referenced in this section. A recent study found that in Ocean County, New Jersey, existing coastal wetlands were responsible for $25.9 million in avoided flood damages during Hurricane Sandy. (See The Value of Coastal Wetlands for Flood Damage Reduction in the Northeastern USA, Nature Climate Change, August 2013.)

Thank you for your comment. The new citation has been added.

Thomas, Devin 142434 Test-Region SE Coastal Effects 304 303 17 5 Strongly suggest moving this entire paragraph to the discussion of figure 8.1.

Thank you for your comment. The author has considered your suggestion and opted to rephrase the paragraph in its original location, as it does not speak to gains from adaptation, but rather from impacts. This helps to maintain the flow of ideas and ensures that the discussion is focused on the implications and potential solutions related to coastal wetlands.

Thomas, Devin 142435 Test-Region SE Coastal Effects 304 303 17 5 Please explain what is meant by "with the Atlantic and Gulf coasts facing greater-than-average risks". It reads out of context with the rest of the paragraph.

Thank you for your comment. This sentence has been amended to make the wording more clear. It now reads: "With the Atlantic and Gulf coasts facing greater-than-average risks, it is important to consider the implications and potential solutions related to coastal wetlands."

Thomas, Devin 142439 Test-Region SE Coastal Effects 304 305 17 5 Innovative approaches..." Please provide documentation and/or concrete examples for what is meant by "innovative approaches". Alternatively, rephrase the sentence to make it more clear.

Thank you for your comment. The sentence has been rephrased to focus on broad ideas related to nature-based infrastructure rather than specific case studies or examples.

Thomas, Devin 142441 Test-Region SE Coastal Effects 304 307 3 8 Each image needs to be called out specifically in the figure caption. For example, the upper left panel could be labeled "A", upper right "B" and so on with a corresponding description of each panel with its new label in the figure caption.

Thank you for your comment. The figure and table will look substantially different once the NCA goes to production; in particular, it will be interactive in the online version. The table was used for the public comment process only and will not be included in the final figure (or in either the print or online version). The figure will also be better sourced back to the NCA4 regional chapters, where all of this information was derived. With the paper over becoming the NCA/S report, this figure would be reproducible.

Thompson, Devin 142459 Test-Region SE Coastal Effects 304 304 17 5... This strengthens the overall narrative and provides a more cohesive message.

Thank you for your comment. The figure and table will look substantially different once the NCA goes to production; in particular, it will be interactive in the online version. The table was used for the public comment process only and will not be included in the final figure (or in either the print or online version). The figure will also be better sourced back to the NCA4 regional chapters, where all of this information was derived.

Thomas, Devin 142519 Test-Region SE Coastal Effects 304 306 1 7 The section needs to be updated or should be removed entirely. I believe the authors are trying to address climate migration in one form of adaptation but have only called out the case study example from Nebraska. Alaska needs to be better sourced back to the NCA4 regional chapters, where all of this information was derived. With the paper over becoming the NCA/S report, this figure would be reproducible.

Thank you for your comment. The sentence has been removed from the final draft. The table was used for the public comment process only and will not be included in the final figure (or in either the print or online version). The figure will also be better sourced back to the NCA4 regional chapters, where all of this information was derived. With the paper over becoming the NCA/S report, this figure would be reproducible.

Thomas, Devin 142520 Test-Region SE Coastal Effects 304 303 17 5...This strengthens the overall narrative and provides a more cohesive message.

Thank you for your comment. The figure and table will look substantially different once the NCA goes to production; in particular, it will be interactive in the online version. The table was used for the public comment process only and will not be included in the final figure (or in either the print or online version). The figure will also be better sourced back to the NCA4 regional chapters, where all of this information was derived. With the paper over becoming the NCA/S report, this figure would be reproducible.

Thomas, Devin 142521 Test-Region SE Coastal Effects 304 303 17 5 Please explain what is meant by "with the Atlantic and Gulf coasts facing greater-than-average risks". It reads out of context with the rest of the paragraph.

Thank you for your comment. This sentence has been amended to make the wording more clear. It now reads: "With the Atlantic and Gulf coasts facing greater-than-average risks, it is important to consider the implications and potential solutions related to coastal wetlands."

Thomas, Devin 142522 Table 304 305 17 5 An NRDC analysis found that between 1998-2014, FEMA spent $48.6 billion on Public Assistance Grants in areas subject to a federal disaster declaration. These grants were predominantly used to repair or replace public buildings ($12.6 billion), public utilities ($7.4 billion), roads and bridges ($5.1 billion), and water and wastewater facilities ($1 billion, dams, and pumps ($1 billion). The biggest recipients were Louisiana ($137.3 billion), New York ($90 billion), Florida ($71.1 billion), Texas ($53.9 billion), and Mississippi ($21.4 billion). (See https://www.nrdc.org/resources/need-flood-protection-standards.)

Thank you for your comment. The new citation has been added.

Thomas, Devin 142523 Test-Region SE Coastal Effects 304 304 17 5...This strengthens the overall narrative and provides a more cohesive message.

Thank you for your comment. The figure and table will look substantially different once the NCA goes to production; in particular, it will be interactive in the online version. The table was used for the public comment process only and will not be included in the final figure (or in either the print or online version). The figure will also be better sourced back to the NCA4 regional chapters, where all of this information was derived. With the paper over becoming the NCA/S report, this figure would be reproducible.


https://www.nrdc.org/resources/need-flood-protection-standards.)

Thank you for your comment. The new citation has been added.

Thomas, Devin 142525 Test-Region SE Coastal Effects 304 308 17 5...This strengthens the overall narrative and provides a more cohesive message.

Thank you for your comment. The figure and table will look substantially different once the NCA goes to production; in particular, it will be interactive in the online version. The table was used for the public comment process only and will not be included in the final figure (or in either the print or online version). The figure will also be better sourced back to the NCA4 regional chapters, where all of this information was derived. With the paper over becoming the NCA/S report, this figure would be reproducible.
Throughout the chapter, emissions scenarios are referenced to characterize potential climate change impacts, primarily RCP 4.5 and RCP 2.6. However, in many instances, only RCP 4.5 is mentioned whereas in other cases potential impacts under both RCP 4.5 and RCP 2.6 are stated. Throughout the chapter, impacts should be assessed under only one scenario, under RCP 4.5 and RCP 2.6, but also under RCP 8.5 since this is the only scenario consistent with keeping temperature below 2 degrees Celsius. Relaying on all three will better frame the likely impacts and effort that will be necessary to prevent many scheme climate change impacts. Also, this will illustrate the benefits and necessity of reducing emissions to avoid unacceptable climate change damage. Relaying solely on RCP 4.5 projections discounts the horrible impacts that will occur at lower emissions trajectories such as RCP 4.5, and how RCP 2.6 and below should truly be the goal.

Thank you for your feedback. The author team agrees that the icons were too difficult to understand; they will be deleted in the final version and replaced with text.

Comment 

Response
Michelle Tigchelaar 14.0000 Test Region: Coastal Effects 294 294 12 13 Suggest stipulating that this is about the "coastal" nature of tourism, human health and public safety, as these latter things could depend on healthy coastal ecosystems. Thank you for your comment. This sentence has been amended for clarity.

Wean of Concerned Scientists 14.0024 Test Region: Coastal Effects 295 295 6 9 Suggest change to "to global trade" Thank you for your comment. This sentence has been amended to include the suggested phrase.

Wean of Concerned Scientists 14.0024 Test Region: Coastal Effects 295 295 14 15 Movie "about $10 billion" to after "real estate..." The threatened national wealth is larger (millions of homes, ports, airports, transportation infrastucture, etc.) Thank you for your comment. This sentence has been amended to incorporate your suggestions and to improve overall readability.

Wean of Concerned Scientists 14.0025 Test Region: Coastal Effects 296 296 2 2 Suggest change to "often economically vibrant" Thank you for your comment. The in-text verbiage has been amended to make it clearer that not every port of coastline is economically vibrant.

Wean of Concerned Scientists 14.0026 Test Region: Coastal Effects 296 296 7 7 A key reason the coasts are economic engines is because of the economic productivity of these big cities, which does not depend solely (or even primarily) on defense, fishing, tourism, and transportation. Suggest something like: "The coasts are economic engines that house some of our nation's major urban centers, that support jobs..." Thank you for your comment. This sentence has been amended to include the suggested phrase.

Wean of Concerned Scientists 14.0027 Test Region: Coastal Effects 296 296 8 8 Other week numbers added or clarification that water bodies in this list are not oceans. These lawsuits and policies are already being tested, for example the 2008 Kivalina lawsuit against ExxonMobil Corporation, 2016 federal grant funding for the resettlement of the residents of Isle de Jean Charles, the listing of the polder as a threatened species under the Endangered Species Act in 2008, and the Massachusetts v. EPA Supreme Court case in 2007. We suggest phrasing the language from "future" to "current" Thank you for the time to review the chapter. This comment does not appear to raise a question or suggest a revision that the authors could adequately address from your comment.

Wean of Concerned Scientists 14.0027 Test Region: Coastal Effects 296 296 15 15 Suggest change to "to global trade" Thank you for your comment. This sentence has been amended to include the suggested phrase.

Wean of Concerned Scientists 14.0028 Test Region: Coastal Effects 296 296 12 12 Suggest change to "often economically vibrant" Thank you for your comment. This sentence has been amended to include the suggested phrase.

Wean of Concerned Scientists 14.0029 Test Region: Coastal Effects 296 296 16 16 These boasts are "coastal" not "ocean" "coastal" impacts are not "ocean" impacts. Suggest something like: "The coasts are economic engines that house some of our nation's major urban centers, that support jobs..." Thank you for taking the time to review the chapter. This comment does not appear to raise a question or suggest a revision that the authors could adequately address from your comment.

Wean of Concerned Scientists 14.0030 Test Region: Coastal Effects 296 296 7 7 Suggest change to "global" and "trade" Thank you for your comment. This sentence has been amended to include the suggested phrase.

Wean of Concerned Scientists 14.0031 Test Region: Coastal Effects 296 296 11 12 Suggest specifying what is meant by "ocean" - transportation infrastructure? Reads like it could mean buildings. Thank you for your feedback. The author team agrees that the sentence as written is unclear. The language has been amended to enhance clarity of meaning.

Wean of Concerned Scientists 14.0032 Test Region: Coastal Effects 296 296 16 19 Comments from summary apply here: This text assertion is both sweeping and too limited. (a) These adverse impacts certainly exist, but they affect people primarily in storm-affected areas, and increasingly in totally flooded areas. Hard to say they are rippling through the country. (b) Some important personal- and household-scale impacts are missing. Suggest "adverse financial, social, and psychological impacts to affected citizens, and in turn, their broader communities". Thank you for your comment. This sentence has been amended to include the suggested phrase.

Wean of Concerned Scientists 14.0033 Test Region: Coastal Effects 296 296 12 12 Suggest changing this sentence to: "Coasts are coastal..." - transportation infrastructure? Reads like it could mean buildings. Thank you for your feedback. The author team agrees that the sentence as written is unclear. The language has been amended to enhance clarity of meaning.

Wean of Concerned Scientists 14.0034 Figure: CO2 Effects 2 288 These terms are of course a mix of climate risks, stressors, vulnerabilities, and impacts. With this image, this text seems fairly well-balanced, but it is a mix of apples and oranges, plus banana, etc. Thank you for the comment on the figure. It does not appear to offer a comment or a suggestion for improvement; as such, the author team was unable to take action on this comment in a way that enhances the figure.

Wean of Concerned Scientists 14.0035 Figure: CO2 Effects 2 288 Suggest adding a note here that "coastal inundation and land loss" is not an impact. The impact is that it drives these two. Thank you for your suggestion. The author team has decided that leaving it as is makes sense, given that the overall stress and climate change, resulting in an impact of SLR. The table has not been amended. For more information regarding climate as the overall stressor, please see the Climate Science Special Report (Vol. 1 of the National Climate Assessment), in particular Chapter 2 (Physical Drivers of Climate Change) and Chapter 12 (Sea Level Rise).

Wean of Concerned Scientists 14.0036 Figure: CO2 Effects 2 288 To bring this bit more inline with a potential impacts table, could change "critical infrastructure at risk" to "critical infrastructure damages". Thank you for your suggestion. The author team agrees that this re-working keeps the impacts consistent and more aligned with the structure of the table.

Wean of Concerned Scientists 14.0037 Figure: CO2 Effects 805 305 4 24 Infrastructure provides important "services" to coastal communities, so impacts there would have far-reaching consequences for the entire nation. It is unclear from this sentence that the second statement should follow the first. What is the scope of the consequence? Clarifying/additional text needed. Thank you for your comment. The author team has amended the in-text verbiage to more clearly demonstrate a link between coastal infrastructure and inland communities that either rely on it or supply it.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Name</th>
<th>Start Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143838</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>55 50 27 27</td>
<td>In this instance, &quot;exposure&quot; is more accurate than &quot;vulnerability.&quot;</td>
<td>Thank you for your comment. The edit has been included in the text.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143839</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>55 50 30 33</td>
<td></td>
<td></td>
<td></td>
<td>Comments from summary apply here. This list assertion is both sweeping and too limited. (a) These adverse impacts certainly exist, but they affect people primarily in storm-affected areas, and increasingly in slowly flooded ones. Hard to say they are ripping through the country. (b) Some important personal-and-household-scale impacts are missing. Suggest &quot;adverse financial, social, and psychological impacts to affected citizens, and their broader communities.&quot;</td>
<td>The comment is the same as Comment 143830. It appears to have been submitted verbatim twice. No action has been taken on this comment. Please see the response to Comment 143830.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143840</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>55 50 30 33</td>
<td>Suggest change to &quot;due to a range of factors, including climate change...&quot; Developments, reduced sediment flows, etc., are also huge factors, as acknowledged elsewhere in this chapter. (c) It’s also hard to think of a coastal scenario that has not already been seen solely because of climate change.</td>
<td>Thank you for your suggestion. The author team agrees and has amended the language to allow for the effects of other activities.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143841</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>53 50 16 17</td>
<td>Useful to clarify here how adapting to degradation can enhance resilience. Do you mean: &quot;Where habitat depth and quality are threatened, adapting to those changing conditions may enhance...&quot;</td>
<td>Thank you for your comment. The language has been amended for enhanced clarity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143842</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>57 50 14 14</td>
<td>This sentence as above: communities are both the actor and the one acted upon. Both are valid points, but they are conflated in this sentence. Suggest breaking out these points.</td>
<td>Thank you for your comment. This has been amended throughout the document. Each instance of 643 now refers to individuals AND communities.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143843</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>58 50 4 4</td>
<td>Are they tested &quot;against these impacts&quot; or &quot;in response to actual or projected climate and damages&quot;</td>
<td>Thank you for your comment. The key message text has been updated to reflect this comment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143844</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>59 50 17 17</td>
<td></td>
<td></td>
<td></td>
<td>This section pulls out individual homeowners and tribes. For the fuller picture of climate inequity, it is important to mention residents (including renters) and communities as a whole. While communities are poor, in some cases, with limited access to adaptation resources, limited political voice, etc.</td>
<td>Thank you for your comment. The author team agrees that community members who do not own property is a unique distinction and should be included in the document. The passage has been amended to include the phrase: “Additionally, communities are comprised of renters and other individuals who do not own property, leaving them out of conversations about preserving neighborhoods.”</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143845</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>62 50 3 3</td>
<td>Suggest adding: &quot;clarifying that this is also one of the few communities, under current policy, that will qualify for federal funding to move en masse.”</td>
<td>Thank you for your suggestion. The sentence has been amended to reflect your proposed change.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143846</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>63 50 10 11</td>
<td>As well as means and metrics a certain extent, recognizable given SSIR invites.</td>
<td>This comment does not appear to raise a question or offer an actionable suggestion. After consideration of this point, the author team has determined that the existing text is clear and accurate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143847</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>63 50 11 14</td>
<td>It’s unclear how the costs associated with responding to NCA4 coastal flood advisories is distinct from the costs associated with the actual high tide and storm surge flooding. Can this be explained?</td>
<td>Thank you for your comment. This sentence has been amended for clarity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143848</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>63 50 15 17</td>
<td>This is inadequately explained for the reader. How will impacts ripple beyond coastal communities? Because of the added costs of disaster response and recovery? Because of buyouts?</td>
<td>Thank you for your comment. An additional citation pointing to the Coastal chapter in NCA4 has been included. In particular, see Key Message 1 (Coastal livelihoods at risk).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143849</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>61 50 19 22</td>
<td>Perhaps consider summarizing the good work by NAVFAC...</td>
<td>Thank you for your comment. Unfortunately, the reference was not successfully transmitted with the rest of your suggestion. This section of the document has remained unchanged.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143850</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>61 50 24 31</td>
<td>As a key element, but an example or two of the adaptation opportunities currently under consideration here would be useful.</td>
<td>Thank you for your suggestion - the document has been amended to include new types of adaptation measures—owning properties or constructing seawalls. The author team agrees that these specific examples add clarity to the sentence.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143851</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>56 50 33 38</td>
<td>Virginia Institute of Marine Science (VIMS). 2013. Recurrent flooding study for tidewater Virginia. Gloucester Point, VA. Online at <a href="http://vims.vims.edu/">http://vims.vims.edu/</a> recurrent_flooding/Recurrent_flooding_study_web.pdf</td>
<td>Thank you for the suggested citation. The author team has added the reference to Connolly 2015 to the report. The other two citations were not added as other references encompassed similar ideas.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143852</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>53 50 2 9</td>
<td>Flood risk reduction costs?</td>
<td>Thank you for your suggestion. The document has been amended to clarify its meaning.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143853</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>53 50 13 13</td>
<td>Communities, properties and infrastructure and services...</td>
<td>Thank you for your comment. The author team has added the word “communities” to broaden the scope of impacts. The passage has been amended.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143854</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>53 50 15 53</td>
<td>Davis, KA, et al at 2017 Effective foundation of continental United States communities with 21st century sea level rise (draft) San Anh, S; 31; DOI: <a href="https://doi.org/10.1525/elementa.254">https://doi.org/10.1525/elementa.254</a></td>
<td>Thank you for your suggestion. The author team has added the reference.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143855</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>53 50 16 18</td>
<td>water extent and number of communities as well as the amount of property... <a href="https://www.usccs.org/sites/default/files/attach/2017/07/when-rising-sea">https://www.usccs.org/sites/default/files/attach/2017/07/when-rising-sea</a>..</td>
<td>Thank you for your suggestion. The author team has added this reference.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143856</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>18</td>
<td>53 50 11 11</td>
<td>Communities (and savings)?</td>
<td>Thank you for your comment. It is not clear that adding a parenthetical to this sentence increases its readability. As a result, the author team has left the sentence unchanged.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year of Concerned Scientists</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>Start Line</td>
<td>End Page</td>
<td>End Line</td>
<td>Type</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>---------------------</td>
<td>------------</td>
<td>-----------</td>
<td>----------</td>
<td>----------</td>
<td>------</td>
</tr>
<tr>
<td>Union of Concerned Scientists</td>
<td>Tigchelaar</td>
<td>14.066</td>
<td>Text Region</td>
<td>Coastal Effects</td>
<td>14.066</td>
<td>313</td>
<td>15</td>
<td>314</td>
<td>38</td>
<td>Figure</td>
</tr>
<tr>
<td>Union of Concerned Scientists</td>
<td>Tigchelaar</td>
<td>14.066</td>
<td>Figure</td>
<td>Coastal Effects</td>
<td>14.066</td>
<td>6-4</td>
<td>308</td>
<td>6-2</td>
<td>388</td>
<td>Figure</td>
</tr>
<tr>
<td>Union of Concerned Scientists</td>
<td>Tigchelaar</td>
<td>14.067</td>
<td>Figure</td>
<td>Coastal Effects</td>
<td>14.067</td>
<td>6-2</td>
<td>388</td>
<td>6-2</td>
<td>388</td>
<td>Figure</td>
</tr>
<tr>
<td>Union of Concerned Scientists</td>
<td>Tigchelaar</td>
<td>14.066</td>
<td>Figure</td>
<td>Coastal Effects</td>
<td>14.066</td>
<td>6-4</td>
<td>308</td>
<td>6-2</td>
<td>388</td>
<td>Figure</td>
</tr>
<tr>
<td>Union of Concerned Scientists</td>
<td>Tigchelaar</td>
<td>14.066</td>
<td>Figure</td>
<td>Coastal Effects</td>
<td>14.066</td>
<td>6-4</td>
<td>308</td>
<td>6-2</td>
<td>388</td>
<td>Figure</td>
</tr>
<tr>
<td>Union of Concerned Scientists</td>
<td>Tigchelaar</td>
<td>14.066</td>
<td>Figure</td>
<td>Coastal Effects</td>
<td>14.066</td>
<td>6-4</td>
<td>308</td>
<td>6-2</td>
<td>388</td>
<td>Figure</td>
</tr>
<tr>
<td>Union of Concerned Scientists</td>
<td>Tigchelaar</td>
<td>14.066</td>
<td>Figure</td>
<td>Coastal Effects</td>
<td>14.066</td>
<td>6-4</td>
<td>308</td>
<td>6-2</td>
<td>388</td>
<td>Figure</td>
</tr>
</tbody>
</table>

For the accompanying table, we think some of the columns could be better. For example, the example for the Northwest regards the Puget Sound, which is not near the coast. We suggest instead mentioning the Quinault, which is moving to higher ground; the authors of the Northwest Chapter may have suggestions on this as well. The examples about Puerto Rico drought (under Caribbean) and Bightampton (under Northwest) also are not about coastal issues.
country, including several large-scale sediment diversions to reconnect the river. Includes a realistic and limited budget, and makes the difficult trade-offs by laying out the specific projects necessary to meet the needs of navigation, flood risk reduction, coastal industries, and communities.

Another innovative approach to explore the concept of maximizing the restoration of a functioning deltaic development. The Master Plan is formulated on a High environmental scenario (including 2.72 feet of sea level rise by 2100) and integrates nature-based infrastructure solutions to enhance community and ecosystem resilience to climate change impacts (both economically and to human health), tropical storms/hurricane events deserve more emphasis in this chapter. These events consistently rank as the costliest disasters in the US as measured by NFIP payouts. The citation of the Shaktoolik berm as a good example of local adaptation is somewhat misleading. A number of Alaska Native villages have put up similar protection in the past several decades (e.g. the Point Hope "Cal Worthington berm" which used most of the abandoned vehicles as part of the structure), as have municipal development. The caption is hard to match with the images. It could be less confusing.

Almost 1/2 of the US coastline is in Alaska. That includes coasts on the Beaufort and Chukchi Seas, which are not traditionally considered part of the Pacific. The caption needs to be changed in this chapter. This figure also appears on P. 295. There is also another figure labeled 2 on p. 298.

The chapter really does not consider the loss of coastal cultural heritages, much of which is concentrated along the coast. This impacts tribal and indigenous communities, to be sure. However, many places which are important in broader American history are on or near the coast and will be impacted, especially under extreme scenarios. Any of these sites are also important tourist attractions and economic engines for communities. The needs to be conveyed throughout the chapter.

The chapter does not consider the loss of coastal cultural heritages, much of which is concentrated along the coast. This impacts tribal and indigenous communities, to be sure. However, many places which are important in broader American history are on or near the coast and will be impacted, especially under extreme scenarios. Any of these sites are also important tourist attractions and economic engines for communities. The needs to be conveyed throughout the chapter.

The sentence would mean that the major impact when describing future coastal flood risk. The terms mention high storm surge and increased probability of heavy precipitation events, but due do their catastrophic impacts (both economically and to human health), tropical storms/hurricane events deserve more emphasis (or perhaps our newspaper message). These events consistently rank as the costliest disasters in the US as measured by NFIP payouts.

The citation of the Shaktoolik berm as a good example of local adaptation is somewhat misleading. A number of Alaska Native villages have put up similar protection in the past several decades (e.g. the Point Hope "Cal Worthington berm" which used most of the abandoned vehicles as part of the structure), as have municipal development.

Almost 1/2 of the US coastline is in Alaska. That includes coasts on the Beaufort and Chukchi Seas, which are not traditionally considered part of the Pacific. The chapter really does not consider the loss of coastal cultural heritages, much of which is concentrated along the coast. This impacts tribal and indigenous communities, to be sure. However, many places which are important in broader American history are on or near the coast and will be impacted, especially under extreme scenarios. Any of these sites are also important tourist attractions and economic engines for communities. The needs to be conveyed throughout the chapter.

The chapter really does not consider the loss of coastal cultural heritages, much of which is concentrated along the coast. This impacts tribal and indigenous communities, to be sure. However, many places which are important in broader American history are on or near the coast and will be impacted, especially under extreme scenarios. Any of these sites are also important tourist attractions and economic engines for communities. The needs to be conveyed throughout the chapter.

Almost 1/2 of the US coastline is in Alaska. That includes coasts on the Beaufort and Chukchi Seas, which are not traditionally considered part of the Pacific. The citation of the Shaktoolik berm as a good example of local adaptation is somewhat misleading. A number of Alaska Native villages have put up similar protection in the past several decades (e.g. the Point Hope "Cal Worthington berm" which used most of the abandoned vehicles as part of the structure), as have municipal development.

Almost 1/2 of the US coastline is in Alaska. That includes coasts on the Beaufort and Chukchi Seas, which are not traditionally considered part of the Pacific. The citation of the Shaktoolik berm as a good example of local adaptation is somewhat misleading. A number of Alaska Native villages have put up similar protection in the past several decades (e.g. the Point Hope "Cal Worthington berm" which used most of the abandoned vehicles as part of the structure), as have municipal development.

Almost 1/2 of the US coastline is in Alaska. That includes coasts on the Beaufort and Chukchi Seas, which are not traditionally considered part of the Pacific. The citation of the Shaktoolik berm as a good example of local adaptation is somewhat misleading. A number of Alaska Native villages have put up similar protection in the past several decades (e.g. the Point Hope "Cal Worthington berm" which used most of the abandoned vehicles as part of the structure), as have municipal development.
acidity will have on atmospheric oxygen content

I don’t think it is really defensible to give two figure precision to the estimates made here. While a specific study might use some approach to get such specific figures, I would make sure to somehow indicate that there is a non-trivial amount of uncertainty.

Whole Text Region

I don’t think it is really defensible to give two figure precision to the estimates made here. While a specific study might use some approach to get such specific figures, I would make sure to somehow indicate that there is a non-trivial amount of uncertainty.

Whole Text Region

I don’t think it is really defensible to give two figure precision to the estimates made here. While a specific study might use some approach to get such specific figures, I would make sure to somehow indicate that there is a non-trivial amount of uncertainty.

Whole Text Region

I don’t think it is really defensible to give two figure precision to the estimates made here. While a specific study might use some approach to get such specific figures, I would make sure to somehow indicate that there is a non-trivial amount of uncertainty.

Whole Text Region

I don’t think it is really defensible to give two figure precision to the estimates made here. While a specific study might use some approach to get such specific figures, I would make sure to somehow indicate that there is a non-trivial amount of uncertainty.

Whole Text Region

I don’t think it is really defensible to give two figure precision to the estimates made here. While a specific study might use some approach to get such specific figures, I would make sure to somehow indicate that there is a non-trivial amount of uncertainty.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Document ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curt</td>
<td>Storlazzi</td>
<td>140895</td>
<td>Whole</td>
<td>09. Oceans and Marine Resources</td>
<td>112</td>
<td>113</td>
<td>2</td>
<td>4</td>
<td>113</td>
<td>318</td>
<td>The authors need to cite some references to support this important paragraph.</td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>Start Line</td>
<td>End Page</td>
<td>End Line</td>
<td>Comment</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>----------</td>
<td>----------</td>
<td>---------</td>
<td></td>
</tr>
</tbody>
</table>

The text has been revised to incorporate this suggestion. The references have been corrected.


The text has been revised to incorporate this suggestion. The references have been corrected.


The text has been revised to incorporate this suggestion. The references have been corrected.


The text has been revised to incorporate this suggestion. The references have been corrected.

| Sally      | Sims      | 141077     | Whole Page   | 09. Oceans and Marine Resources | 361       | 15 | 17 | UNOOSA at end of paragraph. Regional Collaborations, e.g., the Northeast Coastal Acidification Network and the North Pacific Landscape Conservation Cooperative, that bring together researchers, coastal resource managers, and fishing communities, are building new knowledge exchange platforms to address coastal acidification impacts on coastal habitats and species. |

The text has been revised to incorporate this suggestion. The references have been corrected.

| Sally      | Sims      | 141078     | Whole Page   | 09. Oceans and Marine Resources | 340       | 13 | 38 | New title: | Use 3D: The phrase place-based communities is vague. All localities are place-based. Do you mean local communities? |

The text has been revised to incorporate this suggestion. The references have been corrected.

| weldi      | lovert    | 141027     | Test Region  | 09. Oceans and Marine Resources | 325       | 40 | 35 | New title: | 30 Key Message 1: The NationalOcean valuable ocean ecosystems are being disrupted by increasing 31 global temperatures through the loss of coral and highly-valued habitats and changes in 12 species composition and food web structure. Ecosystem disruption will intensify as ocean 33 warming, acidification, desalination, and other aspects of climate change increase. In the 14 absence of significant reductions in carbon emissions, transformative impacts on ocean 35 ecosystems cannot be avoided. Comment: This message is merely a series of speculative conjectures falsely stated as established physical facts. These conjectures appear to be based primarily on the use of questionable computer models. This text probably violates the Information Quality Act requirement that federal agencies ensure and maximize the “quality, objectivity, utility, and integrity of information disseminated by the agency.” The text exhibits neither quality, objectivity, utility nor integrity. To begin with there is neither objectivity nor integrity, as these errors have been pointed out repeatedly during the previous series of National Assessments (references should not be necessary); yet they persist. As a result there is no quality or utility. |

The text has been revised to incorporate this suggestion. The references have been corrected.
The following comments are submitted on behalf of the Marine Fisheries Advisory Committee (MAFAC), a NOAA federal advisory committee:

**Comment:** The authors of the NCA4 Oceans and Marine Resource Chapter did an excellent job providing an update on the impacts and risks of carbon emissions to marine ecosystems and resources in the U.S. This is a rapidly developing field and the authors captured key events and findings in a very succinct manner, using a broad range of regional examples. In addition, they offered important insights and optimism for our potential to adapt to the changes, as well as increase the resilience of marine ecosystems. The draft was well written for a general audience and the figures very much enhanced the communication of key points to a broad audience. The following points raised in the draft of Chapter 9, Oceans and Marine Resources are particularly important to restate:

- We are living with the impacts of climate change now (e.g., extreme weather events such 100-year floods, intense hurricanes, and marine heat waves as well as long-term shifts in fish populations—distribution and productivity). Intensity and frequency of events is increasing. (examples: Key Messages, p. 331, and 332-341.)
- The fact that the oceans play a pivotal role in the global climate system is important to emphasize. The oceans have received relatively little attention in past climate assessments (both national and international); it is important to recognize their importance to the central issue of climate change and potential feedbacks. (examples: Overview, p. 334, lines 11-15.)
- The importance of identifying and continuing assessments on the most vulnerable marine ecosystems (e.g., topical, polar, and island ecosystems in the U.S. and U.S. Territories). (examples: p. 338, lines 14-17, p. 340, lines 6-9.)
- The importance of fostering resilience in our marine ecosystems and resources by taking specific actions to adapt to the changes, as well as increase the resilience of marine ecosystems. (example: Overview, p. 334, lines 6-9.)

We greatly appreciate the thoughtful comments and are pleased with the MAFAC’s general support for our initial draft of the chapter. While the wording has changed in places, we have retained the major themes that the MAFAC found especially appealing.

**Response:** We agree with the reviewer and have added a reference to Sutton et al. 2016.

David Wojick

David Wojick

Adrienne Sutton

Adrienne Sutton

Alison Wojick
Polar Ice is only detected in the Arctic and Antarctic.
This paragraph mostly just repeats other parts of the chapter—you could probably drop it and save yourself some

Even though this is really well known stuff, and was in NCA3, there should be citations here.

but if this comes from the NOAA estimate, then the coastal chapter may have this correct. Even so, it seems like

This first sentence is also the first sentence of chapter 8—almost word for word. Except the fact that they say 123

We greatly appreciate the reviewer's comment. We have referenced this chapter in several places and specifically highlighted the observation that waters in this region may already be understaturated with respect to calcium carbonate.

This comment is in agreement with the current state of the science on this topic nor does it apply specifically to this chapter. Sea level rise is caused extensively in the Climate Change Special Report (Chapter 12) and observed

Added reference to p 336, line 18 to refer to Chapter 27, KM 4.

This article was submitted via the Climate Change 2013: The Physical Science Basis, Chapter 7-8.

We greatly appreciate the reviewer's comments. We have taken the suggested edits to heart and have added the necessary references.

We greatly appreciate the suggestion to develop a stronger link with the Alaska chapter. We have incorporated this feedback into the text and hope that the resulting link is more convincing.

We greatly appreciate the reviewer's comment. We have incorporated the feedback into the text and added the necessary references.

We greatly appreciate the reviewer's comments and have incorporated the feedback into the text. We have added the necessary references and hope that the resulting text is more convincing.

We greatly appreciate the reviewer's comments and have incorporated the feedback into the text. We have added the necessary references and hope that the resulting text is more convincing.

We greatly appreciate the reviewer's comments and have incorporated the feedback into the text. We have added the necessary references and hope that the resulting text is more convincing.

We greatly appreciate the reviewer's comments and have incorporated the feedback into the text. We have added the necessary references and hope that the resulting text is more convincing.

We greatly appreciate the reviewer's comments and have incorporated the feedback into the text. We have added the necessary references and hope that the resulting text is more convincing.

We greatly appreciate the reviewer's comments and have incorporated the feedback into the text. We have added the necessary references and hope that the resulting text is more convincing.

We greatly appreciate the reviewer's comments and have incorporated the feedback into the text. We have added the necessary references and hope that the resulting text is more convincing.

We greatly appreciate the reviewer's comments and have incorporated the feedback into the text. We have added the necessary references and hope that the resulting text is more convincing.

We greatly appreciate the reviewer's comments and have incorporated the feedback into the text. We have added the necessary references and hope that the resulting text is more convincing.
The chapter is 12 pages long, so now the length is a lot shorter. That means a lot needs to be cut out. There are some places of redundancy where whole paragraphs can be cut (noted in other comments). This chapter would also benefit from fewer sub-headings. I would suggest not separating out observed sections from projected sections. Opportunities for reducing risk is good, but wonder if the mitigation ones can be combined and go under Key Message 1 and the adaptation ones under Key Message 2, so you don’t need separate sections under each key message. The climate-ready fisheries management section on the top of page 345 would make a nice text box. The emerging issues text can all be pointed to the traceable accounts. That could help you consolidate the sections under just the overview and three key messages. You also don’t need a conclusion, like a journal article. This can just end when the information is done. Also, all of your figures are maps, which is a little map heavy. But I wonder if you could save space by having a 5 panel set of maps in one figure. Or by overlapping the marine hardwars on top of the projected ocean temperatures in figure 9.1. At the very least, it wouldn’t use as much space and less need the same map projections.

This is a redundant paragraph about how to improve understanding with long term data observations and which it is possible that acidification is happening but only high confidence that it is affecting catches. If that is the case, then we just need some clarification, and maybe move most of the emerging issues info (lines 23-32) into traceable accounts (much of this can be cut down) and the last two sentences from this section (lines 32-36) up into the main text of Key Message 3. Delete Conclusion section 2 and 3.

The text was revised to incorporate this perspective. We streamlined the section material to reduce redundancy. The projected change in extreme ocean events is clearly tied with our understanding of how natural modes of climate variability will behave in the future. Thus, the authors feel it is necessary to have some discussion of the climate modes.

We greatly appreciate the reviewer’s comments on our work.

The suggested reference has been added to the text.

The text is clear and accurate. Each key message is required to have a subsection on emerging issues and research gaps. The lack of case studies showing clear impacts of acidification on management populations was notable in our review of the literature. We think this is an important area where additional research is needed.

We appreciate the reviewer’s suggestions on how to reduce the length of the chapter, however, our chapter is consistent with the guidance set out by USGCRP. In particular, the 6 page limit is exclusive to the traceable accounts. We appreciate the suggestion to remove the conclusion. We will work with the other chapter teams to make sure our chapter is consistent with the overall form of the NCA.

The process of revising our traceable accounts did not lead to changes in our likelihood estimates or confidence levels, but we think that the new text more clearly establishes these levels.

We greatly appreciate the reviewer’s compliment on our work.

We greatly appreciate the reviewer’s feedback on the likelihood estimates and confidence levels. The process of revising our traceable accounts did not lead to changes in our likelihood estimates or confidence levels, but we think that the new text more clearly establishes these levels.

We appreciate the reviewer’s suggestion on how to reduce the length of the chapter, however, our chapter is consistent with the guidance set out by USGCRP. In particular, the 6 page limit is exclusive to the traceable accounts. We appreciate the suggestion to remove the conclusion. We will work with the other chapter teams to make sure our chapter is consistent with the overall form of the NCA.
effectively moving forward. This sentence does not seem to follow directly from the preceding ones. A tighter connection to the paragraph would be useful.

As an example of an impact to a specific community, this line is really important. Elaborate further on 'severe related impacts in the Gulf of Alaska.'

Include any available economic projections of future U.S. fisheries demand.

Statement about factors influencing phytoplankton blooms needs a citation. Consider Ji et al. 2010 or Friedland et al. 2016.

Examples of adapting fisheries to a changing climate should be given. （’...there has been progress in adapting fisheries management to a changing climate.’）

We added edits to loop phytoplankton back to hypoxia.

The Oceans and Marine Resource chapter did an excellent job providing an update on the impacts and risks of ocean/marine users participate?

We appreciate the suggestion. We specifically mention the importance of fisheries to indigenous peoples and do not break this down by region, though we do mention the economic impacts from the loss of coral reefs (we don’t break this down by region, though)

We added an additional sentence to capture that Western Alaska communities receive significant benefits from development quotas, an important source of fishery-derived income for communities in Alaska.

We included a reference to end of sentence describing Gulf of Mexico hypoxia.

We greatly appreciate the reviewer’s comment. We thank the reviewer for this good point. We did not intend to portray that ocean acidification is caused by climate change. We have added the sentence in question to state, ‘Ocean ecosystems are being transformed due to climate change due to increased atmospheric carbon dioxide levels by three key factors: warming seas, ocean acidification, and deoxygenation.’

We greatly appreciate the reviewer’s comment. We added confidence statement for impact of marine ecological disruption to humans.

We greatly appreciate the reviewer’s comment. We great appreciate the reviewer’s comment. We highlight the value of monitoring several places in the test, notably the ‘opportunities for reducing risk’ section of E&M. We do not think a discussion here is necessary.

We greatly appreciate the reviewer’s comment. The chapter Friedman et al. 2016 has been added, as well as Barbier et al. 2016. RJP-edited text to match context of sections.

We have added additional to provide additional details on our outreach activities and who participated.

We greatly appreciate the reviewer’s comment. We appreciate the suggestion. We put the highlighted sections in context.

We greatly appreciate the reviewer’s comment. We added an additional to our description of the evidence, not the process description needs more information on who the stakeholders were. Were the only scientists? Did ocean/marine users participate?

Thank you for your support of our work. The authors agree.

We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We have changed the incomplete sentence.

We greatly appreciate the reviewer’s comment. We have changed the incomplete sentence.

We greatly appreciate the reviewer’s comment. We have changed the incomplete sentence.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.

We greatly appreciate the reviewer’s comment. We greatly appreciate the reviewer’s comment.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kathy</td>
<td>Mills</td>
<td>143007</td>
<td>Text Region</td>
<td>09. Oceans and Marine Resources</td>
<td></td>
<td>139</td>
<td>143</td>
<td>3</td>
<td>6</td>
<td>There are other good single-species studies to cite for high-value fisheries if interested: Le Boit et al. 2018 (American lobster), Cody et al. 2015 (sea scallops).</td>
<td>We thank the reviewer for suggesting the two additional single-species studies. The text has been amended to include them.</td>
</tr>
<tr>
<td>Kathy</td>
<td>Mills</td>
<td>143010</td>
<td>Text Region</td>
<td>09. Oceans and Marine Resources</td>
<td></td>
<td>139</td>
<td>143</td>
<td>3</td>
<td>6</td>
<td>The interpretation may be a bit off in this sentence. First, let’s unpack what “not” is referenced against, the past or the future? The main message of the paper is that as temperatures warm (or warm earlier), more females will make it upriver to spawn before the fishery opens. I think this message is somehow getting turned around in this sentence.</td>
<td>The sentence has been made clearer as suggested by the reviewer.</td>
</tr>
<tr>
<td>None</td>
<td>Boggaard</td>
<td>143014</td>
<td>Text Region</td>
<td>09. Oceans and Marine Resources</td>
<td></td>
<td>138</td>
<td>141</td>
<td>18</td>
<td>27</td>
<td>Protected species is noted in this section, but there isn’t much attention given to this issue. Considering edits above, the title is “Invasive Fisheries,” but is the intended focus or should the title reflect a broader “Invasive Species?”</td>
<td>We appreciate the suggestion. We added an alternative earlier reference for the first part of the sentence and took the reviewer’s citation suggestion for the second part of the sentence.</td>
</tr>
<tr>
<td>Kathy</td>
<td>Mills</td>
<td>143015</td>
<td>Text Region</td>
<td>09. Oceans and Marine Resources</td>
<td></td>
<td>141</td>
<td>141</td>
<td>20</td>
<td>27</td>
<td>Delineating practices provide one example of a policy that impedes diversification (e.g., Sadil et al. 2015) for the latter part of the sentence, Massey et al. (2015) may be useful.</td>
<td>We appreciate the suggestion. We added an alternative earlier reference for the first part of the sentence and took the reviewer’s citation suggestion for the second part of the sentence.</td>
</tr>
<tr>
<td>Kathy</td>
<td>Mills</td>
<td>143080</td>
<td>Text Region</td>
<td>09. Oceans and Marine Resources</td>
<td></td>
<td>141</td>
<td>142</td>
<td>27</td>
<td>It would be valuable to mention that there were specific vulnerability assessments that is underway across the US (Morton et al. 2013; Northeast pilot, Hare et al. 2016). Moving forward, development of pathways to bring this climate information to local communities and to integrate it into fishery management (even as context) would be valuable.</td>
<td>We thank the reviewer for highlighting the recent fish species climate vulnerability assessment work. We now included reference to this work in the main text and also highlight the need to develop novel pathways to leverage such climate information for decision making in the emerging issues/research gaps section of NRM.</td>
<td></td>
</tr>
<tr>
<td>Kathy</td>
<td>Mills</td>
<td>143086</td>
<td>Text Region</td>
<td>09. Oceans and Marine Resources</td>
<td></td>
<td>144</td>
<td>144</td>
<td>1</td>
<td>5</td>
<td>Seems like “frequency” would be a better word than “occurrence.” Also, the sentence refers to “these” toxic algal blooms, but the previous paragraph was about ocean acidification. Delete “Wear.”</td>
<td>The text has been revised to incorporate this suggestion. We edited a topic sentence to the paragraph and removed “Wear.”</td>
</tr>
<tr>
<td>Airwe</td>
<td>Dalach</td>
<td>143088</td>
<td>Whole Chapter</td>
<td>09. Oceans and Marine Resources</td>
<td></td>
<td>144</td>
<td>144</td>
<td>5</td>
<td>5</td>
<td>Of the various chapters pertaining to natural resources, the %CO2Ocean%Seaw% chapter does an excellent job of summarizing the various types of climate change impacts on a wide range of species. This chapter could potentially serve as a model for a fuller treatment of biodiversity in the other chapters.</td>
<td>We greatly appreciate the reviewer’s comment.</td>
</tr>
<tr>
<td>John</td>
<td>Ferring</td>
<td>143043</td>
<td>Whole Chapter</td>
<td>09. Oceans and Marine Resources</td>
<td></td>
<td>146</td>
<td>147</td>
<td>7</td>
<td>Throughout the chapter, emissions scenarios are referenced to characterize potential climate change impacts, primarily RCP4.5 and/or RCP8.5. However, in many instances, only RCP8.5 is mentioned whereas in other cases potential impacts under both RCP4.5 and RCP8.5 are stated. Throughout the chapter, impacts should be assessed under not only RCP4.5 and RCP8.5, but also under RCP6.0 since this is the only scenario consistent with keeping temperature below 2 degrees Celsius. Relaying on all three will better frame the policy options and the effort that will be necessary to prevent many scheme climate change impacts. Also, this will illustrate the benefits and necessity of reducing emissions to avoid unacceptable climate change damage. Relaying solely on RCP8.5 projections discounts the horrible impacts that will occur at lower emissions trajectories such as RCP4.5, and the RCP6.0, if below should truly be the goal.</td>
<td>We greatly appreciate the thoughtful comments. Throughout the NCA process, we have been advised whenever possible, to contrast projected outcomes under RCP 8.5 with RCP 4.5. The difference between these scenarios provides an indication of the benefits to be gained through emission reductions. We appreciate the value in including other scenarios; however, this would be inconsistent with NGA guidance. Furthermore, it is rare to see all three scenarios presented in the ocean climate literature.</td>
<td></td>
</tr>
</tbody>
</table>
| Michelle   | Tsighekau | 143077     | Whole Chapter | 09. Oceans and Marine Resources |          | 148               | 149       | 18      | This comment was prepared after discussions by subgroups of the University of Washington Program on Climate and the Environment, Inc. Among those who participated in discussions, the following wished to be named: Mary Fisher, Megan Feddern, Dr. Michelle Tsighekau, Dr. Cecilia Bizz, Dr. Richard Gammon. 
Shellfish, particularly those harvested through aquaculture, are a key marine resource. Yet, the current climate impacts on shellfish do not figure heavily in the Key Messages of this chapter. In fact, the only reference to current impacts on this industry is made in Key Message #5:Opportunities for Reducing Risk: section 3.3.2/Several correlative events along the Pacific Northwest Coast prompted the Pacific Coast Shellfish Growers Association to work with scientists to address climate change. Similar practices are being employed on the East Coast to adapt shellfish fisheries to %CO2Ocean%Seaw% (Page 314; Lines 8-11). Otherwise, climate change impacts on shellfish harvested are referenced only as a Projected Impact in Key Message 3: %CO2Ocean acidification is expected to reduce harvest of U.S. shellfish:%Seaw% (Page 313; Line 94). Climate change has been of particular interest to large players in the shellfish aquaculture industry, particularly in the Pacific Northwest (referenced in the chapter text using the example of the Pacific Coast Shellfish Growers Association, Page 136). The following information should be included to acknowledge current ongoing effects of climate change on shellfish and aquaculture, rather than just projected or expected impacts (using references already cited in this chapter): Shellfish aquaculture has already cost the US Pacific Northwest oyster industry approximately $110 million, putting it in jeopardy nearly 3,200 jobs (Dietz et al. 2015). Spawning waters with elevated %CO2Ocean%Seaw% (hypothetized as a recurring feature of a warming climate) were linked to several years of oyster seed production failures in a hatchery in the US Pacific Northwest which used common commercial hatchery conditions and protocols (Bartone et al. 2015). While this information does not immediately appear to fit into any specific areas text sections, it seems as though marine aquaculture generally would be best referenced as a part of the %CO2Ocean%Seaw% Key Message, which could be expanded to be more inclusive of other forms of marine resources under existing threat from climate change that does not result solely from extreme events. | Thank you for your ample comments. Please note that ocean acidification impacts in the Northwest were expanded in NCA3. Given our page limit for this chapter, we excluded the Northwest Chapter to cover the story of the impacts of OA on shellfish more in depth. The Barton reference in your comment does show up on p 314, line 3. Oyster aquaculture is also referenced in this section. The section on p 319, lines 34-36 does reference the expected losses to shellfish harvests in the future due to OA. |

**Response**

- **Ekstrom JA, Suatoni L, Cooley SR, Pendleton LH, Waldbusser GG, Cinner JE, Ritter J, Langdon C, van Hooidonk R, and Andrew Gammon.** Following wished to be named: Mary Fisher, Megan Feddern, Dr. Michelle Tigchelaar, Dr. Cecilia Bitz, Dr. Richard Gammon. Thank you for your adequate comments. Please note that ocean acidification impacts in the Northwest were expanded in NCA3. Given our page limit for this chapter, we excluded the Northwest Chapter to cover the story of the impacts of OA on shellfish more in depth. The Barton reference in your comment does show up on p 314, line 3. Oyster aquaculture is also referenced in this section. The section on p 319, lines 34-36 does reference the expected losses to shellfish harvests in the future due to OA.
This comment was prepared after discussions by subgroups of the University of Washington Program on Climate Change and the Public Comment Project in Seattle, WA. Among those who participated in discussions, the following wished to be named: Mary Fisher, Megan Feddern, Dr. Michelle Tigchelaar, Dr. Cecilia Bitz, Dr. Richard Gammon.

This comment is in support of the first Key Message of Chapter 9, “Oceans and Marine Resources.” Two qualities, which we believe to be critically important to the discussion of this subject, distinguish this Key Message from the remaining two Key Messages in Chapter 9, as well as across other NCA4 chapters.

First, the sole focus of this Key Message is on marine ecosystem changes, regardless of related human impacts. This is particularly important information to receive, as it generates a fuller understanding of the challenges facing ocean ecosystems as well as the more human-centric climate change impacts addressed in Key Messages 2 & 3. Before we can fully understand the climate impacts on human populations that result from changes in marine resources and extreme events, it must first be understood that the impacts of ocean warming, ocean acidification, and hypoxia on marine ecosystem structure and function. This Key Message also provides a foundation for future National Climate Assessments, as many of the impacts on marine ecosystems that are currently being observed or projected have, in fact, or are yet to impact, impacts on human populations. Specifically, the Key Message specifically calls out “significant reductions in carbon emissions” as the only way to avoid “degradative impacts on ocean ecosystems.” This is a necessary acknowledgement that while adaptation strategies can mitigate the effects of ocean change on human populations, only reducing carbon emissions can address the actual drivers of ocean change. To strengthen this statement in the Key Message itself, it may get some emphasis further along in the review process, the authors could include the references on page 338, lines 6-7.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

After consideration, the author team decided to keep discussions of ecosystem changes due to reductions in sea ice in Key Message 1. Years with extremely low or extremely high quantities of ice would definitely qualify as extreme events. However, they are not surprising the way that the two heatwaves highlighted are. Rather, we feel that the trend in the Arctic is the most significant aspect to report.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

Thank you for the suggestion. We were not able to find this described in the peer-reviewed literature that is the foundation for future National Climate Assessments, as many of the impacts on marine ecosystems that are currently being observed or projected have, in fact, or are yet to impact, impacts on human populations. Specifically, the Key Message specifically calls out “significant reductions in carbon emissions” as the only way to avoid “degradative impacts on ocean ecosystems.” This is a necessary acknowledgement that while adaptation strategies can mitigate the effects of ocean change on human populations, only reducing carbon emissions can address the actual drivers of ocean change. To strengthen this statement in the Key Message itself, it may get some emphasis further along in the review process, the authors could include the references on page 338, lines 6-7.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

Thank you for your comment which raise points that are beyond the scope of the chapter.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

Thank you for your comment which raise points that are beyond the scope of the chapter.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

Thank you for your comment which raise points that are beyond the scope of the chapter.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.

We greatly appreciate the reviewer’s comment and support of this key message. We are pleased that our thinking is mirrored that of our reviewers. We have guidance from USGCRP to refrain from including weasels in the key messages so will not include the suggested references in the key message text.
Comment: This entire message is merely a series of speculative conjectures falsely stated as established physical facts. These conjectures appear to be based entirely on the use of questionable computer models, especially the projections to 2050. This text probably violates the Information Quality Act requirement that federal agencies ensure and maximize the "quality, objectivity, utility, and integrity of information disseminated by the agency." The severity of risks also depends on changes in food prices as well as local to global level trade, as production and consumption patterns will likely be altered due to climate change (Takle et al., 2013). Many countries are already experiencing rapid price increases for basic food commodities mainly due to frequent weather extremes and unpredictable weather events. Agreed: Sentence is revised to add "Projected global average temperature..."

Agreed: Added the Midwest chapter reference as suggested.

Done: Revised the text as suggested

Done: Revised the text as suggested

Done: Revised the text as suggested

Done: Revised the text as suggested

The paper is cited in another part of the Chapter where it fits better.

Done: Revised the text as suggested

The paper does not relate to crop response to high temperature stresses.

Comment: This entire message is merely a series of speculative conjectures falsely stated as established physical facts. These projections appear to be based entirely on the use of questionable computer models, especially the projections to 2050. That these health claims are highly questionable has already been pointed out repeatedly during the previous series of National Assessments (references should be unnecessary), yet they persist. As a result there is no quality or utility.

Comment: This text falsely states speculative projections as established physical facts. These projections appear to be based primarily on the use of questionable computer models, especially the projections to 2050. We do not in fact know that these unusual events will become more common or more severe in the future.

Comment: This text falsely states speculative projections as established physical facts. These projections appear to be based primarily on the use of questionable computer models, especially the projections to 2050. We do not in fact know that these unusual events will become more common or more severe in the future.
Rural Communities

10. Agriculture and Rural Communities

Crop insurance is mentioned as an option for farmers to mitigate risk from climate change. However, this might not be appropriate, as crop insurance can act as a barrier to crop rotation (another important risk mitigation strategy) because it incentivizes monoculture cropping through yield formulas. The section also names soil erosion technologies and altering crop inputs as strategies for mitigating risk. However, it would be even more appropriate to mention improved soil health. Soil health management practices include soil erosion reduction and lead to reduced crop inputs, but soil health is now viewed more holistically as a biological, chemical, and physical system. A slight modification of language could reflect modern thinking on soil science and avoid promoting crop insurance as a sole-risk management strategy. For example, this sentence could be modified to read: “These include altering crop inputs; adoption of a systems approach to soil health management practices; improved management of livestock production systems; integrated pest and disease management; use of climate forecasting; and diversified farming and crop rotation to reduce production risk.”

We have corrected the Executive Summary. We agree that detail related to adaptation capacity is less than for other Key Messages but with a short number of pages to cover a very broad topic we focused largely on agriculture and covered key rural issues thoroughly. We have linked to other chapters to provide examples of adaptation and capacity building for rural and indigenous communities.

Social Science

Coordinating Committee

142300 Test Region Whole Chapter 10. Agriculture and Rural Communities

We have inserted linkage to regional chapters to capture quantitative examples of climate change impacts on agriculture.

Social Science

Coordinating Committee

142301 Test Region Entire Region 10. Agriculture and Rural Communities

This chapter mainly discusses the impacts of climate change affecting the agricultural sector qualitatively. In the ‘Traceable Accounts’ section there is reference to the body of literature that evaluates the impacts of climate change on agricultural yields, markets, trades, and rural welfare quantitatively, such as through empirical studies in modeling. The authors can consider providing high level findings from these studies (such as the AGMIP, from the USDA Economic Research Services, USDA Climate Impacts and Risk Analysis (2017) and other studies cited in the chapter), to give readers a sense of the magnitude of potential impacts and their regional distributions (with the latter discussed in more detail in the regional chapters).

We have inserted linkage to regional chapters to capture quantitative examples of climate change impacts on agriculture.

Social Science

Coordinating Committee

142307 Chapter 10. Agriculture and Rural Communities

In addition to discussion of impacts of climate change on agriculture and rural communities, this chapter can also consider to include some discussion of measures for reducing GHG emissions, and their synergies for enhancing resilience of the sector.

We have added a draft statement to KEA2 and refer the reader to the SOCR2 report for a thorough discussion of mitigation options for agriculture.

Social Science

Coordinating Committee

142301 Test Region Entire Region 10. Agriculture and Rural Communities

In this paragraph it will also be helpful to give readers a sense of the share of agricultural output/population in rural communities. Not all rural population are engaged in agricultural activities, and the declines also reflect the reduced output and jobs in manufacturing.

It is added on the economic impacts during the 2012 drought in the U.S. Two states were considered.

Social Science

Coordinating Committee

142352 Test Region Entire Region 10. Agriculture and Rural Communities

In this paragraph it will also be helpful to give readers a sense of the share of agricultural output/population in rural communities. Not all rural population are engaged in agricultural activities, and the declines also reflect the reduced output and jobs in manufacturing.

We have added information on population and land use covered by rural areas. We agree with the comment that not all rural population are engaged in agricultural activities. For this reason, it is difficult to provide a share of agricultural output by rural communities.

Social Science

Coordinating Committee

142353 Test Region Entire Region 10. Agriculture and Rural Communities

We have corrected the Executive Summary. We agree that detail related to adaptation capacity is less than for other Key Messages but with a short number of pages to cover a very broad topic we focused largely on agriculture and covered key rural issues thoroughly. We have linked to other chapters to provide examples of adaptation and capacity building for rural and indigenous communities.

Social Science

Coordinating Committee

142354 Test Region Entire Region 10. Agriculture and Rural Communities

We agree with these comments, and have revised the chapter to strengthen the description of climate change impacts on a wide range of agriculture and rural communities.

Social Science

Coordinating Committee

142355 Test Region Entire Region 10. Agriculture and Rural Communities

We have corrected the Executive Summary. We agree that detail related to adaptation capacity is less than for other Key Messages but with a short number of pages to cover a very broad topic we focused largely on agriculture and covered key rural issues thoroughly. We have linked to other chapters to provide examples of adaptation and capacity building for rural and indigenous communities.

Scottie

Coville

142300 Test Region Entire Region 10. Agriculture and Rural Communities

Thanks for the suggestion. We have made the recommended change.

Social Science

Coordinating Committee

142301 Test Region Entire Region 10. Agriculture and Rural Communities

Thank you for the suggestion. We have made the recommended change.

Social Science

Coordinating Committee

142305 Test Region Entire Region 10. Agriculture and Rural Communities

The comments have been mixed. Indeed.

Social Science

Coordinating Committee

142352 Test Region Entire Region 10. Agriculture and Rural Communities

We have corrected the Executive Summary. We agree that detail related to adaptation capacity is less than for other Key Messages but with a short number of pages to cover a very broad topic we focused largely on agriculture and covered key rural issues thoroughly. We have linked to other chapters to provide examples of adaptation and capacity building for rural and indigenous communities.

Social Science

Coordinating Committee

142353 Test Region Entire Region 10. Agriculture and Rural Communities

We have corrected the Executive Summary. We agree that detail related to adaptation capacity is less than for other Key Messages but with a short number of pages to cover a very broad topic we focused largely on agriculture and covered key rural issues thoroughly. We have linked to other chapters to provide examples of adaptation and capacity building for rural and indigenous communities.

Michelle

Gehrke

142370 Test Region Entire Region 10. Agriculture and Rural Communities

The Traceable Account now addresses this as an area of uncertainty and this was added to a new section on research needs.

Social Science

Coordinating Committee

142355 Test Region Entire Region 10. Agriculture and Rural Communities

The comments have been mixed. Indeed.

Social Science

Coordinating Committee

142353 Test Region Entire Region 10. Agriculture and Rural Communities

We have inserted linkage to regional chapters to capture quantitative examples of climate change impacts on agriculture.

Social Science

Coordinating Committee

142354 Test Region Entire Region 10. Agriculture and Rural Communities

We agree with these comments, and have revised the chapter to strengthen the description of climate change impacts on a wide range of agriculture and rural communities.

Social Science

Coordinating Committee

142355 Test Region Entire Region 10. Agriculture and Rural Communities

We have inserted linkage to regional chapters to capture quantitative examples of climate change impacts on agriculture.

Social Science

Coordinating Committee

142354 Test Region Entire Region 10. Agriculture and Rural Communities

We have inserted linkage to regional chapters to capture quantitative examples of climate change impacts on agriculture.

Social Science

Coordinating Committee

142355 Test Region Entire Region 10. Agriculture and Rural Communities

We have inserted linkage to regional chapters to capture quantitative examples of climate change impacts on agriculture.
This comment was prepared after discussions by subgroups of the University of Washington Program on Climate Change and the Public-Comment Project in Seattle, WA. Among those who participated in discussions, the following wished to be named: Mary Fisher, Megan Feddern, Dr. Michelle Tigchelaar, Dr. Cecilia Bitz, Dr. Richard Gammon.

It is not understanding that the mechanisms for heat tolerance in major grains are extremely complex and poorly understood, and that progress in this area has been modest despite the innovation of techniques to accelerate breeding (Ort et al., 2008; Mittler & Blumwald, 2010; Chapman et al., 2012; Jha et al., 2014). This sentiment is expressed under Major Limitation on p. 377. This is considerable capacity for generic improvement in agricultural crops and livestock breeds, but the ultimate ability to breed increased heat and drought tolerance into germplasm while retaining desired agronomic or horticultural attributes remains uncertain (JHA et al., 2014). Just conflicts with the statements in the main text following Key Message 1 (p. 377) that "farm companies have released numerous crop varieties that are tolerant to heat, drought, or pests and diseases. This trend is expected to continue as new crop varieties are developed that adapt to a changing climate" (Kari et al., 2012)." We suggest that the authors more accurately represent the uncertainties associated with the possibility of breeding for heat and drought tolerance in major crops in the main text on p. 377. References:


We agree. A sentence is deleted to mention that progress in this area has been modest.

We have corrected the Executive Summary.

We have revised the Key Messages and re-organized the paper to balance the flow and clarity.

We have revised the Executive Summary. This decision was made by the USGCRP and was not at the discretion of the authors.

We agree that there are numerous health risks associated with climate change. We have reworded all Key Messages and have included links to health impacts in other chapters.

We agree that there are numerous health risks associated with climate change. We have reworded all Key Messages and have included links to health impacts in other chapters.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.

The chapter is focused on major commodity crops, in part because of their警示去and monetary contribution to the overall GDP of the US but also due to the greater amount of peer-reviewed literature focused on these crops. Linkages to regional chapters take readers to discussions of regionally-important crops and alternate systems.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table/Row</th>
<th>Start Line</th>
<th>End Line</th>
<th>Start Page</th>
<th>End Page</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143715</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>371</td>
<td>371</td>
<td>25</td>
<td>28</td>
<td>371</td>
<td>371</td>
<td>even slow shifts, or small changes in the extollar, could pose major challenges</td>
<td>We deleted &quot;relatively rapid&quot;</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143716</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>371</td>
<td>371</td>
<td>24</td>
<td>28</td>
<td>371</td>
<td>371</td>
<td>&quot;The changing patterns of invasive...&quot; seem more like a threat and one of many of the crop failure and loss of livestock. Perhaps rephrase the sentence or add more details here.</td>
<td>This sentence is no longer in the summary.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143717</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>371</td>
<td>371</td>
<td>24</td>
<td>25</td>
<td>371</td>
<td>371</td>
<td>It may be stronger to make the case that rural communities are at risk of agricultural, or to leave this out.</td>
<td>We have edited the sentence as suggested.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143718</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>371</td>
<td>371</td>
<td>11</td>
<td>12</td>
<td>371</td>
<td>371</td>
<td>Cold-rotation and nutrient and chemical transport can cause stress on &quot;extreme cold», and may also be exacerbated by other climate changes such as droughts and changing precipitation patterns. This current framing may cause confusion.</td>
<td>We agree with the comment and revised the paragraph to add more clarity</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143719</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>371</td>
<td>371</td>
<td>24</td>
<td>28</td>
<td>371</td>
<td>371</td>
<td>Seeks out of place. Connect to agriculture or remove.</td>
<td>We agree with the comment and have revisited the paragraph to link to agriculture and added several citations.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143720</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>371</td>
<td>371</td>
<td>27</td>
<td>27</td>
<td>371</td>
<td>371</td>
<td>Any way to (1) add some statistics to make more specific and/or (2) make it clear that this to agriculture?</td>
<td>We agree and the paragraph is revised to link it to agriculture.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143721</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>373</td>
<td>373</td>
<td>9</td>
<td>9</td>
<td>373</td>
<td>373</td>
<td>Consider listing the most important value added sectors here, and briefly explain why they directly depend on the strength/variability of US agriculture/rural communities.</td>
<td>The authors appreciate the comment. However, figure 10.1 lists the most important value added sectors. Considering the page limit, it is not possible to discuss more value added sectors.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143722</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>373</td>
<td>373</td>
<td>11</td>
<td>12</td>
<td>373</td>
<td>373</td>
<td>Agreed. This sentence is somewhat misleading. Consider addressing乡村振兴的, these resources to &quot;these land resources&quot;, or otherwise edit as needed.</td>
<td>We agree with the comment and revised the paragraph to add more clarity</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143723</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>373</td>
<td>373</td>
<td>19</td>
<td>20</td>
<td>373</td>
<td>373</td>
<td>Please describe in more detail/numbers what portion of rural communities are heavily dependent on agriculture (as compared to urban communities)</td>
<td>The section was revised to identify 44 counties classified as farming dependent, most of which were rural.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143724</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>373</td>
<td>373</td>
<td>27</td>
<td>27</td>
<td>373</td>
<td>373</td>
<td>Clarify whether the SIS refers to all US land or 40% of US land?</td>
<td>The Executive Summary has been edited to clarify.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143725</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>374</td>
<td>374</td>
<td>2</td>
<td>2</td>
<td>374</td>
<td>374</td>
<td>Unsure whether the inclusion of &quot;Consequently&quot; means that it's just the integrated land that is affected by management practices and climate change. Consider changing &quot;Consequently, these resources to &quot;these land resources&quot;, or otherwise edit as needed.</td>
<td>We have removed the word Consequently.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143726</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>374</td>
<td>374</td>
<td>8</td>
<td>8</td>
<td>374</td>
<td>374</td>
<td>This is a good and important point, but it does not follow from the previous sentence. It shows how the sector affects climate change, not how it is affected by it. If there is another point for it (within a discussion, perhaps, of what can be done to mitigate climate change risks?)</td>
<td>We agree with the comment and revised the paragraph to add more clarity</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143727</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>374</td>
<td>374</td>
<td>7</td>
<td>7</td>
<td>374</td>
<td>374</td>
<td>Clarify what &quot;inputs&quot; means in the context of this section.</td>
<td>We have inserted examples of inputs.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143728</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>374</td>
<td>374</td>
<td>11</td>
<td>11</td>
<td>374</td>
<td>374</td>
<td>Agreed. This sentence has been moved to a discussion of negative environmental impacts of current agricultural systems.</td>
<td>The Executive Summary has been edited to clarify.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143729</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>374</td>
<td>374</td>
<td>13</td>
<td>13</td>
<td>374</td>
<td>374</td>
<td>This is a changing pattern of invasive...&quot; seems more like a driver than many of the crop failure and loss of livestock. Perhaps restructure the sentence or add more details here.</td>
<td>Changed to &quot;but are vulnerable in different climates&quot;.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143730</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>374</td>
<td>374</td>
<td>7</td>
<td>7</td>
<td>374</td>
<td>374</td>
<td>Possible to add another map showing dependence of rural communities on agriculture? (There was a similar figure in NCA4)</td>
<td>We have added the figure due to space limitations.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143731</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>374</td>
<td>374</td>
<td>25</td>
<td>25</td>
<td>374</td>
<td>374</td>
<td>Change: &quot;climate change&quot; to &quot;climate change--drought effects&quot;</td>
<td>Done. Revised the text as suggested</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143732</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>374</td>
<td>374</td>
<td>27</td>
<td>27</td>
<td>374</td>
<td>374</td>
<td>Not mentioned but also important could be changes in beneficial insects, land use changes and pressures at a larger scale (due to climate change impacts in other regions and sectors), changes in nutrient and water cycling.</td>
<td>We agree and the paragraph is revised to link it to agriculture.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143733</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>375</td>
<td>375</td>
<td>1</td>
<td>2</td>
<td>375</td>
<td>375</td>
<td>Can you be more specific about how the structure is changing, locally?</td>
<td>The sentence has been deleted during revisions.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143734</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>375</td>
<td>375</td>
<td>10</td>
<td>13</td>
<td>375</td>
<td>375</td>
<td>Agricultural commodities are not all food, so it's important to be clear about the scale of the links between these commodities and food security. Also, the export of these commodities from the US even today does not directly address all four dimensions of global food security. Therefore, this sentence is somewhat misleading. Consider editing, i.e., &quot;the US is a major exporter of agricultural commodities (ERS 2017a), and disruption to its agricultural production will affect the agricultural sector on a global scale. Food security, which is already a pressing issue, will be exacerbated by other climate changes such as droughts and changing precipitation patterns. This current framing may cause confusion.</td>
<td>We agree and the paragraph is revised to link it to agriculture.</td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143735</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>375</td>
<td>375</td>
<td>16</td>
<td>17</td>
<td>375</td>
<td>375</td>
<td>We agree with the comment and revised the paragraph to add more clarity</td>
<td></td>
</tr>
<tr>
<td>Scientists Concerned Union of Scientists</td>
<td>143736</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>375</td>
<td>375</td>
<td>18</td>
<td>20</td>
<td>375</td>
<td>375</td>
<td>We agree with the comment and revised the paragraph to add more clarity</td>
<td></td>
</tr>
</tbody>
</table>

Seems out of place. Connect to agriculture or remove.

Please describe in more detail/numbers what portion of rural communities are heavily dependent on agriculture (as compared to urban communities).

The authors appreciate the comment. However, figure 10.1 lists the most important value added sectors. Considering the page limit, it is not possible to discuss more value added sectors.

This is a good and important point, but it does not follow from the previous sentence. It shows how the sector affects climate change, not how it is affected by it. If there is another point for it (within a discussion, perhaps, of what can be done to mitigate climate change risks?)

We have added the figure due to space limitations.

We agree and the paragraph is revised to link it to agriculture.

We agree with the comment and revised the paragraph to add more clarity.

We have removed the word Consequently.

We agree with the comment and revised the paragraph to add more clarity.

We agree with the comment and revised the paragraph to add more clarity.

We agree with the comment and revised the paragraph to add more clarity.

We agree and the paragraph is revised to link it to agriculture and added several citations.

We agree and the paragraph is revised to link it to agriculture.

The authors appreciate the comment. However, figure 10.1 lists the most important value added sectors. Considering the page limit, it is not possible to discuss more value added sectors.

We agree with the comment and revised the paragraph to add more clarity.

We agree and the paragraph is revised to link it to agriculture and added several citations.

We agree and the paragraph is revised to link it to agriculture and added several citations.

We agree and the paragraph is revised to link it to agriculture and added several citations.

The authors appreciate the comment. However, figure 10.1 lists the most important value added sectors. Considering the page limit, it is not possible to discuss more value added sectors.

We agree with the comment and revised the paragraph to add more clarity.

We agree and the paragraph is revised to link it to agriculture and added several citations.

We agree with the comment and revised the paragraph to add more clarity.

We agree with the comment and revised the paragraph to add more clarity.

We agree with the comment and revised the paragraph to add more clarity.

We agree with the comment and revised the paragraph to add more clarity.

We agree with the comment and revised the paragraph to add more clarity.

We agree with the comment and revised the paragraph to add more clarity.

We agree with the comment and revised the paragraph to add more clarity.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Line</th>
<th>End Line</th>
<th>Start Word</th>
<th>End Word</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143737</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>175</td>
<td>175</td>
<td>22</td>
<td>25</td>
<td>Consider changing increased rainfall intensity that greatly impact the environment to changes in rainfall patterns. (Rainfall patterns impact ecosystems in various ways, not just through increased intensity).</td>
<td>Done: Revised as suggested</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143738</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>175</td>
<td>175</td>
<td>22</td>
<td>25</td>
<td>These are great strategies and citizens, but they are provided in the same level of detail above as seven bullet points as currently written. Since they apply to both crop and livestock systems, they might fit better above (or can be deleted). However, several strategies have not been mentioned anywhere. What about no-till, cover cropping, crop rotations, perennial crops, integrated crop-livestock systems, diversification, agroforestry, ...?</td>
<td>Done: Revised the text as suggested</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143739</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>175</td>
<td>175</td>
<td>19</td>
<td>46</td>
<td>These are great strategies and citizens, but they are provided in the same level of detail above as seven bullet points as currently written. Since they apply to both crop and livestock systems, they might fit better above (or can be deleted). However, several strategies have not been mentioned anywhere. What about no-till, cover cropping, crop rotations, perennial crops, integrated crop-livestock systems, diversification, agroforestry, ...?</td>
<td>Done: Revised the text as suggested</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143740</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>176</td>
<td>176</td>
<td>3</td>
<td>5</td>
<td>Only in combination. Adapting these strategies singly would certainly help, but it is unlikely to be enough in the face of moderate climate change. Perhaps instead say &quot;Proper implementation of combinations of these strategies have the potential to...&quot;</td>
<td>Done: Revised as per the suggestion</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143741</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>176</td>
<td>176</td>
<td>4</td>
<td>5</td>
<td>This sentence implies that the list of strategies listed above have led to continued productivity growth which reduces their effectiveness. However, it is not clear that these strategies have been used at large-scale or that they can be attributed to recent productivity growth. Even if they were, current concerns about contributions of agriculture to climate change, water resources, air pollution, etc. may in contrast suggest that the strategies that hard-are led to today's high levels of &quot;productivity&quot; (yield) and &quot;efficiency&quot; (yields/hap/lap) have not been effective in terms of all of the variables relevant for this chapter (i.e., long-term preservation of natural resources that underly a productive agricultural system, the health of crops, animals, humans, and rural communities, etc.).</td>
<td>Done: Revised the text as suggested</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143742</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>176</td>
<td>176</td>
<td>4</td>
<td>6</td>
<td>(We approved). Doesn't seem to fit, since numerous approaches have been listed.</td>
<td>Done: Revised as per the suggestion</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143743</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>176</td>
<td>176</td>
<td>7</td>
<td>7</td>
<td>It is just the growing rate of climate change (including but not limited to extreme events) that justifies the need for more efforts...?</td>
<td>A reference to Climate Change Chapter is provided for more information and the sentence was revised as suggested.</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143744</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>176</td>
<td>176</td>
<td>10</td>
<td>15</td>
<td>It was confusing that they key messages changed from what was first written in the exec summary. Could be good to have these the same everywhere.</td>
<td>Agree: The key messages in both places to have the same everywhere</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143745</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>176</td>
<td>176</td>
<td>14</td>
<td>14</td>
<td>May be more helpful to list this as a % of the current average # consecutive dry days (or otherwise communicate the severity/implications of this change).</td>
<td>Done: We have removed the sentence from our key messages.</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143746</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>176</td>
<td>176</td>
<td>17</td>
<td>19</td>
<td>“Clarify whether/how this was linked to climate change. Also, consider defining &quot;drought disaster area&quot;.”</td>
<td>We are not aware of specific attribution of this drought to climate change but used this example to indicate the magnitude of losses that could be associated with future climate conditions. “Drought” was defined from drought-disaster areas.</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143747</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>176</td>
<td>176</td>
<td>26</td>
<td>27</td>
<td>Soil carbon is important for many other relevant reasons as well (e.g., soil water holding capacity, for one).</td>
<td>Agree: Drought increases soil water in the rangelands. The sentence is revised to provide additional information.</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143748</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>176</td>
<td>176</td>
<td>28</td>
<td>30</td>
<td>Clarify whether/how this was linked to climate change.</td>
<td>Agree: A sentence and two citations are provided to show the linkage</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143749</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>176</td>
<td>176</td>
<td>11</td>
<td>14</td>
<td>This feels out of place. Perhaps it would be more interesting in a separate box on a case study to demonstrate the severity of the possible drought-related risks, and to explain what could be done to mitigate those risks. However, specific management practices (rather than a policy example) may be more instructive.</td>
<td>We disagree with the comments and have therefore not made changes.</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143750</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>176</td>
<td>176</td>
<td>16</td>
<td>25</td>
<td>More accurate might be: &quot;Irrigation is used for crop production in most of the western US&quot; or &quot;Irrigation is necessary for current production in most of the western US&quot;.</td>
<td>Agree: Irrigation increases soil water in the rangelands. The sentence is revised to provide additional information.</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143751</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>177</td>
<td>177</td>
<td>19</td>
<td>22</td>
<td>Opportunity to refer to Tribal and Indigenous Peoples’ chapter?</td>
<td>A reference to Chapter 15 has been added.</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143752</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>177</td>
<td>177</td>
<td>21</td>
<td>25</td>
<td>Possible to raise this more specific to agriculture/rural communities? Otherwise perhaps simplify and keep the reference to the other chapters.</td>
<td>We disagree with the comments and have therefore not made changes.</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143753</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>177</td>
<td>177</td>
<td>29</td>
<td>30</td>
<td>Are these advancements actually due to the demand for higher crop productivity under climate change, or in response to current threats and extreme weather?</td>
<td>Done: Revised as per the suggestion</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143754</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>177</td>
<td>177</td>
<td>22</td>
<td>27</td>
<td>How many of these recent advances have been developed for a very limited subset of agricultural systems (that might not even still exist when climate change is a whole), and/or for current climate extremes and conditions versus longer term changes?</td>
<td>We disagree with the comments and have therefore not made changes.</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143755</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>178</td>
<td>178</td>
<td>8</td>
<td>9</td>
<td>It would be helpful to introduce and define the term climate smart agriculture in another general section and to define it as it is relevant to more than just drought. In this section, there is an opportunity to be more specific about what aspects of climate smart ag matter with respect to drought.</td>
<td>Agree: The term climate smart agriculture is relevant to more than just drought. Revising the sentence as: “Climate smart agriculture can reduce the impacts of climate change and consequent environmental conditions on crop yield.” Remaining sentences in that paragraph discuss what is involved in climate smart agriculture in response to climate change including drought conditions.</td>
<td></td>
</tr>
<tr>
<td>Scientists Union of Concerned Scientists</td>
<td>143756</td>
<td>Text Region</td>
<td>10: Agriculture and Rural Communities</td>
<td>178</td>
<td>178</td>
<td>14</td>
<td>13</td>
<td>This is one requirement for irrigation technologies, but what are other limitations? (e.g., cost, water use, freak, training, extension)</td>
<td>Agree with reviewers’ concern. However, we do not have space to fully address these details.</td>
<td></td>
</tr>
</tbody>
</table>
Scientists Concerned Scientists Union of Scientists

143757 Civil Region: Agriculture and Rural Communities

178 - 179 10 12 This is the only time “Rural” is mentioned, and it also seems like only one of many different management practices that may be needed. What about saying “different technologies, agricultural production systems, and management practices will be needed” (be sure to mention crop rotations in earlier sections that describe potential practices)

143758 Civil Region: Agriculture and Rural Communities

179 - 179 7 7 Based on earlier descriptions of the key message in the present draft, I would have thought this would be succinctly described instead as “Crop, livestock and human health” OR, perhaps “Temperature changes and extremes”

143759 Civil Region: Agriculture and Rural Communities

180 - 180 7 10 This is important, but does not feel out of place and not particularly relevant here (especially as the starting point of this section)

143760 Civil Region: Agriculture and Rural Communities

180 - 180 11 20 This is important, but doesn’t seem to fit well in this section which seemed to have been focused on temperature extremes. Some reworking here or elsewhere could help

143761 Civil Region: Agriculture and Rural Communities

180 - 180 12 12 why would rural communities be more affected if they don’t have pollen allergies?

143762 Civil Region: Agriculture and Rural Communities

180 - 180 24 28 since the section is framed to be focused on temperatures, these points feel out of place. Consider reworking section(s) or adding this text

143763 Civil Region: Agriculture and Rural Communities

181 - 181 4 4 Could this be a change?

143764 Civil Region: Agriculture and Rural Communities

181 - 181 24 26 Why are these regions likely to see larger declines?

143765 Civil Region: Agriculture and Rural Communities

181 - 181 30 31 Another obstacle could be related to lack of communication, and lack of education

143766 Civil Region: Agriculture and Rural Communities

181 - 181 36 38 Now, is this, and what are the obstacles/implications surrounding this risk mitigation strategy?

143767 Civil Region: Agriculture and Rural Communities

182 - 182 8 8 Seems out of place. This is about drought rather than extreme temperatures. Also, the statement about crops might fit better (or should at least be introduced) in a section focused on crops rather than livestock

143768 Civil Region: Agriculture and Rural Communities

182 - 182 14 16 This is a stronger sentence. Might make for a better introduction sentence to the section than the current one

143769 Civil Region: Agriculture and Rural Communities

182 - 182 38 41 Would this help in defining/clarifying the stated “progress”? Also, it may be that protecting progress to-date won’t be enough (in current or future climates), as erosion is currently a very big problem

143770 Civil Region: Agriculture and Rural Communities

183 - 183 1 1 It would be great to list a few examples of the conservation practices that are being implemented

143771 Civil Region: Agriculture and Rural Communities

183 - 183 3 3 Is the proposal that the existing strategies therewith be improved by considering proposed extensions? Or would extended strategies show that the current strategies aren’t expansive and/or effective enough?

143772 Civil Region: Agriculture and Rural Communities

183 - 183 4 6 How are the “most intense” storms defined? Is this referring to storms that specifically impacted agriculture?

143773 Civil Region: Agriculture and Rural Communities

183 - 183 9 10 None of this is clearly linked to agriculture (or rural communities)

143774 Figure: Agriculture and Rural Communities

183 - 183 4 4 How are extreme events calculated/defined? Also, what is the orange line (is it an N-A year moving average)?

143775 Civil Region: Agriculture and Rural Communities

184 - 184 1 1 This message has been missing in all previous texts, and is not clearly linked to agriculture currently.

143776 Civil Region: Agriculture and Rural Communities

184 - 184 21 22 did this fall (“or to be more loosely”) read “and more likely to be loosely”? Agreed: Revised the text

143777 Civil Region: Agriculture and Rural Communities

185 - 185 10 13 The current draft doesn’t clearly highlight the different issues that different regions face. Possible to include some bullets, or a table or figure that clearly communicates the major regions and their primary concerns/vulnerabilities with respect to this chapter?

143778 Civil Region: Agriculture and Rural Communities

185 - 185 16 16 Previous versions of this key message were written in text as “Drawn” only. Consistency would help ensure clarity. The text was correct.

143779 Civil Region: Agriculture and Rural Communities

185 - 185 29 29 what about hot days that are not necessarily concurrent with drought? Or other changes to temperature patterns (changes to mins, maxes, and mean) that influence seasons and agriculture

143780 Civil Region: Agriculture and Rural Communities

185 - 185 25 25 "Inherent resilience" doesn’t seem like the right phrase, given the context of major climate changes and recent extreme events that have been very challenging for the livestock sector despite their historical and/or relative resilience

143781 Civil Region: Agriculture and Rural Communities

185 - 185 26 26 This overview sentence might make for a better introduction sentence to the section than the current one

143782 Civil Region: Agriculture and Rural Communities

185 - 185 30 33 Another obstacle could be related to lack of communication, and lack of education

143783 Civil Region: Agriculture and Rural Communities

185 - 185 33 35 Another obstacle could be related to lack of communication, and lack of education
This section is missing some key points. It seems that a full explanation of the problem could be fixed by including the full key message here. What seems to be missing is the change in minimum temperatures on crops which would seem important (this was covered in the previous chapter but is largely missing here).

The change has been made as suggested.

We revised the text to remove comparison of rural to urban workers. If it states many rural workers are exposed to climate extremes.

The section was revised to KXY-I now related to reduced agricultural productivity. While all plants are impacted by climate change stress, most of the peer review literature focuses on major crop commodities. Nighttime temperature effects on crop yield and quality are discussed briefly.

This is an important point. Young (2017) refers to insects, diseases, and weeds, which would include beneficial insects. However, data are lacking on specific beneficial insect responses to climate change. This was added to emerging issues and research needs section.

We made additional discussion of climate impacts on beneficial and pest insects and microorganisms and added a section on research needs, including this.

We have made additional discussion of climate impacts on beneficial and pest insects and microorganisms and added a section on research needs, including this.

We added “agricultural management practices” and inserted sentences about adaptation and mitigation benefits of increased soil carbon. Specific practices to increase soil carbon are given in Paustian et al., 2016; 14, 162; 164; Brown and Hendrick, 2016; Derrr et al., 2016; Bianco-Coppola et al., 2015; Parton et al., 2015.

The Key Messages were restructured.  X: adds addressional health and livestock health issues related to climate and X: focuses on vulnerability and adaptive capacity of rural communities.

The authors appreciate the importance of this comment, but adequacy of current or future funding is beyond the scope of this report.

We changed the likelihood to “be of medium confidence” because of the regional variability of investments and capacity.

We changed the likelihood to “be of medium confidence” because of the regional variability of investments and capacity.

This is an important point. However, due to page limitations on this chapter we do not have space to address this.

This is an important point. However, due to page limitations on this chapter we do not have space to address this.

This chapter is general is written like an advertisement for American agricultural productivity, and seems to treat climate change as a secondary topic. It would be a more useful chapter for readers if it referred to other sources for well-rounded background information, and used the space to more clearly explain the projected impacts of climate on agriculture, the contribution of agriculture to emissions, and the needs and opportunities for adaptation and mitigation.

There are many new agricultural technologies and other advances that are briefly described in this chapter, such as the role of climate change in pest management, and the need to maintain productive yields as the influence of increased water. Climate change-specific assessments are described in the CSRG and chapter 2 of this volume.

The sentence has been removed during revision to the summary.

We agree with the comments. Additional details about water are in other portions of the text.

We agree with the comments. Additional details about water are in other portions of the text.

This is an important point. However, due to page limitations on this chapter we do not have space to address this.

This is an important point. However, due to page limitations on this chapter we do not have space to address this.

The sentence has been revised to communicate the broader economic impact beyond livelihood.

This sentence has been revised to communicate the broader economic impact beyond livelihood.

The sentence has been revised to communicate the broader economic impact beyond livelihood.

This sentence has been revised to communicate the broader economic impact beyond livelihood.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>Start Line</th>
<th>End Page</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144041</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>171 171</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the last century, seems a bit awkward (does it mean progress in 21st century, etc.). Saying over the last hundred years might be a better option.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144043</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>174 174</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10. Agriculture and Rural Communities</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144044</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>175 175</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Would that the term “integration” is used (or missed, depending on viewpoint) to mean emissions reductions, might be a better way to say “To moderate” or “To reduce” or something similar?</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144045</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>175 175</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I’d suggest changing “needs to change grants’ outcomes” or say “will create more and worse challenges”</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144046</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>175 175</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>kinship not continue, the phrase “in the last century” is a bit confusing.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144047</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>178 178</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20. I’d suggest actually giving the amounts of each of the key gases rather than doing the 100-year summary as that really hides the potential for cutting methane emissions from the agricultural sector.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144048</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>178 178</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20. I’d suggest actually giving the amounts of each of the key gases rather than doing the 100-year summary as that really hides the potential for cutting methane emissions from the agricultural sector.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144050</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>179 179</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I’m surprised at the ordering here—I would have thought that “uncharted immigrants” would have been the last one listed, although it depends a bit on the reasoning included at the end of the sentence.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144051</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>181 181</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20. I’d suggest changing “in the last century” to something like “since 1900.”</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144052</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>181 181</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I’d suggest changing “extreme range of global” to “extreme range of possible global.”</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144053</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>181 181</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20. I’d suggest changing “extreme range of global” to “extreme range of possible global.”</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144054</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>181 181</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>You might consider changing “including rural communities” to “including many rural communities located along low lying areas in the coastal plains around the US” or something similar to indicate that sea level rise can have effects inland and this will affect many farmers, etc., that located farms up along these rivers to ensure a freshwater supply. And, of course, salt water intrusion will become more of a problem along these rivers.</td>
</tr>
<tr>
<td>Ade</td>
<td>Baldrista</td>
<td>144055</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>191 191</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It relates to atmospheric vapor pressure, which is important, however it is not mentioned elsewhere in this chapter. The critical role that plays should either be explored more in relation to climate change, or this line should be taken out.</td>
</tr>
<tr>
<td>Angel</td>
<td>Garcia</td>
<td>144056</td>
<td>Footnote</td>
<td>10: Agriculture and Rural Communities</td>
<td>196 196</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Vital factor productivity does not imply that there were no losses associated with climate change. No change was made.</td>
</tr>
<tr>
<td>lando</td>
<td>Feliciano</td>
<td>144057</td>
<td>Footnote</td>
<td>11: Built Environment, Urban Systems, and Cities</td>
<td>199 199</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>We have moved the cited section to KNF and reviewed the certainty levels. Now the certainty levels relate to human and livestock health impacts.</td>
</tr>
<tr>
<td>lando</td>
<td>Feliciano</td>
<td>144058</td>
<td>Footnote</td>
<td>11: Built Environment, Urban Systems, and Cities</td>
<td>227 227</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>We have added additional reference as: Feliciano et al. (2017); Maldonado et al. (2016, OTF 2015); Rockman et al. (2016, CCA 2015); and Maldonado et al. (2016, CCA 2015).</td>
</tr>
</tbody>
</table>
A recent publication on the effectiveness of the role city networks such as CGI and C21 cities adopt climate policies. This research covered 127 cities around the globe, including those of the US. Therefore, I would recommend you have a reference to that effectiveness: Original text: “Strong leadership and political will are central to addressing these challenges (Buller et al. 2016, Stadelmann et al. 2015, Vogel 2016). Many U.S. cities participate in networks such as the U.S. Conference of Mayors, ICLEI (International Council for Local Environmental Initiatives), 4C21 Cities Climate Leadership Group, and 100 Resilient Cities. Multi-city networks foster peer-to-peer learning, share best practices, and provide technical assistance for adaptation and mitigation (Clark and Clark 2014, Arup 2015, Rosenzweig et al. 2015, Vogel 2016). Suggested change: “Strong leadership and political will are central to addressing these challenges (Buller et al. 2016, Stadelmann et al. 2015, Vogel 2016). Many U.S. cities participate in networks such as the U.S. Conference of Mayors, ICLEI (International Council for Local Environmental Initiatives), 4C21 Cities Climate Leadership Group, and 100 Resilient Cities. Multi-city networks foster peer-to-peer learning, share best practices, and provide technical assistance for adaptation and mitigation (Clark and Clark 2014, Arup 2015, Rosenzweig et al. 2015, Vogel 2016).”

We appreciate the suggestion. We have added a sentence on how the five case study cities were selected to the chapter. "Building infrastructure” or “buildings” when we specifically mean buildings only. We are interpreting infrastructure to include buildings, so we have edited the document to use the term “infrastructure” rather than “buildings and infrastructure” when we are referring to all types of infrastructure, and “urban areas” are the primary source of greenhouse gas emissions because of increased population and industrial development? It might help to say that here.

The text has been revised to incorporate this suggestion.

In some places in the chapter, it states “buildings and infrastructure” and in other places it is described as “urban infrastructure.” It seems like there should be a distinction made between these two terms to improve clarity.

We are interpreting infrastructure to include buildings, so we have edited the document to use the term “infrastructure” rather than “buildings and infrastructure” when we are referring to all types of infrastructure, and “building infrastructure” or “buildings” when we specifically mean buildings only.

Thank you for your comment. We incorporated your suggestion by adding details regarding metropolitan land uses, mixing graphics and text to better illustrate "where" in the built environment people experience particular impacts.

We appreciate the suggestion. We have added a sentence on how the five case study cities were selected to the chapter. "Building and infrastructure are designed for historical climate trends may not be able to withstand future weather extremes and climate change." It then goes on to describe "forward-looking" design and may differ from traditional techniques of averages of past data uses.

The text has been revised to incorporate this suggestion.

Thank you for drawing our attention to this reference. We have included it in the supporting text to Key Message 4.

We appreciate the suggestion. To meet plain language guidance and avoid confusion, we removed the word "tail."
Sarah Davidson 241882 Whole Chapter 11. Built Environment, Urban Systems, and Cities 224 231 12 34 This chapter describes many extreme events but does not describe other slow moving changes (other than sea level rise) that may have a negative impact on buildings and infrastructure. The chapter is not always consistent in the use of past tense (e.g., "In 2010..." vs. "2010..." vs. "2010..."), and the chapter does not always use consistent color or numbering schemes.

Sarah Davidson 241808 Whole Chapter 11. Built Environment, Urban Systems, and Cities 448 455 12 25 Thank you very much for your suggestions. We have added a more detailed list of relevant stakeholders, including public and private sector stakeholders, in the supporting text to Key Message 4. We also added reference to Key Message 4. We also added additional references to SOCCR-2, which analyzes the role of the built environment in adaptation and mitigation.

Sarah Davidson 241809 Whole Chapter 11. Built Environment, Urban Systems, and Cities 141 148 12 25 Thank you for your observance. We did not mean to imply that only municipal governments are playing critical roles in urban adaptation and mitigation. We added a more detailed list of relevant stakeholders, including public and private sector stakeholders, in the supporting text to Key Message 4.

Sarah Davidson 241890 Whole Chapter 11. Built Environment, Urban Systems, and Cities 64 71 12 25 Thank you for your observation. We did not mean to imply that cities can achieve adaptation and mitigation goals on their own. We have added more details to our discussion of the factors that constrain urban adaptation and mitigation. We specifically highlight the role of policy decisions at other scales.

Sarah Davidson 241892 Whole Chapter 11. Built Environment, Urban Systems, and Cities 348 355 12 25 Because of limited space, we are not able to add the suggested graphic. The sectoral interdependencies chapter has included a graphic that addresses this topic.

Nicholas Rajkovich 241976 Whole Chapter 11. Built Environment, Urban Systems, and Cities 100 107 12 14 We revised Figure 11.4 and its caption to increase its clarity and impact. In the supporting text to Key Message 4, we highlight the variety of governmental and non-governmental policies and strategies for urban adaptation and mitigation. While it is beyond the scope of this chapter to detail all the strategies and policy choices that could be used for all maps, describing populations equal to or less than 10k, 100k, 1mil, 10mil, 20mil, 30mil and 100mil are visually differentiated across maps. We also specified that stressors are acute and chronic.

Nicholas Rajkovich 241977 Figure 11. Built Environment, Urban Systems, and Cities 149-150% 244 The figure shows working at night, cooling patrol, and other policies that are not included in the chapter. It may be helpful to describe some of these policies like changes to building codes at the state level, changes to standards (e.g., ASHRAE Standard 55 for thermal comfort, etc.), and voluntary protocols like the LEED Rating System. Not all policies that affect urban life are determined by cities, and organizations at other levels may impact city performance during extreme events. See for example: Gordon, Kathryn C., Rajkovich, Nicholas B., White-Naveh, Jakob, Lemen, Lanie, Larrace, & Monte S. (2011). Preventing cold related mortality and morbidity in a changing climate. Meteorology 49 (9): 197-202. doi:10.1016/j.meteo.2011.04.004. Kwon, Kyungchul, and Nicholas B. Rajkovich. 2010. Addressing climate change in policy standards, building codes, and urban planning. Urban Climate 1 (1): 1-15. doi:10.1016/j.urcl.2009.02.001.

Nicholas Rajkovich 241978 Whole Chapter 11. Built Environment, Urban Systems, and Cities 142 149 12 20 This section highlights a good example, space restrictions do not allow us to discuss it in detail in the chapter. We have added more details to our discussion of the factors that constrain urban adaptation and mitigation. We specifically highlight the role of policy decisions at other scales.

Nicholas Rajkovich 241979 Whole Chapter 11. Built Environment, Urban Systems, and Cities 100-105% 144 These use a consistent coloring scheme for all three maps, and consider using non-arbitrary numbers for the key (e.g., 18,893,109). The used numbers in the 2100 SSP2 (bottom) map represent much larger populations than the base value on the 2100 SSP3 (middle) map but this is difficult to notice. For example, the same key with 7 colors could be used for maps, describing populations equal to or less than 10k, 100k, 1mil, 10mil, 20mil, 30mil and 100mil. Use colors to make clear that the difference between 30mil and 60mil is much larger.

Nicholas Rajkovich 241980 Whole Chapter 11. Built Environment, Urban Systems, and Cities 119 126 12 20 This section highlights a good example, space restrictions do not allow us to discuss it in detail in the chapter. We have added more details to our discussion of the factors that constrain urban adaptation and mitigation. We specifically highlight the role of policy decisions at other scales.

Nicholas Rajkovich 241975 Whole Chapter 11. Built Environment, Urban Systems, and Cities 121 128 12 14 In this chapter, we describe how infrastructure failures can lead to cascading failures (beyond Figure 11.3 which only describes heavy rainfall) would lead to failures. While the energy-water nexus is a good example, other sectors like commerce are affected by loss of electricity, water, sewage, etc. Very few organizations can function if a critical building system is offline, disrupting the economy and hampering recovery.

Nicholas Rajkovich 241974 Whole Region 11. Built Environment, Urban Systems, and Cities 417 424 The report mentions extreme heat several times, but there is no mention of cold temperatures. While the NCA4 states that heavy snowfall will occur in the future, it also states on page 312 (Box 18) that declines in arctic sea ice may cause the atmospheric jet stream to get stuck in place for days and weeks. This can lead to cold weather in North America. Extreme cold can also cause mortality and morbidity, and cause failures to heating systems in buildings and damage to urban infrastructure. Should this also be retained in this chapter?

Nicholas Rajkovich 241972 Whole Region 11. Built Environment, Urban Systems, and Cities 261 262 12 16 Because of limited space, we are not able to add the suggested graphic. The sectoral interdependencies chapter has included a graphic that addresses this topic.

Nicholas Rajkovich 241973 Whole Region 11. Built Environment, Urban Systems, and Cities 415 422 From this sentence, it’s unclear if a level rise contributed to damage as part of Hurricane Ida (as if it’s implied) or if it contributed to problems in the future. Thank you for your observance. We did not mean to imply that only municipal governments are playing critical roles in urban adaptation and mitigation. We added a more detailed list of relevant stakeholders, including public and private sector stakeholders, in the supporting text to Key Message 4.

Nicholas Rajkovich 241971 Whole Region 11. Built Environment, Urban Systems, and Cities 417 418 12 34 Because of limited space, we are not able to add the suggested graphic. The sectoral interdependencies chapter has included a graphic that addresses this topic.

Nicholas Rajkovich 241970 Whole Region 11. Built Environment, Urban Systems, and Cities 141-150% 244 The chapter describes many extreme events but does not describe other slow moving changes (other than sea level rise) that may have a negative impact on buildings and infrastructure. These include changes in pest management (e.g., pests that can do damage to wood framed buildings, radon due to drawing water out from aquifers and salt water intrusion, and changes to building envelopes and foundations required to offset changes in temperature and humidity.

Nicholas Rajkovich 241969 Whole Region 11. Built Environment, Urban Systems, and Cities 138 145 12 25 Thank you for noticing. We separated the two references.

Nicholas Rajkovich 241968 Whole Region 11. Built Environment, Urban Systems, and Cities 138 145 12 25 Thank you for your observance. We incorporated this suggestion into text and added appropriate references.

Nicholas Rajkovich 241967 Whole Region 11. Built Environment, Urban Systems, and Cities 121 128 12 14 The chapter describes many extreme events but does not describe other slow moving changes (other than sea level rise) that may have a negative impact on buildings and infrastructure. These include changes in pest management (e.g., pests that can do damage to wood framed buildings, radon due to drawing water out from aquifers and salt water intrusion, and changes to building envelopes and foundations required to offset changes in temperature and humidity.

Nicholas Rajkovich 241966 Whole Region 11. Built Environment, Urban Systems, and Cities 121 128 12 14 The chapter describes many extreme events but does not describe other slow moving changes (other than sea level rise) that may have a negative impact on buildings and infrastructure. These include changes in pest management (e.g., pests that can do damage to wood framed buildings, radon due to drawing water out from aquifers and salt water intrusion, and changes to building envelopes and foundations required to offset changes in temperature and humidity.

Nicholas Rajkovich 241965 Whole Region 11. Built Environment, Urban Systems, and Cities 121 128 12 14 The chapter describes many extreme events but does not describe other slow moving changes (other than sea level rise) that may have a negative impact on buildings and infrastructure. These include changes in pest management (e.g., pests that can do damage to wood framed buildings, radon due to drawing water out from aquifers and salt water intrusion, and changes to building envelopes and foundations required to offset changes in temperature and humidity.

Nicholas Rajkovich 241964 Whole Region 11. Built Environment, Urban Systems, and Cities 121 128 12 14 The chapter describes many extreme events but does not describe other slow moving changes (other than sea level rise) that may have a negative impact on buildings and infrastructure. These include changes in pest management (e.g., pests that can do damage to wood framed buildings, radon due to drawing water out from aquifers and salt water intrusion, and changes to building envelopes and foundations required to offset changes in temperature and humidity.

Nicholas Rajkovich 241963 Whole Region 11. Built Environment, Urban Systems, and Cities 121 128 12 14 The chapter describes many extreme events but does not describe other slow moving changes (other than sea level rise) that may have a negative impact on buildings and infrastructure. These include changes in pest management (e.g., pests that can do damage to wood framed buildings, radon due to drawing water out from aquifers and salt water intrusion, and changes to building envelopes and foundations required to offset changes in temperature and humidity.

Nicholas Rajkovich 241962 Whole Region 11. Built Environment, Urban Systems, and Cities 328 335 12 20 This is largely outside the scope of our chapter. We provided additional references to SOCCR-2, which analyzes the science on urban emissions and mitigation at the national level, and to the mitigation chapter. We added a more detailed list of relevant stakeholders, including public and private sector stakeholders, in the supporting text to Key Message 4.
This chapter provides an excellent overview and update to the 2014 Review, "Urban Systems, Infrastructure, and Vulnerability" chapter on the risk of climate change to urban environments and systems. Cities have taken a central position in our response to climate change particularly in the current political context. One suggestion for the overall framing of the chapter is that it should also acknowledge how the urban built environment itself creates vulnerabilities in our choices for how we have constructed the urban form. The chapter acknowledges the interconnectedness of urban and regional systems, but makes no mention of how the urban form creates unique vulnerabilities for cities that can extend and multiply in other regions.

The text has been improved to incorporate this suggestion. We added the modifier "many" added to text.

We appreciate the reviewer's comment. Per USGCRP guidance, we provide a confidence level for each component of each key message in the tabular account section, not the main text.

We appreciate the reviewer's comment. Per USGCRP guidance, we provide a confidence level for each component of each key message in the tabular account section, not the main text.

We appreciate the reviewer's comment. Per USGCRP guidance, we provide a confidence level for each component of each key message in the tabular account section, not the main text.

Thank you for this insight. We expanded our discussion of urban vulnerability to highlight how historic development patterns increase differential risks to urban populations and properties.

Thank you for this suggestion. We added a sentence in the introduction to orient readers to what is new in this chapter since NCA4.

Thank you for this insight. We expanded our discussion of urban vulnerability to highlight how historic development patterns increase differential risks to urban populations and properties.

Thank you for this observation. We addressed this comment by highlighting the importance of different parts of the built environment to urban quality of life in both the introduction and supporting text to Key Message 1.

We do not think this citation is relevant for our chapter, so therefore have not added information from this reference. The information is more appropriate for the coastal chapter.

Thank you for the comment. Clarification and references on risk management strategies regarding these uncertainties are provided in the supporting text.

Thank you for this insight. We revised the supporting text to Key Message 4 to include literature that provides evidence for the importance of addressing social inequality and quality of life as part of urban adaptation and mitigation efforts.

Thank you for this insight. We revised the supporting text to Key Message 4 to include literature that provides evidence for the importance of addressing social inequality and quality of life as part of urban adaptation and mitigation efforts.

Thank you for this insight. We revised the supporting text to Key Message 4 to include literature that provides evidence for the importance of addressing social inequality and quality of life as part of urban adaptation and mitigation efforts.

Thank you for this insight. We revised the supporting text to Key Message 4 to include literature that provides evidence for the importance of addressing social inequality and quality of life as part of urban adaptation and mitigation efforts.

Thank you for the comment. Clarification and references on risk management strategies regarding these uncertainties are provided in the supporting text.

Thank you for this insight. We revised the supporting text to Key Message 4 to include literature that provides evidence for the importance of addressing social inequality and quality of life as part of urban adaptation and mitigation efforts.

Thank you for this insight. We revised the supporting text to Key Message 4 to include literature that provides evidence for the importance of addressing social inequality and quality of life as part of urban adaptation and mitigation efforts.

Thank you for this insight. We revised the supporting text to Key Message 4 to include literature that provides evidence for the importance of addressing social inequality and quality of life as part of urban adaptation and mitigation efforts.
1. Built Environment, Urban Systems, and Cities

11. Built Environment, Urban Systems, and Cities

Figure/Table Number | Start Page | End Page | Start Line | End Line | Comment
--- | --- | --- | --- | --- | ---
418 | 418 | 7 | 1 | MPC’s green building program is called the MillionTreesNYC Initiative not the Trees for Public Health program. (https://www.nycgovparks.org/trees/milliontreesnyc) |

Thanks for the comment. Trees for Public Health is part of the MillionTreesNYC program, so our text is correct. We fixed the link in our references: http://www.milliontreesnyc.org/about/getting_parks.shtml

Mikko McFeely | 14.062 | N/A | 412 | 412 | 7 | The text section does not account for the water sector which is a leading adaptation sector within many large urban areas. Please consider editing the sentence to read: Municipal departments from water systems to public works to transportation and other... etc. |

We agree that additional urban stakeholders other than municipalities, including the water sector, play important roles in urban adaptation efforts. We revised this sentence accordingly. The particular role the water sector plays and strategies it uses are provided in more detail in the water chapter.

Mikko McFeely | 14.063 | N/A | 412 | 412 | 7 | Given the chapter topic, it is surprising that none of the authors work for a municipality or are civil engineers or city planners with urban experience. Lacking that experience, the authors do an admirable job developing the content of this chapter. That said, we recommend having someone with that background complete a thorough review or perhaps if it is not too late have the person join the author team. |

Thank you for your suggestion. We believe we have a high degree of expertise on the author team needed to write this chapter. We recognize that the author team does not represent all expertise engaged in the urban environment. We rely on the review process, including both the public and National Academies review, to provide any missing expertise and commentary to ensure this chapter addresses all important aspects of climate change and the urban environment.

Mikko McFeely | 14.064 | N/A | 411 | 411 | 3 | We recommend changing Opportunities and resources of urban areas are critically important to the health and well-being of urban residents to Opportunities and resources in urban areas are critically important to the health and well-being of residents. It is not necessary to say urban residents, which is already implied. |

Thank you for the suggestion. The text has been revised to read “residents” not “urban residents.”

Mikko McFeely | 14.065 | N/A | 411 | 411 | 6 | We recommend changing the 2nd sentence of KM4 to be Climate change can exacerbate existing urban challenges affecting the populations quality of life... |

After consideration, the author team determined that the existing word choice is appropriate, and no change was made.

Mikko McFeely | 14.066 | N/A | 411 | 411 | 18 | 28 | We recommend changing Urban areas in the United States are already... to Urban centers are already... In its current form, the starting phrase sounds repetitive because it is used to open the previous paragraph (line 20). |

After consideration, the author team determined that the existing word choice is appropriate, and no change was made.

Mikko McFeely | 14.067 | N/A | 411 | 411 | 6 | We suggest avoiding using pronoun’s such as we in the text to be consistent with other chapters. |

Thank you for noticing this. We have been advised to avoid the passive voice in the chapter, so we changed it to “to this chapter” in the text.

Mikko McFeely | 14.068 | N/A | 413 | 413 | 14 | 14 | What are smaller micro areas? Can you use a footnote to define? |

We suggest avoiding using pronoun’s such as we in the text to be consistent with other chapters.

Mikko McFeely | 14.069 | N/A | 413 | 413 | 16 | 16 | We recommend you focus the five largest cities in the text to referring, perhaps as a footnote. By specifically mentioning the five largest cities it makes the reader wonder which one’s those are. |

Space constraints preclude us from listing these cities.

Mikko McFeely | 14.070 | N/A | 415 | 415 | 18 | 18 | Change Regional Roll Up to Regional Summary. |

Thank you for this fix. We are following SEGRCP guidance to make the title of this section consistent with the other chapters. We will let USGCRP decide about whether to make this change for the entire report.

Mikko McFeely | 14.071 | N/A | 415 | 415 | 18 | 18 | To be consistent with other chapters, it would be helpful if the Regional Summary referenced the NCA regions. Recognizing that this Chapter's focus on cities, perhaps you could say Cities in the Southeast, such as Los Angeles, CA and Phoenix, AZ, are more vulnerable... to... cities in the Northeast for example. |

We appreciate this suggestion, but space is limited. References to NCA regions were added where appropriate.

Mikko McFeely | 14.072 | N/A | 416 | 416 | 18 | 19 | Add reference (see Ch. 4: Energy) to the end of the sentence. |

Thank you for noticing. We added the reference to the energy chapter.

Mikko McFeely | 14.073 | N/A | 417 | 417 | 4 | 5 | Water etc. (2011) is not in the reference list and based on a quick search, doesn’t seem like the right reference for this statement. |

Thank you for your suggestion. We reviewed the text and determined that this is an appropriate reference to use in this statement.

Mikko McFeely | 14.074 | N/A | 419 | 419 | 11 | 21 | The text should probably define the term foresting. Does the mean resident or adaptive? |

Thank you for the comment. Clarifications are provided in reference accounts. Forward-looking means planning for or anticipating possible future events, conditions. Resilience is defined in the USGCRP glossary.

Mikko McFeely | 14.075 | N/A | 421 | 421 | 14 | 13 | Please edit text to include drinking water impacts. Suggested change: Hotter water temperatures affect coding for electricity production and drinking water treatment and distribution processes. |

Thank you for the suggestion about drinking water impacts. We added this point to an earlier sentence: "Both extreme weather that causes power outages and hotter water temperatures can affect drinking water treatment and distribution in urban areas."

Mikko McFeely | 14.076 | N/A | 422 | 422 | 30 | 37 | The text on cities does not mention the leading edge work of municipal water providers within cities to plan for and adapt to climate change. Suggest adding the following statement at the end of the paragraph of text: Large municipal water providers within cities are also pioneering ways to assess and adapt to climate impacts that are foundational to city resilience [Water Utility Climate Alliance, 2017]. |

We agree that additional urban stakeholders other than municipalities, including the water sector, play important roles in urban adaptation efforts. We revised this sentence accordingly and added details about water utility adaptation planning and planning for climate impacts in the supporting text for Key Message 6 on urban adaptation.


Thank you for the comment. We added the reference you suggested.

Social Science Coordinating Committee | 14.078 | N/A | 411 | 411 | 14 | 14 | Two of the four key messages relate to social systems. The linkages are a bit vague, unclear and leave important components undefined e.g. ‘many areas of urban life’---what does this mean? |

Thank you for your suggestion. The goal of this chapter is to provide a high level summary of the available information for cities across the US, which means that it is not possible for us to provide more detailed information. While the KM’s are not linear, they are logical, and the 4 most important messages to communicate about the urban environment and climate change. The flow of information builds from general vulnerability of cities (KM1) to specific infrastructure impacts (KM2) to networked infrastructure and societal impacts (KM3), to adaptation responses (KM4). In all of these KM’s, we address social systems. We clarified language within the chapter.

Social Science Coordinating Committee | 14.079 | N/A | 411 | 411 | 24 | 28 | Links center around making linkages between climate events and impacts on residents of urban cities e.g. Heavy rainfall are expected to increase in frequency and intensity. “This statement should be followed by potential scenarios of impacts and examples. We already see impacts from these events---how are social systems reacting? |

In the caption of Figures 11.3, we provide more information on social system impacts of flooding.

Social Science Coordinating Committee | 14.080 | N/A | 415 | 415 | 24 | 28 | Examples of multiple scenarios provided steps from using social science to interpret impacts. The examples of Charleston and Fort Collins explore broader economic impacts and do not discuss response across social or cultural systems. |

We do mention what Charleston and Fort Collins data response to impacts elsewhere in the chapter. However, the Boreas assessing broader systems social and cultural responses is not mature enough such that we can draw conclusions for this chapter; particularly for long term climate change.
Andrew Lahmacher 144308 End Region 11. Built Environment, Urban Systems, and Cities 413 413 5 9 The cities studied are relatively representative of the USA as a whole. Full gut renovation why these cities traits were selected and why not different ones? It seems that the Western USA might have been shorted in this sample.

We thank you for your suggestion. We added a sentence on how the five case study cities were selected to the Process Description paragraph of the Traceable Accounts. Because of space limitations, we were not able to include additional cities.

Michael MacCracken 144306 End Region 11. Built Environment, Urban Systems, and Cities 415 415 3 17 Since 80% of human caused greenhouse gases comes from urban areas, does that mean that even a slight change in an urban area to decrease emissions will have a large impact on the total? We agree that additional urban stakeholders other than municipalities, including the water sector, play important roles in urban adaptation efforts. We revised this sentence accordingly and specified measures that water utilities are taking to protect assets essential to the functioning of urban systems.

Michael MacCracken 144305 End Region 11. Built Environment, Urban Systems, and Cities 415 415 3 37 The word "may" needs to be replaced by a word from the lexicon to provide a useful indication of likelihood. I can't mean anything. Here, I would suggest saying "floods are not likely to be able to be adjusted" is justified.

Thank you for the comment. We changed "may" and used more appropriate terminology.

Michael MacCracken 144307 Figure 11. Built Environment, Urban Systems, and Cities 100.00% 114 Regarding the color key for the population, the breakdowns at the higher population levels that go to 9 figure precision make no sense at all. If we change some rounding.

Thank you for the suggestion. We have revised Figure 11.1 to have a consistent and logical coloring and numbering scheme.

Michael MacCracken 144309 End Region 11. Built Environment, Urban Systems, and Cities 417 417 4 24 Best to avoid use of word "may" rather than using a word from the likelihood lexicon (i.e. likely, very likely). This on line 34 might be changed to "likely" and on line 19 to "very likely to be at risk".

Thank you for the comment. We changed "may" and used more appropriate terminology.

Michael MacCracken 144308 End Region 11. Built Environment, Urban Systems, and Cities 418 418 0 6 You might change "may experience to be unable to do something" to something similar like the likelihood lexicon in possible.

Thank you for the comment. We changed "may" and used more appropriate terminology.

Michael MacCracken 144307 End Region 11. Built Environment, Urban Systems, and Cities 418 418 2 27 Change "may not be able to be likely to be able to as avoiding the lexicon.

Thank you for the comment. We changed "may" and used more appropriate terminology.

Michael MacCracken 144306 End Region 11. Built Environment, Urban Systems, and Cities 419 419 0 2 Or line 439, change "may fail" to "become more likely to fail" or something similar. best to avoid "may" and use the lexicon. Or line 2, change "may be to "very likely to be".

Thank you for the comment. We changed "may" and used more appropriate terminology.

Michael MacCracken 144363 End Region 11. Built Environment, Urban Systems, and Cities 420 420 0 13 Or line 11, change "may" to "is likely to" and on the 12 change to "has level will overcome permanently urban economy and its more and more coastal properties and public infrastructure.

We thank the reviewer for the helpful suggestion. We revised the text to change "may be constrained" to "is often constrained" in the modification is supported by the scientific literature. The first sentence of the section makes the observation that cities are mainstreaming adaptation and mitigation into other aspects of planning. We also focus on the issue of key message phrasing.

Michael MacCracken 144366 End Region 11. Built Environment, Urban Systems, and Cities 425 425 3 5 How about changing "are constrained" to "are often constrained".

We revised the text to incorporate this suggestion by adding used "often" to modify the sentence.
I don't understand what it means that VMT has "doubled on transit". Another impact to add is that rail track damage due to extreme heat might lead to locomotive idling if trains heat days to protect electronics, occupants/drivers, and cargo—unless equipped with idle reduction equipment, which helps to mitigate greenhouse gas emissions if forest fires. This is also worth pointing out that transportation planners both state and federal— are increasingly interested in measuring and reducing their greenhouse gases from transportation, as evidenced by more vulnerability assessments. It's also worth pointing out that transportation planners—both state and federal—are increasingly interested in measuring and reducing their greenhouse-gas emissions from transportation, as evidenced by the adoption by USDOT/WAPA of the MAP-21 carbon performance standard in January, 2017. The chapter mentions the fact that urban areas are perhaps more resilient than rural areas because of the many transportation options which create some redundancy in the system. It would strengthen the chapter to mention that providing more transportation choices not only makes a community more resilient to climate change, but also helps to mitigate greenhouse gas emissions if forest fires, crossing, safe walking and cycling are possible. Additionally, the chapter points out that communities such as New York where people can simply walk, are inherently more resilient to climate change. Dense, walkable communities also significantly reduce the need to drive, and therefore the carbon footprint of their residents. For policy makers struggling to adapt to climate change, creating walkable communities does double duty, and failing to point this out weakens the chapter. In a world of increasingly limited resources, public dollars have to fill multiple socio-economic objectives. The chapter would do well to point out that in a world of limited resources, our investments can and must advance adaptation to -- and mitigation of -- climate change. The text suggests that the impact of ridesourcing is uncertain. However, many recent studies have documented that in a world of limited resources, our investments can and must advance adaptation to -- and mitigation of -- climate change. The definitions of the scenarios were added to the body of the text. The definition of vehicle-hours of delay was added to the figure caption. The remaining requested details appear in the paper's methods from which the figure was taken and are beyond the scope of this chapter. In general, there seems to be a lack of emphasis on the role transportation plays in causing climate change. Transportation is the leading source of US GHG emissions, and while that fact is mentioned, it's not one of the key messages. It could be worked into Key Message 3. The chapter points out that the impacts of urban areas are perhaps more resilient than rural areas because of the many transportation options which create some redundancy in the system. It would strengthen the chapter to mention that providing more transportation choices not only makes a community more resilient to climate change, but also helps to mitigate greenhouse gas emissions if forest fires, crossing, safe walking and cycling are possible. Additionally, the chapter points out that communities such as New York where people can simply walk, are inherently more resilient to climate change. Dense, walkable communities also significantly reduce the need to drive, and therefore the carbon footprint of their residents. For policy makers struggling to adapt to climate change, creating walkable communities does double duty, and failing to point this out weakens the chapter. In a world of increasingly limited resources, public dollars have to fill multiple socio-economic objectives. The chapter would do well to point out that in a world of limited resources, our investments can and must advance adaptation to -- and mitigation of -- climate change. The chapter mentions the fact that urban areas are perhaps more resilient than rural areas because of the many transportation options which create some redundancy in the system. It would strengthen the chapter to mention that providing more transportation choices not only makes a community more resilient to climate change, but also helps to mitigate greenhouse gas emissions if forest fires, crossing, safe walking and cycling are possible. Additionally, the chapter points out that communities such as New York where people can simply walk, are inherently more resilient to climate change. Dense, walkable communities also significantly reduce the need to drive, and therefore the carbon footprint of their residents. For policy makers struggling to adapt to climate change, creating walkable communities does double duty, and failing to point this out weakens the chapter. In a world of increasingly limited resources, public dollars have to fill multiple socio-economic objectives. The chapter would do well to point out that in a world of limited resources, our investments can and must advance adaptation to -- and mitigation of -- climate change. The comment is correct that there has been increased interest from substantial governments and the private sector in climate mitigation. However, due to the size of the topic, the page limit for the chapter, and the overall focus of the NOAA, it was not included in this chapter. The commenter's position is not supported by the literature. We reviewed peer-reviewed and grey literature on this topic. We found that while increased VMT is common in states with ride-sharing, there is not enough evidence to claim this is a definitive trend. Trends of re-locating on transit and the overall impacts of ride-sharing on the environment [when considering parking impacts, reduced vehicle ownership etc] are not within the scope of this chapter. The chapter points out that the impacts of urban areas are perhaps more resilient than rural areas because of the many transportation options which create some redundancy in the system. It would strengthen the chapter to mention that providing more transportation choices not only makes a community more resilient to climate change, but also helps to mitigate greenhouse gas emissions if forest fires, crossing, safe walking and cycling are possible. Additionally, the chapter points out that communities such as New York where people can simply walk, are inherently more resilient to climate change. Dense, walkable communities also significantly reduce the need to drive, and therefore the carbon footprint of their residents. For policy makers struggling to adapt to climate change, creating walkable communities does double duty, and failing to point this out weakens the chapter. In a world of increasingly limited resources, public dollars have to fill multiple socio-economic objectives. The chapter would do well to point out that in a world of limited resources, our investments can and must advance adaptation to -- and mitigation of -- climate change. The suggestion is outside the scope of this chapter; detailed discussions of mitigation/contributions to climate change belong in the Mitigation chapter. I don't understand what it means that VMT has "doubled on transit". Another impact to add is that rail track damage due to extreme heat might lead to locomotive idling if trains heat days to protect electronics, occupants/drivers, and cargo—unless equipped with idle reduction equipment, which helps to mitigate greenhouse gas emissions if forest fires, crossing, safe walking and cycling are possible. Additionally, the chapter points out that communities such as New York where people can simply walk, are inherently more resilient to climate change. Dense, walkable communities also significantly reduce the need to drive, and therefore the carbon footprint of their residents. For policy makers struggling to adapt to climate change, creating walkable communities does double duty, and failing to point this out weakens the chapter. In a world of increasingly limited resources, public dollars have to fill multiple socio-economic objectives. The chapter would do well to point out that in a world of limited resources, our investments can and must advance adaptation to -- and mitigation of -- climate change. The suggestion is outside the scope of this chapter; detailed discussions of mitigation/contributions to climate change belong in the Mitigation chapter. The commenter's position is not supported by the literature. We reviewed peer-reviewed and grey literature on this topic. We found that while increased VMT is common in states with ride-sharing, there is not enough evidence to claim this is a definitive trend. Trends of re-locating on transit and the overall impacts of ride-sharing on the environment [when considering parking impacts, reduced vehicle ownership etc] are not within the scope of this chapter. The text falsely states speculative projections of impacts as established physical facts. These conjectures appear to be based primarily on the use of questionable computer models. The suggestion is outside the scope of this chapter; detailed discussions of mitigation/contributions to climate change belong in the Mitigation chapter. I don't understand what it means that VMT has "doubled on transit". Another impact to add is that rail track damage due to extreme heat might lead to locomotive idling if trains heat days to protect electronics, occupants/drivers, and cargo—unless equipped with idle reduction equipment, which helps to mitigate greenhouse gas emissions if forest fires, crossing, safe walking and cycling are possible. Additionally, the chapter points out that communities such as New York where people can simply walk, are inherently more resilient to climate change. Dense, walkable communities also significantly reduce the need to drive, and therefore the carbon footprint of their residents. For policy makers struggling to adapt to climate change, creating walkable communities does double duty, and failing to point this out weakens the chapter. In a world of increasingly limited resources, public dollars have to fill multiple socio-economic objectives. The chapter would do well to point out that in a world of limited resources, our investments can and must advance adaptation to -- and mitigation of -- climate change. The suggestion is outside the scope of this chapter; detailed discussions of mitigation/contributions to climate change belong in the Mitigation chapter. In a world of increasingly limited resources, public dollars have to fill multiple socio-economic objectives. The chapter would do well to point out that in a world of limited resources, our investments can and must advance adaptation to -- and mitigation of -- climate change. The suggestion is outside the scope of this chapter; detailed discussions of mitigation/contributions to climate change belong in the Mitigation chapter. I don't understand what it means that VMT has "doubled on transit". Another impact to add is that rail track damage due to extreme heat might lead to locomotive idling if trains heat days to protect electronics, occupants/drivers, and cargo—unless equipped with idle reduction equipment, which helps to mitigate greenhouse gas emissions if forest fires, crossing, safe walking and cycling are possible. Additionally, the chapter points out that communities such as New York where people can simply walk, are inherently more resilient to climate change. Dense, walkable communities also significantly reduce the need to drive, and therefore the carbon footprint of their residents. For policy makers struggling to adapt to climate change, creating walkable communities does double duty, and failing to point this out weakens the chapter. In a world of increasingly limited resources, public dollars have to fill multiple socio-economic objectives. The chapter would do well to point out that in a world of limited resources, our investments can and must advance adaptation to -- and mitigation of -- climate change. The suggestion is outside the scope of this chapter; detailed discussions of mitigation/contributions to climate change belong in the Mitigation chapter.
Climate change will likely force changes to the transportation system, but these changes have yet to be realized in most cases. In this Key Message, we focus on the climate impact to the existing transportation system.

Climate change will likely force changes to the transportation system, but these changes have yet to be realized in most cases. In this Key Message, we focus on the climate impact to the existing transportation system.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>David</td>
<td>Skipper</td>
<td>241089</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>496</td>
<td>496</td>
<td>3</td>
<td>9</td>
<td>Here is the text:</td>
<td>Assertions that global climate models are not useful or adequate for making climate projections at appropriate spatial scales do not accurately represent the scientific understanding of climate change or the assessment of the peer-reviewed literature, as presented in NCA4 Vol. 1. NCA4 Vol. 1 states (Ch. 4): “Confidence in the usefulness of the future projections generated by global climate models is based on multiple factors. These include the fundamental nature of the physical processes they represent, such as radiation transfer or geophysical fluid dynamics, which can be tested directly against measurements or theoretical calculations to demonstrate that model approximations are valid. They also include the vast body of literature dedicated to evaluating and assessing model abilities to simulate observed features of the earth system, including large scale modes of natural variability, and to reproduce their net response to external forcing that captures the interaction of many processes which produce observable climate system feedbacks (e.g., Flato et al. 2013).” Confidence in the impact of climate change on air quality is likewise grounded in understanding of the physical and chemical processes governing pollutant formation.</td>
<td></td>
</tr>
<tr>
<td>Robienne</td>
<td>Sutton</td>
<td>241000</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>496</td>
<td>496</td>
<td>13</td>
<td>36</td>
<td>Here is the present text:</td>
<td>Assertions that global climate models are not useful or adequate for making climate projections at appropriate spatial scales do not accurately represent the scientific understanding of climate change or the assessment of the peer-reviewed literature, as presented in NCA4 Vol. 1. NCA4 Vol. 1 states (Ch. 4): “Confidence in the usefulness of the future projections generated by global climate models is based on multiple factors. These include the fundamental nature of the physical processes they represent, such as radiation transfer or geophysical fluid dynamics, which can be tested directly against measurements or theoretical calculations to demonstrate that model approximations are valid. They also include the vast body of literature dedicated to evaluating and assessing model abilities to simulate observed features of the earth system, including large scale modes of natural variability, and to reproduce their net response to external forcing that captures the interaction of many processes which produce observable climate system feedbacks (e.g., Flato et al. 2013).” Confidence in the impact of climate change on air quality is likewise grounded in understanding of the physical and chemical processes governing pollutant formation.</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>David-Chavez</td>
<td>241013</td>
<td>Figure</td>
<td>13: Air Quality</td>
<td>489</td>
<td>489</td>
<td>13</td>
<td>2</td>
<td>There are two figure 13.2 in this chapter (on page 490 and 491). What are the difference of these two figures? Also, Which model does the figure 13.2 come from? Has the simulations been set up? NCA4 Vol. 1 states (Ch. 4): “Confidence in the usefulness of the future projections generated by global climate models is based on multiple factors. These include the fundamental nature of the physical processes they represent, such as radiation transfer or geophysical fluid dynamics, which can be tested directly against measurements or theoretical calculations to demonstrate that model approximations are valid. They also include the vast body of literature dedicated to evaluating and assessing model abilities to simulate observed features of the earth system, including large scale modes of natural variability, and to reproduce their net response to external forcing that captures the interaction of many processes which produce observable climate system feedbacks (e.g., Flato et al. 2013).” Confidence in the impact of climate change on air quality is likewise grounded in understanding of the physical and chemical processes governing pollutant formation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>David-Chavez</td>
<td>Rajkovich</td>
<td>241075</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>522</td>
<td>522</td>
<td>3</td>
<td>5</td>
<td>It is interesting to note that actually “People who live outside of urban areas are potentially more susceptible to these health risks than those in urban areas due to differences in factors such as population density, percentage of families living in poverty, and percentage of elderly residents” -- contrary to one’s usual lines of thought.</td>
<td>After a thorough literature review, we find that the relative health risk for rural versus urban populations is largely uncertain. We have therefore deleted this sentence.</td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>Corellie</td>
<td>142006</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>488</td>
<td>488</td>
<td>3</td>
<td>3</td>
<td>The direct health risks of wildfire-triggered pollution (largely due to exposure to particulate matter) are not</td>
<td>Consider changing “controlling air pollutant emissions” to “controlling air pollutant and pollutant precursor emissions” so that statement also reflects the secondary processes of tropospheric ozone formation from primary anthropogenic NOx and VOC emissions. The text has been modified as suggested.</td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>Corellie</td>
<td>142007</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>488</td>
<td>488</td>
<td>8</td>
<td>8</td>
<td>Consider changing “enhance emissions” to “enhance natural air pollutant emissions” to improve clarity.</td>
<td>This sentence has been deleted from the Key Message.</td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>Corellie</td>
<td>142008</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>488</td>
<td>488</td>
<td>10</td>
<td>10</td>
<td>Consider changing “controlling air pollutant emissions” to “controlling air pollutant and pollutant precursor emissions” so that statement also reflects the secondary processes of tropospheric ozone formation from primary anthropogenic NOx and VOC emissions.</td>
<td>This sentence has been deleted from the Key Message.</td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>Corellie</td>
<td>142009</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>488</td>
<td>488</td>
<td>12</td>
<td>16</td>
<td>The direct health risks of wildfire-triggered pollution (largely due to exposure to particulate matter) are not described in this key message. After “air quality” is line 13, consider adding “…including adverse effects on respiratory and cardiovascular health due to particles in wildfire smoke.”</td>
<td>We have revised the Key Message to emphasize the health risks of wildfire smoke. We chose not to refer more specifically to respiratory and cardiovascular health risks due to particles in wildfire smoke, because that detail is included in Key Message 4.</td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>Corellie</td>
<td>142010</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>488</td>
<td>488</td>
<td>16</td>
<td>16</td>
<td>Consider changing “hazard” to “hazards,” because the health effects of wildfire smoke are numerous.</td>
<td>Consider changing “hazard” to “hazards,” because the health effects of wildfire smoke are numerous.</td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>Corellie</td>
<td>142011</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>488</td>
<td>488</td>
<td>22</td>
<td>22</td>
<td>Consider changing “precipitation that affects human health” to “precipitation that threatens human health.”</td>
<td>The text has been modified as suggested.</td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>Corellie</td>
<td>142012</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>488</td>
<td>488</td>
<td>29</td>
<td>29</td>
<td>Consider adding “…including biogenic compounds like isoprene that are emitted from certain plants and trees” to the sentence concluding with “enfluenced by temperature” to improve clarity.</td>
<td>After consideration of this point, we have determined that the existing text is clear and accurate. There are potential interactions between climate change and other sources of emissions besides biogens, including increased evapotranspiration emissions and changes in power plant emissions from increased electricity demands for air conditioning.</td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>Corellie</td>
<td>142013</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>488</td>
<td>488</td>
<td>3</td>
<td>3</td>
<td>Consider changing “produced…” to “produced by plants” to improve clarity.</td>
<td>This sentence has been modified as suggested by the commentator.</td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>Corellie</td>
<td>142014</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>489</td>
<td>489</td>
<td>7</td>
<td>9</td>
<td>The words “contributor” and “precursor” are used inconsistently with respect to particle formation. Consider using the phrase “precursor (contributor)” consistently throughout the chapter to improve consistency and clarity.</td>
<td>We have improved the consistency of our usage, now referring to “precursors” throughout the chapter. The term “contributor” has been removed, and we now refer to important “components” of pollutant matter (e.g., sulphate aerosols).</td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>Corellie</td>
<td>142015</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>489</td>
<td>489</td>
<td>15</td>
<td>16</td>
<td>The “higher scenario” and “lower scenario” are not explained---consider changing to “Higher GHG scenario” and “lower GHG scenario.” Consider changing “compared with” to “compared to” to improve clarity.</td>
<td>As discussed in the “Scenario Products” subsection of the Front Matter, the terms “higher scenario” and “lower scenario” are used inconsistently throughout the entire NCA4 Volume 2 (to refer to KEMP 3 and KEMP 5, respectively). After careful consideration, we believe “compared with” is clear and grammatically correct.</td>
<td></td>
</tr>
<tr>
<td>Austin</td>
<td>Corellie</td>
<td>142016</td>
<td>Fed Region</td>
<td>13: Air Quality</td>
<td>489</td>
<td>489</td>
<td>16</td>
<td>16</td>
<td>Consider beginning this sentence with “Under KEMP 5, by 2050…” rather than mentioning the year at the end of this sentence to improve clarity.</td>
<td>This sentence has been revised the wording to improve clarity.</td>
<td></td>
</tr>
</tbody>
</table>
We appreciate the suggested additional references. The underlying statement regarding variation in results across models and the associated references has been moved from the caption of the figure to the Traceable Accounts.

The text has been modified to incorporate this suggestion.

The text has been modified as suggested.

The suggested references have been added to the paragraph as appropriate.

The text has been modified to incorporate this suggestion.

We agree that the caption to Figure 13.1 was complex and difficult to follow, and have simplified it for clarity.

The text has been modified as suggested.

This sentence cites the 2015 Design Value data from U.S. EPA, which indicates areas that exceed the applicable National Ambient Air Quality Standard (NAAQS) for ozone. The NAAQS for ozone is set to protect human health and the environment.

The text has been modified to incorporate this suggestion.

These parts of the nation is not clear. Consider changing this sentence to "Areas that experience excessive periods of drought and higher temperatures will experience an increasing frequency of wildfires and more dried-out dust from soils."

We agree with the suggestion to improve clarity.

The text has been modified to incorporate this suggestion.

The text has been modified to incorporate this suggestion.

This sentence should read "Lower Emissions Scenario" rather than just "Lower Scenario."

We appreciate the suggested additional references. The underlying statement regarding variation in results across models and the associated references has been moved from the caption of the figure to the Traceable Accounts.

The text has been modified as suggested.
We have added the suggested references to the chapter.

After consideration of this point, we have determined that the existing text is clear and accurate. The author team has deliberated and agreed on the most relevant information and illustrations to include and therefore have not revised the chapter.

We have added the suggested references to the chapter.

We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information and illustrations to include and therefore have not revised the chapter.

We have added the suggested references to the chapter.

We have added the suggested references to the chapter.

We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information and illustrations to include and therefore have not revised the chapter.

We have added the suggested references to the chapter.

We have added the suggested references to the chapter.

We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information and illustrations to include and therefore have not revised the chapter.

We have added the suggested references to the chapter.

We have added the suggested references to the chapter.

We have added the suggested references to the chapter.

We have added the suggested references to the chapter.

We have added the suggested references to the chapter.

We have added the suggested references to the chapter.
Air Quality

This section focuses on the impact of climate change on the particulate matter. Since there is a future projection plot in the ozone air quality section, adding a figure of projected change for PM would be more obvious and persuasive to see its future change. Any projections are currently available.

We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information and illustrations to include and therefore have not revised the chapter.
Michael Fleming 14-0137 Whole Chapter 13: Air Quality 144394 144393 144392 143637 145895

In the "Air Quality" chapter, the co-benefits of reducing greenhouse gas emissions are discussed. These co-benefits include slowing of the progression of global warming and reducing the risks to human health from air pollution. These benefits occur together because, as discussed in the chapter, many contaminants emitted with greenhouse gases contribute to ozone and particulate matter formation, so reducing greenhouse gas emissions reduces these as well. However, there is a manner in which co-benefits might manifest that has not been discussed.

Visible organic compounds (VOCs) are primarily discussed in the chapter only in terms of their contribution to the formation of ozone, where ozone is a significant air pollutant. However, this downplays the role of VOCs as air pollutants themselves. For instance, benzene is a known human carcinogen, while the other BTEX compounds (toluene, ethylbenzene, xylene) have varying effects, including damage to the brain and nervous system, kidneys, and liver. Symptoms of exposure include fatigue, dizziness, headaches, dizziness, confusion, eye and respiratory tract irritation, and loss of muscle coordination (Laack F., & Barkou M., A short primer on benzene, toluene, ethylbenzene and xylenes in the environment and its effects). A report by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency (U.S. Army Corps of Engineers, Environmental Engineering Report, 1991) also highlights the importance of VOCs in the environment and their potential for adverse health effects.

The co-benefits from shutting down fossil fuel infrastructure such as refineries would be halting greenhouse gas emissions, limiting the formation of ozone and PM, and preventing the spread of harmful VOCs into surrounding communities. Several studies have linked poor health outcomes to proximity to refineries. A 2013 study in Georgia found that non-Hodgkin lymphoma incidence was significantly higher in the counties where the refinery is located. Other studies have suggested that refineries contribute to increased air pollution, which can have serious health implications for nearby communities, such as respiratory problems, cardiovascular disease, and cancer.

Overall, a very well done chapter. However, it would be helpful to have more specific examples and references from recent studies to support the claims made in the chapter.

Michael MacCracken 144091 Test Region 12: Air Quality 494 494 4 4

Is it just the risk that is increasing, or also the incidence? If the latter, this needs to be made clear.

Michael MacCracken 144092 Test Region 12: Air Quality 494 494 14 14

"Does this sentence need to say something about its assumption of future vehicle emissions? If the US goes electric, emissions should go down enough that this statement would not be true."

The text has been modified to incorporate this suggestion. Specifically, the chapter now states: "Unless offset by additional reductions of ozone precursor emissions, ..."

Michael MacCracken 144093 Test Region 12: Air Quality 494 494 14 14

"If suggesting "from 1984 to 2015""

The text has been modified to incorporate this suggestion.

Michael MacCracken 144094 Test Region 12: Air Quality 494 494 14 14

"Better to say "air quality concentrations""

The text has been modified as suggested.

Michael MacCracken 144095 Whole Chapter 11: Air Quality 494 494 14 14

Overall, a very well-written chapter. I greatly appreciate the reviewer’s comment about the report and how the chapter is useful.

Mary Wangler 140874 Figure 14: Human Health 2 518

This is not a very compelling figure to have in the executive summary. First, it talks about hospitals, but nowhere in the text of the summary is there mention of hospitals. So why is the figure on hospitals here? Second, it is from an old source, well before NACI came out and of course before the USGCRP health report. This isn’t necessarily bed on its own but it certainly doesn’t convey that there is any new information or literature that has come out in the last five years. But of course there has been more recent literature that has come out: there was a presentation at this year’s APHA meeting looking at hospitals across the country in the flood plain. This figure also does not incorporate FEMA’s 2016 proposal to rewrite the 100-year floodplain standard. There is also, of course, all the post-Sandy literature, some of it specific to New York.

http://www.ingentaconnect.com/content/wel/WHO2015;4(5000000001);4(5000000001).

http://www.cambridge.org/core/journals/prehospital-and-disaster-medicine, ..."

http://www.cambridge.org/core/journals/prehospital-and-disaster-medicine, ..."

The text has been modified to incorporate this suggestion. The chapter now states:

"Specifically, mitigating GHGs can lower emissions of PM, ozone and PM precursors, and other hazardous pollutants, reducing the risks to human health and air pollution (Snedeker et al. 2012; West et al. 2013; Rea et al. 2016; Chang et al. 2016; Thompson et al. 2014; Gao et al. 2018)."

Figure replaced with another example; reference to Adelaine et al. 2017 was added to text.

Response
Delete this drawing. This is badly done, does not present any information, is not appropriate for the intended audience, and has no valid citation. The figure is not about climate change, but is trying to say something about response to weather. There are no notes on the x or y axis. There is no explanation of what disease is being shown. The caption itself says this is a "stylized" epidemic curve. It is inappropriate to take up so much space in this chapter with a diagram filled with jargon about public health/outbreak concerns in a climate assessment. The boxes on the left have meaningless text in them and point (randomly?) to other boxes with meaningless text in them. How do those strange boxes "show the opportunity for disease prevention when moving from an approach of surveillance and response to prevention and prediction"? The authors do not explain the meaning of difference between surveillance, response, prediction, or prevention. What is the meaning of ~120 days (the only number in this drawing) and the poorly drawn black marks under the poorly drawn gray arrow? This entire figure could be summed up in a sentence that says "early warnings can improve response times" rather than an entire text box and made-up (blurred) image about prediction in a climate assessment. Furthermore, that simple sentence is all that needs to be conveyed in a chapter on climate impacts to health. Any more details on predictive response would be more appropriate in other publications; here it only opens up the vulnerability of confusing weather and predictions with climate and projections. The authors were backsliding on avoiding the literature, but instead this "figure" is cited to personal communication. This figure is in stark contrast to the well-written section on adaptation on page 525 and the first half of 526, and weakens the Key Message #2. This seems to be a figure that the authors created for themselves, rather than for the consumers of this assessment. Delete entirely. There are much better figures available that represent climate impacts on health or economics. Even deleting this figure and instead using the table or pathway figure from the 2016 climate and health assessment in key message section would be an improvement. Also, there are several quantitative evaluations of health-related impacts in the mitigation key message (K8) that represent new information since the 2016 report, so a figure or maps of these impacts would be more useful in this chapter’s audience.

The authors disagree with the premise and conclusions of this comment. The test and traceable accounts describe specifically the level of certainty for the key messages, and conclusions based on future models are not stated as physical facts but instead qualified appropriately with levels of uncertainty. The peer-reviewed studies and methods supporting this finding can be found in the chapter text and the associated traceable account for this key message. For responses to public comments made by Paul Knappenberger on the Draft Impacts of Climate Change on Human Health in the United States: A Scientific Assessment, see https://www.globalchange.gov/health-assessment. The transparent process leading to this report is documented on the USGCRP website and includes numerous avenues for the public to engage. All sources were assessed to meet the guidance to authors on Information Quality. This comment exhibits neither quality, objectivity, utility, and integrity of information disseminated by the agency." This text exhibits neither quality, objectivity, utility, nor integrity. To begin with there is neither objectivity nor integrity, as these errors have been corrected not repeatedly during the previous series of National Assessments (deficiencies should not be necessary yet persist). As a result there is no quality or utility.

The authors disagree with the premise and conclusions of this comment. The test and traceable accounts describe specifically the level of certainty with the key messages, and conclusions based on future models are not stated as physical facts but instead qualified appropriately with levels of uncertainty. The peer-reviewed studies and methods supporting this finding can be found in the chapter text and the associated traceable account for this key message. For responses to public comments made by Paul Knappenberger on the Draft Impacts of Climate Change on Human Health in the United States: A Scientific Assessment, see https://www.globalchange.gov/health-assessment. The transparent process leading to this report is documented on the USGCRP website and includes numerous avenues for the public to engage. All sources were assessed to meet the guidance to authors on Information Quality. This comment exhibits neither quality, objectivity, utility, nor integrity. To begin with there is neither objectivity nor integrity, as these errors have been corrected not repeatedly during the previous series of National Assessments (deficiencies should not be necessary yet persist). As a result there is no quality or utility.

The authors disagree with the premise and conclusions of this comment. The test and traceable accounts describe specifically the level of certainty with the key messages, and conclusions based on future models are not stated as physical facts but instead qualified appropriately with levels of uncertainty. The peer-reviewed studies and methods supporting this finding can be found in the chapter text and the associated traceable account for this key message. For responses to public comments made by Paul Knappenberger on the Draft Impacts of Climate Change on Human Health in the United States: A Scientific Assessment, see https://www.globalchange.gov/health-assessment. The transparent process leading to this report is documented on the USGCRP website and includes numerous avenues for the public to engage. All sources were assessed to meet the guidance to authors on Information Quality. This comment exhibits neither quality, objectivity, utility, nor integrity. To begin with there is neither objectivity nor integrity, as these errors have been corrected not repeatedly during the previous series of National Assessments (deficiencies should not be necessary yet persist). As a result there is no quality or utility.

The authors disagree with the premise and conclusions of this comment. The test and traceable accounts describe specifically the level of certainty with the key messages, and conclusions based on future models are not stated as physical facts but instead qualified appropriately with levels of uncertainty. The peer-reviewed studies and methods supporting this finding can be found in the chapter text and the associated traceable account for this key message. For responses to public comments made by Paul Knappenberger on the Draft Impacts of Climate Change on Human Health in the United States: A Scientific Assessment, see https://www.globalchange.gov/health-assessment. The transparent process leading to this report is documented on the USGCRP website and includes numerous avenues for the public to engage. All sources were assessed to meet the guidance to authors on Information Quality. This comment exhibits neither quality, objectivity, utility, nor integrity. To begin with there is neither objectivity nor integrity, as these errors have been corrected not repeatedly during the previous series of National Assessments (deficiencies should not be necessary yet persist). As a result there is no quality or utility.
The sentence was split as suggested. The four groups listed are particularly vulnerable, as noted throughout the chapter. Because this chapter builds on the information in the 2016 Climate and Health Assessment, the conclusions from that assessment were very briefly summarized. Readers are encouraged to refer to that assessment for further details.

The commenter is correct in noting the NCA is focused on climate impacts relevant to the United States. Global assessment is out of the scope of the Assessment and this chapter.

The key message was added to be more explicit. The NOAA focus on the United States and the authors were not mandated to assess the global literature on adaptation. The adaptation chapter does not cover health adaptation, so removing information on health adaptation from this chapter would remove it from the report. Assessing warning and response systems are an important tool for reducing the translation of the health risks of climate change into impacts.

This section has been extensively edited and the language in question has been changed in a way that should address the commenter's concerns about clarity.

The sentence was split as suggested. The four groups listed are particularly vulnerable, as noted throughout the chapter. Because this chapter builds on the information in the 2016 Climate and Health Assessment, the conclusions from that assessment were very briefly summarized. Readers are encouraged to refer to that assessment for further details.

The comment was split as suggested. The four groups listed are particularly vulnerable, as noted throughout the chapter. Because this chapter builds on the information in the 2016 Climate and Health Assessment, the conclusions from that assessment were very briefly summarized. Readers are encouraged to refer to that assessment for further details.

The sentence was split as suggested. The four groups listed are particularly vulnerable, as noted throughout the chapter. Because this chapter builds on the information in the 2016 Climate and Health Assessment, the conclusions from that assessment were very briefly summarized. Readers are encouraged to refer to that assessment for further details.

The sentence was split as suggested. The four groups listed are particularly vulnerable, as noted throughout the chapter. Because this chapter builds on the information in the 2016 Climate and Health Assessment, the conclusions from that assessment were very briefly summarized. Readers are encouraged to refer to that assessment for further details.

This section has been removed from the summary. The authors have made every attempt to clarify and use appropriate language in the main text where these topics now appear.
Allison Crimmins 142201 Reid Region 14. Human Health 10 20 20 Since the 2016 report was only on the science of climate and health, the last part of this sentence starting with "...unless additional interventions..." is not actually a conclusion of the 2016 report. It is a harmless enough statement, but not one that was in the 2016 report. For instance, it is not stated in the 2016 report's executive summary. The authors believe summarizing the findings of the 2016 Climate Health Assessment in the NCA4 is a critical priority, while also conveying new insights from more recent literature. Because of space constraints, not all new literature results can be explained fully within the text, and in some cases, the reader may have to read the internal study to get a complete understanding. Where possible, the authors have revised the text, including in the section provided as an example, to provide as much detail or specific examples within space constraints. Sentence edited for accuracy.

Allison Crimmins 142201 Reid Region 14. Human Health 10 21 1 0 To the paragraph doesn’t follow the NCA style guidelines: it tells the reader there is information out there, but doesn’t tell the reader what that information is. Suggest dropping the “recent research” language and explain what the new findings are. For instance, the paragraph cites a paper that identifies new vulnerable populations. What are these populations? Another paper identifies new strategies. So what are those strategies?

Allison Crimmins 142202 Reid Region 14. Human Health 10 21 5 8 While the information on vulnerable populations would be helpful if the authors tell us what the findings of those citations are, not just that they exist, the only other “new” research that is cited is this Endnote: section is on adaptation. Why is this under key message 5? When adaptation is covered under key message 2? There has been more research that has come out since 2016 on extreme events and health impacts that are not cited or discussed here. Where is that literature? Strongly suggest putting this adaptation information (bermery) in the section on adaptation, or dropping it, since it is so vague. Instead, assess the literature on extreme events impacts on health here. For example, here is a short list of papers on the health impacts of climate-related changes in extreme events, that have all come in the last couple years: https://onlinelibrary.wiley.com/doi/10.1002/2017GL073524 https://www.ncbi.nlm.nih.gov/pubmed/27004689 https://onlinelibrary.wiley.com/doi/10.1002/2017GL073524

Allison Crimmins 142201 Reid Region 14. Human Health 10 21 10 19 Strongly suggest citing the literature the authors assessed that has come out since 2016. For example, here are two studies on climate and coccidioidomycosis published in 2017: http://onlinelibrary.wiley.com/doi/10.1002/2017GL073524/full http://onlinelibrary.wiley.com/doi/10.1002/2017GL073524/full These citations would also help you extend the findings of this text box to the entire Southwest region, not just California and Arizona. It would be very helpful if there were consistent definitions of drought, including when a drought starts and ends. There are periods of dry weather that do not constitute a meteorological drought that can have adverse health consequences, as noted in the text box.

Allison Crimmins 142204 Reid Region 14. Human Health 10 21 9 9 Suggest dropping “end periods of unusually dry months” from the title. First, it is redundant. Second, you don’t explain what it means by “unusually dry” nor how many months/how long a period is in the box/text. Keep it simple for the intended audience.

Allison Crimmins 142201 Reid Region 14. Human Health 10 21 14 9 29 This is a good text box and well written. I especially appreciate how it discusses a climate impact that is not always considered an extreme weather event, as drought tends to be long-lasting or more gradual in nature. It is helpful to explain to readers how climate affects health beyond just hurricanes and fires, and this box does that very effectively and succinctly.

Allison Crimmins 142206 Reid Region 14. Human Health 10 21 11 32 To do all these sections, it would be helpful to drop the “2016 Climate and Health Assessment conclusions” and the “Additional research shown” language. It makes the sections unnecessarily long and hard to read.

Allison Crimmins 142201 Reid Region 14. Human Health 10 21 16 17 The authors may need to state, or should state, that only the major reasons people cite high urban temperatures is because of air conditioning. I think the authors were trying to say there are other important factors because of the urban heat island effect PLUS there is also worse heat from air conditioning.

Allison Crimmins 142208 Reid Region 14. Human Health 10 21 8 8 The paper cited here (Lane et al. 2014) is not an “additional research” since 2016 report. The 2014 report only focused on New York City. It does not compare heat warnings across regions, or other states. Replace this citation with an appropriate source for this statement or drop that part of the sentence, if there is no literature to support it.

Allison Crimmins 142209 Reid Region 14. Human Health 10 21 9 9 The paper cited here (Berisha et al. 2017) is not an appropriate citation to demonstrate that risks vary across regions due to access to cooling centers. This paper focuses only on Maricopa county. It does not compare cooling stations across regions, or other states. Replace this citation with an appropriate source for this statement or drop that part of the sentence, if there is no literature to support it.

Allison Crimmins 142210 Reid Region 14. Human Health 10 21 10 10 The paper cited here (Ghandour et al. 2015) is not an appropriate citation to demonstrate that risks vary across regions due to access to green spaces. This paper focuses only on 8 cities in Michigan. It does not compare green space across regions due to early warning systems. This paper only focuses on New York City. It does not compare heat warnings across regions, or other states. Replace this citation with an appropriate source for this statement or drop that part of the sentence, if there is no literature to support it. The second citation here (Klein-Rosenthal et al. 2014) at least compares vulnerability across locations within New York City, but it does not compare vulnerability across regions. Edit or drop if there is no sufficient literature to support it.

Allison Crimmins 142211 Reid Region 14. Human Health 10 21 5 11 This sentence was full of citations that were inappropriate and did not support the claims the authors made. Most did not represent updates since the 2016 Climate and Health Assessment. Furthermore, the authors use “risk” and “vulnerability” at times even “exposure” interchangeably in this chapter, though the 2016 Climate and Health Assessment had very specific definitions of these terms. This further confuses this paragraph. The citations provided (Lane, Berisha, Ghandour, Klein-Rosenthal) do not demonstrate regional variation in risk, but they do provide some interesting case studies of evaluation of response/adaptation actions. These citations therefore serve more appropriate for the section on adaptation, rather than the section updating impacts of extreme heat. Suggest moving or deleting.

Allison Crimmins 142207 Reid Region 14. Human Health 10 21 8 8 This is a good text box and well written. I especially appreciate how it discusses a climate impact that is not always considered an extreme weather event, as drought tends to be long-lasting or more gradual in nature. It is helpful to explain to readers how climate affects health beyond just hurricanes and fires, and this box does that very effectively and succinctly.

Allison Crimmins 142207 Reid Region 14. Human Health 10 21 9 9 The health chapter builds off the 2016 Climate and Health Assessment, and then assesses new research. The sentence and sentence were reordered to maintain clarity.


Allison Crimmins 142209 Reid Region 14. Human Health 10 21 9 9 I would very much like to see one climate modeler’s conclusions. Keep it simple for the intended audience.

Allison Crimmins 142210 Reid Region 14. Human Health 10 21 10 10 I would very much like to see one climate modeler’s conclusions. Keep it simple for the intended audience.

Allison Crimmins 142211 Reid Region 14. Human Health 10 21 11 8 This is the interaction of hazards, exposure, and vulnerability, as defined in the IPCC climate assessment report, and is not the definition of risk as it is considered in the NCA4 climate assessment report.
Allison Crimmins 142212 End Region 14. Human Health 121 522 1 11 Many new papers have been released on impacts of extreme heat on health. Here are a few examples that the authors should assess: some of these specifically address vulnerable populations, which is relevant to the key message of this section:

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6149077/

It was very difficult to find all suggested references because many of the urls were incomplete. The identified literature was reviewed and relevant papers included in the chapter.

Allison Crimmins 142213 end Region 14. Human Health 121 522 1 11 This version of vector-borne disease is good. But I suggested editing the academic language to better accommodate the intended audience. For example: "favor the establishment and maintenance of vector-borne disease." Do you mean that more people will get sick? If so, please state simply.

Sentence edited for clarity.

Allison Crimmins 142214 end Region 14. Human Health 121 522 2 25 The mitigation chapter is found here as 2015, but in the references it is 2016. The correction was made.

Sentence deleted.

Allison Crimmins 142215 end Region 14. Human Health 121 522 3 26 While the two citations here (Belova et al 2017 and Monaghan et al 2016) are very good citations, they do not discuss "increasing survival of vector" or "notching the development time of the pathogens themselves." These two obits are projecting future exposure, and they are good citations to confirm that we expect more people to be exposed to mosquito-borne disease in the future under climate change (as in lines 26-30). They just aren't good citations for this sentence. Move Below to the end of the sentence on lines 26-30 and replace with recent literature supporting this statement, or delete.

The sentence has been edited for accuracy in a manner that reflects input from this commenter.

Allison Crimmins 142216 End Region 14. Human Health 121 522 3 41 The first and third sentence of this paragraph are redundant. Pick one or combine into just one sentence. Also mention that this is a very good paper.

These sentences made different points, they are now combined.

Allison Crimmins 142217 End Region 14. Human Health 121 522 3 33 The authors may want to consider a different title for this box. "Climate variability" is jargon and in the text box itself the authors call El Nino events "anomalies." This could confuse readers about whether this is a natural swing within the range of variability, or whether it is actually outside the range of variation (therefore, anomalies). Plus, it is just overly academic for this kind of report. If you are only talking about El Nino, then just say El Nino (since El Nino happens on a general scale of once every 7 years; I wouldn't call this an anomaly). If you are talking about extreme weather, then say extreme weather. It may also be helpful to include a sentence about how this relates to climate change: you say it is an analogy, do you mean that we will expect more El Nino events to occur in the future? Maybe cite the CSIR here?

The reference was deleted.

Allison Crimmins 142218 End Region 14. Human Health 121 522 3 21 Lissner 2014 is an inappropriate citation to use here. First, it is a study that takes place in Australia. Second, it is not "additional research" to the 2016 report, as it was published in 2014. Third, while it does mention water availability and quality, that is not the main focus of this paper and it does not measure climate change impacts on water quality and subsequent impacts of reduced water quality on food security. Strongly suggest deleting and replacing with a citation that supports the finding.

Sentence deleted.

Allison Crimmins 142219 End Region 14. Human Health 121 522 3 21 Barosh 2014 is inappropriate citation to use here. It isn't "additional research" to the 2016 report, as it was published in 2014. Third, the paper does not discuss water availability or quality. In fact, the word "water" does not even appear in this paper. Finally, this paper is about cost and access to food, and inequity in food choice, in Australia and in no way supports the sentence for which it is cited. Delete and replace with a citation that supports this finding.

Sentence deleted.

Allison Crimmins 142220 End Region 14. Human Health 121 522 3 21 Wutich 2014 is also a very odd citation to use here. It is not "additional research" to the 2016 report, as it was published in 2014, and therefore would have been assessed by that report's authors. Also, this paper does not discuss food security, so does not support this sentence's finding. While this does talk about water availability and quality, it is really more of a methodological paper, so an odd choice for a citation here. Suggest replacing with literature that supports this finding.

Sentence deleted.

Allison Crimmins 142221 End Region 14. Human Health 121 522 3 21 Guo et al 2015 does talk about food security in the United States, but does not discuss water quality at all. It is a very odd citation to use here. It is not "additional research" to the 2016 report, as it was published in 2014, and therefore would have been assessed by that report's authors. Also, this paper does not discuss climate change- it only mentions climate change once and it is cursory. While this does talk about food security, so does not support this sentence's finding. While this does talk about water availability and quality, it is really more of a methodological paper, so an odd choice for a citation here. Suggest replacing with literature that supports this finding.

Sentence deleted.

Allison Crimmins 142222 End Region 14. Human Health 121 522 3 21 Monaghan et al 2016 is also a very odd citation to use here. It is not "additional research" to the 2016 report, as it was published in 2014, and therefore would have been assessed by that report's authors. Also, this paper does not discuss climate change- it only mentions climate change once and it is cursory. While this does talk about food and water security, it is really more of a methodological paper comparing "tipo" and behavioral responses, so an odd choice for a citation here. It is also an anthropological essay, not a research article. Suggest replacing with literature that supports this finding.

Sentence deleted.

Allison Crimmins 142223 End Region 14. Human Health 121 522 3 21 Belova et al 2017 is also a very odd citation to use here. It is not "additional research" to the 2016 report, as it was published in 2014, and therefore would have been assessed by that report's authors. Also, this paper does not discuss climate change- it only mentions climate change once and it is cursory. While this does talk about food and water security, it is really more of a methodological paper comparing "posit" and behavioral responses, so an odd choice for a citation here. It is also an anthropological essay, not a research article. Suggest replacing with literature that supports this finding.

Sentence deleted.

Allison Crimmins 142224 End Region 14. Human Health 121 522 3 21 Crooks et al 2016 is also a very odd citation to use here. It is not "additional research" to the 2016 report, as it was published in 2014, and therefore would have been assessed by that report's authors. Also, this paper does not discuss climate change- it only mentions climate change once and it is cursory. While this does talk about food and water security, it is really more of a methodological paper comparing "tipo" and behavioral responses, so an odd choice for a citation here. It is also an anthropological essay, not a research article. Suggest replacing with literature that supports this finding.

Sentence deleted.

Allison Crimmins 142225 End Region 14. Human Health 121 523 3 22 While at least the citation Hulme et al (2016) talks about water availability/quality and food security in the context of climate change, it is not "additional research" to the 2016 report, as it was published in 2014 and therefore would have been assessed by that report's authors. Consider citing in the previous paragraph or replacing with more appropriate citation.

Sentence deleted.

Allison Crimmins 142226 End Region 14. Human Health 121 523 3 22 The citation for this sentence was not one an appropriate source to support this sentence. None of them are more recent than the 2016 climate health assessment. Some are focused on other countries, some do not discuss food security or climate change or water quality at all, and one is about the morality of treating fish like sentient animals (it represents a disturbing failure of the authors to conduct a robust literature assessment and accurately report findings). I do not doubt the veracity of the sentence, only the lack of demonstrated literature review from the authors to support it.

The section on waterborne disease, which apparently this comment refers to (although the page number cited is consistent) was reviewed, reference checked, and references from outside the US and other OECD countries removed. The statement referencing hideous states "Extreme weather and climate events can negatively impact the safety of produce from agriculture and fisheries".

The sentence was corrected.

Allison Crimmins 142227 End Region 14. Human Health 121 523 3 22 Delete sentence as it adds no new information, is extremely vague, and does not have appropriate citations.

Sentence deleted.

Allison Crimmins 142228 End Region 14. Human Health 121 523 3 22 This was a very good paper, but it does not address vector-borne contamination from contaminated sewage overflows.

The correction was made.
The outcomes of this review are relevant, it does take place in Scotland and it was published in 2014, so not additional research since the 2016 report. With all the other citations for this sentence, this may not be needed.

Reference deleted.

The manuscript 2015 reference is a good example of a study that looks at climate impacts on marine aquatic species, and potential subsequent impacts on human health. But it does not discuss extreme precipitation or flooding, impacts on seawater or water infrastructure, or human pathogens, viral or bacterial contamination. Thus, it is not an appropriate reference for this sentence. Move this reference to an appropriate place or delete.

Reference deleted.

The Bush et al 2014, Galway et al 2014, and Lugo et al 2014 papers are all relevant in this sentence, but were published in 2014, so would not have been assessed by the authors of the 2016 report. In fact, the Lugo et al paper is cited in the 2016 report, so not new research. The Galway paper also takes place in Canada. “Tsunami” is spelled right in the reference. This too is a relevant paper, but taken place in Sweden. Is there such a lack of recent research on extreme events and water quality focused in the United States that these are the best resources the authors could access? Here are six recent references focused on this topic in the United States, though two are from 2015, so potentially were included in the 2016 report:

http://www.sciencedirect.com/science/article/pii/S0043135415308159?_rdoc=1&_sk=99&_sid=scr&md5=43a0340e1776375b557f23e92ef6e550
http://www.sciencedirect.com/science/article/pii/S0043135415311490?_rdoc=1&_sk=99&_sid=scr&md5=43a0340e1776375b557f23e92ef6e550

The paragraph does not add any value, not a research article. Delete.

Reference deleted.

The Farmer-Brown reference takes place in Australia, was published in 2014 so would have been assessed in the 2016 report, and does not discuss drought or water scarcity, but agricultural food security in Australia. Therefore it does not appear to be an appropriate reference for this statement. Delete.

Reference deleted.

The Nash 2015 report is not additional research since the 2016 report, but was published in 2014, and therefore would have been assessed by that report's authors. Also, this paper also does not discuss climate change - it only mentions climate change once and it is cursory. There is no mention of drought in this paper. While this does talk about food and water security, it is really more of a methodological paper comparing "coping" and behavioral responses, so an odd choice for a citation here. It is also an anthropological essay, not a research article. Delete.

Reference deleted.

The Nash 2015 reference is a study that takes place in Bangladesh, is published in 2014 and so would have been assessed by the 2016 report, is focused on salinity -not pathogens, and does not discuss children or elderly populations, but pre-eclampsia in pregnant women. Therefore it is not an appropriate citation for this sentence. Delete.

Reference deleted.

The Galway et al. 2014 paper may also be an inappropriate citation. Though it is not open access, so hard to tell. But it does take place in Indonesia, doesn't mention climate change, and may have been published in time to be reviewed by the authors of the 2016 report, so it is not additional research.

Reference deleted.

The Grace et al 2015 paper does address children's risk to climate related impacts on waterborne disease, it is focused in Africa and may have been published in time to be reviewed by the authors of the 2016 report, so it is not additional research. But it is focused in Africa and may have been published in time to be reviewed by the authors of the 2016 report, so it is not additional research.

Reference deleted.

The Khan et al 2014 reference is a study that takes place in Bangladesh, is published in 2014 and so would have been assessed by the authors of the 2016 report. While the Grace et al 2015 paper does address children's risk to climate-related impacts on waterborne disease, it is focused in Africa and may have been published in time to be reviewed by the authors of the 2016 report, so it is not additional research. The Khan et al 2014 reference is a study that takes place in Bangladesh, is published in 2014 and so would have been assessed by the authors of the 2016 report. Therefore it does not appear to be an appropriate reference for this statement. Delete.

Reference deleted.

The Cornwell 2015 paper may also be an inappropriate citation, though it is not open access, so hard to tell. But it does take place in Indonesia, doesn't mention climate change, and may have been published in time to be reviewed by the authors of the 2016 report. In fact, the Uejio paper is cited. Furthermore, nothing in this paragraph presents new information from the 2016 report - these sentences are the best resources the authors could access? Here are six recent references focused on this topic in the United States, though two are from 2015, so potentially were included in the 2016 report:

http://www.sciencedirect.com/science/article/pii/S0043135415311490?_rdoc=1&_sk=99&_sid=scr&md5=43a0340e1776375b557f23e92ef6e550

The section introduces these two sentences, one in Australia, one in Bangladesh, one in Indonesia, and one in Africa. None are more recent than 2015 and four are from 2014, so should not be classified as research since the 2015 climate and health reassessment assessment. Several are completely irrelevant to the sentence where it is cited. Furthermore, nothing in this paragraph presents new information from the 2016 report - these sentences are very general and repeat the findings of the waterborne chapter in the 2016 report. This is rather alarming, as it demonstrates either a) there is no recent research focused on water-borne disease in the United States or b) the authors have not done their due diligence in finding such resources. We know "n" to be untrue, as there have been publications on this topic since 2016. In addition to the suggested research articles in another comment, here are some additional references of recent research on climate change and waterborne disease that take place in the United States:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4109613/
https://www.epa.gov/safedrinking/water/rewind/review_water/climate_change_and/

The authors still need to cite data sources from other countries. It would be helpful to select studies that may be applicable to the United States (e.g. EU or Australia over Bangladesh and Indonesia) and explain how those may be similar or different to impacts expected in the United States.

Reference deleted.

The section on waterborne disease, which apparently this comment refers to was revised, references checked, and references from outside the US and other OECD countries removed.

Section edited to focus on publications from the U.S., and other OECD countries where relevant. It was very difficult to find all suggested references because many of the urls were incomplete. The identified literature was reviewed and relevant papers included in the chapter.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allison</td>
<td>Comm</td>
<td>142421</td>
<td>End Region</td>
<td>14-Human Health</td>
<td></td>
<td>121</td>
<td>532</td>
<td>52-52</td>
<td>11-11</td>
<td>Request of should be 15, not 2016. The text was revised.</td>
</tr>
<tr>
<td>Allison</td>
<td>Comm</td>
<td>142422</td>
<td>End Region</td>
<td>14-Human Health</td>
<td></td>
<td>121</td>
<td>524</td>
<td>4-4</td>
<td>1-1</td>
<td>Marvin et al 2013 would have been assessed by the authors of the 2016 climate and health report or the Brown law school security report, so this is not classified as new and took place since the publication of these reports. Marvin et al. removed.</td>
</tr>
<tr>
<td>Allison</td>
<td>Comm</td>
<td>142424</td>
<td>End Region</td>
<td>14-Human Health</td>
<td></td>
<td>121</td>
<td>524</td>
<td>17-1</td>
<td>11-11</td>
<td>There are good examples of recent work on raising CO2 concentrations on different nutrients, but is there any work on the decreases on human health? If not, that may be worth mentioning. A sentence was added to that effect.</td>
</tr>
<tr>
<td>Allison</td>
<td>Comm</td>
<td>142425</td>
<td>End Region</td>
<td>14-Human Health</td>
<td></td>
<td>121</td>
<td>523</td>
<td>55-55</td>
<td>1-1</td>
<td>Suggest the authors refrain from saying that recent research shows that... It is a risk that the earlier reports (Birds &amp; Brown) did not reach these same conclusions. Similarly on line 37; avoid the word &quot;shows&quot;. In both cases, and in the last sentence on the top page 524, these words could be replaced by &quot;confirmed&quot; or &quot;strengthened the understanding of&quot; or something similar to let the reader better understand the state of the science. Sentence edits to remove &quot;shows&quot;. The introduction to this section of the chapter stated that new research confirms and strengthens the conclusions of the 2017 Climate and Health Assessment.</td>
</tr>
<tr>
<td>Allison</td>
<td>Comm</td>
<td>142426</td>
<td>End Region</td>
<td>14-Human Health</td>
<td></td>
<td>121</td>
<td>528</td>
<td>9-9</td>
<td>11-11</td>
<td>An as an excellent summary paragraph. Should the references be at the end, as these were all points made in Gamble et al. (2016)? The text was revised to include the discussion at the end of the sentence.</td>
</tr>
<tr>
<td>Allison</td>
<td>Comm</td>
<td>142427</td>
<td>End Region</td>
<td>14-Human Health</td>
<td></td>
<td>121</td>
<td>526</td>
<td>14-18</td>
<td>1-1</td>
<td>While these statements are all true, they were all made in Dodgen et al. 2016, and do not represent &quot;recent research&quot; since the publication of the 2016 report. The citations are all older than 2016, so would have been assessed by the literature review those authors conducted. In fact, Dodgen et al. is cited in Dodgen 2016. These statements and citations, while true and valid, should not be represented or characterized as &quot;new knowledge&quot; or &quot;additional recent research&quot; (page 520 line 30-32)</td>
</tr>
<tr>
<td>Allison</td>
<td>Comm</td>
<td>142428</td>
<td>End Region</td>
<td>14-Human Health</td>
<td></td>
<td>121</td>
<td>525</td>
<td>1-1</td>
<td>1-1</td>
<td>Reference the Tribal chapter here. Reference added.</td>
</tr>
<tr>
<td>Allison</td>
<td>Comm</td>
<td>142429</td>
<td>End Region</td>
<td>14-Human Health</td>
<td></td>
<td>121</td>
<td>526</td>
<td>33-38</td>
<td>1-1</td>
<td>It is unclear which of these references were published or available after the 2016 report, but none of these statements are new findings. They were all already stated in Gamble et al. 2016. Suggest not saying that &quot;recent research shows...&quot; or stating these facts as if they are new, when in fact they have been known. These additional citations may &quot;confirm&quot; or &quot;strengthen our understanding&quot; or &quot;advance the science&quot;, but they are not the first to show these impacts. Earlier comments requested the reference to be after the first sentence, otherwise it appeared these sentences were not new. Reference added.</td>
</tr>
<tr>
<td>Allison</td>
<td>Comm</td>
<td>142500</td>
<td>End Region</td>
<td>14-Human Health</td>
<td></td>
<td>121</td>
<td>526</td>
<td>34-38</td>
<td>1-1</td>
<td>The first sentence of this paragraph (lines 13-36) is redundant to, or could be combined with, the last sentence of the previous paragraph. The second sentence of this paragraph is mentioned in the previous paragraph (indigenous people, etc.) also cited in the Tribal chapter. Such general statements do not need to be repeated, but the reader would benefit from more specific information. This is such an important topic, and a key player to the key message #1, it would be nice to see specific findings or its rather than just general &quot;these populations are vulnerable&quot; statements, which were made in the 2016 report. It may help to add vulnerable population considerations into the numerous text boxes in this chapter. In future FAAs, a separate chapter on social inequities would be beneficial. But in the meantime, it would help readers if the authors of this chapter told us the findings of the citations in lines 31 through line 4 on page 525. What are the new findings? Are some populations more vulnerable or less vulnerable than we previously thought? Are any other populations identified? Were new characteristics of certain populations recently identified as the source of the vulnerability? Explain how the science on this subject has advanced rather than just reiterating the fact that these groups are vulnerable. The chapter was extensively edited to shorten and clarify the content.</td>
</tr>
<tr>
<td>Allison</td>
<td>Comm</td>
<td>142501</td>
<td>End Region</td>
<td>14-Human Health</td>
<td></td>
<td>121</td>
<td>525</td>
<td>1-4</td>
<td>1-1</td>
<td>I realize there is a lot of information to cover in this section, but it is five pages long in a chapter meant to be six pages total. The adaptation sections is 5 pages and the economic section is 2 pages long. It seems that each of these three findings need to be closer to 2 pages space in it 5 pages total assuming there will be no regional breakout, and so requires some difficult cutting. The text under this Key Message #1 is very redundant - both to the 2016 report and to itself. Much of the information that was presented as &quot;new&quot; since the 2016 report was not, in fact, new but just another reiteration of the points found in the 2016 report. Many of the &quot;new research shows...&quot; statements were using studies that were published before the 2016 report, and did not in fact show that some new piece of scientific knowledge had been achieved. Yet, there are many new papers that have been published since 2016 that the authors unfortunately did not find or see. Suggested examples of sources in previous comments. There are a few options for shortening this section, though I make each would be painful. First, the authors could remove all the information that was in the 2016 report and only report actual new findings since that publication- only updates, or where the science has advanced. In this option, rather than making general statements about climate change impacting, say, species or vectorborne disease, there would need room to present specific findings from the author's literature review. Another option would be to create a large figure with the 2016 information. One example may be the table at the beginning of the 2016 report with findings from each chapter. An additional column could be added to note recent research or updates. This could get cumbersome, but it would at least serve as a quick reference guide to the findings of the 2016 report. Or a table could be created with the link to the appropriate chapter in the 2016 report and only information about new science displayed. Another overall option for shortening, one that may have to be taken even if one of the earlier options is employed, is to delete one of the text boxes. Both boxes are well-written and helpful, but there just doesn't seem to room. Another option would be to drastically shorten or cut the adaptation section. There is already an adaptation chapter, so much of that information could be placed there, if it is not there already. Regardless, the Key Message #2 section would need to be shortened by nearly half anyway. That section could be cut to only a comprehensive 3-page fact box that discusses impacts, adaptation, and social inequities, having more room for the text boxes under Key Message #3. The portions of Key Message #2 section that don't have to reflect updated research could be removed. It is unclear which of these references were published or available after the 2016 report, but none of these statements are new findings. They were all already stated in Gamble et al. 2016. Suggest not saying that &quot;recent research shows...&quot; or stating these facts as if they are new, when in fact they have been known. These additional citations may &quot;confirm&quot; or &quot;strengthen our understanding&quot; or &quot;advance the science&quot;, but they are not the first to show these impacts. The chapter was extensively edited to shorten and clarify the content.</td>
</tr>
</tbody>
</table>

---

The chapter is differentiating between conclusions in the 2018 Climate and Health Assessment, and the results of recent research.}

---

The chapter was extensively edited to shorten and clarify the content. The chapter was extensively edited to shorten and clarify the content.
The paragraphs were edited for conciseness and clarity. Adaptation can reduce risks and social inequities; whether communities and states decide to do so is up to policymakers. Sadly, Ebi et al. 2004 has not been updated.

The text on hospitals under key message 2 was reduced and the text on healthcare in key messages 2 and 3 summarized and included. The suggested references were not included because they are about a decade old.

The paragraphs were edited for conciseness and clarity. Adaptation can reduce risks and social inequities; whether communities and states decide to do so is up to policymakers. Sadly, Ebi et al. 2004 has not been updated.

The text on systems, landscaping, reductions of food waste in cafeterias, etc. in box 14.4 right now gets into more details— the years hospitals took action, the costs saved, whether the information itself. This is an inappropriate citation that feels like the authors promoting their own federal toolkit. Again, why is the climate resilience toolkit cited here? The toolkit is just a repository of info, not the source of information. This is a stark contrast to the box and badly drawn stick diagram (?) on early warning and response systems, which is about weather and not climate and seems to be an advertisement for the government’s toolkit. This section under Key Message 2 would be greatly strengthened by deleting Text Box 14.3. Some of the citations in that text box could be moved to the paragraph on page 525 lines 29-38 where it already talks about forecasts and advisories, etc.

The paragraph preceding this one was so well-written (lines 1-6), but this paragraph should be deleted. The first sentence is policy prescriptive and doesn’t belong in this assessment. Put the idea of decreasing social inequities is already covered in the previous paragraph. The second sentence has nothing to do with social inequities and has no citations even though the sentence talks about the existence of evaluations. If these evaluations are limited, why do the authors feel the need to report it in this limited space? The third sentence is from a very old citation of the lead author’s own work and the figure would have likely been updated in the last 15 years. It may work in a case study or the following section on economic impacts, but it does not fit in with the flow of this section. Furthermore, the point of this paragraph seems to be that considering costs and benefits is a good thing for social inequity. I’m not sure that it is. Cost-benefit analyses may suggest protecting higher-value property is more beneficial, for example, and I’ve read that a policy is the USGCRP would tend to advocate. Strongly suggest deleting entire paragraph.

The sentence “Healthcare facilities...of additional climate change” is vague and redundant. Delete. The rest of this paragraph is strong enough without it. Reference to the climate resilience toolkit removed. Additional information, to the extent it was available, was summarized and included. The suggested references were not included because they are about a decade old.

Figure replaced with another example showing hospitals facing inundation during hurricanes.

The text on hospitals under key message 2 was reduced and the text on healthcare in key messages 2 and 3 summarized and included. The suggested references were not included because they are about a decade old.

The text on systems, landscaping, reductions of food waste in cafeterias, etc. in box 14.4 right now gets into more details— the years hospitals took action, the costs saved, whether the information itself. This is an inappropriate citation that feels like the authors promoting their own federal toolkit. Again, why is the climate resilience toolkit cited here? The toolkit is just a repository of info, not the source of information. This is a stark contrast to the box and badly drawn stick diagram (?) on early warning and response systems, which is about weather and not climate and seems to be an advertisement for the government’s toolkit. This section under Key Message 2 would be greatly strengthened by deleting Text Box 14.3. Some of the citations in that text box could be moved to the paragraph on page 525 lines 29-38 where it already talks about forecasts and advisories, etc.

Although these are adaptation measures, but they are already captured as such in the text above this. This section has been extensively edited and the language in question has been changed in a way that should address the commenter’s concerns about detail, within space constraints.

This section has been edited in a way that reflects input from the commenter.

The text on systems, landscaping, reductions of food waste in cafeterias, etc. in box 14.4 right now gets into more details— the years hospitals took action, the costs saved, whether the information itself. This is an inappropriate citation that feels like the authors promoting their own federal toolkit. Again, why is the climate resilience toolkit cited here? The toolkit is just a repository of info, not the source of information. This is a stark contrast to the box and badly drawn stick diagram (?) on early warning and response systems, which is about weather and not climate and seems to be an advertisement for the government’s toolkit. This section under Key Message 2 would be greatly strengthened by deleting Text Box 14.3. Some of the citations in that text box could be moved to the paragraph on page 525 lines 29-38 where it already talks about forecasts and advisories, etc.

This section has been extensively edited and the language in question has been changed in a way that should address the commenter’s concerns about detail, within space constraints.

The text on systems, landscaping, reductions of food waste in cafeterias, etc. in box 14.4 right now gets into more details— the years hospitals took action, the costs saved, whether the information itself. This is an inappropriate citation that feels like the authors promoting their own federal toolkit. Again, why is the climate resilience toolkit cited here? The toolkit is just a repository of info, not the source of information. This is a stark contrast to the box and badly drawn stick diagram (?) on early warning and response systems, which is about weather and not climate and seems to be an advertisement for the government’s toolkit. This section under Key Message 2 would be greatly strengthened by deleting Text Box 14.3. Some of the citations in that text box could be moved to the paragraph on page 525 lines 29-38 where it already talks about forecasts and advisories, etc.

This section has been extensively edited and the language in question has been changed in a way that should address the commenter’s concerns about detail, within space constraints.

The text on systems, landscaping, reductions of food waste in cafeterias, etc. in box 14.4 right now gets into more details— the years hospitals took action, the costs saved, whether the information itself. This is an inappropriate citation that feels like the authors promoting their own federal toolkit. Again, why is the climate resilience toolkit cited here? The toolkit is just a repository of info, not the source of information. This is a stark contrast to the box and badly drawn stick diagram (?) on early warning and response systems, which is about weather and not climate and seems to be an advertisement for the government’s toolkit. This section under Key Message 2 would be greatly strengthened by deleting Text Box 14.3. Some of the citations in that text box could be moved to the paragraph on page 525 lines 29-38 where it already talks about forecasts and advisories, etc.

This section has been extensively edited and the language in question has been changed in a way that should address the commenter’s concerns about detail, within space constraints.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142258</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>5</td>
<td>5</td>
<td>A citation to the landing page of the federal climate resilience toolkit site is not an appropriate citation. Even if the reader were to navigate through the toolkit site to the page on Greenview, there are no citations on that page. There needs to be a citation specific to Greenview hospital. Ideally one that is not advertising the federal government's programs. For example, authors could cite this: <a href="https://www1.eere.energy.gov/manufacturing/distributedenergy/pdf/sgy_co2.pdf">https://www1.eere.energy.gov/manufacturing/distributedenergy/pdf/sgy_co2.pdf</a></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142259</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>22</td>
<td>23</td>
<td>Is that estimated $15 billion per year? One time savings? Cumulative savings over the lifetime of the hospital? For every hospital in the US, or for each hospital in the US? Is there a more recent estimate of this? (as this sentence will be 6-7 years old by the time this is published) Based on the hospitals that have taken action, such as the examples the authors provided!</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142270</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>1</td>
<td>5</td>
<td>Authors may want to know what Superstorm Sandy caused. That may be common knowledge on the east coast, but not the west. Specific reference to Superstorm Sandy was removed.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142271</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>7</td>
<td>10</td>
<td>Authors may want to consider using the language established in the About this report/overview section on &quot;higher&quot; and &quot;lower&quot; scenarios, which could help cut down on the two uses of &quot;reducing&quot; in this first sentence. For instance, say &quot;By the end of this century, thousands of lives could be saved each year and hundreds of billions of dollars in health-related economic benefits could be produced each year under a lower emissions scenario.&quot; - The current text is not laid just potential to be more consistent with report style/language.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142272</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>9</td>
<td>9</td>
<td>What pollutants? Reduced exposures to what is this score? PM2.5? Walkability? Airborne pollutants? Also, since there is a chapter on Air Quality, I’m not sure you need this example here. Since the first sentence repeats the sentence on page 528 line 11 (reducing emissions benefits health) and the second sentence is vague and probably better covered in the air quality chapter, suggest deleting these two sentences. The rest of the paragraph works well without the first two sentences and the third sentence is a strong statement.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142274</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>23</td>
<td>23</td>
<td>If you say in the next sentence “considering adaptation or other adaptations”, then do you need to say “without considering adaptation” here? The text was revised.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142275</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>29</td>
<td>29</td>
<td>Suggest moving “in 2030” after “death” or to the very end of the sentence to keep the flow of 5 under 8.5 and 5 under 4.5 easier to follow.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142276</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>34</td>
<td>34</td>
<td>May want to say “both ambient heat and extreme cold” in the parentheses, as I didn’t catch in that the text was talking about the net impacts of heat events and less cold events, which is an important point.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142277</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>20</td>
<td>20</td>
<td>Suggest wording the section title here, as the other sections seem to be more about people, or at least the health impact, rather than the physical climate driver. For instance “Temperature-related deaths.” Section title changed.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142278</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>33</td>
<td>33</td>
<td>What is an example of a high risk sector? Charged to jobs, with greater exposure to heat.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142279</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>1</td>
<td>1</td>
<td>Why did the chart break up the numbers? Time to revisit this. The text was revised and quantifications added.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142280</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>7</td>
<td>9</td>
<td>The rest of these sections are very quantitative - can this water quality section also be? For instance, can you say how much increase in harmful concentrations there will be? Or how much lower risks would be under 4.5?</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142281</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>80</td>
<td>80</td>
<td>Formatting error Fixed.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142282</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>8</td>
<td>8</td>
<td>Air pollution is not mentioned as a health threat in this opening paragraph. We suggest revising to “…quality of air, food, and water…” to capture this important environmental risk factor. Air pollution is an important health threat and is covered in a separate chapter.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142283</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>22</td>
<td>24</td>
<td>In addition to changes in average temperatures and temperature variability, change in minimum temperature is a key metric for health that should be included. Minimum temperature is important metric to consider because, in addition to heightened daytime exposure to extreme heat, elevated overnight temperatures reduce the body’s natural ability to dissipate heat and reduce stress on the circulatory system. See: McGeehin, Michael A., and Maria Mirabelli. 2001. &quot;The Potential Impacts of Climate Variability and Change on Temperature-related Mortality and Morbidity in the United States.&quot; Environmental Health Perspectives 109 (Suppl 2): 185</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142284</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>1</td>
<td>1</td>
<td>The cooling benefit of green infrastructure is generally local. To make this point clear, the phrase should be revised to “…benefits by cooling ambient temperature locally and alleviating storm water flows.” The text was deleted.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142285</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>6</td>
<td>6</td>
<td>This estimate was over 10 years; this is now specified.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142286</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>14</td>
<td>The paragraph was deleted.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142287</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>6</td>
<td>6</td>
<td>In addition to changes in average temperatures and temperature variability, change in minimum temperature is a key metric for health that should be included. Minimum temperature is important metric to consider because, in addition to heightened daytime exposure to extreme heat, elevated overnight temperatures reduce the body’s natural ability to dissipate heat and reduce stress on the circulatory system. See: McGeehin, Michael A., and Maria Mirabelli. 2001. &quot;The Potential Impacts of Climate Variability and Change on Temperature-related Mortality and Morbidity in the United States.&quot; Environmental Health Perspectives 109 (Suppl 2): 185</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142288</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>1</td>
<td>1</td>
<td>Another reference to add is to the statement of U. Stanway, B. Roob, and P. Stoez. 2011. &quot;Projections of Seasonal Patterns in Temperature-Related Deaths for Manhattan, New York.&quot; Nature Climate Change, May, <a href="https://doi.org/10.1038/nclimate1065">https://doi.org/10.1038/nclimate1065</a></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142289</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>10</td>
<td>11</td>
<td>This statement needs more explanation. Consider moving to, “Health risks may be higher under the summer season when populations are less accustomed to experiencing elevated temperatures.” Change made.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142290</td>
<td>Text Region</td>
<td>Human Health</td>
<td>14</td>
<td>14</td>
<td>23</td>
<td>23</td>
<td>We mention mental/health risks particular to Alaskan Native populations, which is alluded to in line 38. The text was revised to include tribal communities as a vulnerable population.</td>
<td></td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Title Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Start Column</td>
<td>End Column</td>
<td>Comment</td>
<td>Response</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>------------</td>
<td>------------</td>
<td>----------</td>
<td>--------------</td>
<td>------------</td>
<td>---------</td>
<td>----------</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142291_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>128</td>
<td>10</td>
<td>02</td>
<td>05</td>
<td>The acronym “PWHS” is used in the figure legend, but the acronym is not referenced in the figure caption. Consider revising to “prevalence work weeks (PWHS).” More generally, the meaning/use of prevalence work maps by EMA is not mentioned in the figure caption.</td>
<td>Figure deleted.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142292_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>128</td>
<td>13</td>
<td>09</td>
<td>12</td>
<td>It seems beyond question that inclusion of mental health impacts and no benefits associated with greenhouse gas reductions would rather “launder” increase these estimates. Consider revising to better reflect the state of the science.</td>
<td>Sentence edited for clarity.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142293_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>128</td>
<td>16</td>
<td>23</td>
<td>23</td>
<td>Air pollution is not mentioned as a health threat in this paragraph. We suggest revising to “… quality and safety of food, and water…” to capture this important environmental risk factor.</td>
<td>Air pollution is an important health threat and is covered in a separate chapter.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142294_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>128</td>
<td>19</td>
<td>14</td>
<td>15</td>
<td>References to the RCPs should be made more clear by describing them as emissions scenarios, since many people are not familiar with the specifics of the RCPs. We suggest revising to “RCP 5.0 (low emissions)” compared to RCP 5.0 (high emissions).”</td>
<td>Section edited to refer to lower and higher emission scenarios.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142295_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>128</td>
<td>22</td>
<td>2</td>
<td>2</td>
<td>References to the RCPs should be made more clear by describing them as emissions scenarios, since many people are not familiar with the specifics of the RCPs. We suggest revising to “RCP 5.0 (low emissions)” compared to RCP 5.0 (high emissions).”</td>
<td>Section edited to refer to lower and higher emission scenarios.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142296_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>128</td>
<td>25</td>
<td>18</td>
<td>18</td>
<td>References to the RCPs should be made more clear by describing them as emissions scenarios, since many people are not familiar with the specifics of the RCPs. We suggest revising to “RCP 5.0 (low emissions)” compared to RCP 5.0 (high emissions).”</td>
<td>Section edited to refer to lower and higher emission scenarios.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142297_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>129</td>
<td>10</td>
<td>13</td>
<td>13</td>
<td>Figure 14.2 shows hospitals in the 200-year and 500-year floodplains in NYC not just the 100-year floodplains.</td>
<td>Figure and table repositioned with another focusing on potential inundation following hurricanes of varying strengths.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142298_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>129</td>
<td>13</td>
<td>5</td>
<td>5</td>
<td>End temperature extremes in the UK have been linked to increases in enteric disease. Alternatively, you could add the citations described above, to support the biological plausibility of the above climate-diarrhea associations.</td>
<td>References provided.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142299_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>129</td>
<td>16</td>
<td>24</td>
<td>24</td>
<td>Collectively we have only just touched the tip of the iceberg on this issue when it comes to our most vulnerable populations. There are many factors at play.</td>
<td>References reviewed and context added.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142300_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>129</td>
<td>18</td>
<td>06</td>
<td>06</td>
<td>The chapter needs to be more explicitly linked to the air-quality chapter. Changes in air quality resulting from climate change is one of the larger contributors to health impacts from climate change. Acknowledging here and referring the reader to Chapter 13 would be appropriate. Otherwise, someone reading this chapter but not the air-quality chapter might miss the point that air quality changes are a driver for climate health impacts. The existing sentence does not even acknowledge air quality impacts on health. The first real-scaled model of air quality impacts is in on page 520, and there it redacts to Chapter 13 without giving any sense of the magnitude of the health impact relative to other health impacts of climate change.</td>
<td>References to Vasquez-Frechou 2017 was included in the section on vector-borne diseases.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142301_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>129</td>
<td>21</td>
<td>06</td>
<td>06</td>
<td>Please provide an example of a new strategy for working with crianças and adolescents in all phases of a disaster.</td>
<td>End sentence and the associated reference have been deleted from the report.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142302_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>129</td>
<td>24</td>
<td>32</td>
<td>32</td>
<td>In the extreme temperatures section, please provide text linking to the air quality chapter, which discusses how high temperatures can exacerbate poor air quality and also increase responses to poor quality.</td>
<td>Sentence added.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142303_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>129</td>
<td>24</td>
<td>32</td>
<td>32</td>
<td>Please include some text about the importance of urban adaptation to either exacerbating or mitigating the risks from increased range of disease vectors. For example, Vasquez-Frechou et al. (2016) highlight that housing improvements (screens, reductions in areas where standing water collects, etc.) can be effective ways of addressing mosquito borne risks.</td>
<td>Reference to Vasquez-Frechou 2017 was included in the section on vector-borne diseases.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142304_1</td>
<td>Footnote</td>
<td>14, Human Health</td>
<td>129</td>
<td>26</td>
<td>21</td>
<td>21</td>
<td>Please connect the discussion with the discussion on page 521. In the discussion on 521, other mental health effects are highlighted based on additional references, e.g. Vito et al 2015 and Friel et al 2014.</td>
<td>The text was revised to include vulnerable populations and impacts from drought.</td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Type</td>
<td>Comment</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Line</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
<td>------------</td>
<td>------</td>
<td>---------</td>
<td>---------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------</td>
<td>---------</td>
<td>------</td>
</tr>
<tr>
<td>Allison</td>
<td>Constible</td>
<td>142305</td>
<td>Text Region</td>
<td>14. Human Health</td>
<td>129-131 14-16</td>
<td>typo here, need to either add the word 'that' before the first 'are' in the sentence, or add the word 'and' directly before the second 'are' in the sentence. This could read either: 'Recent research shows that low-income communities and communities of color that are often already overburdened with poor environmental conditions are disproportionately affected by, and less resilient to, the health impacts of climate change' or: 'Recent research shows that low-income communities and communities of color are often already overburdened with poor environmental conditions and are disproportionately affected by, and less resilient to, the health impacts of climate change'</td>
<td>129</td>
<td>131</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>Allison</td>
<td>Constible</td>
<td>142306</td>
<td>Text Region</td>
<td>14. Human Health</td>
<td>129-131 12-23</td>
<td>Please add some discussion of how alterations to the built environment can mitigate increased risks from vector-borne disease. For example, Vyasque-Pepeko et al (2016) highlight that housing improvements (screened, ventilations in areas where standing water collects, etc.) can be effective ways of addressing mosquito/borne risks.</td>
<td>129</td>
<td>131</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>Allison</td>
<td>Constible</td>
<td>142307</td>
<td>Text Region</td>
<td>14. Human Health</td>
<td>129-131 8-19</td>
<td>Please cross-reference this discussion with the air quality chapter 13. The 3rd key message addresses this subject.</td>
<td>129</td>
<td>131</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Allison</td>
<td>Constible</td>
<td>142308</td>
<td>Text Region</td>
<td>14. Human Health</td>
<td>129-131 17-18</td>
<td>The key for this key line is the following: The economic benefits of greenhouse gas emissions to the health sector could be on the order of hundreds of billions of dollars annually by the end of the century. &quot;A word is missing. The text should be: &quot;The economic benefits of greenhouse gas emissions (reductions) to the health sector(s)&quot;</td>
<td>129</td>
<td>131</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Allison</td>
<td>Constible</td>
<td>142309</td>
<td>Text Region</td>
<td>14. Human Health</td>
<td>130-131 3-4</td>
<td>This sentence seems vague/tony. Can't measure human and financial resources? Be measured or quantified? Also, the amount that the current burden would be reduced is quantified? It would be nice to see how much effort and money is needed to make a change, and how large that change would be.</td>
<td>130</td>
<td>131</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Allison</td>
<td>Constible</td>
<td>142311</td>
<td>Text Region</td>
<td>14. Human Health</td>
<td>131-133 15-17</td>
<td>I don't understand why this is saying only &quot;thousands&quot; instead of some much higher number given how much climate change is projected for the end of the century. If no action is taken. And what does &quot;reducing the severity of climate change&quot; mean? Is this referring to mitigation and/or to adaptation and by how much would the reduction be and from which sources? Sea level rise will also be displacing billions by then or soon thereafter.</td>
<td>131</td>
<td>133</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Allison</td>
<td>Constible</td>
<td>142312</td>
<td>Text Region</td>
<td>14. Human Health</td>
<td>131-132 11-11</td>
<td>It seems so that a better way to put something like &quot;benefits of Enhancing Resilience to the Health Risks of Climate Change&quot;--something saying &quot;adapting&quot; seems to me to basically just accommodate (well, yes, the death rate goes up--that is just the way it is) rather than be proactive in taking steps to reduce the risks.</td>
<td>131</td>
<td>132</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Allison</td>
<td>Constible</td>
<td>142313</td>
<td>Text Region</td>
<td>14. Human Health</td>
<td>131-131 17-20</td>
<td>See previous comments. I'd also better indicate that the effort needs to go on all through the century. Indeed, steps that have been taken to date (e.g., having moved off of CFCs, etc., which are powerful GHGs and would have had no impact on climate change if they were not already contributing to the warming of the earth) and then there is the saving from the efficiency and conservation efforts to limit GHG emissions that have also helped slow climate change. So, I do think this point would benefit from some revision and clarification.</td>
<td>131</td>
<td>131</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>Allison</td>
<td>Constible</td>
<td>142314</td>
<td>Text Region</td>
<td>14. Human Health</td>
<td>131-131 11-12</td>
<td>Perhaps it would help here to have &quot;further reductions in is&quot; (given some have already been done. Also, however, it needs to be said that the cuts need to be substantive--just doing little bits won't really help much. Given the international pledge to get to zero emissions in the second half of the century (a good start), perhaps what to say here is &quot;Eliminating greenhouse gas emissions over coming decades would provide substantial benefits for the health of Americans and all the world's peoples in the near and long term.&quot; So, there needs to be an indication about the size of the needed reduction, and just focusing on Americans seems quite provincial.</td>
<td>131</td>
<td>131</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Allison</td>
<td>Constible</td>
<td>142315</td>
<td>Text Region</td>
<td>14. Human Health</td>
<td>131-131 24-27</td>
<td>Including the aspect of multiple time scales in this sentence is slightly confusing. It would be helpful to add an additional sentence that defines these time scales.</td>
<td>131</td>
<td>131</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>Lauren</td>
<td>Considine</td>
<td>142306</td>
<td>Text Region</td>
<td>14. Human Health</td>
<td>131-131 8-10</td>
<td>The sentence could be worded more clearly. Perhaps this? &quot;Because some health impacts are difficult to quantify (lot examples of these impacts), the actual benefits of a lower emission pathways would likely be even greater. &quot; I would also hope to define what is meant by 'low impact benefits associated with reducing greenhouse gas emissions.'</td>
<td>131</td>
<td>131</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Lauren</td>
<td>Considine</td>
<td>142357</td>
<td>Crossable Account</td>
<td>14. Human Health</td>
<td>132-133 4-4</td>
<td>This does not appear to be true. By a quick scan of your references, almost 30% of the citations are from 2014 and before. It is unclear how many of the 2015s came before the fall cut off, but that would increase this estimate. It is appropriate that older citations would be useful if they are seminal works, or used in the sections of this chapter that were not in the other report (e.g., adaptation, economics.) I would suggest moving that point from line 12-14 above, but in the section for Key Message #3, older references seems less appropriate for providing an update from the 2016 report. Furthermore, there are a number of key citations (provided in other comments) that have been published since 2013 that the authors have missed.</td>
<td>132</td>
<td>133</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Lauren</td>
<td>Considine</td>
<td>142358</td>
<td>Crossable Account</td>
<td>14. Human Health</td>
<td>132-133 8-8</td>
<td>What does &quot;health authors&quot; mean?</td>
<td>132</td>
<td>133</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Lauren</td>
<td>Considine</td>
<td>142359</td>
<td>Crossable Account</td>
<td>14. Human Health</td>
<td>132-133 1-16</td>
<td>This crossable account section does not describe the methods used to select authors, nor the decisions made about the scope of the chapter. This would benefit from a description of how the authors selected the key messages, what topics are in other chapters, like air quality or adaptation, and what topics were considered out of scope. See other chapters for examples.</td>
<td>132</td>
<td>133</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Lauren</td>
<td>Considine</td>
<td>142540</td>
<td>Crossable Account</td>
<td>14. Human Health</td>
<td>132-131 27-27</td>
<td>The phrase &quot;indicating sensitivity to weather patterns&quot; is very odd. How does sea level rise fit into this? This phrase is unnecessary and potentially confounding.</td>
<td>132</td>
<td>131</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Lauren</td>
<td>Considine</td>
<td>142541</td>
<td>Crossable Account</td>
<td>14. Human Health</td>
<td>131-131 35-35</td>
<td>This sentence is good, but could be interpreted as something new--some new finding that was just discussed in 2017. It would be better if the sentence was revised so that the &quot;recent research confirms the large body of research and wide consensus that... &quot;</td>
<td>131</td>
<td>131</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomi</td>
<td>Constible</td>
<td>142402</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S22 7 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142403</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S22 6 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142404</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S22 14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142405</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S22 18 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142406</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S23 2 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142407</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S24 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142408</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S24 14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142409</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S24 16 21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142410</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S24 34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142411</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S25 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142412</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S26 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142413</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S27 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142414</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S28 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142415</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S29 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142416</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S30 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142417</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S31 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142418</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S32 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142419</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S33 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142420</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S34 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142421</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S35 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142422</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S36 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142423</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S37 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142424</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S38 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142425</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S39 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142426</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S40 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142427</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S41 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142428</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S42 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142429</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S43 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142430</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S44 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142431</td>
<td>Traceable Account</td>
<td>14. Human Health</td>
<td>131</td>
<td>S45 26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The intention of this paragraph is very good, but I did find the part about “creating uncertainty in the magnitude..." awkward. First, it makes it sound like uncertainty will increase in the coming decades in the face of further research. Second, non-climate factors don’t create uncertainty about the severity or frequency of occurrence of the health impacts of climate change. Finally, the traceable accounts in this sentence, it is unclear why the topic of adaptation is in here and not mitigation. It seems that “without additional adaptation efforts” should be deleted or it is covered elsewhere. But if the authors feel the need to keep it here, then mitigation should also be included: “without additional mitigation or adaptation efforts.” I would strongly suggest dropping adaptation from this sentence, as health RISKS will increase under climate change with or without adaptation, though adaptation may help people avoid health IMPACTS. Even if adaptation reduced some risks, it would not reduce the health risks of birds.”

Adaptation policies and programs without sufficient resources, human and financial, will fail. Therefore, this needs to be stated. Change made on number of confidence statements.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed, and references were checked.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed.

The chapter was extensively edited to shorten and clarify the content. The text boxes were changed.
References reviewed and content added

Social Science Coordinating Committee
4/12/20 Whole Chapter 14. Human Health Please review and consider citing Prudencio et al. 2016 (https://digitalcommons.unl.edu/gpviewcontent.jsp?view=homepage ... see if it is a relevant citation to add to sections on adaptation or environmental justice.

This paper was added

Social Science Coordinating Committee
4/12/20 Whole Chapter 14. Human Health Please review and consider citing, if appropriate, these 2016- and newer studies on climate and food security: Sygmann et al. 2016. (http://library.ipmn.nl/img/ekkelmand/collections/5670995295) Hasegawa et al. 2016. (http://link.springer.com/article/10.1007/s10346-016-1069-4) Ken were unable to locate this reference with the information provided.

Social Science Coordinating Committee
4/12/21 Whole Chapter 14. Human Health Please review and consider citing Cayton et al. 2016 (https://www.cambridge.org/core/journals/cluster-studies-and-public-heap ... This paper may be relevant to the vectorborne disease section, or for recommendations to the Hawaii Pacific Islands chapter.

Social Science Coordinating Committee

Social Science Coordinating Committee

Social Science Coordinating Committee
4/12/24 Whole Chapter 14. Human Health Please review and consider citing Buttersworth et al 2017 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5380195/) for information on climate change and dengue in the Southeast US.

Reference to Buttersworth et al. was included in the section on vector borne diseases.

Social Science Coordinating Committee
4/12/25 Whole Chapter 14. Human Health Please review and consider citing Littmann et al. 2016 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5099440/) for information on climate and vectorborne disease. This may be relevant to the box on Effluo and Zika.

Reference to Littmann et al. 2016 was included in the section on vector borne diseases.

Social Science Coordinating Committee

Social Science Coordinating Committee
4/12/27 Whole Chapter 14. Human Health Please review and consider citing Cambardella et al 2016 (http://www.plos.org/content/10.1371/journal.pone.0118620) for information on malaria distribution into the United States.

Reference to the suggested citation indicated it was not appropriate for inclusion in the chapter.

Social Science Coordinating Committee

Reference to the suggested citation indicated it was not appropriate for inclusion in the chapter.

Social Science Coordinating Committee

The references were included in the chapter.

John Fleming

The publications were reviewed and appropriate citations added.

Zorn Loper

Acknowledgements were included except for the reference from Ziegler that does not add any additional or review information.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144006</td>
<td>Whole Chapter</td>
<td>14</td>
<td>Human Health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The chapter focuses on peer-reviewed publications.
15. Tribal and Indigenous Communities

There is a qualitative and important difference between direct impacts (like the increased frequency of storms, etc.) and indirect effects, e.g., income related worsening of mental health impacts. To what extent does the literature provide understanding of why impacts on household property and finances cause physical and mental health impacts? Is it due to loss of safety net or insurance? Is it because of reduced availability of money for other health care needs? Does this hold true regardless of income levels or housing prices? This is important because policies should be directed at the underlying causes. I would move the sentence at the end of the section (lines 25-29) up to the first paragraph (before line 10), and frame the discussion within the conceptual causal model used by Vite et al. 2015. It does a good job of laying out the complex causal pathways and highlights direct vs indirect effects.

Lake Waldenstrøm 14/4756 Whole Page 14. Human Health
There is a qualitative and important difference between direct impacts (like the increased frequency of storms, etc.) and indirect effects, e.g., income related worsening of mental health impacts. To what extent does the literature provide understanding of why impacts on household property and finances cause physical and mental health impacts? Is it due to loss of safety net or insurance? Is it because of reduced availability of money for other health care needs? Does this hold true regardless of income levels or housing prices? This is important because policies should be directed at the underlying causes. I would move the sentence at the end of the section (lines 25-29) up to the first paragraph (before line 10), and frame the discussion within the conceptual causal model used by Vite et al. 2015. It does a good job of laying out the complex causal pathways and highlights direct vs indirect effects.

Rebecca Laurent 14/4756 Whole Page 14. Human Health
The construction of the section is confusing. You have temperature extremes as a subsection, but then you have labor productivity as a separate subsection, but it in fact a subset of the impacts from extreme temperatures. As an editor, you should cross-reference to the air quality chapter (13) which discusses the air quality related impacts from temperature extremes.

Hilary Barrett 14/0807 Text Region 15. Tribal and Indigenous Communities
It is unclear what "federally listed animals and plants" means here, should it be "species listed" under the Endangered Species Act? We have made this suggested edit.

Hilary Barrett 14/0808 Text Region 15. Tribal and Indigenous Communities
I could be wrong but I have never seen seals skins used for clothes (have seen them used for bosoms)--could be more accurate to replace "sealskins and tusk s" with "skins, funs, and walrus tusk s" We have made this suggested edit.

Hilary Barrett 14/0809 Text Region 15. Tribal and Indigenous Communities
Consider adding a line or a footnote after the first sentence in the paragraph that says something like "But this does not apply to 228 federally recognized tribes in Alaska who do not negotiate or receive funds from..." Possible citation could be Ristroph, E.B. 2017. "Climate Takes a Village: Legal Pathways Toward the Relocation of Alaska Native Villages." Climate Law 7(4): 259-289.

Hilary Barrett 14/0810 Text Region 15. Tribal and Indigenous Communities
This could be misleading because there are federal programs designed to prevent disasters and address erosion. It’s just that the federal Stafford Act (which provides for federal disaster declarations) does not provide for alleviating disasters other than drought. Suggested rewrite of second sentence in this paragraph. "Presidential disaster declarations, which yield large amounts of federal funding, only apply after sudden disasters."

Hilary Barrett 14/0811 Figure Region 15. Tribal and Indigenous Communities
The photo from Shishmaref.org shown on the right of Kukhia, not Shishmaref We have made this correction.

Hilary Barrett 14/0812 Text Region 15. Tribal and Indigenous Communities
It may be an overstatement to suggest that Indigenous peoples are considering relocation in every region of the USA--I am only familiar with planned relocation in Louisiana, the Pacific Northwest, and Alaska. Suggest deleting the phrase: "In nearly every region of the United States" We have made the edited to incorporate the commenter’s perspective. We have identified examples of relocation in communities we are only familiar with planned relocation in Louisiana, the Pacific Northwest, and Alaska. Suggest deleting the phrase “In nearly every region of the United States”

Hilary Barrett 14/0813 Text Region 15. Tribal and Indigenous Communities
Suggest changing "move" to "some" to avoid over-stating the planing that has actually been occurring We have made this suggested edit.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Line</th>
<th>End Line</th>
<th>Start Page</th>
<th>End Page</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>David</td>
<td>Wojick</td>
<td>141007</td>
<td>11.4</td>
<td>Page 550</td>
<td>22</td>
<td>23</td>
<td>14</td>
<td>15</td>
<td>This is the present text: 11.4 Key Message 2: Climate change adversely affects cultural identities, food security, and the 12 determinants of physical and mental health for Indigenous peoples and communities through 13 disruption of interconnected social, physical, and ecological systems. 14 Comment: This entire message falsely states speculative projections of impacts as established physical facts. These projections appear to be based primarily on the use of questionable computer models.</td>
<td></td>
</tr>
<tr>
<td>Aliosa</td>
<td>Custle</td>
<td>141051</td>
<td>11.4</td>
<td>Page 550</td>
<td>14</td>
<td>15</td>
<td>14</td>
<td>15</td>
<td>This sentence should read “uniquely and disproportionately.” 16 Unique by itself does not adequately point to the disproportionately of climate change impacts on Indigenous peoples as compared to non-Indigenous peoples.</td>
<td></td>
</tr>
<tr>
<td>Allissa</td>
<td>Barrett</td>
<td>140014</td>
<td>11.4</td>
<td>Page 550</td>
<td>6</td>
<td>7</td>
<td>14</td>
<td>15</td>
<td>Here are some studies on Indigenous economic resilience that you might not want to overlook, including 17 Chapin, T., Stuart, H., Michaelen, N. 2020. Climate Change and Conflict: Managing Arctic Change.” Ambio 45 (4): 1886-80011, and 19 Blumstein, David, 2006. “Building Resilience and Adaptation to Manage Arctic Change.” Ambio 45 (4): 1886-80011. 20 These studies were added to note to economic resilience of tribes more generally (not solely focused on Alaska Natives and Villagers). These include articles by Anderson et al. 2016; Shammas et al. 2017; Milner, 2016; and Milner, 2012. 21 Ecolgy economics analyses specific to Indigenous peoples and climate adaptation is limited and the need for this work is highlighted in the Traceable Accounts section.</td>
<td></td>
</tr>
<tr>
<td>Allissa</td>
<td>Barrett</td>
<td>140015</td>
<td>11.4</td>
<td>Page 550</td>
<td>7</td>
<td>7</td>
<td>14</td>
<td>15</td>
<td>This suggests adding an additional study on cultural resilience: Stutte, L. 2014. 15.2b Across three generations of Alaska Natives to explore How Culture Fostered Indigenous Resilience.” Transcultural Psychiatry 51 (1): 73-80022. 23 We have added this study to the list of recommended readings in the Traceable Accounts section.</td>
<td></td>
</tr>
<tr>
<td>Aliosa</td>
<td>Custle</td>
<td>141052</td>
<td>11.4</td>
<td>Page 550</td>
<td>14</td>
<td>15</td>
<td>14</td>
<td>15</td>
<td>This section could benefit from the inclusion of the concept of Traditional Ecological Knowledge (TEK) in order for readers to draw connections to other adaptation options utilizing TEK and identified by that name.</td>
<td></td>
</tr>
<tr>
<td>Allissa</td>
<td>Barrett</td>
<td>140016</td>
<td>11.4</td>
<td>Page 550</td>
<td>6</td>
<td>7</td>
<td>14</td>
<td>15</td>
<td>There are some studies on Indigenous economic resilience that you might not want to overlook, including 17 Chapin, T., Stuart, H., Michaelen, N. 2020. Climate Change and Conflict: Managing Arctic Change.” Ambio 45 (4): 1886-80011, and 19 Blumstein, David, 2006. “Building Resilience and Adaptation to Manage Arctic Change.” Ambio 45 (4): 1886-80011. These studies were added to note to economic resilience of tribes more generally (not solely focused on Alaska Natives and Villagers). These include articles by Anderson et al. 2016; Shammas et al. 2017; Milner, 2016; and Milner, 2012. 21 Ecolgy economics analyses specific to Indigenous peoples and climate adaptation is limited and the need for this work is highlighted in the Traceable Accounts section.</td>
<td></td>
</tr>
<tr>
<td>David</td>
<td>Wojick</td>
<td>141008</td>
<td>11.4</td>
<td>Page 550</td>
<td>7</td>
<td>7</td>
<td>14</td>
<td>15</td>
<td>This is the present text: 11.4 Key Message 2: Climate change adversely affects cultural identities, food security, and the 12 determinants of physical and mental health for Indigenous peoples and communities through 13 disruption of interconnected social, physical, and ecological systems. 14 Comment: This entire message falsely states speculative projections of impacts as established physical facts. These projections appear to be based primarily on the use of questionable computer models.</td>
<td></td>
</tr>
<tr>
<td>Allissa</td>
<td>Custle</td>
<td>141053</td>
<td>11.4</td>
<td>Page 550</td>
<td>6</td>
<td>7</td>
<td>14</td>
<td>15</td>
<td>Removal of the first “impacted” in this sentence will help make the sentence clearer. The sentence also reads as “services will be impacted rather than the aforementioned activities and could benefit from a service after the word ‘services.’” 16 We have made this correction.</td>
<td></td>
</tr>
<tr>
<td>Aliosa</td>
<td>Custle</td>
<td>141054</td>
<td>11.4</td>
<td>Page 550</td>
<td>28</td>
<td>29</td>
<td>14</td>
<td>15</td>
<td>Add “and associated socioeconomic effects” after “Historical trauma” to more fully address the social and economic effects of loss of homeland and traditional ways of life. 17 We have made this suggested edit.</td>
<td></td>
</tr>
<tr>
<td>Aliosa</td>
<td>Custle</td>
<td>141055</td>
<td>11.4</td>
<td>Page 550</td>
<td>1</td>
<td>1</td>
<td>14</td>
<td>15</td>
<td>This paragraph intentionally repeated verbatim from page 5487. 16 We have made this change to increase clarity.</td>
<td></td>
</tr>
<tr>
<td>Aliosa</td>
<td>Custle</td>
<td>141056</td>
<td>11.4</td>
<td>Page 550</td>
<td>7</td>
<td>8</td>
<td>14</td>
<td>15</td>
<td>Include “and non-federally recognized tribes” in this sentence. 16 We have made this correction.</td>
<td></td>
</tr>
<tr>
<td>Aliosa</td>
<td>Custle</td>
<td>141057</td>
<td>11.4</td>
<td>Page 550</td>
<td>20</td>
<td>21</td>
<td>14</td>
<td>15</td>
<td>“The climate impacts on” or “The impacts of climate change on” the sentence as it currently reads addresses climate impacts but is referring to climate change impacts. 16 We have made this suggested edit.</td>
<td></td>
</tr>
<tr>
<td>Aliosa</td>
<td>Custle</td>
<td>141058</td>
<td>11.4</td>
<td>Page 550</td>
<td>19</td>
<td>20</td>
<td>14</td>
<td>15</td>
<td>“The climate impacts on” or “The impacts of climate change on” the sentence as it currently reads addresses climate impacts but is referring to climate change impacts. 16 We have made this correction.</td>
<td></td>
</tr>
<tr>
<td>Aliosa</td>
<td>Custle</td>
<td>141060</td>
<td>11.4</td>
<td>Page 550</td>
<td>7</td>
<td>20</td>
<td>14</td>
<td>15</td>
<td>This work has been edited for clarity and to add additional detail to explain how degraded water quality can affect mental health through impacts on sacred water sources and subsistence practices. 16 After consideration of the suggested citation, the author team has determined that the current references are appropriate and adequate. The suggested study is about Indigenous resilience but not in the context of climate change, so the author team does not have a basis to extrapolate any of its findings to a climate change context.</td>
<td></td>
</tr>
<tr>
<td>Aliosa</td>
<td>Custle</td>
<td>141061</td>
<td>11.4</td>
<td>Page 550</td>
<td>13</td>
<td>17</td>
<td>14</td>
<td>15</td>
<td>This section could benefit from the inclusion of the concept of Traditional Ecological Knowledge (TEK) in order for readers to draw connections to other adaptation options utilizing TEK and identified by that name. 16 We have made this correction.</td>
<td></td>
</tr>
</tbody>
</table>
The sentence reads as if the Indigenous people themselves are limited by size and rural context; add the word "lands" or "homelands" or "reservations" or "territories" after Indigenous peoples to accurately describe what is meant.

We have changed this sentence to incorporate the commenter's perspective by identifying low population and rural contexts of Indigenous communities rather than as a key component to negative scoring.

Given space constraints, the author team did not include the suggested paragraph. A brief descriptor of Indigenous peoples is provided in the state of the sector section, and the authors have added a reference to a new glossary that will house a longer, more comprehensive definition of Indigenous peoples.

We want to reword the chapter title from "Tribal and Indigenous Peoples" to "Indigenous Peoples and Tribal Nations." Reason: When the term Tribal stands alone it can be interpreted to have multiple or even vague meanings. In this context, however, it is meant by the National Congress of American Indians (NCAI) and the United South and Eastern Tribes (USET) Inc., to refer to the 527 as of January 2018, federally recognized sovereign Tribes (variously called tribes, nations, bands, peoples, communities, and Alaska Native villages) that have a "tribal-to-nation relationship" with the U.S. Government. See the NCAI Guide to Tribal Nations and the United States for more information: https://www.ncai.org/resources/ncai/publications/ncai_guide_and_the_united_states_an_introduction

We have changed the title to "Tribes and Indigenous Peoples" to maintain broad, inclusive language for Indigenous peoples of all statuses in the United States. "Tribes" refers to collective, self-governing entities and "Indigenous peoples" includes all other relevant groups and individuals. We acknowledge that "Nations" is a term used by organizations like the National Congress of American Indians (NCAI) and the United South and Eastern Tribes (USET); however, not all federally recognized tribes are members of these organizations and the term "Nations" is not universally inclusive of how all federally recognized tribes wish to be referred to.

Range shifts are discussed in the text supporting Key Message 3 as an example supporting the broader point that Indigenous peoples are affected by climate change. However, the NCAI report actually focuses on the issue that because most of that land is held in trust and managed by the BIA, tribes have limited ability to manage this land. This pertains to forest and rangelands as well. Overall, the chapter should address the importance of managing land and decision-making over off-reservation lands and resources in the context of climate change. This could be addressed in the closing paragraph for Key message 3 (pg. 553 after line 30). Specifically, a statement could be added to discuss the need for government to government consultation for the management of off-reservation natural and cultural resources that are impacted by climate change and threatening the loss of Indigenous knowledge, culture and resources. Citizens to consider on this topic include: Whyte, K. P. 2013. Justice forward: tribes, climate adaptation and resilience. Climatic Change 117:935-105. DOI: 10.1007/s10584-013-0743-2 (ALREADY CITED IN THE CHAPTER)

We have included this citation, related citations, and new text describing how indigenous definitions of health are used to inform policy decisions and promote health outcomes.
**First Name** | **Last Name** | **Comment ID** | **Comment Type** | **Chapter** | **Figure/Table Number** | **Start Page** | **End Page** | **Start Line** | **End Line** | **Comment** |
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
Juanita | Constible | 241908 | Constible Region | 15: Tribal and Indigenous Communities | 548 | 548 | 9 | 9 | Revise the sentence, "Many Indigenous peoples have developed governments, cultures, and economies designed to adapt to seasonal and interannual environmental changes." To: "Indigenous peoples have developed governments, cultures, and economies designed to adapt to seasonal and interannual environmental changes."

Reason: The use of the wording "have developed" implies a recent development of governments, cultures, and economies when in fact Indigenous governments, cultures, and Indigenous economies (e.g. Pacific Northwest adaptations) pre-date the United States and colonial governments. We have made edits based on this suggestion.

Juanita | Constible | 241909 | Constible Region | 15: Tribal and Indigenous Communities | 550 | 550 | 7 | 7 | Revise the sentence, "Many Indigenous peoples have developed governments, cultures, and economies designed to adapt to seasonal and interannual environmental changes."

To: "Many Indigenous peoples have developed governments, cultures, and economies designed to adapt to seasonal and interannual environmental changes."

Reason: The use of the wording "have developed" implies a recent development of governments, cultures, and economies when in fact Indigenous governments, cultures, and Indigenous economies (e.g. Pacific Northwest adaptations) pre-date the United States and colonial governments. We have made edits based on this suggestion.

Nicholas | Rajkovich | 241970 | Constible Region | 15: Tribal and Indigenous Communities | 550 | 550 | 10 | 10 | In the sentence, "The U.S. has a trust responsibility to work with federally recognized tribes on a government-to-government basis." 

To: "The U.S. has a trust responsibility to work with federally recognized tribes on a government-to-government basis."

Reason: It is important to elaborate on what the U.S. has a trust responsibility to tribes and what that trust responsibility entails.

Nicholas | Rajkovich | 241972 | Constible Region | 15: Tribal and Indigenous Communities | 550 | 550 | 10 | 10 | After the sentence, "The U.S. has a trust responsibility to work with federally recognized tribes on a government-to-government basis." 

To: "The U.S. has a trust responsibility to work with federally recognized tribes on a government-to-government basis."

Reason: It is important to elaborate on why the U.S. has a trust responsibility to tribes and what that trust responsibility entails.

Laurio | Constible | 242051 | Whole Chapter | 15: Tribal and Indigenous Communities | 548 | 548 | 3 | 4 | Add "cultural practices" after "indigenous peoples" and before "livelihoods".

This chapter does a good job of explaining the unique impacts of climate change on indigenous communities throughout the United States and its territories. However, is could have included additional examples, specifically highlighting existing efforts of indigenous communities to adapt to and mitigate climate change. Building on this, it could be useful for the chapter to explore in greater detail the difference in access to resources between federally recognized and non-recognized tribes. A prime example of a non-recognized tribe that could cite, with examples of how they are approaching the climate issue, despite lacking federal recognition is the United Houma Nation in Louisiana.

We have made edits based on this suggestion.

Laurio | Constible | 242052 | Whole Chapter | 15: Tribal and Indigenous Communities | 548 | 548 | 26 | 26 | Add "cultural practices" after "indigenous peoples" and before "livelihoods".

While the chapter explores adaptation, it talk to mention mitigation strategies. While this may not be the NCA4's purpose, in the context of indigenous communities, it is essential, particularly because both mitigation and adaptation in indigenous communities relies heavily on traditional ecological knowledge and intergenerational power. Examples of mitigation include: "https://www.govt.org/globalenergy/research/renewable-energy-on-tribal-l..."

We have made edits based on this suggestion.

Laurio | Constible | 242053 | Whole Chapter | 15: Tribal and Indigenous Communities | 548 | 548 | 26 | 26 | Add "cultural practices" after "indigenous peoples" and before "livelihoods".

This chapter treats indigenous communities, to a certain extent, as a monolithic entity. Recommendations Beginning on page 551 with Figure 15.1, or maybe at the very beginning of the chapter, the authors should state clearly that significant variation exists across different geographies and different federal recognition statuses, especially when it comes to climate resilience and mitigation strategies.

We have made edits based on this suggestion.

Laurio | Constible | 242054 | Constible Region | 15: Tribal and Indigenous Communities | 548 | 548 | 3 | 4 | Add "cultural practices" after "indigenous peoples" and before "livelihoods".

After consideration of this point, we have determined that the existing text is appropriate because cultural practices are included throughout this section as they relate directly to economies and livelihoods. Cultural practices are also included in other sections of the chapter.

Laurio | Constible | 242055 | Constible Region | 15: Tribal and Indigenous Communities | 548 | 548 | 16 | 16 | Add "cultural practices" after "indigenous peoples" and before "livelihoods".

Instead of the word "loss of homelands and their traditional ways of life," would use "removal from their homelands and loss of their traditional ways of life." In this context, it is important to recognize colonial history.

The Executive Summary has been heavily edited and no longer contains this specific language. However, historical trauma is still mentioned in the Executive Summary, in reference to the underlying text in Key Message 2 that discusses historical trauma stemming from forced removal from homelands. The lingering effects of colonialism and forced relocation are also discussed in Key Message 3 in the Depensation and Relocation section.

Laurio | Constible | 242056 | Constible Region | 15: Tribal and Indigenous Communities | 550 | 550 | 9 | 9 | Add "cultural practices" after "indigenous peoples" and before "livelihoods".

It would be useful to describe what a "trust responsibility" is. Per Seminole Nation v. United States, 1942, the federal Indian trust responsibility is a legal obligation under which the United States "has charged itself with the care of the land... of the Native Hawaiians, Indigenous peoples from areas beyond the continental U.S. and Alaska are not beneficiaries of the U.S. trust responsibility, and therefore have had to develop other strategies toward self-determination to protect their cultures, ancestral lands, and to provide services to their communities." To: "Indigenous peoples have governments, cultures, and economies designed to adapt to seasonal and interannual environmental changes."

We have made edits based on this suggestion.

Laurio | Constible | 242057 | Whole Page | 15: Tribal and Indigenous Communities | 551 | 551 | 1 | 1 | Focus draft the document to include more detailed examples of how certain tribes are addressing climate change in a way that supports planning, vulnerability assessments, and increasing training capacity. A specific call-out of monitoring and research initiatives (examples of what these look like), as well as capacity building, cultural continuity and youth engagement, would also improve the quick mention of tribal climate initiatives and plans.

The text on the length of the chapter should be cut to five pages. Late Figure 15.1 provides a link to an interactive mapping application to explore actions in more detail (https://biamaps.doi.gov/node/548).

We have made edits based on this suggestion. The State of the Sector section now includes new text on the federal trust responsibility.
This entire paragraph has already been word-for-word used on page 548, lines 18-22. It is suggested that the "range shifts of plant and animal species of cultural significance out of traditional territories." add: programs, collaborations, and funding mechanisms impacts; however, many communities face obstacles to adaptation, including limited capacity to implement rights. significant implications for tribal economies is the capacity of federally recognized tribes to implement water impacts associated with increased temperatures, and delete the sentence beginning on line 7, as well as "for example" in the 8.

We have incorporated this suggested point in the State of the Sector section because it helps to provide larger context for all the Key Messages, not just Key Message 1 that was the focus of this commenter. Additional edits include Message 3: distinguish federally recognized tribes in a completely different context, with little to no support from government agencies which exacerbate their vulnerability and adaptation potential.

We have discussed the act of sharing "traditional knowledge" because we believe this phrase is more appropriate in this context because it refers to knowledge that include, but are broader than, the environmental-based knowledge of TS.

Would include the word "colonial" in between "settler" and "governments" to clarify this sentence. Would rewrite this sentence as "Indigenous peoples have a unique and interconnected relationship with ecological systems." The text has been edited to incorporate this suggestion.

The text has been edited to incorporate this suggestion.

We have made this suggested edit.

Open further examination of this sentence, the authors decided to remove it altogether. The figures same from the 2010 Census but is based on self-identification and included all respondents who identified as indigenous, including federally recognized, state-recognized, and non-recognized tribal groups. To compound the, the "American Indians or Alaskan Native" race and ethnicity category does not include "Native Hawaiians or Other Pacific Islanders" and there is no category for Caribbean Indian peoples. Given this confusion this could cause and the broad term, "Indigenous" authors this chapter, the authors decided that this statement could cause some confusion as to the actual numbers of Indigenous peoples across the U.S. and its territories, and so removed it.

Some confusion as to the actual numbers of Indigenous peoples across the U.S. and its territories, and so cause and the broad term, "Indigenous" used in this chapter, the authors decided that this statement could cause some confusion as to the actual numbers of Indigenous peoples across the U.S. and its territories, and so removed it.

The sentence in question has been edited and we have capitalized Indigenous in the revised sentence.

We have edited this section to include more details on why the capacity to quantify and implement water rights is a barrier to adaptation planning for federally recognized tribes with resource constraints. The authors decided to add a specific example because the experiences are so diverse, one example might provide the reader the false impression that that example is representative when each state has different water laws and restrictions that affect the tribes. Additionally, the authors wanted to focus on adaptations and solutions rather than only impacts and barriers (per peer review comments), and so provided the citation to the appropriate 50 water rights settlements (Cousens and Chaffin, 2016).

The sentence has been edited to incorporate this suggestion.

The word "Limit" was grammatically correct and so the author team has kept the word; however, we have split the sentence into two separate sentences to increase clarity.

We have made this suggested edit.

The text has been edited to incorporate this suggestion.

We have incorporated this suggestion.

We have incorporated this suggestion.

We have incorporated this suggestion.

We have incorporated this suggestion.

We have incorporated this suggestion.

We have incorporated this suggestion.

We have incorporated this suggestion.

We have incorporated this suggestion.
There is a danger of climate change and other natural disasters forcing Indigenous communities to relocate. The language of "managed retreat" is a physical/geographically-focused militarized vision that disregards the social and cultural losses at risk in relocation. Relocation is more than just managing the physical movement of people. It would be useful for each of the three key messages to each tie back into the concept of self-determination.

We appreciate this suggestion, but space is limited and so the author team cannot provide a summary of NCA3's Indigenous peoples' chapter. We have deliberated and agreed on the most relevant information and illustrations to include as a state-of-the-science update for this version of the NCA, and provide the citation to NCA3 if readers would like to see what has been written previously.

We have made edits based on this suggestion.

The authors note that "managed retreat" is a common term used in the scientific literature with regard to climate adaptation, but agree that alternative wording would be appropriate in this context. The short title of the section has not been revised as suggested by the commenter. The placement of the graphics will change in the final formatted version of the report.

We have changed the wording to be more precise, acknowledging both coastal and inland flooding, and floodplain flooding, as contributors to conditions that force Indigenous communities to consider relocation. There are a range of current climate change impact scenarios that are forcing tribes to relocate that aren't specifically related to "coastal" changes. Relocation examples include Isle de Jean Charles, which is located in Louisiana's barrier islands of Southern Louisiana. The island is at risk due to coastal changes as well as erosion of this historically low-lying area. Other tribes in Alaska are considering or planning relocation in response to inland flooding, and permafrost thaw. We added citations that document some of these.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anne</td>
<td>Ferguson-Behrens</td>
<td>14-0809</td>
<td>African American</td>
<td>15</td>
<td>Tribal and Indigenous Communities</td>
<td>548</td>
<td>548</td>
<td>28</td>
<td>28</td>
<td>The Indian Legal Program and the Indian Legal Clinic at the Sandra Day O'Connor College Law hosted a conference titled Cultures Under Water: Climate Impacts on Tribal Cultural Heritage Conference on December 6th &amp; 7th, 2017 Much of this comment is based on either panel discussions or small group discussions from that event. This comment includes three main areas. First, the chapter could be improved by including a discussion on how climate change affects intangible cultural heritage. Second, Key Message 3 could include more details about challenges a Tribal government may face when implementing a resettlement plan. Finally, the Assessment includes a discussion on potential solutions to the myriad of challenges that Tribes experience in accessing federal funding, protecting intangible cultural heritage, and promoting Tribal self-determination; this comment suggests additional solutions. Intangible Cultural Heritage: The discussion on cultural heritage including built environments, monuments, and historical sites, could be improved by including more discussion of intangible cultural heritage. The intangible cultural heritage is just as integral to preserving a people’s way of life as it is their homes and infrastructure. The Assessment references the impact that climate change has on the mental/health of Indigenous Peoples, The Assessment could be improved with a discussion on the importance of intangible cultural heritage for the continued health and welfare of Indigenous Peoples. Intangible cultural heritage as defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO)  Intangible Cultural Heritage, What is Intangible Cultural Heritage?, page 3 (January 31, 2018) The Pocantico Call to Action recognizes that Natives have a right and that the changing climate puts some aspects of cultural heritage at additional risk. Rather costs of addressing climate change impacts on cultural heritage, nor the knowledge we</td>
<td>The authors disagreed with the statement that these enterprises are irrelevant. Because the scope of this chapter is broader than just Alaska. Different subsistence and commercial enterprises are important in different locations. However, “hunting” was added to the list of enterprises throughout Key Message 1. The authors disagreed with the statement that these enterprises are irrelevant. Because the scope of this chapter is broader than just Alaska. Different subsistence and commercial enterprises are important in different locations. However, “hunting” was added to the list of enterprises throughout Key Message 1. The text has been extensively edited in Key Message 2 and we are no longer reference “infrastructure.” The term “infrastructure” does not necessarily indicate these types of resources to the reader. The text has been extensively edited in Key Message 2 and we are no longer reference “infrastructure.” The term “infrastructure” does not necessarily indicate these types of resources to the reader.</td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>14-1008</td>
<td>Test Region</td>
<td>15</td>
<td>Tribal and Indigenous Communities</td>
<td>532</td>
<td>532</td>
<td>12</td>
<td>12</td>
<td>Agriculture, fisheries and forestry enterprises are completely irrelevant in North and Northwestern Alaska. Hunting needs to be added as an activity under threat.</td>
<td>After lengthy deliberation and investigation as we did in consultation with the authors of the Alaska Chapter, we determined that the section pertaining to opportunities and discussion of vessel traffic be omitted from the chapter. This comment thus no longer applies. After lengthy deliberation and investigation as we did in consultation with the authors of the Alaska Chapter, we determined that the section pertaining to opportunities and discussion of vessel traffic be omitted from the chapter. This comment thus no longer applies.</td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>14-1701</td>
<td>Test Region</td>
<td>15</td>
<td>Tribal and Indigenous Communities</td>
<td>533</td>
<td>533</td>
<td>13</td>
<td>13</td>
<td>The main problem with increased vessel traffic is more direct and more certain than possible invasive species. Vessels make noise. The animals which many Alaska Coastal Natives depend on for food security don’t like the noise, so go elsewhere, ofochastic and safe hunting areas.</td>
<td>After lengthy deliberation and investigation as we did in consultation with the authors of the Alaska Chapter, we determined that the section pertaining to opportunities and discussion of vessel traffic be omitted from the chapter. This comment thus no longer applies. After lengthy deliberation and investigation as we did in consultation with the authors of the Alaska Chapter, we determined that the section pertaining to opportunities and discussion of vessel traffic be omitted from the chapter. This comment thus no longer applies.</td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>14-1703</td>
<td>Test Region</td>
<td>15</td>
<td>Tribal and Indigenous Communities</td>
<td>535</td>
<td>535</td>
<td>17</td>
<td>17</td>
<td>The loss of tangible cultural heritage as anthropological sites, cemeteries, and Tribal Cultural Properties happens somewhere, since in a separate problem having its similar effects. The term “infrastructure” does not necessarily indicate these types of resources to the reader.</td>
<td>The text has been extensively edited in Key Message 2 and we are no longer reference “infrastructure.” The term “infrastructure” does not necessarily indicate these types of resources to the reader.</td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>14-1709</td>
<td>Test Region</td>
<td>15</td>
<td>Tribal and Indigenous Communities</td>
<td>535</td>
<td>535</td>
<td>10</td>
<td>10</td>
<td>It’s not clear that tourism jobs fit well with subsistence lifestyle, nor is it clear that it is economic for them to pay a living wage in higher-cost areas like rural Alaska.</td>
<td>After lengthy deliberation and investigation as we did in consultation with the authors of the Alaska Chapter, we determined that the section pertaining to opportunities and discussion of vessel traffic be omitted from the chapter. This comment thus no longer applies. After lengthy deliberation and investigation as we did in consultation with the authors of the Alaska Chapter, we determined that the section pertaining to opportunities and discussion of vessel traffic be omitted from the chapter. This comment thus no longer applies.</td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>14-1375</td>
<td>Figure</td>
<td>15</td>
<td>Tribal and Indigenous Communities</td>
<td>535</td>
<td>535</td>
<td>1</td>
<td>1</td>
<td>This is a duplicate of the figure on page 569.</td>
<td>This is a duplicate of the figure on page 569.</td>
</tr>
<tr>
<td>Patty</td>
<td>Maldonado</td>
<td>14-0862</td>
<td>Test Region</td>
<td>15</td>
<td>Tribal and Indigenous Communities</td>
<td>539</td>
<td>539</td>
<td>8</td>
<td>8</td>
<td>Suggest changing the word non-Indigenous to western in this sentence. After consideration, the author team determined that both the original wording term “non-Indigenous” or “western” unsuitable accurate, but decided that “non-Indigenous” is more in line with the recent literature in the context.</td>
<td>Authors recognize and appreciate the extensive thought and suggestions of this comment. We have added text and a citation (JEESIO 2018) to bring in the specific terminology of “Intangible cultural heritage,” and note that the chapter already contained discussion of these concepts related to passing down or sharing traditional knowledge to sustain place-based cultural identity, which is foundational for Indigenous physical and mental health. Regarding the second component on challenges with respect to resettlement planning and challenges a Tribal government may face when implementing a resettlement plan. Finally, the Assessment includes a discussion on potential solutions to the myriad of challenges that Tribes experience in accessing federal funding, protecting intangible cultural heritage, and promoting Tribal self-determination; this comment suggests additional solutions. Intangible Cultural Heritage: The discussion on cultural heritage including built environments, monuments, and historical sites, could be improved by including more discussion of intangible cultural heritage. The intangible cultural heritage is just as integral to preserving a people’s way of life as it is their homes and infrastructure. The Assessment references the impact that climate change has on the mental/health of Indigenous Peoples, The Assessment could be improved with a discussion on the importance of intangible cultural heritage for the continued health and welfare of Indigenous Peoples. Intangible cultural heritage as defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO)  Intangible Cultural Heritage, What is Intangible Cultural Heritage?, page 3 (January 31, 2018) The Pocantico Call to Action recognizes that Natives have a right and that the changing climate puts some aspects of cultural heritage at additional risk. Rather costs of addressing climate change impacts on cultural heritage, nor the knowledge we</td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Name</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>------------------</td>
<td>------------</td>
<td>---------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td></td>
</tr>
</tbody>
</table>
| Michael   | MacCracken | 144401     | Test Region | 15: Tribal and Indigenous Communities | 149       | 150    | 14       | 15      | I'd suggest changing caption to read, "Many tribal communities\...on their priorities.

We have made some wording changes to the caption to reflect points made in this comment. In making edits, chapter authors worked closely with authors of the Southwest Chapter case study to ensure consistency.

| Michael   | MacCracken | 144402     | Test Region | 15: Tribal and Indigenous Communities | 148       | 149    | 14       | 15      | I'd suggest changing sentence to increase clarity as suggested.

We have edited this sentence to increase clarity as suggested.

| Michael   | MacCracken | 144403     | Test Region | 15: Tribal and Indigenous Communities | 148       | 150    | 14       | 15      | I'd suggest changing "efforts" to "can affect" or "can influence", if now those of others in Alaska or the relocation ongoing in Louisiana, "are already affecting".

The Executive Summary has been heavily edited and no longer contains this exact language from the Public Review Draft. Throughout the chapter, we have included the "can influence" suggested "can compound", "can be recognized by", "can also influence", "can affect", etc. Impacts are discussed in the present tense when appropriate as noted by the comment.

| Michael   | MacCracken | 144404     | Test Region | 15: Tribal and Indigenous Communities | 148       | 150    | 14       | 15      | Nothing.

The Executive Summary has been heavily edited and no longer contains this exact language from the Public Review Draft. However, the text supporting Key Message 3 has been edited to incorporate the commenter's perspective on how historical adaptation strategies associated with being highly mobile are largely no longer available to tribes.

| Michael   | MacCracken | 144405     | Test Region | 15: Tribal and Indigenous Communities | 148       | 150    | 14       | 15      | Nothing.

The Executive Summary has been heavily edited and no longer contains this exact language from the Public Review Draft. However, the text supporting Key Message 3 has been edited to incorporate the commenter's perspective on how historical adaptation strategies associated with being highly mobile are largely no longer available to tribes.

| Michael   | MacCracken | 144406     | Test Region | 15: Tribal and Indigenous Communities | 199       | 200    | 1        | 2       | I don't really get the impression that the types of efforts listed are really "steps to adapt to climate change impacts" -- it seems to me they are more taking steps to learn more about the difficult situation that lies ahead. It thus seems to me that the first sentence is a bit of an overstatement of what the plot shows.

After consideration of this point, we have determined that the existing text is clear and accurate and no changes were made. The author team interprets adaptation more broadly than the commenter to include inclusive information-gathering and planning activities to understand climate vulnerabilities and risks. The chapter already acknowledged that the majority of project types are planning-related including adaptation planning, vulnerability assessments, and attending meetings to increase skills and capacity of tribal staff and engagement.

| Michael   | MacCracken | 144407     | Test Region | 15: Tribal and Indigenous Communities | 350       | 351    | 6        | 7       | Again, the primary strategy through their histories has been to relocate--move to where there are resources, not in the same place and figure out then how to deal with the situation. I'd suggest that the phrase "strategies for adaptation" is rather optimistic.

The text in Key Message 3 has been edited to incorporate the commenter's perspective on how historical adaptation strategies associated with being highly mobile are largely no longer available to tribes (see section entitled "Limited Access to Traditional Territory and Decision-making"). However, the existing text about "strategies for adaptation" that is referenced by the commenter in the State of the Sector section has not been changed because the author team provides in-depth explanation and citations throughout the chapter that support our statement that Indigenous peoples are distinctly suited to develop local strategies for adaptation in areas that honor their cultures, histories, and place-based traditional knowledge.

| Michael   | MacCracken | 144408     | Test Region | 15: Tribal and Indigenous Communities | 350       | 351    | 15       | 16      | I hope there was also a checking of the results of the first national assessment, which was a bottom-up exercise from the tribes that grew out of a Native Peoples/Native Homelands workshop that had representatives of many tribal nations at the table; one has not seen the results, but the work is proceeding; and the second national assessment since. There is a NMAP report that includes results of the workshop and the resulting chapter summary that were part of the National Assessment that came out in 2000. You can download the Native Peoples/Native Homelands workshop report that was part of the Assessment effort (and the report also includes the related chapter from the assessment itself at https://www.globalchange.gov/nca/nca-ch6nat.pdf).

The authors appreciate all the previous work from earlier assessments and resulting products. We are aware of the 2000 NCA and the Native People/Native Homelands workshop and subsequent report; this chapter was developed to build off of and update the assessments that have come before. This chapter focuses on national trends that are broadly applicable and seeks to highlight topics that have not had in-depth coverage in past reports. In the State of the Sector, the text states that NCA4 represents updates to NCA3 and now clarifies that it builds upon previous assessments as well. Also, we have updated the Traceable Accounts to provide more details about the author team's tribal outreach efforts and the "on the ground" input that was received as part of the chapter development process from tribal environmental practitioners working in the climate change field.

The inclusion of many meetings, webinars, and working groups to colloborate Tribal input on the NCA4 process and content from Travel support for tribal representatives to attend and provide input to NCA4 regional engagement workshops held in 2017. Mini-grants for several Tribes to host community meetings to discuss climate change impacts was also provided. The feedback and reports from these activities was used to ensure that the key messages and supporting text included the most-prominent topics and themes that emerged from the engagement.
The chapter team notes that the text was developed collaboratively and with consensus of all contributing authors, and has added more background description of our chapter development process to the Traceable Accounts section to clarify the process for readers. The BIA is the administrative lead for the chapter because the National Climate Assessment is a federal report mandated by Congress. The author team disagrees that there was not significant outreach or opportunities for input from Indigenous peoples themselves. Throughout 2016-2018, the Chapter Authors worked with tribal partners to identify and develop content for this chapter. In particular, the BIA worked with the College of Menominee Nation and Sahä Kōłłëtäl delegate to develop and execute an outreach plan for the Chapter. This included awarding mini-grants for community meetings in the fall of 2016, attending and presenting at tribally-focused meetings such as Native American Fish and Wildlife Society, National Adaptation Forum (2017), Rising Voices 2016 and 2017, and the BIA Providers Conference in Alaska (November 2017), among many others. Additionally, through these tribal partners, BIA provided travel scholarships to Regional Engagement Workshops (28 requested and provided early 2017) for interested tribal partners to attend and comment on regional climate concerns and issues. The chapter team also published USGCRP's formal requests for public comment and participated in webinars hosted by USGCRP for the purpose of soliciting input from Indigenous peoples. The authors also held or participated in conference calls with regional organizations such as the Northwest Tribal Climate Network. The formal open calls for public comment were published through multiple channels including multiple webinars, website notices on the BIA Tribal Resilience page, and email notices through BIA, EPA, universities, and partner email lists. In addition, BIA solicited comments on completeness of the interactive map in Figure 15.1 from multiple tribal partners. Regarding text about Indigenous peoples of Alaska and the island nations, the author team disagrees that the chapter does not address this. Key Message 2 discussed subsistence and commercial activities in Alaska and Key Message 3 provided an Indigenous knowledge example from Alaska and discussed community-led relocation in Alaska (see cross-references to information from the Pacific islands and the Caribbean regions have been included, and an example from the Marshall Islands has been added to Key Message 2). The author team has made edits throughout the chapter to further clarify and expand on these discussions where possible given space constraints and support of the peer-reviewed literature.

We have added a link to address this issue and cited Martinez 2018.

We have added a link to address this issue and cited Martinez 2018.

We have added new text to multiple sections of the chapter that further explains key differences between federally recognized and non-federally recognized tribes, including those related to federal trust responsibility and authority/access to traditional territory and resources.

We have added a link to address this issue and cited Martinez 2018.

We have added a link to address this issue and cited Martinez 2018.

We have added new text in multiple sections of the chapter that further explains key differences between federally recognized and non-federally recognized tribes, including those related to federal trust responsibility and authority/access to traditional territory and resources.

We have added new text in multiple sections of the chapter that further explains key differences between federally recognized and non-federally recognized tribes, including those related to federal trust responsibility and authority/access to traditional territory and resources.

We have added new text in multiple sections of the chapter that further explains key differences between federally recognized and non-federally recognized tribes, including those related to federal trust responsibility and authority/access to traditional territory and resources.

We have added a link to address this issue and cited Martinez 2018.

We have added new text in multiple sections of the chapter that further explains key differences between federally recognized and non-federally recognized tribes, including those related to federal trust responsibility and authority/access to traditional territory and resources.

We have added new text in multiple sections of the chapter that further explains key differences between federally recognized and non-federally recognized tribes, including those related to federal trust responsibility and authority/access to traditional territory and resources.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert</td>
<td>Kopp</td>
<td>141178</td>
<td>Test Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>581</td>
<td>584</td>
<td>15</td>
<td>20</td>
<td>This section states that &quot;is not possible to draw conclusions on the role of climate&quot; as far as the conflict in Syria is concerned since there are no main talking points of this chapter.</td>
<td>In response to this comment, the authors changed the sentence as follows: &quot;The importance of climate change to current and future national security is not possible to draw conclusions on the role of climate.&quot; The portion of the conclusion that pertains to the past is based on empirical information. The portion that relates to the future is based on combination of empirical relationships and climate model projections. This commenter disagrees with scientific consensus about the reliability of climate models (see, e.g., the Climate Science Special Report for a description of the current state of knowledge regarding climate models).</td>
</tr>
<tr>
<td>Robert</td>
<td>Kopp</td>
<td>141179</td>
<td>Test Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>581</td>
<td>584</td>
<td>15</td>
<td>20</td>
<td>This literature does exist and it is peculiar that it is not mentioned here.</td>
<td>The absence of a discussion of the (controversial) literature on climate and the Syrian conflict is notable here. The article has been considered, found relevant, and recent; therefore, it has been included as a cite.</td>
</tr>
<tr>
<td>Robert</td>
<td>Kopp</td>
<td>141482</td>
<td>Test Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>581</td>
<td>584</td>
<td>15</td>
<td>20</td>
<td>Good use of examples here. A citation or reference to a more detailed list would be helpful too.</td>
<td>We have added a reference to the TOE as follows, which includes a listing of hundreds of corporate partners as of February 2018: &quot;The Financial Stability Board Task Force on Climate-related Financial Disclosures (TCFD) has encouraged businesses to report risks associated with climate change, with hundreds of businesses currently listed as partners.&quot;</td>
</tr>
<tr>
<td>Robert</td>
<td>Kopp</td>
<td>141200</td>
<td>Test Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>581</td>
<td>584</td>
<td>15</td>
<td>20</td>
<td>The absence of a discussion of the (controversial) literature on climate and the Syrian conflict is notable here. The portion of the conclusion that pertains to the past is based on empirical information. The portion that relates to the future is based on combination of empirical relationships and climate model projections. This commenter disagrees with scientific consensus about the reliability of climate models (see, e.g., the Climate Science Special Report for a description of the current state of knowledge regarding climate models).</td>
<td>The absence of a discussion of the (controversial) literature on climate and the Syrian conflict is notable here. The portion of the conclusion that pertains to the past is based on empirical information. The portion that relates to the future is based on combination of empirical relationships and climate model projections. This commenter disagrees with scientific consensus about the reliability of climate models (see, e.g., the Climate Science Special Report for a description of the current state of knowledge regarding climate models).</td>
</tr>
</tbody>
</table>

The table above contains responses to comments from reviewers on a manuscript addressing the impacts of climate change on national security. The comments address various aspects, including the role of climate in conflict, the reliability of climate models, and the inclusion of relevant literature. The authors have responded to these comments, providing clarifications and further references where necessary, to ensure a comprehensive and scientifically grounded discussion.
We are considering drafting a summary statement for the chapter.
This is the only figure in the chapter and I'm afraid it's a little lacking. I realize the icons in the map are examples, but they are oddly sparse. If you were only providing one example for each type, that would make more sense. But, for instance, there are two examples of instability (I'm guessing from the symbols this has something to do with climate risk) that are just coffee and cocoa supply issues. I think this section needs to more explicitly state that 1) the U.S. has people outside of the US and that fact is important to own, without telling us up to what it is also human Americans.

The authors agree that the figure is lacking, for reasons the reviewer identified and for other reasons. The original figure has been removed from the chapter, as it does not reflect accurately the complexity of topics addressed in this chapter.

We added a sentence clarifying that the focus on the implications of climate for U.S. interests is not meant to minimize the importance of impacts of climate change outside the country. We cite Americans’ international volunteering and contributions to international charities as evidence.

We have revised the language to briefly reflect the commenter’s issues.

We have reviewed the language to briefly reflect the commenter’s issues.

We appreciate the suggestion, but space is limited. The author team has deliberated and agreed on the most important information and illustrations relevant for this section.

The second sentence has been edited to remove the word “are” and has been reworded for clarification.

The review's first recommendation has been implemented as follows: “For example, the price of agricultural and mining commodities and manufactured goods can be affected by year-to-year variations in the availability of irrigation water for agriculture or hydropower power (von Braun and Tedesse 2012; Ubilava 2016). Regarding the reviewer’s second comment about the directionality of price changes, there is not a clear directionality, as illustrated in the newly added data from 2013 wheat prices.”

We added a reference that describes the efficacy of one aspect of Cocoa-Cola’s investments. For example, the price of agricultural and mining commodities and manufactured goods can be affected by year-to-year variations in the availability of irrigation water for agriculture or hydropower power (von Braun and Tedesse 2012; Ubilava 2016). Regarding the reviewer’s second comment about the directionality of price changes, there is not a clear directionality, as illustrated in the newly added data from 2013 wheat prices.

The reviewer’s first recommendation has been implemented as follows: “For example, the price of agricultural and mining commodities and manufactured goods can be affected by year-to-year variations in the availability of irrigation water for agriculture or hydropower power (von Braun and Tedesse 2012; Ubilava 2016).”

We have added a sentence that describes the efficacy of one aspect of Cocoa-Cola’s investments. For example, the price of agricultural and mining commodities and manufactured goods can be affected by year-to-year variations in the availability of irrigation water for agriculture or hydropower power (von Braun and Tedesse 2012; Ubilava 2016). Regarding the reviewer's second comment about the directionality of price changes, there is not a clear directionality, as illustrated in the newly added data from 2013 wheat prices.

We added a sentence that describes the efficacy of one aspect of Cocoa-Cola’s investments. For example, the price of agricultural and mining commodities and manufactured goods can be affected by year-to-year variations in the availability of irrigation water for agriculture or hydropower power (von Braun and Tedesse 2012; Ubilava 2016). Regarding the reviewer's second comment about the directionality of price changes, there is not a clear directionality, as illustrated in the newly added data from 2013 wheat prices.

We have revised the language to briefly reflect the commenter’s issues.

The review's first recommendation has been implemented as follows: “For example, the price of agricultural and mining commodities and manufactured goods can be affected by year-to-year variations in the availability of irrigation water for agriculture or hydropower power (von Braun and Tedesse 2012; Ubilava 2016).”

We added a sentence that describes the efficacy of one aspect of Cocoa-Cola’s investments. For example, the price of agricultural and mining commodities and manufactured goods can be affected by year-to-year variations in the availability of irrigation water for agriculture or hydropower power (von Braun and Tedesse 2012; Ubilava 2016). Regarding the reviewer’s second comment about the directionality of price changes, there is not a clear directionality, as illustrated in the newly added data from 2013 wheat prices.

We have revised the language to briefly reflect the commenter’s issues.

We added a sentence that describes the efficacy of one aspect of Cocoa-Cola’s investments. For example, the price of agricultural and mining commodities and manufactured goods can be affected by year-to-year variations in the availability of irrigation water for agriculture or hydropower power (von Braun and Tedesse 2012; Ubilava 2016). Regarding the reviewer’s second comment about the directionality of price changes, there is not a clear directionality, as illustrated in the newly added data from 2013 wheat prices.

We added a sentence that describes the efficacy of one aspect of Cocoa-Cola’s investments. For example, the price of agricultural and mining commodities and manufactured goods can be affected by year-to-year variations in the availability of irrigation water for agriculture or hydropower power (von Braun and Tedesse 2012; Ubilava 2016). Regarding the reviewer’s second comment about the directionality of price changes, there is not a clear directionality, as illustrated in the newly added data from 2013 wheat prices.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142337</td>
<td>Text Region</td>
<td>18</td>
<td>Climate Effects on U.S. International Interests</td>
<td>582</td>
<td>582</td>
<td>16</td>
<td>16</td>
<td>Suggest editing sentence to read: “These sectors, and these US investments in them, are sensitive...” Also consider adding sanitation to your list in the previous sentence and providing a citation. Comment accepted.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142338</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>583</td>
<td>583</td>
<td>2</td>
<td>4</td>
<td>Suggest deleting the entire last sentence. It is too much promotion of Obama era programs, sounds too advocacy-like, and does not impart much information to the reader. The statement has been revised, but we think it is appropriate to use U.S. policy as evidence of the interests of the U.S.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142339</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>583</td>
<td>585</td>
<td>5</td>
<td>8</td>
<td>This sentence needs a citation. The two succeeding sentences elaborate and provide citations.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142340</td>
<td>Text Region</td>
<td>18</td>
<td>Climate Effects on U.S. International Interests</td>
<td>583</td>
<td>584</td>
<td>16</td>
<td>18</td>
<td>These stats are very confusing. Why would impacts to farmers that self identify as higher? Wouldn't these self identify climate risks as a major concern use the drought forecasts (and therefore see their losses cut in half as implied by the next sentence?)?</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142341</td>
<td>Text Region</td>
<td>18</td>
<td>Climate Effects on U.S. International Interests</td>
<td>583</td>
<td>585</td>
<td>13</td>
<td>15</td>
<td>Can you please show how this is helpful to the U.S.? The larger point being made elsewhere in the section (and chapter) is that helping countries manage climate risks can help to reduce costs of humanitarian assistance and the likelihood of regional insecurity, create stability, etc. and advance US interests.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142342</td>
<td>Text Region</td>
<td>18</td>
<td>Climate Effects on U.S. International Interests</td>
<td>583</td>
<td>585</td>
<td>14</td>
<td>26</td>
<td>This paragraph is not very helpful. First, lines 10-22 are repetitive to the lines on page 582 line 36-38. Second, there are too many programs listed, making it hard to follow and smack of self-congratulatory promotion of federal government programs. Nice, the example is very old(1998). And finally, there is no way for readers to know whether the dollar amounts in this paragraph are a list or a little-no context is provided. $190 million doesn’t sound like very much to me, especially given how expensive recent extreme events in the US were. While the following paragraph is an even older example (here there will be readers of this who weren’t even born then), the paragraph is better written and provides more context to the aid amounts. The reference to 1898 was a historical reference to the creation of FEWS Net; the example itself was from 2015-16. We have removed the dollar amounts.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142343</td>
<td>Text Region</td>
<td>18</td>
<td>Climate Effects on U.S. International Interests</td>
<td>583</td>
<td>585</td>
<td>13</td>
<td>15</td>
<td>Don’t think this is the right context: there was an early warning system? So should “As drought and a food crisis materialized…” be changed to “Even before the drought and subsequent food crisis materialized…?” We have made an edit to clarify.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142344</td>
<td>Text Region</td>
<td>18</td>
<td>Climate Effects on U.S. International Interests</td>
<td>584</td>
<td>584</td>
<td>10</td>
<td>12</td>
<td>Suggest including information on military personnel here. Also the use of the word “affecting” is rather tepid. Can you provide a direction or magnitude for this statement, such as “exacerbating” or “increasing threats of”, etc. After consideration of this point, we still feel the existing text is clear and accurate. The focus of the KM3 discussion is risk to assets in the form of fixed, physical infrastructure. People are DoD assets which are not fixed and are impacted by health effects which are addressed elsewhere in Box 16.1.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142345</td>
<td>Text Region</td>
<td>18</td>
<td>Climate Effects on U.S. International Interests</td>
<td>584</td>
<td>584</td>
<td>12</td>
<td>14</td>
<td>Could include mention of impacts that occur after the events, such as mold leading to health issues, clean up concerns or conflict, disease, violence, etc. We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most important information and illustrations relevant for this section. We have made the citation clearer.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142346</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>584</td>
<td>584</td>
<td>22</td>
<td>23</td>
<td>A risk-based examination of climate risks? You don’t say. This comment does not seem to raise any question or suggest any revision.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142347</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>584</td>
<td>584</td>
<td>24</td>
<td>27</td>
<td>This language is very jargon-filled and academic. Suggest revising with audience in mind. After consideration of this point, we still feel the existing text is clear and accurate.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142348</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>584</td>
<td>584</td>
<td>24</td>
<td>27</td>
<td>In other words, where there is the least ability to prepare for/ adapt to climate change. This comment does not seem to raise any question or suggest any revision.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142349</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>584</td>
<td>584</td>
<td>12</td>
<td>18</td>
<td>Have climate attribution analyses been conducted on these events? Can you say whether these were definitively climate-induced or related? If so, that would strengthen the argument. This is a good point. As intended, we believe that the existing text indicates the partial attribution of the unrest to the climate events. We have made the citation clearer. This is a good point. As intended, we believe that the existing text indicates the partial attribution of the unrest to the climate events. We have made the citation clearer.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142350</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>584</td>
<td>584</td>
<td>16</td>
<td>18</td>
<td>Clusters needed. Also provide the year that the Egyptian revolution took place. This won’t be common knowledge to NCA readers. This is a good point. As intended, we believe that the existing text indicates the partial attribution of the unrest to the climate events. We have made the citation clearer.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142351</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>584</td>
<td>584</td>
<td>18</td>
<td>19</td>
<td>Can you be more specific than “some”? E.g. men? Boys? Farmers? This is a good point. As intended, we believe that the existing text indicates the partial attribution of the unrest to the climate events. We have made the citation clearer.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142352</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>585</td>
<td>585</td>
<td>1</td>
<td>5</td>
<td>Suggest moving this sentence to the third paragraph of NCA.3 (p 584 lines 24-31) We appreciate and thank the reviewer and respect their comment; however, the author team has deliberated and the chapter has not been restructured in this way. We have added a citation in our chapter summary.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142353</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>585</td>
<td>585</td>
<td>11</td>
<td>13</td>
<td>Please provide citation for attribution study We have added a citation in our chapter summary.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142354</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>585</td>
<td>585</td>
<td>14</td>
<td>17</td>
<td>Really? I find this surprising. Isn’t there ample evidence of this? The assessment of the evidence is still uncertain and contradictory, we have included several additional references to accurately capture the ongoing debate.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142355</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>585</td>
<td>585</td>
<td>15</td>
<td>20</td>
<td>Authors could mention the marine species indicator here, or even use the NOAA/EPA figure: <a href="https://www.epa.gov/marine-education/climate-change-indicators-marine">https://www.epa.gov/marine-education/climate-change-indicators-marine</a>... We have decided not to include reference to the NOAA/EPA marine species indicator reference as it does not address the specific point being made in this chapter. Chapter 9 in Osborn covers this topic more thoroughly</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142356</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>586</td>
<td>586</td>
<td>3</td>
<td>5</td>
<td>Use the USGCRF 2016 climate and health assessment here, which has an entire box on climate related health impacts to DoD personnel etc. Agree. The citation was added.</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142357</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>586</td>
<td>586</td>
<td>23</td>
<td>23</td>
<td>Suggest deleting mention of the 2012 Climate 220 agreement; no one will know what this is or why it is important and it just comes off sounding like promotion of government programs. The mention of the 2012 Climate 220 agreement has been removed</td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142358</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>586</td>
<td>586</td>
<td>17</td>
<td>18</td>
<td>The test lists examples of private foundations, but does not list examples of NGOs or academic institutions. Why? Suggest deleting examples, or providing examples for all of the categories, as this could be seen as federal government endorsement. The examples have been removed</td>
</tr>
</tbody>
</table>
Climate Effects on U.S. International Interests

This is a great list, but strongly recommend that the examples are dropped from all these bullets. In most cases the examples are captured by the citations provided. For example, in the fourth bullet you list WCRP and Future Earth, and then just provide WCRP and Future Earth. Just keep the citations and cut back on the text.

We agree that the examples provided in the bullets are unnecessary, and we will delete them in order to tighten up the text.

We have revised the discussion on economic impacts of climate change and included more references.

We are adding some citations, and have edited the sentence about who is implementing the projects.

We have added the following to support the likelihood statement: “The portion of the main message pertaining to the past is very likely since these effects are already being seen. The portion of the main message pertaining to the future is also very likely due to the likelihood of future climate change (see Climate Science Special Report) and persistence of the vulnerability of the U.S. economy and trade to climate conditions.”

This paragraph has been modified as follows: “Major U.S. firms are concerned about potential climate change impacts and are implementing “green” strategies in their business practice, e.g. Pease et al., 2015; Pearson and Maher 2015; and illustrative examples of U.S. firms describing climate risks to U.S. companies operating abroad. Examples include the 2011 food price spike (Krugel et al., 2011; Yotopoulos 2012) and the 2011 Bangkok flooding and corresponding impacts to transportation supply chains (Jose and Toffel 2011; Abe and Fr 2013; Puppe 2011). Future changes in precipitation, temperature, and sea level (among other factors) are very likely, as described in the CSSR (2017), and are very likely to exacerbate impacts on the U.S. economy and trade, relative to past impacts. It is very surprising to read that there is high confidence in this key finding after the exhaustive text on major climate drivers and their impacts. Whether this point is even relevant to this key message.

The first sentence does not reflect the EPA CIRA report (a technical input to this report) or the Risky Business literature on this subject? Line 22: What about government/local projects? Wouldn’t these be publicized? Lines 25-26: I’m a bit lost on the first statement: “The current evidence is broad and deep. The literature on this evidence. But more description would be better.

For example, what do you mean by “broad and deep” on lines 15-16? That is a bit of a throw-away phrase. The world war II helps explain how long we’ve known about this evidence. But more description would be better.

This section needs to be a DESCRIPTION of the evidence base. It is inappropriate to say “see references” on line 15; it suggests that the statements should be deleted. The section does not seem to relate to the key message. Perhaps each of these three statements need their own likelihood and evidence, but where is this evidence? Please provide citations in the description of evidence base section. I’m a bit confused why evidence of measure to reduce climate risks in the last sentence is listed here, as it does not seem to relate to the key message. Perhaps each of these three statements need their own likelihood and confidence rankings. Suggest revisiting traceable accounts guidance.

We have added the following to support the likelihood statement: “The portion of the main message pertaining to the past is very likely since these effects are already being seen. The portion of the main message pertaining to the future is also very likely due to the likelihood of future climate change (see Climate Science Special Report) and persistence of the vulnerability of the U.S. economy and trade to climate conditions.”

We added to the traceable accounts a description of the process that includes an explanation of why the chapter was structured as it is.

This chapter was very well written, but the traceable accounts needs some more work. First, the chapter is missing the introductory TA paragraphs that explain how the author team was selected, how key messages were developed, and how the scope of the chapter was determined (be it, what is out, what is found elsewhere in the report and therefore not here, etc.) See other chapters for examples.

We added the following to support the likelihood statement: “The portion of the main message pertaining to the past is very likely since these effects are already being seen. The portion of the main message pertaining to the future is also very likely due to the likelihood of future climate change (see Climate Science Special Report) and persistence of the vulnerability of the U.S. economy and trade to climate conditions.”

This section needs to be a DESCRIPTION of the evidence base. It is inappropriate to say “see references” on line 15; it suggests that the statements should be deleted. The section does not seem to relate to the key message. Perhaps each of these three statements need their own likelihood and evidence, but where is this evidence? Please provide citations in the description of evidence base section. I’m a bit confused why evidence of measure to reduce climate risks in the last sentence is listed here, as it does not seem to relate to the key message. Perhaps each of these three statements need their own likelihood and confidence rankings. Suggest revisiting traceable accounts guidance.

We have added the following to support the likelihood statement: “The portion of the main message pertaining to the past is very likely since these effects are already being seen. The portion of the main message pertaining to the future is also very likely due to the likelihood of future climate change (see Climate Science Special Report) and persistence of the vulnerability of the U.S. economy and trade to climate conditions.”

We have added the following to support the likelihood statement: “The portion of the main message pertaining to the past is very likely since these effects are already being seen. The portion of the main message pertaining to the future is also very likely due to the likelihood of future climate change (see Climate Science Special Report) and persistence of the vulnerability of the U.S. economy and trade to climate conditions.”

We have added the following to support the likelihood statement: “The portion of the main message pertaining to the past is very likely since these effects are already being seen. The portion of the main message pertaining to the future is also very likely due to the likelihood of future climate change (see Climate Science Special Report) and persistence of the vulnerability of the U.S. economy and trade to climate conditions.”

This is a great list, but strongly recommend that the examples are dropped from all these bullets. In most cases the examples are captured by the citations provided. For example, in the fourth bullet you list WCRP and Future Earth, and then just provide WCRP and Future Earth. Just keep the citations and cut back on the text.

We agree that the examples provided in the bullets are unnecessary, and we will delete them in order to tighten up the text.

We have revised the discussion on economic impacts of climate change and included more references.

We are adding some citations, and have edited the sentence about who is implementing the projects.

We have added the following to support the likelihood statement: “The portion of the main message pertaining to the past is very likely since these effects are already being seen. The portion of the main message pertaining to the future is also very likely due to the likelihood of future climate change (see Climate Science Special Report) and persistence of the vulnerability of the U.S. economy and trade to climate conditions.”

We have made some edits to properly characterize the evidence.

We have made some edits to properly characterize the evidence.

We are adding some citations, and have edited the sentence about when implementing the projects.

We have revised the discussion on economic impacts of climate change and included more references.

We have made some edits to properly characterize the evidence.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juanita</td>
<td>McFeely</td>
<td>142372</td>
<td>Traceable Account</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>592</td>
<td>592</td>
<td>27</td>
<td></td>
<td>This is very well written, but also very long. Move the text on lines 20-27 to the confidence/Unlikelihood section. The sections identified have been rearranged to incorporate your suggestion.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142373</td>
<td>Traceable Account</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>592</td>
<td>592</td>
<td>4</td>
<td>27</td>
<td>This text has been revised to make the confidence statements more consistent and clearer. Check all key messages for consistency.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142374</td>
<td>Traceable Account</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>592</td>
<td>592</td>
<td>29</td>
<td>6</td>
<td>Delete entire section. It is not needed or appropriate here and makes the TA way too long. After consideration of this point, we still feel the existing text is appropriate for describing the complex subject. While it is lengthy, the three sentences demonstrate a need to briefly response to this comment.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142375</td>
<td>Traceable Account</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>593</td>
<td>593</td>
<td>6</td>
<td></td>
<td>Delete “conflicts driven by many factors” That is covered in the text and does not need to be explained here. Just keep to the uncertainties.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142376</td>
<td>Traceable Account</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>593</td>
<td>593</td>
<td>9</td>
<td></td>
<td>Suggest “direct causality” and consider using the phrase “attribution and detection” if appropriate.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142377</td>
<td>Traceable Account</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>593</td>
<td>593</td>
<td>14</td>
<td>25</td>
<td>Delete lines 16-17; delete the “Therefore,” on line 17 and “Furthermore” on line 18; delete “these studies examine a” on line 20 and replace with “the”; delete “and” at the beginning of line 21; completely delete the paragraphs from lines 22-25. Especially near the end of this section, you don’t need to be putting the entire list of climate uncertainties in this traceable account-those are covered in the CSSR. Delete “Similarly” from the beginning of line 16. After consideration of this point, we have revised the text along the lines of the suggestion of “direct causality.” After deliberation, we do not find the “attribution and detection” are appropriate to add this sentence.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142378</td>
<td>Traceable Account</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>594</td>
<td>594</td>
<td>4</td>
<td></td>
<td>This section needs editing to be consistent with the confidence and confidence statements. Delete lines 15-15 as they are not appropriate here. Reutilize text on page 592 lines 20-27.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142380</td>
<td>Traceable Account</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>594</td>
<td>594</td>
<td>23</td>
<td>36</td>
<td>Don’t list, DESCRIBE the evidence. Much of this repeats the chapter or topic description. Delete “The citations provided in the traceable account document that” and then provide those citations here (lines 26-27). Provide citations at the end of line 23. Delete the sentence on line 29-30. Delete the text from lines 30-36, which only repeats the chapter. Provide descriptions of the evidence–is there a lot of data, is it solid now, emerging or established, consistent consensus or controversial?</td>
<td>Where deemed appropriate, the text has been revised to incorporate this perspective.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142381</td>
<td>Traceable Account</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>595</td>
<td>595</td>
<td>2</td>
<td>9</td>
<td>Rewrite this section. Delete the first sentence. Move line 2-7 to the previous section. Check the cond/Brightness and Unlikeness.</td>
<td>The sections identified have been rearranged to incorporate your suggestion. The section has been rewritten for clarity and consistency.</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>142382</td>
<td>Traceable Account</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>595</td>
<td>595</td>
<td>14</td>
<td>15</td>
<td>This text has put expert understanding and past negotiations serves more suited to the description of evidence section.</td>
<td>The text has been revised to incorporate this perspective.</td>
</tr>
<tr>
<td>David</td>
<td>Peterson</td>
<td>142396</td>
<td>Footnote</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>582</td>
<td>582</td>
<td>80</td>
<td></td>
<td>This chapter provides a unique view of the U.S. leadership in humanitarian aid especially in response to the climate extremes and climate adaptation. The section that interests me most is the key Message 2 (U.S. International Development and Humanitarian Assistance$) It is very encouraging to see the collaboration between the U.S. and foreign countries (no matter if they are private or local) to find solutions to mitigate potential disaster that could save thousands of lives and properties. Based on this, I suggest adding a chart that shows the amount of the U.S. expenditure on humanitarian aid over the decades to compare with U.S. future projected humanitarian aid due to climate extremes and climate change without the mitigation and 2) future projected humanitarian aid but with mitigation in place in order to emphasize the significance of having climate mitigation planning.</td>
<td>The suggestion is not feasible for this chapter given its length. We are not familiar with such estimates being published.</td>
</tr>
<tr>
<td>Aurors</td>
<td>Constable</td>
<td>142466</td>
<td>Whole Page</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>582</td>
<td>582</td>
<td>18</td>
<td></td>
<td>Key Message 2 does a great job discussing U.S. programs to build climate-resilience abroad and prevent the need for increases to international humanitarian aid due to climate change. The section would benefit from a clearer description of the issue itself. It would be useful to quantify the potential impact and link the regions where these programs are implemented.</td>
<td>We point to the documentation of expected impacts or likely humanitarian hotspots elsewhere (e.g., IPCC) but do not have space to restate them. We are not able to quantify impact here.</td>
</tr>
<tr>
<td>Aurors</td>
<td>Constable</td>
<td>142467</td>
<td>Footnote</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>584</td>
<td>584</td>
<td>18</td>
<td>23</td>
<td>The section would benefit from quantification of the impacts on Department of Defense assets, perhaps through the value of the assets that are located in high-risk areas, or the projected economic impact in the recent risk analysis.</td>
<td>We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most important information is provided. For those readers with an interest, a reference is provided which possesses specific information on value and risk.</td>
</tr>
<tr>
<td>Aurors</td>
<td>Constable</td>
<td>142468</td>
<td>Footnote</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>585</td>
<td>585</td>
<td>9</td>
<td>17</td>
<td>This paragraph explores the impact of climate change on migration. The section would benefit from consideration of the potential impact of climate change on immigration to the U.S.</td>
<td>Due to the size of the topic, and the page limit for the chapter, we focused on broad trends rather than delve deeply or providing such a level of specificity.</td>
</tr>
<tr>
<td>Aurors</td>
<td>Constable</td>
<td>142469</td>
<td>Footnote</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>593</td>
<td>593</td>
<td>31</td>
<td>35</td>
<td>This section explains that increases in extreme weather and climate events are increasingly attributable to climate change, but &quot;attribution uncertainty&quot;. It would be useful to provide more detail on the uncertainty of attribution and to quantify the confidence which the literature links events to climate change.</td>
<td>We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most important information to include.</td>
</tr>
<tr>
<td>Aurors</td>
<td>Constable</td>
<td>142470</td>
<td>Footnote</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>594</td>
<td>594</td>
<td>19</td>
<td>21</td>
<td>The statement “Many multistakeholder frameworks that manage shared resources are increasingly incorporating climate risk in their transboundary decision-making processes” is listed in High Confidence. The following paragraph provides evidence for this statement that appears to give it Very High Confidence. This statement would benefit from a description of the uncertainties here.</td>
<td>Thank you for your comment, but in keeping with the standards required of our statements of confidence, we have kept them as “high confidence.” Remaining consistent with the format of other sections in this chapter, we have included a description of the uncertainties in the traceable accounts section. See pg 595, line 2-9.</td>
</tr>
<tr>
<td>HRCS</td>
<td>McFiey</td>
<td>142484</td>
<td>Footnote</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td></td>
<td>584</td>
<td>584</td>
<td>3</td>
<td>8</td>
<td>The section on climate and natural security never mentions that the Dept. of Defense and the U.S. military considers climate change to be a threat multiplier. It is important to use this term somewhere in this section of text and maybe in other places of the chapter to speak the same language as the national security sector.</td>
<td>The authors request and appreciate the comment, we feel that use of the term “threat multiplier” is not helpful for the discussion. The chapter lays out the actions that DoD has taken regarding climate change as its impact to DoD in clear language. Notwithstanding, that for a time the term was used in the context of climate change and the military, the term “threat multiplier” is an indefinite word or phrase derived from a military term of art whose meaning in this context would be unclear and not sufficiently specific.</td>
</tr>
</tbody>
</table>
I think it might be useful to also make the point that this is occurring in addition to climate variability and change might be appropriate. It is for this latter reason that I think the rephrasing in the first sentence It seems to me it might be useful to rephrase here to also, even primarily, be indicating that it is in the self-interest of the United States (Vocke, 2012).”

We appreciate this very good suggestion, but with limited space, we are only able to provide a couple of examples to support this key message, which you will find in the Transboundary section, beginning on pg. 585.

We have rephrased this and it reflects current USG positions and policies.

We have attempted to address these issues as best we can with the limited space available.

We appreciate this very good suggestion, but with limited space, we are only able to provide a couple of examples to support this key message, which you will find in the Transboundary section, beginning on pg. 585.

We have attempted to address these issues as best we can with the limited space available.

We appreciate the reviewer raising a concern about discussion on climate variability. After further consideration We have rephrased this and it reflects current USG positions and policies.

We have attempted to address these issues as best we can with the limited space available.

We have attempted to address these issues as best we can with the limited space available.

We have attempted to address these issues as best we can with the limited space available.

We have attempted to address these issues as best we can with the limited space available.

We have attempted to address these issues as best we can with the limited space available.

We have attempted to address these issues as best we can with the limited space available.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Name</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144413</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>178</td>
<td>179</td>
<td>15</td>
<td>17</td>
<td>逶来 “can exacerbate” is an indication it is possible, whereas this is already happening - in the Middle East, the melting back of the Arctic, shifts in fisheries, and so on. Also, DOD is not only responding by planning - the Navy, for instance, has been moving to whaler-attention to coastal regions (to provide assistance in response to disasters, etc.) from the deep sea. I’d also suggest that it is not just conflicts that are exacerbated, but events that could be manifested in terrorism. This comment provides a helpful切入点, that conflicts are exacerbated, but responses that can become manifest in terrorism which the authors respect and have analyzed. As a result, the comment does not raise any new issues, has adequate citations or require revision. With regard to “can exacerbate,” the commenter appears to raise concerns regarding the timing of impacts, the term “can exacerbate” applies to both current observed phenomena and phenomena observed in the future. The authors have decided that in this case the possible existence of a relationship is better understood than its particulars. The conceptualization that “climate extremes and change can exacerbate conflict” best conveys the existing levels of certainty and uncertainty.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144414</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>178</td>
<td>179</td>
<td>16</td>
<td>19</td>
<td>We appreciate this suggestion, but with limited space, we are only able to provide a couple of examples to support this key message, which you will find in the Transboundary section, beginning on pg. 581.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144415</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>178</td>
<td>179</td>
<td>21</td>
<td>23</td>
<td>I think this opening statement exhibits too limited a perspective, as explained a bit more fully in my comment on pages 3-10 and what seems to be left off (specifically, the shared interests and burdens between the US and the rest of the world).</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144416</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>178</td>
<td>179</td>
<td>19</td>
<td>19</td>
<td>I’m sure there is no mention here of the common interest we have in international health, given how infectious disease can move around the world. There is no mention of either public or private capacity to address global issues, or of the US’ role in providing leadership by example.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144417</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>179</td>
<td>179</td>
<td>6</td>
<td>6</td>
<td>On the phrase “transboundary resources” is too vague - please give some examples for the reader.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144418</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>179</td>
<td>179</td>
<td>7</td>
<td>7</td>
<td>Rethink “are” - and again, the sentence needs some examples - just too vague.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144419</td>
<td>Figure</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>179</td>
<td>179</td>
<td>19</td>
<td>19</td>
<td>Fascinating that the impacts on coffee production are here on a par with “Demand for US-military and humanitarian aid” - I guess that really does tell us something about America. Also then specifically mentioning “Impacts on US electron supply (speed)” is also interesting. Taken together, showing potential impacts on coffee and electronics I guess is appropriate in that those are likely America’s two most critical resources. On specifics, why no text on how climate change impacts coffee, fish, agriculture, coffee in Central America, fishing in Australia, instability in Syria and so on? the map seems poorly reproducible.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144420</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>179</td>
<td>179</td>
<td>14</td>
<td>14</td>
<td>The phrase “global impacts” seems quite vague - does this mean impacts on the US from global climate change?</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144421</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>181</td>
<td>181</td>
<td>6</td>
<td>6</td>
<td>Need to change “or” to “and”</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144422</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>181</td>
<td>181</td>
<td>8</td>
<td>8</td>
<td>The example just seems to sound very one-sided: that is, US interests all concern our specific economic interests and not really the patrimony interests of both nations. Somewhere, the example sounds very exploitative, aimed at resonating economic and environmental interests, rather than on providing assistance to help the particular nation develop - there being no mention of the harm that the climate change we are mainly responsible for might be impacting other peoples. Overall, this just sounds too much like “America first and last” with not enough empathy for those in other nations. Is it really intended?</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144423</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>181</td>
<td>181</td>
<td>4</td>
<td>4</td>
<td>I am especially interested in the issues of “international security and development” - the report seems to me to only focus the chapter on one limited aspect of what US interests need to be about - namely international security, development, and well-being.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144424</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>181</td>
<td>181</td>
<td>17</td>
<td>17</td>
<td>In not there here why “sustainability” is framed here rather than economics, as is used elsewhere. What climate change itself is doing is increasing the likelihood and intensity of climate variations (the shifting of the bell curve distribution), so that the US is having to respond more and more is due largely to climate change and the enhancement of extremes (i.e., variability matters, but climate change and its induced disproportionate increase in climate extremes is what the main issue would seem to be). Also, subject is pivotal, so the needs to be framed more clearly.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144425</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>181</td>
<td>181</td>
<td>23</td>
<td>23</td>
<td>We agree. The word “also” was added to this sentence per the reviewer’s recommendation.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144426</td>
<td>Text Region</td>
<td>16</td>
<td>Climate Effects on U.S. International Interests</td>
<td>182</td>
<td>182</td>
<td>3</td>
<td>3</td>
<td>I’d be careful on this as it not just meting back is all that needs to happen - there are basically no safety, secure capabilities and broken can also be dangerous. I’d suggest somehow that these are potential and will require a good bit of infrastructure development, etc.</td>
<td></td>
</tr>
</tbody>
</table>

We agree with the gist of the reviewer's recommendation and have amended this text as follows: "...Shorn at all?" though the infrastructure to support this transportation pathway is to safety policy have not yet been developed. See the report's Alaska Chapter for more information on Arctic marine transport."
Another example might be the Arctic Council agreements regarding responsibility for the increasingly ice-free

region. Some authors have suggested that the results of creating refugees is not at all attributable to climate change.

Phrasing needs something regarding "other U.S. interests"--as "in" is now the operative preposition. Overall, pretty limited coverage.

A separate KM on health may then require additional KMs on other climate-related issues. Health has been revisited to incorporate this perspective. The referenced report was released during the public comment period and speaks directly to this comment. The text has been amended to a reference to Pacific abrupt. The reference is "Hofstra, C.D., et al., 2013. The impact of loss-level typhoon and Climate Change on

Department of Defense Installations on Ahls in the Pacific Ocean (DC: 2314); U.S. Geological Survey Administration Report for the U.S. Department of Defense Strategic Environmental Research and Development Program; 121 p."

I'd suggest saying "generally poses" in that there are so many different situations that I don't think that the point is always valid.

Again, a focus only on the direct corporate consequences--nothing about indirect consequences for the US or for

the people in the region, etc. Again, the authors appreciate the reviewer's comments, the links between climate and conflict and the focus of scientific debate are discussed later paragraphs of this section.

First part of sentence is fine, but it would help to show some empathy in the second part, indicating that creating

refugees may not have been "violent" attributable to climate change. I think the word "may" is bad practice as it provides no

useful indication of likelihood--this needs to be replaced using the phrase. Here, can't properly say "are likely to"

The focus of this section is on impact to US economics and trade. The types of concerns mentioned in this review

comment are covered in the section on international development.

Another example might be the Arctic Council agreements regarding responsibility for the increasingly ice-free

Arctic Ocean.

This section is dedicated to the shared Arctic, it does not produce legally binding agreements. This section of the chapter is dedicated to

relevant literature.

The text has been revised to reflect this comment in a more careful wording of unassumingly. The author team has

deliberated and decided that the possible existence of a relationship is better understood than its particulars and it

inexperts in the formulation that climate Extremes and change can exacerbate conflict.

A separate KM on health may then require additional KMs on other climate-related issues. Health has been revisited to incorporate this perspective. The referenced report was released during the public comment period and speaks directly to this comment. The text has been amended to a reference to Pacific abrupt. The reference is "Hofstra, C.D., et al., 2013. The impact of loss-level typhoon and Climate Change on

Department of Defense Installations on Ahls in the Pacific Ocean (DC: 2314); U.S. Geological Survey Administration Report for the U.S. Department of Defense Strategic Environmental Research and Development Program; 121 p."

The sections identified have been rearranged to incorporate your suggestion. "The risks climate change may

hold for national security are more broadly are connected to the relationships between climate-related stresses, migration

and conflict."

The text has been revised to reflect this comment in a more careful wording of unassumingly. The author team has

deliberated and decided that the possible existence of a relationship is better understood than its particulars and it

inexperts in the formulation that climate Extremes and change can exacerbate conflict.

Another example might be the Arctic Council agreements regarding responsibility for the increasingly ice-free

Arctic Ocean.

So, what has happened with refugees moving from Africa toward and into Europe may not have been "violent"

attributable to climate change. We feel that health is adequately addressed in the international chapter through this box. In addition, Health has its own stand alone sector chapter. A separate KM on health may then require additional KMs on other climate-related issues mentioned in the chapter, and there is not sufficient room to add another KM. In response to the comment a relevant obstruction was added regarding attribution.

Different examples from this draft, including some you mention. If we find that before the text is finalized we have

additional space, we will elaborate on the Great Lakes and Rio Grande water issues. On the Pacific Hake,

recognizing that migration can be temporary, short term, or permanent, we use the word "migrant" as employed

in the underlying literature.

In such cases, it was the authors feel the existing examples are appropriate and adequate given the space available.

If we feel that health is adequately addressed in the international chapter through this box. In addition, Health has its own stand alone sector chapter. A separate KM on health may then require additional KMs on other climate-related issues mentioned in the chapter, and there is not sufficient room to add another KM. In response to the comment a relevant obstruction was added regarding attribution.
### First Name Last Name  | Comment ID | Comment Type | Chapter | Figure/Table | Start Page | Start Line | End Line | Comment |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael MacCracken</td>
<td>144445</td>
<td>Text Region</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td>197</td>
<td>567</td>
<td>1</td>
<td>7</td>
<td>This entire message falsely states speculative projections of impacts as established physical facts.</td>
</tr>
<tr>
<td>Michael MacCracken</td>
<td>144447</td>
<td>Text Region</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td>193</td>
<td>599</td>
<td>25</td>
<td>29</td>
<td>Strange explanations. First, the asserted variability was pretty clearly exacerbated by climate change--as is evidenced by the fact that so much human-induced climate change has occurred, everything is being affected, and this needs to be the presumption, not that one has to demonstrate to high statistical confidence that some change is not natural. Second, the second sentence is about how climate change might affect the “outcomes”--well, of course not; the issue is that climate change-related impacts contributed to the start of the conflict. But, again, focusing the discussion on it being variability and not change seems to me mistaken, neglecting the fact climate change has shifted the overall baseline for the variability, etc.</td>
</tr>
<tr>
<td>Michael MacCracken</td>
<td>144448</td>
<td>Text Region</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td>193</td>
<td>599</td>
<td>31</td>
<td>31</td>
<td>We realize this chapter is an international impacts that affect the US, but I think it is well worth a sentence at the beginning of the executive summary and main text that acknowledges that international impacts have their own worth (outside of what it means for the US), that the damages incurred affect many people around the world and those people have intrinsic value in and of themselves. Given that, those impacts ALSO affect the US. It is ok that this chapter is about the “also affect the US” part, but it just sounds heartless to not clearly state that other people’s suffering has value outside of what it costs Americans.</td>
</tr>
<tr>
<td>Michael MacCracken</td>
<td>144449</td>
<td>Text Region</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td>193</td>
<td>599</td>
<td>31</td>
<td>35</td>
<td>This seems a very poorly worded discussion of the issue. Human induced-climate change is affecting everything—my passing that something is purely natural. Or the statement “attribution is uncertain”—well, yes, but to a degree—so how uncertain? This does not mean at all that there has been no human influence. What is happening is a shift in the bell-shaped curves that is shifting the Bandwidth of various regimes and disturbances.</td>
</tr>
<tr>
<td>Michael MacCracken</td>
<td>144450</td>
<td>Text Region</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td>194</td>
<td>594</td>
<td>1</td>
<td>1</td>
<td>...within a variety of ecosystem[s]—this does not seem to me to be what is being considered—it is not consideration across a wide set of defense-relevant situations. Is DOD really doing full ecosystem analyses? I doubt it—they are likely focused on the particular aspects that relate to their specific situations.</td>
</tr>
<tr>
<td>Michael MacCracken</td>
<td>144451</td>
<td>Text Region</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td>194</td>
<td>594</td>
<td>5</td>
<td>5</td>
<td>Need a period after “assigned”</td>
</tr>
<tr>
<td>Michael MacCracken</td>
<td>144452</td>
<td>Text Region</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td>194</td>
<td>594</td>
<td>7</td>
<td>8</td>
<td>It would be helpful to have listed what these factors are. I would also note that the linkages can be direct or, more often, indirect, and such indirect linkages are often not really considered.</td>
</tr>
<tr>
<td>Michael MacCracken</td>
<td>144453</td>
<td>Text Region</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td>195</td>
<td>599</td>
<td>7</td>
<td>8</td>
<td>There are no degrees of certainty—that makes no sense at all. There can be high degrees of confidence, and that is what needs to be said here. Stick to the key that is being used for this assessment report.</td>
</tr>
<tr>
<td>Michael MacCracken</td>
<td>144454</td>
<td>Text Region</td>
<td>16. Climate Effects on U.S. International Interests</td>
<td>194</td>
<td>594</td>
<td>1</td>
<td>1</td>
<td>There is no opening paragraph here as in the other chapters explaining what the process was for developing this chapter, so was involved and what sum of resources and impacts were used.</td>
</tr>
<tr>
<td>David Zoppik</td>
<td>141722</td>
<td>Text Region</td>
<td>17. Complex Systems</td>
<td>165</td>
<td>165</td>
<td>14</td>
<td>22</td>
<td>The present text says this. 16 Key Message 1: Climate change and extreme weather directly impact electricity generation, water supply, food production, human health, and other resources. Traditional approaches to assessing the direct and indirect impacts of climate change on human health and well-being do not fully consider the indirect effects of climate change on the natural environment. 17 The direct impacts of climate change on human health and well-being are projected to increase in the future. 18 Risks to human health and well-being from climate change will be exacerbated by other stressors. 19 The present text says this. 20 The direct impacts of climate change on human health and well-being are projected to increase in the future. 21 The direct impacts of climate change on human health and well-being are projected to increase in the future. 22 The direct impacts of climate change on human health and well-being are projected to increase in the future. 23 The direct impacts of climate change on human health and well-being are projected to increase in the future. 24 The direct impacts of climate change on human health and well-being are projected to increase in the future. 25 Key Message 2: Climate change risk assessment requires evaluating climate or weather impacts that are relevant to the US, not just those that are considered significant for the US. 26 The present text says this. 27 The direct impacts of climate change on human health and well-being are projected to increase in the future. 28 The direct impacts of climate change on human health and well-being are projected to increase in the future. 29 The direct impacts of climate change on human health and well-being are projected to increase in the future. 30 The direct impacts of climate change on human health and well-being are projected to increase in the future. 31 The direct impacts of climate change on human health and well-being are projected to increase in the future. 32 The direct impacts of climate change on human health and well-being are projected to increase in the future.</td>
</tr>
<tr>
<td>David Zoppik</td>
<td>141733</td>
<td>Text Region</td>
<td>17. Complex Systems</td>
<td>169</td>
<td>169</td>
<td>13</td>
<td>29</td>
<td>The present text says this. 16 Key Message 2: Climate change risk assessment requires evaluating climate or weather impacts that are relevant to the US, not just those that are considered significant for the US. 17 The direct impacts of climate change on human health and well-being are projected to increase in the future. 18 Risks to human health and well-being from climate change will be exacerbated by other stressors. 19 The present text says this. 20 The direct impacts of climate change on human health and well-being are projected to increase in the future. 21 The direct impacts of climate change on human health and well-being are projected to increase in the future. 22 The direct impacts of climate change on human health and well-being are projected to increase in the future. 23 The direct impacts of climate change on human health and well-being are projected to increase in the future. 24 The direct impacts of climate change on human health and well-being are projected to increase in the future. 25 Key Message 2: Climate change risk assessment requires evaluating climate or weather impacts that are relevant to the US, not just those that are considered significant for the US. 26 The present text says this. 27 The direct impacts of climate change on human health and well-being are projected to increase in the future. 28 The direct impacts of climate change on human health and well-being are projected to increase in the future. 29 The direct impacts of climate change on human health and well-being are projected to increase in the future. 30 The direct impacts of climate change on human health and well-being are projected to increase in the future. 31 The direct impacts of climate change on human health and well-being are projected to increase in the future. 32 The direct impacts of climate change on human health and well-being are projected to increase in the future. 33 The direct impacts of climate change on human health and well-being are projected to increase in the future. 34 The direct impacts of climate change on human health and well-being are projected to increase in the future. 35 Key Message 2: Climate change risk assessment requires evaluating climate or weather impacts that are relevant to the US, not just those that are considered significant for the US. 36 The present text says this. 37 The direct impacts of climate change on human health and well-being are projected to increase in the future. 38 The direct impacts of climate change on human health and well-being are projected to increase in the future. 39 The direct impacts of climate change on human health and well-being are projected to increase in the future. 40 The direct impacts of climate change on human health and well-being are projected to increase in the future. 41 The direct impacts of climate change on human health and well-being are projected to increase in the future. 42 The direct impacts of climate change on human health and well-being are projected to increase in the future. 43 The direct impacts of climate change on human health and well-being are projected to increase in the future. 44 The direct impacts of climate change on human health and well-being are projected to increase in the future. 45 Key Message 2: Climate change risk assessment requires evaluating climate or weather impacts that are relevant to the US, not just those that are considered significant for the US. 46 The present text says this. 47 The direct impacts of climate change on human health and well-being are projected to increase in the future.</td>
</tr>
</tbody>
</table>
The use of complex-systems concept is interesting and appropriate to note in the chapter, but it is not useful to the general reader. The most salient and insightful element for readers is how the chapter ties together the topics regional and sector of the other chapters. It enables readers to understand the interdependencies, say among water, agriculture, forests, human health, energy production, as well as to understand spillover impacts to/from other regions. Without this analysis, one may be misled into thinking the authors are proposing a climate-change adaptation plan resulting in a neat cascade of societal impacts building to a desired outcome. The focus on one aspect of isolation could lead to significant counterproductive outcomes. Within the other chapters and even the chapter, the use of the word "complex" often implies "complicated" or more precisely the complications associated with managing highly interconnected systems undergoing multiple stresses. Therefore, to emphasize the importance to the reader rather than the expansive nature of the science, I think the chapter would be better titled "Sectoral interdependencies, Multiple stressors, and Highly-interconnected Systems." Further, the use of the words "Highly-interconnected" and "interdependencies," which the authors have discussed, we decided to reserve "interdependencies" for specific cases, and use "interacting" and "interactions" for the broader meaning. In my view, complexity remains a central theme to the chapter because the interactions among these systems make their behavior hard to predict. We agree with the reviewer’s comment about the accessibility of the notion of complex systems science and the way in which this more specific use of the word "complex" might confuse readers. We have moved the discussion of complex systems literature to Key Message #1 where it more clearly fits within the flow of the logic of the chapter. This comment makes a good point about the vernacular use of "complex" and "interdependencies," which the authors have discussed. We decided to reserve "interdependencies" for specific cases, and use "interacting" and "interactions" for the broader meaning. In my view, complexity remains a central theme to the chapter because the interactions among these systems make their behavior hard to predict. We agree with the reviewer’s comment about the accessibility of the notion of complex systems science and the way in which this more specific use of the word "complex" might confuse readers. We have moved the discussion of complex systems literature to Key Message #1 where it more clearly fits within the flow of the logic of the chapter. This comment makes a good point about the vernacular use of "complex" and "interdependencies," which the authors have discussed. We decided to reserve "interdependencies" for specific cases, and use "interacting" and "interactions" for the broader meaning. In my view, complexity remains a central theme to the chapter because the interactions among these systems make their behavior hard to predict. We agree with the reviewer’s comment about the accessibility of the notion of complex systems science and the way in which this more specific use of the word "complex" might confuse readers. We have moved the discussion of complex systems literature to Key Message #1 where it more clearly fits within the flow of the logic of the chapter. This comment makes a good point about the vernacular use of "complex" and "interdependencies," which the authors have discussed. We decided to reserve "interdependencies" for specific cases, and use "interacting" and "interactions" for the broader meaning. In my view, complexity remains a central theme to the chapter because the interactions among these systems make their behavior hard to predict. We agree with the reviewer’s comment about the accessibility of the notion of complex systems science and the way in which this more specific use of the word "complex" might confuse readers. We have moved the discussion of complex systems literature to Key Message #1 where it more clearly fits within the flow of the logic of the chapter. This comment makes a good point about the vernacular use of "complex" and "interdependencies," which the authors have discussed. We decided to reserve "interdependencies" for specific cases, and use "interacting" and "interactions" for the broader meaning. In my view, complexity remains a central theme to the chapter because the interactions among these systems make their behavior hard to predict. We agree with the reviewer’s comment about the accessibility of the notion of complex systems science and the way in which this more specific use of the word "complex" might confuse readers. We have moved the discussion of complex systems literature to Key Message #1 where it more clearly fits within the flow of the logic of the chapter. This comment makes a good point about the vernacular use of "complex" and "interdependencies," which the authors have discussed. We decided to reserve "interdependencies" for specific cases, and use "interacting" and "interactions" for the broader meaning. In my view, complexity remains a central theme to the chapter because the interactions among these systems make their behavior hard to predict. We agree with the reviewer’s comment about the accessibility of the notion of complex systems science and the way in which this more specific use of the word "complex" might confuse readers. We have moved the discussion of complex systems literature to Key Message #1 where it more clearly fits within the flow of the logic of the chapter. This comment makes a good point about the vernacular use of "complex" and "interdependencies," which the authors have discussed. We decided to reserve "interdependencies" for specific cases, and use "interacting" and "interactions" for the broader meaning. In my view, complexity remains a central theme to the chapter because the interactions among these systems make their behavior hard to predict. We agree with the reviewer’s comment about the accessibility of the notion of complex systems science and the way in which this more specific use of the word "complex" might confuse readers. We have moved the discussion of complex systems literature to Key Message #1 where it more clearly fits within the flow of the logic of the chapter. Thanks for the helpful suggestion. We have revised the introduction to the chapter to make it more effectively give the reader the necessary context to read the remainder of the chapter. We have also included a new conceptual diagram to the chapter that is inspired by the comment. Thank you for your suggestions. A station has been added.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table (Number)</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>1433001</td>
<td>Test Region</td>
<td>17: Complex Systems</td>
<td>615</td>
<td>611</td>
<td>12</td>
<td>12</td>
<td>Recommended on an archaeological example to build on out - research in the Southwest has looked at which communities/households responded and how during decades-long droughts. Recommended author with which is start: Scott Ingram</td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>1433002</td>
<td>Test Region</td>
<td>17: Complex Systems</td>
<td>616</td>
<td>616</td>
<td>16</td>
<td>17</td>
<td>Writing style: phrasing of this sentence is awkward, recommended revising.</td>
<td></td>
</tr>
</tbody>
</table>
| Social Science | Coordinating Committee | 1433003 | Test Region | 17: Complex Systems | 616 | 616 | 16 | 16 | Can a climate-related example be found? | "I suggest water rights and the recent California drought, although noted that California and water is a frequent example in the balance of this chapter."
| Social Science | Coordinating Committee | 1433004 | Test Region | 17: Complex Systems | 620 | 620 | 6 | 6 | Archaeologists/anthropologists work well. Interdependencies are an outcome of emphasis on physical systems/vegetation (or in government terms, separation into "boxes") of physical and natural sciences from social sciences. Recommend this situational be incorporated here. |
| Social Science | Coordinating Committee | 1433005 | Test Region | 17: Complex Systems | 621 | 621 | 3 | 7 | Recommend noting that agent-based modeling does work with human responses to environmental and other events/traumas. Recommend of the former responses to drought in the Southwest as a starting point. |
| Social Science | Coordinating Committee | 1433006 | Test Region | 17: Complex Systems | 621 | 621 | 13 | 14 | It is a real key point things out that it's not just lack of awareness of interdependent systems, but how and where control is allocated. Recommend ensuring that this point continues to be made in this chapter. |
| Social Science | Coordinating Committee | 1433007 | Test Region | 17: Complex Systems | 622 | 622 | 17 | 18 | Perspective is one thing, but - as noted toward bottom of previous page, organizational and regulatory barriers may structures of modern human systems are key factors in determining how and why things are integrated as a system. Suggest developing a stronger connection between this paragraph and the last paragraph on the previous page. |
| Social Science | Coordinating Committee | 1433008 | Test Region | 17: Complex Systems | 623 | 623 | 24 | 30 | Please see USGCRP Social Science Coordinating Committee social science white paper, particularly Group 2 paper on vulnerability, for integrated social science approaches to vulnerable populations. For example, per the last sentence in this paragraph, it is not just infrastructure failures that affect public health. It is also an outcome of systems inequity, governance, social networks, political capital. |
| Social Science | Coordinating Committee | 1433009 | Test Region | 17: Complex Systems | 624 | 624 | 15 | 17 | Disregard with this statement: There are modeling efforts that integrate key human systems, specifically agent-based modeling systems. Anthropologist Tim Kaller has worked with agent-based modeling to look at an agricultural responses to drought. Other work with human agents and environmental change has been developed at Argonne National Laboratory for example. |
| Social Science | Coordinating Committee | 1433010 | Test Region | 17: Complex Systems | 629 | 629 | 24 | 25 | Attention is needed here to the cost implications of building in redundancy and flexibility. Current economic pressures emphasize "just in time" delivery; 4 for example, which reduces storage costs but increases sensitivity of transportation systems to disruptive weather events or supply chain issues. Increasing storage capacity in some places might increase robustness, but at what cost? How will costs be justified in an economic system that emphasizes shareholder value and cost reduction? |
| Social Science | Coordinating Committee | 1433011 | Test Region | 17: Complex Systems | 632 | 632 | 30 | 30 | Which sources/internalize social and or environmental systems? If none, social vulnerability certainly affects public health outcomes during extreme events such as this. |
| Alison | Cimmaron | 1434202 | Test Region | 17: Complex Systems | 611 | 611 | 7 | 7 | These key messages are very redundant to one another. There are also parts of each message - particularly key message 2- that are not KEY. Strongly suggest avoiding these key messages and consolidating to only one or even two. For example, you make the point about these being uncertain but (that is a key message) and seeking to integrate evidentiary models/effects in the last section of KM2, the last sentence of KM2, and the last sentence of KM3. You make the point that one should not just one analysis in the second sentence of KM2 which means what was said in the second sentence of KM2. Key message 2 can be deleted in its entirety without losing any of the points, since they are all already conveyed elsewhere. The example in key message 3 (lines 15-18) is not an example of the sentence follows (lines 12-18). Delete. The reader is well aware of what the authors were trying to make. All four messages seem to say that we should be considering more than one analysis of complex interactions of impacts and inform responses. So that is one key message. What else do the authors want to us? |
| Alison | Cimmaron | 1434203 | Test Region | 17: Complex Systems | 611 | 611 | 11 | 14 | Repaired: this was also stated on page 615 but 22-24 |
| Alison | Cimmaron | 1434204 | Test Region | 17: Complex Systems | 611 | 611 | 29 | 29 | These key messages are very redundant to one another. There are also parts of each message - particularly key message 2- that are not KEY. Strongly suggest avoiding these key messages and consolidating to only one or even two. For example, you make the point about these being uncertain but (that is a key message) and seeking to integrate evidentiary models/effects in the last section of KM2, the last sentence of KM2, and the last sentence of KM3. You make the point that one should not just one analysis in the second sentence of KM2 which means what was said in the second sentence of KM2. Key message 2 can be deleted in its entirety without losing any of the points, since they are all already conveyed elsewhere. The example in key message 3 (lines 15-18) is not an example of the sentence follows (lines 12-18). Delete. The reader is well aware of what the authors were trying to make. All four messages seem to say that we should be considering more than one analysis of complex interactions of impacts and inform responses. So that is one key message. What else do the authors want to us? |
| Alison | Cimmaron | 1434207 | Test Region | 17: Complex Systems | 611 | 611 | 24 | 24 | The sentence has been removed. |
| Alison | Cimmaron | 1434208 | Test Region | 17: Complex Systems | 611 | 611 | 29 | 29 | The State of the Sector has been renamed as "introduction". It is not necessary to include the state in the introduction of the chapter, as its role is to introduce key themes rather than to draw conclusions. These are provided extensively throughout the remainder of the chapter in key messages and in boxes. |
| Alison | Cimmaron | 1434209 | Test Region | 17: Complex Systems | 611 | 611 | 41 | 41 | Again, there is an entire page of text that went by with ZERO citations. What literature did the authors assess to come to these conclusions? Include citations. |
| Alison | Cimmaron | 1434210 | Test Region | 17: Complex Systems | 611 | 611 | 40 | 40 | Yes, social vulnerability certainly affects public health outcomes during extreme events such as this. First paragraph of box text has been updated to acknowledge other determinants of health outcomes such as inequalities of income and education as well as human behavior and choice. |
| Alison | Cimmaron | 1434211 | Test Region | 17: Complex Systems | 611 | 611 | 41 | 41 | Additional discussion has been added to KM2 regarding the potential short-term and long-term costs vs. benefits of expanding flexibility and robustness of systems. Supporting material has also been added to the receivable account for KM2. |
| Alison | Cimmaron | 1434212 | Test Region | 17: Complex Systems | 611 | 611 | 29 | 29 | We have substantially rewored KM1, KM2, and KM3 to reduce redundancy among them and to make their emphasis clearer. |
| Alison | Cimmaron | 1434213 | Test Region | 17: Complex Systems | 611 | 611 | 14 | 14 | Sentence was inserted to acknowledge that shifting from recognizing complex, multidisciplinary risks to designing policies and practices that deal effectively with these risks is a non-trivial undertaking. |
| Alison | Cimmaron | 1434214 | Test Region | 17: Complex Systems | 611 | 611 | 33 | 33 | Writing style: phrasing of this sentence is awkward, recommend rephrasing. |
| Alison | Cimmaron | 1434215 | Test Region | 17: Complex Systems | 611 | 611 | 70 | 70 | Yes, social vulnerability certainly affects public health outcomes during extreme events such as this. First paragraph of box text has been updated to acknowledge other determinants of health outcomes such as inequalities of income and education as well as human behavior and choice. |
| Alison | Cimmaron | 1434216 | Test Region | 17: Complex Systems | 611 | 611 | 72 | 72 | Yes, the text has been revised, streamlining which modeling frameworks deal with individual systems and which incorporate key human systems (without being encyclopedic). The suggested references have been added. |
| Alison | Cimmaron | 1434217 | Test Region | 17: Complex Systems | 611 | 611 | 74 | 74 | Additional discussion has been added to KM3 regarding the potential short-term and long-term costs vs. benefits of expanding flexibility and robustness of systems. Supporting material has also been added to the receivable account for KM3. |
| Alison | Cimmaron | 1434218 | Test Region | 17: Complex Systems | 611 | 611 | 75 | 75 | Additional discussion has been added to KM3 regarding the potential short-term and long-term costs vs. benefits of expanding flexibility and robustness of systems. Supporting material has also been added to the receivable account for KM3. |
| Alison | Cimmaron | 1434219 | Test Region | 17: Complex Systems | 611 | 611 | 76 | 76 | Additional discussion has been added to KM3 regarding the potential short-term and long-term costs vs. benefits of expanding flexibility and robustness of systems. Supporting material has also been added to the receivable account for KM3. |
| Alison | Cimmaron | 1434220 | Test Region | 17: Complex Systems | 611 | 611 | 77 | 77 | Additional discussion has been added to KM3 regarding the potential short-term and long-term costs vs. benefits of expanding flexibility and robustness of systems. Supporting material has also been added to the receivable account for KM3. |
The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The sentence has been fixed.

Thank you for the recommendation. We have included a reference to the Climate and Health Assessment on cascading failures.

This is some very dry text that sounds like it is out of a propaganda brochure. Can you summarize and use plain language?

What is CAP? Please spell out the acronym.

It would be better to use a long-term climate indicator here rather than just three years, which is really only the California example, and removing the Arizona example.

"severe" is an odd word choice here and seems a bit strong. Better.

There is no need to introduce an arbitrary acronym like EWL here. This is not a common acronym and readers will not know what it means.

Please consider dropping the phrase "sectoral interdependencies" and even the word "interdependencies" from this entire chapter, including the title. This is a jargon and rather an empty phrase at that. Almost all of these can be replaced with simpler words more appropriate for this audience, such as "connected" or "interact." We have decided to reserve "interdependence" for specific cases, but to use "interacting" and "interaction" for the broader meanings.

Add a reference to the health chapter either to this bullet or in the last bullet on wildfire impacts. Drop this entire box. This topic is covered in a dedicated chapter and there isn’t room for it in the chapter. Plus there are zero citations in it, so it’s unclear what literature the authors assessed in writing this. It is a nice story, but completely irrelevant.

Thank you for the suggestion. We agree with the reviewer and have decided to shorten the box by including only the California example, and removing the Arizona example.

Drop this entire box. This topic is covered in the International chapter and there isn’t room for it in the chapter. Plus there are zero citations in it, so it’s unclear what literature the authors assessed in writing this. We have decided to keep the box because it illustrates the interdependency of complex systems well, and because it illustrates the importance of interactions with societal decisions. The points made in the chapter are not necessarily specific to climate, and this will be important for readers to understand.

(No change) This is some very dry text that sounds like it is out of a propaganda brochure. Can you summarize and use plain language?

There is no need to introduce an arbitrary acronym like EWL here. This is not a common acronym and readers will not know what it means.

Plus there are zero citations in it, so it is unclear what literature the authors assessed in writing this. It is a nice story, but completely irrelevant.

Thank you for the comment. We agree with the reviewer and have removed the use of the EWL acronym for daily.

"severe" is an odd word choice here and seems a bit strong. Better.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

Drop this entire box. This topic is covered in the International chapter and there isn’t room for it in the chapter. Plus there are zero citations in it, so it’s unclear what literature the authors assessed in writing this. It is a nice story, but completely irrelevant.

Thank you for the comment. We agree with the reviewer and have removed the use of the EWL acronym for daily.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

Thank you for the suggestion. We agree with the reviewer and have decided to shorten the box by including only the California example, and removing the Arizona example.

This is some very dry text that sounds like it is out of a propaganda brochure. Can you summarize and use plain language?

Please consider dropping the phrase "sectoral interdependencies" and even the word "interdependencies" from this entire chapter, including the title. This is a jargon and rather an empty phrase at that. Almost all of these can be replaced with simpler words more appropriate for this audience, such as "connected" or "interact." We have decided to reserve "interdependence" for specific cases, but to use "interacting" and "interaction" for the broader meanings.

Thank you for the comment. We agree with the reviewer and have added a citation for this statement.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.

The regional rollup has been substantially revised. It is now constructed to demonstrate that there are examples relevant to the themes in this chapter throughout the regional chapters of the NCA. Every regional chapter is now referenced in this section.
than 3x the global average over this time period (1.9 mm/yr from 1951-2010 per Hay et al. 2015).

An additional good reference on habitat modifications is http://northatlanticlcc.org/products/synthesis-of-tidal-

increasing without any explanation in the above text (p.655) may be confusing. Suggest adding a sentence

This area does not seem to me to be the "Southwest"—it seems to me to be the "western US". Also, line 5.

Need to use lexicon instead of "may"—that word is just far too vague.

generations—such as fire consuming a stressed ecosystem, rains causing mudslides, new vegetation growing up.

would be unlikely to really assist in the assessment. I'd suggest a bit more discussion to provide further context.

from them—and I would venture that for quite a number of aspects of what is being examined and assessed, the

This is a really long section and it seems that these citations were not in the main text.

Were these citations in the chapter?

No need to repeat what is in the chapter—just describe the evidence. Is it old, new, emerging or established,

Confidence and Likelihood rankings are not provided here—please add.

Citation needed

The phrase "but these do not effectively integrate key human systems" is false. What about the CSSR and how

Confidence and likelihood rankings are not provided here—please add.

Citation needed

More, including MIT's EPPA model, which is all about human systems.

The authors feel that some overlap is necessary for the traceable account to be comprehensible. Building from

This is what the chapter just describe the mitigation. It is old, new, emerging or established, consensus or contentious? Etc.

We have modified the text to make clear that there is strong evidence base supporting the importance of interactions between systems but that there is only a small set of literature that has begun attempting to systematically quantify the implications of these interactions.

We have put the appropriate citations in the main text and removed any overlap. Given the size of the point in

the narrative of the chapter, a smaller set of citations was sufficient to support the point.

These citations do not seem to appear in the chapter itself. I believe the guidance for authors says that all citations in the traceable accounts must also be in the chapter, and this chapter would greatly benefit from more

This is revisiting uncertainty across the whole field or topic, not the author's uncertainty about key message 1. Please remove mention of IAM and replace general information with uncertainties specific to KM.

We would respectfully disagree with the reviewers suggestion. The reference to KM in this traceable account is not intended to support the uncertainty assessment of KM, but to support the uncertainty assessment of IAM.

It is important to understand that while we have strong evidence regarding the linkages between systems and many historical examples of the importance of these linkages, we do not have tools today to identify or predict all the multi-sector dynamics that might emerge in the future.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The authors feel that some overlap is necessary for the traceable account to be comprehensible. Building from this overlap, the traceable account then goes forward to underscore the original of the conclusions in the underlying literature.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The authors feel that some overlap is necessary for the traceable account to be comprehensible. Building from

This is what the chapter just describe the mitigation. It is old, new, emerging or established, consensus or contentious? Etc.

We have modified the text to make clear that there is strong evidence base supporting the importance of interactions between systems but that there is only a small set of literature that has begun attempting to systematically quantify the implications of these interactions.

We have put the appropriate citations in the main text and removed any overlap. Given the size of the point in

the narrative of the chapter, a smaller set of citations was sufficient to support the point.

These citations do not seem to appear in the chapter itself. I believe the guidance for authors says that all citations in the traceable accounts must also be in the chapter, and this chapter would greatly benefit from more

This is revisiting uncertainty across the whole field or topic, not the author's uncertainty about key message 1. Please remove mention of IAM and replace general information with uncertainties specific to KM.

We would respectfully disagree with the reviewers suggestion. The reference to KM in this traceable account is not intended to support the uncertainty assessment of KM, but to support the uncertainty assessment of IAM.

It is important to understand that while we have strong evidence regarding the linkages between systems and many historical examples of the importance of these linkages, we do not have tools today to identify or predict all the multi-sector dynamics that might emerge in the future.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The authors feel that some overlap is necessary for the traceable account to be comprehensible. Building from this overlap, the traceable account then goes forward to underscore the original of the conclusions in the underlying literature.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The summary has been revised to reflect the changes throughout the document. Note that all the text in the summary comes verbatim from the lead of the chapter.

The authors feel that some overlap is necessary for the traceable account to be comprehensible. Building from this overlap, the traceable account then goes forward to underscore the original of the conclusions in the underlying literature.


Elizabeth Burakowski 201506 2015 150 25 26 Please include Scott et al. 2008 and Dawson and Scott, 2013 in the discussion of economic viability of ski resorts in the Northeastern United States. Both of these studies note that one metric for economic viability is a 100-day ski season length, in addition to being open during the Christmas Holiday break and maintaining winter temperatures cold enough for snowmaking. The Wobus et al. (2017) study's present-day modeled ski season length in the Northeast US is about 60-90 days (including snowmaking, see Figure 2 in Wobus et al. 2017). The typical northeastern US ski season length is closer to 200 days (see Dawson and Scott, 2013; National Ski Areas Association 9th biennial End of Season Reports - nasa.org). Thus, the model bias in the Wobus et al. (2017) potentially overestimates impacts to ski season length in the Northeastern US.


To consider removing "cross country skiing" from the list of winter recreation activities that rely on natural snow cover. At the very least, include text that describes how many cross country ski resorts are relying in artificial snow making, including at least a dozen in the northeastern United States as of 2016 (check with the Cross Country Ski Areas Association - Reowe Brown for exact numbers and trends).


Elizabeth Burakowski 201507 2015 169 6 3 Please include discussion of Hamilton et al. (2007), which focused on the demand-side of ski visitation. This study importantly identified cross-exA in both urban (ie: "backyard effect") and at the mountains as important drivers in ski visitation. An important conclusion of the study is that supply-side economics (ie: snowmaking to increase supply of ski trails) is not adequate to maintain skier visitation. Skiers must also see snow in their own backyards to generate demand for skiing.


Elizabeth Burakowski 201508 2015 165 665 24 24 Consider removing "cross country skiing" from the list of winter recreation activities that rely on natural snow cover. At the very least, include text that describes how many cross country ski resorts are relying in artificial snow making, including at least a dozen in the northeastern United States as of 2016 (check with the Cross Country Ski Areas Association - Reowe Brown for exact numbers and trends).


Elizabeth Burakowski 201509 2015 165 665 20 20 The ST1: Climate change should be corrected. It does not come from Hamish et al. (2007) or Wobus et al. (2017). The number was generated in Scott et al. (2008) and comes from several sources summed together. These sources include Southwick Associates (2006), International Snowmobile Manufacturers Association (2006), Relling (1998), and Snowmobile Association of Massachusetts (2005). Note this figure may include double-counting from economic activity from participants across state lines. A more recent figure could be derived from Burakowski and Magnusson (2017) by summing state-level economic activity ("$3.8 billion", or from the Outdoor Industries of America (Southwick Associates, 2017) and participation statistics from Snowsports Industries of America (2017).

Several historical sites, health, and urban economies are already occurring and will become more common with a changing climate. Disruptions to infrastructure and negative impacts on historic sites, health, and well-being, and urban economies are already occurring and will become more common with a changing climate. The present text is this:

• Key Message 3: Rural communities are an essential part of the Northeast economy and are largely supported by a diverse range of agricultural, tourism, and natural resource-dependent industries. Coastal communities already impacted by declining fisheries and flooding are threatened by further warming, sea level rise, and coastal storms. Inland, the impacts of extreme heat on health, increased precipitation on farming, and warming winters on recreation, specialty crops, and forestry threaten rural economies and livelihoods. Rural communities face economic uncertainty if they cannot adapt to projected changes in climate.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. These errors have been pointed out repeatedly during the previous series of National Assessments (references should be revisited), yet they persist. As a result there is no quality or utility. Here is the present text:

Chapter 16 Rural communities face economic uncertainty if they cannot adapt to projected changes in climate. Emphasizing this effect of climate change forces people to see an immediate threat to public health. Focusing on deaths from air pollution is also a useful strategy for urging action, since deaths from particulate matter and other types of air pollution are an immediate and tangible threat to poor environmental health. Especially in the northeastern states with shorelines, civic leaders will be interested in the effects of climate change on recreational opportunities. Tourism in these states is a crucial industry that provides a source of jobs in rural areas that would otherwise have high unemployment rates, so it is crucial to provide detail about how climate change will affect these natural resources. There was good information about this subject presented in the chapter.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. These errors have been pointed out repeatedly during the previous series of National Assessments (references should be revisited), yet they persist. As a result there is no quality or utility. Here is the present text:

16. Key Message 2: The distinct seasonality of the Northeast, which is central to the region’s cultural heritage, is at risk from rising temperatures and changing precipitation patterns. Milder winters and earlier spring conditions are already occurring and will become more common with a changing climate. The present text is this:

• Key Message 2: The distinct seasonality of the Northeast, which is central to the region’s cultural heritage, is at risk from rising temperatures and changing precipitation patterns. Milder winters and earlier spring conditions are already occurring and will become more common with a changing climate. The present text is this:

8 March 2017
Version of record online: 1 November 2016
Manuscript accepted: 23 August 2016
Manuscript reviewed: 14 June 2016

The citation should be Tebaldi et al. 2012, not Tebeulidi et al. 2012.

These projections appear to be based primarily on the use of questionable computer models. That climate change will affect these natural resources. There was good information about this subject presented in the chapter.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. These errors have been pointed out repeatedly during the previous series of National Assessments (references should be revisited), yet they persist. As a result there is no quality or utility. Here is the present text:

This typographical error has been corrected.

The authors have considered this comment and revised the text where appropriate.

Another issue to consider in the northeast is migration from other places to the country to this area. As the climate in the southeastern and western regions of the US becomes hotter and less tolerable to people, some will move to the northeast in order to live in a cooler climate. The northeast, especially northern states such as Maine, can expect to see an influx of people in the coming decades. The chapter mentioned outflows of people from the city, but did not consider that a warming climate may cause more people to move into the states. Monitoring the contamination of water and soil through increased heavy precipitation events and storm surge is a good point for sparking a local civil government to take action on updating infrastructure to deal with a changing climate. Emphasizing this effect of climate change forces people to see an immediate threat to public health. Focusing on deaths from air pollution is also a useful strategy for urging action, since deaths from particulate matter and other types of air pollution are an immediate and tangible threat to poor environmental health. Especially in the northeastern states with shorelines, civic leaders will be interested in the effects of climate change on recreational opportunities. Tourism in these states is a crucial industry that provides a source of jobs in rural areas that would otherwise have high unemployment rates, so it is crucial to provide detail about how climate change will affect these natural resources. There was good information about this subject presented in the chapter.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. These errors have been pointed out repeatedly during the previous series of National Assessments (references should be revisited), yet they persist. As a result there is no quality or utility. Here is the present text:

This comment is inconsistent with the current state of the science on this topic.

The text has been revised as suggested.

The text has been revised as suggested.

The text has been revised as suggested.

This comment has been incorporated into the chapter.

This comment has been incorporated into the chapter.

This comment has been incorporated into the chapter.

This comment has been incorporated into the chapter.
This chapter is a challenge. It’s not very well organized/editied nor is it written at the appropriate level for the NCA. The challenges begin with the key messages, which do not follow any particular logical structure. Because the entire body of the chapter does not follow a logical structure, there are some really interesting stories in the chapter that could make for stronger key messages. For example, there is a powerful section on the impact of climate change on Lyme disease and West Nile virus. Here is a “people value being healthy and climate change is making that challenging in the Northeast” not a key message?

Another unique aspect of this region is that it completely absent in the story of the Regional Greenhouse Gas Initiative. RGGI spans most of the chapter domain and has reduced CO2 emissions from the energy sector while keeping costs increases below average. This is an incredible success story from this region that is highly relevant to the NCA.

Thank you for your comments. The Key Messages have been substantially revised.

Andrew Pershing 141871 Whole Chapter 1E Northeast 642 These key messages are a bit of a mess. They feel like they were written by 5 (or more) different people and that there was very little effort to make them work together in any way. First, the chapter talks about seasons, then seasons & catchment, then rural, urban, then a non-key message that contradicts a point in the seasons key message. The entire chapter would benefit from restructuring these key messages to really focus on the unique aspects of the region. One potential reorganization:

- Instead of all seasons, pick one. The Northeast is known for its harsh winter, so why not talk about them? You could then bring in recreation, and maple sugaring. There is solid science, a strong climate connection, ecosystem impacts, and economic impacts. An alternative would be to focus on hydrology and extreme precipitation as a unique driver recognized in the region.

- Urban. Since urban is so much about infrastructure, you could bring in carbon reductions through Regional Greenhouse Gas Initiative and also bring in some of the stories from KM4 (which isn’t written as a KM yet).

- Coasts and oceans. Considering motivate that with coastal communities (both urban and rural) depend on services...

- Disease. This is one of the strongest points in the entire chapter. Consider elevating it to a KM.

Andrew Pershing 141872 Whole Page 1E Northeast 642 These key messages are a bit of a mess. They feel like they were written by 5 (or more) different people and that there was very little effort to make them work together in any way. First, the chapter talks about seasons, then seasons & catchment, then rural, urban, then a non-key message that contradicts a point in the seasons key message. The entire chapter would benefit from restructuring these key messages to really focus on the unique aspects of the region. One potential reorganization:

- Instead of all seasons, pick one. The Northeast is known for its harsh winter, so why not talk about them? You could then bring in recreation, and maple sugaring. There is solid science, a strong climate connection, ecosystem impacts, and economic impacts. An alternative would be to focus on hydrology and extreme precipitation as a unique driver recognized in the region.

- Urban. Since urban is so much about infrastructure, you could bring in carbon reductions through Regional Greenhouse Gas Initiative and also bring in some of the stories from KM4 (which isn’t written as a KM yet).

- Coasts and oceans. Considering motivate that with coastal communities (both urban and rural) depend on services...

- Disease. This is one of the strongest points in the entire chapter. Consider elevating it to a KM.

Andrew Pershing 141873 Test Region 1E Northeast 642 650 1 7 The logic of this KM is unclear to this reviewer. It seems like you want to talk about NPM in the string of the seasons (winter spring, fall, transitions), but it is written in an absolute sense (warmer, colder). This makes it seem like a generic climate change catch all rather than something really unique.

On appreciate this suggestion. This KM has been written to focus more on seasonality and natural impacts of climate change.

Andrew Pershing 141874 Test Region 1E Northeast 642 650 16 16 The KM does not follow the NCA guidance. It would be better if the first sentence (on impacts) would precede the second last sentence (adaptation). As suggested in my previous comments on the KM, consider building the motivation from coastal communities (both urban and rural) depend on services...

The assertion that adaptive capacity is limited is contradicted by other information in this chapter (notably KM 3). There is actually significant adaptation going on in the marine sector (and even more potential) in the Northeast.

We appreciate the reviewer’s comments and have revised the key message to reflect the content order suggested in the comment. We have also revised the statement regarding adaptive capacity to indicate that it is variable across ecosystems and communities.

Andrew Pershing 141875 Test Region 1E Northeast 642 650 17 24 Essential in what sense? Culturally, perhaps, but the economic activity in the rural parts of any area, especially the Northeast is going to be dispersed by the cities, and this region has some large cities (Boston, New York, Newark, Philadelphia, Baltimore, DC, Pittsburgh, etc.). Writing fisheries here seems wrong. I think we need a KM on marine.

We agree. The Key Message has been revised to address the reviewer’s comment: Text referring to rural

The Key Message has been revised to address the reviewer’s comment: Text referring to fisheries was incorporated into Key Message 2.

Andrew Pershing 141876 Test Region 1E Northeast 642 650 21 29 This is written in the same format as the other KMs in the style used by NCA. It is not very interesting and could possibly be merged with the urban one.

This paragraph needs references.

Thank you for your comment. Figure 1.1 has been provided to orient all readers to the geographic heterogeneity of the Northeast as a region.

Andrew Pershing 141877 Test Region 1E Northeast 644 645 15 25 The second half of this paragraph restates the points from the first, but with references.

This statement “intensely rural and intensely urban” is strange. Intensely urban makes sense (NYC is more intense urban) but there are also vast areas of intense rural.

We agree. Reference example references have been incorporated throughout this paragraph. More-detailed stations are provided in the body of key message 4.

Andrew Pershing 141878 Test Region 1E Northeast 645 646 26 26 This statement “intensively rural and intensely urban” is strange. Intensively urban makes sense (NYC is more intensely urban) but can’t picture what it means when intensely rural. It is out there! There are some major urban areas (the nation’s oldest and most densely populated cities) but there are also vast areas of forests, farms, and small towns.

This isn’t written in the same format at the other KMs nor in the style used by NCA. The challenge begins with the key messages, which do not follow any logical structure. Because the entire body of the chapter does not follow a logical structure, there are some really interesting stories in the chapter that could make for stronger key messages. For example, there is a powerful section on the impact of climate change on Lyme disease and West Nile virus. Here is a “people value being healthy and climate change is making that challenging in the Northeast” not a key message?

Another unique aspect of this region is that it completely absent in the story of the Regional Greenhouse Gas Initiative. RGGI spans most of the chapter domain and has reduced CO2 emissions from the energy sector while keeping costs increases below average. This is an incredible success story from this region that is highly relevant to the NCA.

Thank you for your comments. The Key Messages have been substantially revised.

Andrew Pershing 141880 Test Region 1E Northeast 645 646 25 25 This paragraph restates the points from the first, but with references.

Key references have been added.

Andrew Pershing 141881 Test Region 1E Northeast 646 647 16 16 This is actually the same set with the addition of air quality. Text has been revised as suggested.

Andrew Pershing 141882 Test Region 1E Northeast 647 648 20 21 This is actually the same set with the addition of air quality. Text has been revised as suggested.

Andrew Pershing 141883 Test Region 1E Northeast 647 648 9 16 There are a number of precise statements there that need references.

Andrew Pershing 141884 Test Region 1E Northeast 648 649 18 22 It seems weird to have a figure that has so few data points on it. Aren’t there stream gauges in NY, PA, MO, VA that would otherwise convey the information very quickly and the figure seems like a generic climate change.

The rivers in Dudley et al. (2017) need to meet criteria of having substantial amounts of snowpack, long-term complete data, and flows not substantially impacted by reservoir regulation. These criteria were not met by any stations in the southern part of the region. We have updated the figure by removing the southern part of the region from the figure. We think a map is the best way to present this information. A single time series plot would convey the variability/consistency of results from individual rivers not the location of the rivers.

The sections identified have been rearranged and revised to incorporate the reviewer’s suggestion. The Key Message was revised to focus on the landscape response to changes in seasonality that impact rural and urban communities. This includes changes in phenology, hydrology and wildfires that support natural industries specifically tourism, forestry, and agriculture.

Health issues have been redefined into a new Key Message in the chapter.

Andrew Pershing 141887 Test Region 1E Northeast 650 651 1 11 This is a general climate change discussion.

Andrew Pershing 141888 Test Region 1E Northeast 650 651 24 40 You are burying the lede here. The section is much more interesting and powerful for the NCA audience than the most compelling stories and tell them with data and the literature.

Wow, this is a very cool story. It is unique to this region and seems to be documented. If you could connect it to some major urban areas (the nation’s oldest and most densely populated cities) but there are also vast areas of intense rural.

The assertion that adaptive capacity is limited is contradicted by other information in this chapter (notably KM 3). There is actually significant adaptation going on in the marine sector (and even more potential) in the Northeast.

Andrew Pershing 141889 Test Region 1E Northeast 650 651 25 16 There are a number of precise statements there that need references.

Thank you for your comments. The Key Messages have been substantially revised.

Andrew Pershing 141890 Test Region 1E Northeast 651 652 23 23 These paragraph restates the points from the first, but with references.

Key references have been added.

Andrew Pershing 141891 Test Region 1E Northeast 651 652 15 15 This is actually the same set with the addition of air quality. Text has been revised as suggested.

Andrew Pershing 141892 Test Region 1E Northeast 652 653 20 21 This is actually the same set with the addition of air quality. Text has been revised as suggested.

Andrew Pershing 141893 Test Region 1E Northeast 652 653 9 16 There are a number of precise statements there that need references.
This is a confusing section. First, it says that low-elevation forests are most vulnerable, then it says that spruce-fir forest is generally considered to be occupied by relict species that survive in mountainous regions and that climate change may lead to irreversible changes. The statement about irreversible changes seems extreme. And "irreversibleâ€”may lead to large numbers of evacuated and displaced populations and investment projections would be helpful.

The chapter would benefit from a couple figures showing historical (1805-present) monthly mean temperature and precipitation. Temperature could be shown as anomalies for annual and seasonal (or at least the important months). Precipitation annual total would likely suffice. The temperatures 1805-present could also be supplemented with a figure showing the mean temperature annual cycle for different time intervals (e.g., ca. 1800, 1900, 2000 and projected 2030, 2070). One benefit of the latter is that it provides a visual of how the seasons change with respect to, say, a 32 day julian day. A similar figure could be used in conjunction with discussion on the growing season length and also changes in the snow season.

The statement about irreversible changes seems extreme. And "irreversibleâ€”replaced with "non-reversible" to incorporate this perspective.

The sentence was revised and the term "irreversible" removed to incorporate this perspective.

The text has been revised to incorporate this suggestion and a new reference (Ralston et al. 2015) used.

The paragraph seems to be about fisheries, but there is no mention of fisheries management. The slow response of management was highlighted in the Petchet et al. paper as a contributing factor to the collapse of cod. There is also a new paper by Le Bel et al. (www.pnas.org/cgi/doi/10.1073/pnas.171153) that discusses temperature as a driver of the decline of lobster in the south, the run in the north, and projects future declines in both regions. A major component of this story is the role of management, with protections for large lobsters in Maine conflicting claiming resilience. It would also be good to get the ecological and social impact of fisheries declines in somewhere. The box describing the 2012 story and its impact on lobster is good. Nothing talking about the economic or social challenges due to this.

The chapter would benefit from a couple figures showing historical (1805-present) monthly mean temperature and precipitation. Temperature could be shown as anomalies for annual and seasonal (or at least the important months). Precipitation annual total would likely suffice. The temperatures 1805-present could also be supplemented with a figure showing the mean temperature annual cycle for different time intervals (e.g., ca. 1800, 1900, 2000 and projected 2030, 2070). One benefit of the latter is that it provides a visual of how the seasons change with respect to, say, a 32 day julian day. A similar figure could be used in conjunction with discussion on the growing season length and also changes in the snow season.

The paragraph seems to be about fisheries, but there is no mention of fisheries management. The slow response of management was highlighted in the Petchet et al. paper as a contributing factor to the collapse of cod. There is also a new paper by Le Bel et al. (www.pnas.org/cgi/doi/10.1073/pnas.171153) that discusses temperature as a driver of the decline of lobster in the south, the run in the north, and projects future declines in both regions. A major component of this story is the role of management, with protections for large lobsters in Maine conflicting claiming resilience. It would also be good to get the ecological and social impact of fisheries declines in somewhere. The box describing the 2012 story and its impact on lobster is good. Nothing talking about the economic or social challenges due to this.

The chapter would benefit from a couple figures showing historical (1805-present) monthly mean temperature and precipitation. Temperature could be shown as anomalies for annual and seasonal (or at least the important months). Precipitation annual total would likely suffice. The temperatures 1805-present could also be supplemented with a figure showing the mean temperature annual cycle for different time intervals (e.g., ca. 1800, 1900, 2000 and projected 2030, 2070). One benefit of the latter is that it provides a visual of how the seasons change with respect to, say, a 32 day julian day. A similar figure could be used in conjunction with discussion on the growing season length and also changes in the snow season.

The paragraph seems to be about fisheries, but there is no mention of fisheries management. The slow response of management was highlighted in the Petchet et al. paper as a contributing factor to the collapse of cod. There is also a new paper by Le Bel et al. (www.pnas.org/cgi/doi/10.1073/pnas.171153) that discusses temperature as a driver of the decline of lobster in the south, the run in the north, and projects future declines in both regions. A major component of this story is the role of management, with protections for large lobsters in Maine conflicting claiming resilience. It would also be good to get the ecological and social impact of fisheries declines in somewhere. The box describing the 2012 story and its impact on lobster is good. Nothing talking about the economic or social challenges due to this.

The chapter would benefit from a couple figures showing historical (1805-present) monthly mean temperature and precipitation. Temperature could be shown as anomalies for annual and seasonal (or at least the important months). Precipitation annual total would likely suffice. The temperatures 1805-present could also be supplemented with a figure showing the mean temperature annual cycle for different time intervals (e.g., ca. 1800, 1900, 2000 and projected 2030, 2070). One benefit of the latter is that it provides a visual of how the seasons change with respect to, say, a 32 day julian day. A similar figure could be used in conjunction with discussion on the growing season length and also changes in the snow season.

The paragraph seems to be about fisheries, but there is no mention of fisheries management. The slow response of management was highlighted in the Petchet et al. paper as a contributing factor to the collapse of cod. There is also a new paper by Le Bel et al. (www.pnas.org/cgi/doi/10.1073/pnas.171153) that discusses temperature as a driver of the decline of lobster in the south, the run in the north, and projects future declines in both regions. A major component of this story is the role of management, with protections for large lobsters in Maine conflicting claiming resilience. It would also be good to get the ecological and social impact of fisheries declines in somewhere. The box describing the 2012 story and its impact on lobster is good. Nothing talking about the economic or social challenges due to this.

The chapter would benefit from a couple figures showing historical (1805-present) monthly mean temperature and precipitation. Temperature could be shown as anomalies for annual and seasonal (or at least the important months). Precipitation annual total would likely suffice. The temperatures 1805-present could also be supplemented with a figure showing the mean temperature annual cycle for different time intervals (e.g., ca. 1800, 1900, 2000 and projected 2030, 2070). One benefit of the latter is that it provides a visual of how the seasons change with respect to, say, a 32 day julian day. A similar figure could be used in conjunction with discussion on the growing season length and also changes in the snow season.

The paragraph seems to be about fisheries, but there is no mention of fisheries management. The slow response of management was highlighted in the Petchet et al. paper as a contributing factor to the collapse of cod. There is also a new paper by Le Bel et al. (www.pnas.org/cgi/doi/10.1073/pnas.171153) that discusses temperature as a driver of the decline of lobster in the south, the run in the north, and projects future declines in both regions. A major component of this story is the role of management, with protections for large lobsters in Maine conflicting claiming resilience. It would also be good to get the ecological and social impact of fisheries declines in somewhere. The box describing the 2012 story and its impact on lobster is good. Nothing talking about the economic or social challenges due to this.

The chapter would benefit from a couple figures showing historical (1805-present) monthly mean temperature and precipitation. Temperature could be shown as anomalies for annual and seasonal (or at least the important months). Precipitation annual total would likely suffice. The temperatures 1805-present could also be supplemented with a figure showing the mean temperature annual cycle for different time intervals (e.g., ca. 1800, 1900, 2000 and projected 2030, 2070). One benefit of the latter is that it provides a visual of how the seasons change with respect to, say, a 32 day julian day. A similar figure could be used in conjunction with discussion on the growing season length and also changes in the snow season.
The chapter is a bit uneven in its level of detail for a general audience. It would benefit greatly from a more consistent level of detail throughout. Recommending additional in-text citations in sections now without any at all and translating some of the technical jargon for the general reader.

We have reviewed the chapter text for the evenness of the overall "voice", added in-text citations, and used non-technical language in places of the technical jargon.

These lines are redundant, and repeat verbatim the text on p.643, lines 18-21. Please edit so that text is not exactly duplicative, which is distracting to readers.

Thank you for the comment. The summary overview sections are formatted as required by the NCA report guidance.

<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142209</td>
<td>Text</td>
<td>1B-Northeast</td>
<td>Figure 1B</td>
<td>180</td>
<td>225</td>
<td>14</td>
<td>16</td>
<td>To clarify this sentence, please add &quot;it&quot; after &quot;low&quot; and then their, and &quot;they&quot; before &quot;may become&quot;.</td>
<td>The text has been revised as suggested.</td>
</tr>
</tbody>
</table>

The text has been revised to incorporate the suggestion. Examples of the negative impacts of changing seasonality on forests, wildlife and industry were moved to directly follow this statement.
mental health impacts, weigh heavily on the Northeast in the context of climate change. Please describe whether author team members with expertise and/or experience in cultural and social issues in adaptation plans, and provide a citation to sources in which readers can find more information.

Please provide information on how many states, counties, or municipalities in the Northeast region have existing communities and/or neighborhoods are adapting to climate change. Most readers of the Northeast chapter. Suggest including one more detailed text box of how human conservation and protection goals? If so, please add "simultaneously".

The word order as shown makes this sentence unclear. Suggest reorder text & delete "the" to read, "...most..."

Suggest "are lower" rather than "becomes lower" - for clarity.

This section on climate-health impacts in the Northeast has omitted mention of several important health effects. The text has been revised to incorporate this suggestion.

Suggest replacing "enhanced" with "increased", since "enhance usually refers to something positive, which here, for example, by adding, "which occurs as manmade materials re-radiate absorbed solar heat." Has the "urban heat island effect" been defined for readers elsewhere? If not, please provide a brief definition.

Suggest inserting "at elevations" before "within about 16 feet..." to clarify that these are vertical, not horizontal, distances.

Suggest "traffic" congestion was not added as that falls within forms of transportation disruptions.

Research Program Climate & Health Assessment; or in their 2014 Third US National Climate Assessment, Ch.9 on the actual projected event that's harmful, not the projection.

Suggest that for completeness, add "and ER visits" after "hospitalizations".

We agree that a definition would be helpful and have added a footnote that cites Appendix 5 for the definition. We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information to include and therefore have not revised the chapter. The post-Assessment reports are human health and are lower than the pre-Assessment reports available to the public and it is not our intent to repeat this information in this report - rather to build upon or revise as appropriate. Please see Chapter 14 that provides more discussion on human health.

vulnerability to the harmful effects of heat."

Suggest a brief mention of the connection(s) between erosion and human health, which is the theme of this paragraph.

Suggest removing "excess" to clarify "...1,000 fewer annual excess heat-related ER visits" because "fewer" and "less" are confusing when stated together.

Suggest an expression of "...to build upon or revise as appropriate. Please see Chapter 14 that provides more discussion on human health."

Uncomfortably” has been changed to “health-threatening” as defined by the increase in risk of ER visits at temperatures >80 deg F. Specific heat metrics are defined in the figure itself.

This is an evolving area of research. This knowledge gap is highlighted the traceable account for NK 4.

The text has been modified as suggested

We agree that a definition would be helpful and have added a footnote that cites Appendix 5 for the definition. We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information to include and therefore have not revised the chapter. The post-Assessment reports are human health and are lower than the pre-Assessment reports available to the public and it is not our intent to repeat this information in this report - rather to build upon or revise as appropriate. Please see Chapter 14 that provides more discussion on human health.

Suggest inserting "building" before "codes" for clarity.

It would be great to hear more about what people in the Chesapeake Bay Watershed are doing to build human conservation and protection goals? If so, please add "simultaneously".

Suggest that for completeness, add "and ER visits" after "hospitalizations".

Suggest inserting “Traffice” congestion was not added as that falls within forms of transportation disruptions.

The text was revised to incorporate the additional clarification requested for the plover case study. Examples of wildlife management has been incorporated into the document.

Some questions and suggestions in this example of the piping plover. One, please explain why it is "species of concern" is that because of low population numbers, or because of its ecosystem importance? Two, who uses the "iWolver" smartphone application? -- only readers of this report will benefit from this question which occurs as manmade materials re-radiate absorbed solar heat. We agree that a definition would be helpful and have added a footnote that cites Appendix 5 for the definition. We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information to include and therefore have not revised the chapter. The post-Assessment reports are human health and are lower than the pre-Assessment reports available to the public and it is not our intent to repeat this information in this report - rather to build upon or revise as appropriate. Please see Chapter 14 that provides more discussion on human health.

We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information to include and therefore have not revised the chapter. The post-Assessment reports are human health and are lower than the pre-Assessment reports available to the public and it is not our intent to repeat this information in this report - rather to build upon or revise as appropriate. Please see Chapter 14 that provides more discussion on human health.

Suggest removing "excess" to clarify "...1,000 fewer annual excess heat-related ER visits" because "fewer" and "less" are confusing when stated together.

Suggest "are lower" rather than "becomes lower" - for clarity.

Suggest replacing "enhanced" with "increased", since "enhance usually refers to something positive, which here, for example, by adding, "which occurs as manmade materials re-radiate absorbed solar heat." Has the "urban heat island effect" been defined for readers elsewhere? If not, please provide a brief definition.

The word order as shown makes this sentence unclear. Suggest reorder text & delete "the" to read, "...most..."

Suggest "are lower" rather than "becomes lower" - for clarity.

Suggest that for completeness, add "and ER visits" after "hospitalizations".

We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information to include and therefore have not revised the chapter. The post-Assessment reports are human health and are lower than the pre-Assessment reports available to the public and it is not our intent to repeat this information in this report - rather to build upon or revise as appropriate. Please see Chapter 14 that provides more discussion on human health.
flooding: riverine flooding and heavy and long duration rainfall. We suggest including additional sources of climate change hazards includes recurrent coastal flooding. Flooding hazards in the NE include etc.) to the regional impacts/key messages.

Aside from one sentence in Key Message #1 (The region can expect irreversible changes... the extent have models actually been used to evaluate what happens after decades of reduced greenhouse gas emissions? I think you need to be careful about the use of irreversible. Also note that on page 677, it says that there is very high confidence in this statement regarding irreversible changes. I believe that there is very high confidence that the changes described will occur. But is there also very high confidence in the irreversibility of these changes? The chapter text has been revised to reflect this comment.

Please provide in this chapter either a description, or a note on where to find a description, of the distinction between "Likelihood" and "Confidence" as applied in the Traceable Accounts. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

This section on Key Message 3 seems to be skewed toward coastal communities, with inland communities not being impacted by climate change. We suggest including text that specifically mentions vulnerable populations in these key messages. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The incidence of increased coastal flooding is much more certain because sea level rise is driven because they depend upon intense precipitation as well as factors such as snowpack amounts and antecedent soil moisture. The chapter text has been revised to reflect this comment.

While minor/moderate inundation flooding has increased in the Northeast during the last century, there is currently insufficient evidence to conclude that major inundation flooding has increased despite some high profile events such as flooding related to hurricanes. Also, increases in future major flooding across the region are uncertain as they are impacted by not only intense precipitation but also by factors such as increased amounts and antecedent soil moisture. Increased coastal flooding is much more certain because sea level rise is driven primarily by temperature increases. We therefore think the current text relevant to this comment is appropriate. We do discuss implications of future change in many places in the chapter. The text has been revised to reflect this.

Do less predictable mean more variability in the model predictions, or just more uncertainty? We suggest including language that specifically mentions vulnerable populations in these key messages. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The symbology used in the legend has been updated and the southern part of the region removed as no data exist in the study from which this figure was derived. This eliminates large geographic areas for which there are no results.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

This information is to be provided in the chapter. The table has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

We suggest that these statements be revised to reflect the current understanding of the science. The text has been revised to reflect this comment. The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The chapter text has been revised to reflect this comment. The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.
If not already messages, language about vulnerable populations should be highlighted in the summary overview. This comment is related to a previous comment. The NE has many vulnerable populations (elderly, children, indigenous, poor, etc.) in both rural and urban communities. As climate change is superimposed on existing vulnerabilities, we suggest including language that specifically mentions vulnerable populations in these key messages.

We have added additional language about vulnerable populations in the key messages.

Figure 18.5 has been replaced with a new figure and caption. This comment does not appear to raise a question or suggest a revision.

We appreciate this comment, but space and references specific to the region that meet LGI standards are only available in the appendices. When possible, we have included some additional local and state sources related to sea level rise in the Key Message 5.

The duplicative text on this page has been removed.

We recognize these may have been some confusion due to the way the text was written. We have revised the text to specify that this is associated with rates in the mid-Atlantic region, and make clear the potential contributions to this increase. Although we appreciate the suggestion to consider the historic record, space is limited, and after deliberation with the author team, we have elected not to expand this section further.

The text in this section about higher rates of sea level rise in the NE is confusing. It discusses sea level rise rates that apply to the entire Northeast. We have added the following reference: Ezer, T., and W. B. Corlett (2012), is sea level rise accelerating in the north Atlantic? A demonstration of a new approach for analyzing sea level data, Geophys. Res. Lett. 39, L11601, doi:10.1029/2012GL051305.

We recognize these may have been some confusion due to the way the text was written. We have revised the text to provide clarification as potential contributors to the recent trend. “North of Cape Hatteras, NC several decades of tide-gauge data through 2009 along the mid-Atlantic Coast have shown sea-level rise rates were those to four times higher than the global average rate (Kudrass et al. 2012; Roen et al. 2012; Ezer et al. 2012) (Figure 18.6). The region’s sea-level rate of rise is increased by land subsidence (sinking)—largely due to vertical land movement related to the drooping of glaciers from the last ice age— which lowers much of the land relative to current sea level (Sebald et al. 2009; Karaman et al. 2013; Lave et al. 2013; Swart et al. 2017). Additionally, shorter-term fluctuations in the variability of ocean currents (Kopp 2012; Rahmstorf et al. 2013), atmospheric shifts (Cane-Leventhal et al. 2013), and/or mass loss from Greenland and Antarctica (Stuiver and Viovy, 2017) have been connected to these recent accelerations in the SLR rate in the region.”

We appreciate the reviewer’s comment about the report and hope that the content is useful. Please note that interdependencies is also discussed in other part of the report including Chapters 11 and 17.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table/Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ken</td>
<td>McFreely</td>
<td>143101</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143101</td>
<td>21</td>
<td>15</td>
<td>1</td>
<td>22</td>
<td>This section discusses some of the issues that climate change poses to water systems (supply and wastewater) and the resulting health impacts. In addition to everything mentioned, we highly suggest that this section includes language about the great risk of inundation to wastewater infrastructure given the location of these assets. Water infrastructure including infrastructure like outfalls or wastewater or water treatment plants is often located in current or future floodplains and may be vulnerable to flooding and damage associated with storm surge. Another potential natural location to make this could be on page 657, lines 28 to 30.</td>
<td>We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information to include and therefore have not revised the chapter.</td>
</tr>
<tr>
<td>Ken</td>
<td>McFreely</td>
<td>143131</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143131</td>
<td>26</td>
<td>12</td>
<td>1</td>
<td>26</td>
<td>Is this sentence implying that planting trees leads to increase in VOCs? This wording is unknown. If trees can be a source of VOCs, this should be explained further.</td>
<td>The authors concluded this comment and agree that this sentence appropriately constructed as written.</td>
</tr>
<tr>
<td>Casey</td>
<td>Thornbrugh</td>
<td>143100</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143100</td>
<td>24</td>
<td>14</td>
<td>1</td>
<td>24</td>
<td>We added the sentence: &quot;from Atlantic and Indigenous Peoples to Atlantic and Indigenous Peoples and Tribal Nations.&quot; Paragraph: &quot;...more consecutive hours.&quot;</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Casey</td>
<td>Thornbrugh</td>
<td>143101</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143101</td>
<td>16</td>
<td>15</td>
<td>1</td>
<td>16</td>
<td>We revised the sentence: &quot;Atlantic and Indigenous peoples and tribal communities of the Northeast region have millennia-long relationships with the diverse landscapes and climate zones found throughout the region. It is clear that Indigenous peoples and tribal nations of the Northeast region have millennia-long relationships with the diverse landscapes and climate zones found throughout the region. It is clear that.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Casey</td>
<td>Thornbrugh</td>
<td>143102</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143102</td>
<td>17</td>
<td>17</td>
<td>1</td>
<td>17</td>
<td>There are actually 56,000 federally recognized tribes in the Northeast. See: <a href="https://www.fs.usda.gov/main/northeast/tribalprograms/map.html">https://www.fs.usda.gov/main/northeast/tribalprograms/map.html</a>.</td>
<td>The text has been revised to incorporate this suggestion.</td>
</tr>
<tr>
<td>Casey</td>
<td>Thornbrugh</td>
<td>143103</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143103</td>
<td>9</td>
<td>11</td>
<td>1</td>
<td>11</td>
<td>Add to the sentence: &quot;Relevant planning and climate change adaptation in order to preserve the cultural, economic, and natural heritage of the Northeast would require ongoing collaboration among tribal, rural, and urban communities as well as municipal, state, and federal agencies. It is clear that.</td>
<td>The text has been revised to incorporate this suggestion.</td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>143173</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143173</td>
<td>9</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>The revised Figure 18.1 is a locational map of the states in the Northeast Region, that includes population density, major river systems, and the Great Lakes. It is clear that.</td>
<td>The text has been revised to incorporate this perspective.</td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>143174</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143174</td>
<td>20</td>
<td>9</td>
<td>9</td>
<td>20</td>
<td>This is a point that has been addressed in the revision.</td>
<td>The revised figure 18.1 is a locational map of the states in the Northeast Region, that includes population density, major river systems, and the Great Lakes. The text was revised to include the locational map of the Northeast region.</td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>143175</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143175</td>
<td>20</td>
<td>29</td>
<td>29</td>
<td>20</td>
<td>Add the word &quot;agriculture&quot; after &quot;rural areas.&quot; The text has been revised to include this recommendation.</td>
<td>The text has been revised to include this recommendation.</td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>143176</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143176</td>
<td>6</td>
<td>18</td>
<td>18</td>
<td>6</td>
<td>Implementing resiliency planning and climate change adaptation in order to preserve the cultural, economic, and natural heritage of the Northeast would require ongoing collaboration among tribal, rural, and urban communities as well as municipal, state, and federal agencies. It is clear that.</td>
<td>The text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>143177</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143177</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>Add language isolated after &quot;recent immigrants.&quot; It is clear that.</td>
<td>The text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>143178</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143178</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>As there are multiple reasons for the exacerbation at the coastal margins, the following language additions are suggested. It is clear that.</td>
<td>The text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>143179</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143179</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>Add to the sentence: &quot;Natural hazards like drought and flooding are considered the two major environmental stressors that have the potential to increase the risk of adverse health effects due to climate change. It is clear that.</td>
<td>The text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>143180</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143180</td>
<td>11</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>As a demonstration on the concern for migration island, the Farmer’s Valley Planning Commission in Massachusetts climate adaptation plan includes sea level rise as a concern, not for flooding, but for a influx of migrants from the coastal regions. It is clear that.</td>
<td>The text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>143181</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143181</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>More emphasis should be placed on urban quality in this chapter. Specifically, there is a high confidence that severe and particularly urban areas are suffering as a result of climate change. It is clear that.</td>
<td>We appreciate this suggestion, but space is limited. Note that the Chapter 13 map for summertime ozone concentrations and snow shows the Northeast add regarding experiencing worsening or improving conditions. As noted in Chapter 13, PM2.5 projections have noted uncertainty about future concentrations, with some suggestion of decreases in response to increased controls and some suggestion of increases based on changes in environmental factors that influence PM2.5 concentrations.</td>
</tr>
<tr>
<td>Ken</td>
<td>Moraff</td>
<td>143182</td>
<td>Text Region</td>
<td>18: Northeast</td>
<td>143182</td>
<td>12</td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>Add impact interactions among species &quot;after&quot; by species. Delete &quot;Def.&quot; and begin new sentence: &quot;It is clear that...&quot; The text has been revised to incorporate the suggestion.</td>
<td>The text has been revised to incorporate the suggestion.</td>
</tr>
</tbody>
</table>

**Explanation:** The table above highlights comments and revisions made to the chapter text based on reviewer feedback. Each comment is paired with a response indicating whether the change was incorporated into the chapter or if space limitations prevented revision.
The impacts of climate change on the health of residents of the Northeast are now described in a separate key message to address this and other points.

We thank the commenter. The text has been revised to reflect this comment.

The duplicative text on this page has been removed.

The text has been revised to reflect these changes.

It seems to me the first point ultimately covers more than human health aspects—saying that seemed to me to... would be helpful.

We have added additional details where possible (oceans KM, health KM, and in the traceable accounts). The majority of magnitude of these numbers are contained in the CSSR.

The text has been revised to reflect this comment. Sub-headings have been added throughout the chapter.

We thank the commenter. We added additional details where possible (oceans KM, health KM, and in the traceable accounts). The majority of magnitude of these numbers are contained in the CSSR.

The duplicative text on this page has been removed.

The key messages have been revised to provide consistency, more specificity, and reflect the content in the narrative. The traceable accounts have been updated to reflect these changes.

The text has been revised to reflect this comment. Sub-headings have been added throughout the chapter.

We thank the commenter. The impacts of climate change on the health of residents of the Northeast are now described in a separate key message to address this and other points.

We thank the commenter. The text has been revised to reflect this point.

Additional text regarding barriers to action have been added.

The duplicative text on this page has been removed.

The text has been revised as necessary.

Additional details where possible (oceans KM, health KM, and in the traceable accounts). The majority of magnitude of these numbers are contained in the CSSR.

We have added additional details where possible (oceans KM, health KM, and in the traceable accounts). The majority of magnitude of these numbers are contained in the CSSR.

The duplicative text on this page has been removed.

The text has been revised as necessary.

We thank the commenter. We added additional details where possible (oceans KM, health KM, and in the traceable accounts). The majority of magnitude of these numbers are contained in the CSSR.

The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We added additional details where possible (oceans KM, health KM, and in the traceable accounts). The majority of magnitude of these numbers are contained in the CSSR.

The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.

We thank the commenter. The text has been revised to reflect this point.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144473</td>
<td>Field Region</td>
<td>Northeast</td>
<td></td>
<td>115</td>
<td>166</td>
<td>2</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144474</td>
<td>Field Region</td>
<td>Northeast</td>
<td></td>
<td>170</td>
<td>179</td>
<td>16</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144475</td>
<td>Whole Chapter</td>
<td>Northeast</td>
<td></td>
<td>721</td>
<td>721</td>
<td>11</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Grant</td>
<td>Mills</td>
<td>140866</td>
<td>Whole Chapter</td>
<td>Southeast</td>
<td></td>
<td>31</td>
<td>31</td>
<td>11</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

There is no mention here that what is a lot going up is the air. Temperature in the absolute humidity will be overall temperatures feel a lot warmer, that is, the discomfort index goes up more than the temperature. This increase in absolute humidity will have very important implications for the air conditioning load as it takes of order 20 times as much energy to pull the temperature of moist air down as it takes for dry air. Keeping absolute humidity down in buildings will require tightening up of the buildings, and this itself can have health effects; indeed, frequently going in and out of air-conditioned buildings would seem likely to cause health problems.

The call out box has been re-named to better represent the content and the focus on historical sites and cultural landscapes.

We agree that adding RCP 8.5 would be helpful, and have made the addition.

We appreciate the suggestion and have determined that the current figure illustrates what one Southeast coastal city, Charleston, has done to address sea level rise. Their sea level rise strategy came out before the Sweet et al., 2017 and NCAS OSIR, thus used previously available federal scenarios (i.e., USGCRP and NOAA - NCAS). We think it important to show existing work on this. The City of Charleston is discussing possibly adding their guidance to include the NCAS scenarios.

Comment noted and corrected in the text.

Comment noted. Yes, there may be non-Tribal community members on the Isle de Jean Charles, however this case study focuses on the resettlement of a Tribal community through funds allocated by Housing and Urban Development awards to the State of Louisiana.

The call out box has been re-named to better represent the content and the focus on historical sites and cultural landscapes.

The call out box has been re-named to better represent the content and the focus on historical sites and cultural landscapes.

The call out box has been re-named to better represent the content and the focus on historical sites and cultural landscapes.

Comment noted. Yes, there may be non-Tribal community members on the Isle de Jean Charles, however this case study focuses on the resettlement of a Tribal community through funds allocated by Housing and Urban Development awards to the State of Louisiana. The Rockefeller Foundation provided key technical assistance to the applicants.

The call out box has been re-named to better represent the content and the focus on historical sites and cultural landscapes.

We agree that adding RCP 8.5 would be helpful, and have made the addition.

We appreciate the suggestion and have determined that the current figure illustrates what one Southeast coastal city, Charleston, has done to address sea level rise. Their sea level rise strategy came out before the Sweet et al., 2017 and NCAS OSIR, thus used previously available federal scenarios (i.e., USGCRP and NOAA - NCAS). We think it important to show existing work on this. The City of Charleston is discussing possibly adding their guidance to include the NCAS scenarios.

We agree that adding RCP 8.5 would be helpful, and have made the addition.

We appreciate the suggestion and have determined that the current figure illustrates what one Southeast coastal city, Charleston, has done to address sea level rise. Their sea level rise strategy came out before the Sweet et al., 2017 and NCAS OSIR, thus used previously available federal scenarios (i.e., USGCRP and NOAA - NCAS). We think it important to show existing work on this. The City of Charleston is discussing possibly adding their guidance to include the NCAS scenarios.

We agree that adding RCP 8.5 would be helpful, and have made the addition.

We appreciate the suggestion and have determined that the current figure illustrates what one Southeast coastal city, Charleston, has done to address sea level rise. Their sea level rise strategy came out before the Sweet et al., 2017 and NCAS OSIR, thus used previously available federal scenarios (i.e., USGCRP and NOAA - NCAS). We think it important to show existing work on this. The City of Charleston is discussing possibly adding their guidance to include the NCAS scenarios.

We agree that adding RCP 8.5 would be helpful, and have made the addition.

We appreciate the suggestion and have determined that the current figure illustrates what one Southeast coastal city, Charleston, has done to address sea level rise. Their sea level rise strategy came out before the Sweet et al., 2017 and NCAS OSIR, thus used previously available federal scenarios (i.e., USGCRP and NOAA - NCAS). We think it important to show existing work on this. The City of Charleston is discussing possibly adding their guidance to include the NCAS scenarios.

We agree that adding RCP 8.5 would be helpful, and have made the addition.

We appreciate the suggestion and have determined that the current figure illustrates what one Southeast coastal city, Charleston, has done to address sea level rise. Their sea level rise strategy came out before the Sweet et al., 2017 and NCAS OSIR, thus used previously available federal scenarios (i.e., USGCRP and NOAA - NCAS). We think it important to show existing work on this. The City of Charleston is discussing possibly adding their guidance to include the NCAS scenarios.
climate change will have negative impacts has yet to be determined and appears increasingly unlikely. These projections appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely. The present text says this: 13 Sea Level Rise: Intense flooding, and vector-borne disease could effect the viability and 15 diversity of metropolitan areas. Comment: This text falsely states speculative projections of impacts as established physical facts. These projections appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely. The test was revised to incorporate this perspective.

David Koepf 141708 First Name: David Last Name: Koepf Comment ID: 141708 Comment Type: First Name: Southeast Chapter: 13 Sea Level Rise: Intense flooding, and vector-borne disease could effect the viability and 15 diversity of metropolitan areas. Comment: This text falsely states speculative projections of impacts as established physical facts. These projections appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely. The present text says this: 13 Sea Level Rise: Intense flooding, and vector-borne disease could effect the viability and 15 diversity of metropolitan areas. Comment: This text falsely states speculative projections of impacts as established physical facts. These projections appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely. The present text says this: 13 Sea Level Rise: Intense flooding, and vector-borne disease could effect the viability and 15 diversity of metropolitan areas. Comment: This text falsely states speculative projections of impacts as established physical facts. These projections appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely. The present text says this: 13 Sea Level Rise: Intense flooding, and vector-borne disease could effect the viability and 15 diversity of metropolitan areas. Comment: This text falsely states speculative projections of impacts as established physical facts. These projections appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely. The comment is inconsistent with the current text of the state's climate change plan. The present text says this: 13 Sea Level Rise: Intense flooding, and vector-borne disease could effect the viability and 15 diversity of metropolitan areas. Comment: This text falsely states speculative projections of impacts as established physical facts. These projections appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely. The present text says this: 13 Sea Level Rise: Intense flooding, and vector-borne disease could effect the viability and 15 diversity of metropolitan areas. Comment: This text falsely states speculative projections of impacts as established physical facts. These projections appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely. The comment is consistent with the current text of the state's climate change plan.
The chapter discusses key consequences of climate change in the region. It appropriately identifies the key areas of concern. One overall comment, however, is that the discussion and treatment of coastal cities is not as detailed as expected. The current section does not provide enough detail to address this issue. We have added cross references to provide more information.

**First Name** | **Last Name** | **Comment ID** | **Comment Type** | **Chapter** | **Figure/Table Number** | **Start Page** | **End Page** | **End Line** | **Comment** | **Response**
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
David | Wopick | 141731 | Text Region | Southeast | 19 | 29 | 78 | 7 | The present text says this: "...1 increases frequent...". This statement could be improved by providing more specific examples or statistics. | Thank you for your comment. We have updated the text to include more specific examples. |
David | Wopick | 141732 | Text Region | Southeast | 19 | 29 | 78 | 7 | The present text says this: "...1 increases frequent...". This statement could be improved by providing more specific examples or statistics. | Thank you for your comment. We have updated the text to include more specific examples. |
David | Peterson | 142030 | Text Region | Southeast | 19 | 31 | 79 | 14 | What is a "critical foundation plant species"? | The definition of "critical foundation plant species" is provided in the chapter. |
David | Peterson | 142031 | Text Region | Southeast | 19 | 31 | 79 | 14 | Because most of the forest benefits privately owned, forest managers have several options for adapting actively and quickly to altered conditions. Timing and prescribed burning are already standard practice, and short rotations allow for periodic modification of management practices. This suggests that actively managed forests may not be as vulnerable as suggested in the first sentence of this paragraph. | The comment is well-taken. We have updated the text to reflect this information. |
David | Peterson | 142032 | Whole Chapter | Southeast | 19 | 31 | 79 | 14 | The chapter implies that Southen forests are vulnerable to climate change, but many of the actual effects are rather vague, as are the mechanisms. A more compelling discussion with supporting literature (including in the Traceable Accounts) would be more convincing. No need to state severe effects of climate change if they are not likely. | The comment is well-taken. We have updated the text to reflect this information. |
Kathy | Lynn | 142539 | Whole Chapter | Southeast | 19 | 31 | 79 | 14 | Suggest including adaptation case studies from recent State of Adaptation in Water Resources Management: Southeastern United States and U.S. Caribbean to give some concrete examples of how climate adaptation is currently occurring in the region. | We have added the case studies you suggested. |
Laura | Corruble | 142666 | Whole Chapter | Southeast | 19 | 31 | 79 | 14 | Does the reviewer have the reference? Is there a demand for climate change adaptation? | We have added the reference you suggested. |
Laura | Corruble | 142667 | Whole Chapter | Southeast | 19 | 31 | 79 | 14 | There is also limited coverage on the likelihood of increases in wildfires in the region. It is very difficult to identify wildfire trends. The increase in temperatures and drying overall may lead to severe wildfire impacts. | We have added the reference you suggested. |
Laura | Corruble | 142668 | Whole Chapter | Southeast | 19 | 31 | 79 | 14 | Similar to wildfires, the flooding issues experienced across the SE were given limited coverage. | We have added the reference you suggested. |
Kathy | Mills | 142105 | Whole Chapter | Southeast | 19 | 31 | 79 | 14 | Recommend to add the title by the full name in the title, "Tide de Juan Charles-Band de Bâble-Chimantu-Chotrone Tribe" as shown on the title's website: http://www.skipekipekachoral.com/ | We have added the title as suggested. |
Social Science | Coordination Committee | 142556 | Whole Chapter | Southeast | 19 | 31 | 79 | 14 | The chapter discusses the impacts of climate change in the region. It appropriately identifies the key areas of concern. One overall comment, however, is that the discussion and treatment of coastal cities is not as detailed as expected. The current section does not provide enough detail to address this issue. We have added cross references to provide more information. | We have added cross references to help ensure that these mechanisms are clearly documented and supported by current literature, and that we have addressed this issue. We have also added cross-linked to the French Chapter of the broader NCA4 document that include additional details about these mechanisms and literature behind forest vulnerabilities in the SE and other regions. |
The end result for the Chesapeake should be clearly stated, which is that the plant will disappear from their for flood management, although these activities are also in response to high tide flooding, not just extreme flooding was already discussed on p. 727. The paragraph starting on p. 734 line 23 discusses adaptive activities line 1-5 states that "Sea level rise is already causing an increase in high tide flood events...." although high tide flooding is now really an issue for the study region. It's great that the report will reflect on the recent extreme events that affected the region. For this special topic, there is an opportunity to also reflect on the social vulnerability and what may have driven climate impacts, and how social vulnerability and resilience outcomes may vary across community and population groups, and why. One point that should be made is how adaptive capacity varies across community and population groups, which may have determined the outcome. Taking the case of Hurricane Harvey and Irma, with similar historical levels, the outcomes were very different - cities in FL, for example, had learned from past experience and implemented policies (such as building code, land use planning) to enhance resilience and infrastructure and the cities, whereas in regions affected by Hurricane Harvey in Texas, land use planning did not take into consideration the future risks of extreme weather events and the area displayed significant vulnerabilities and resulting damages from extreme events.

While Mitigation and Adaptation are not given equal attention in this document - it focused on impacts and possible adaptation actions, the text was revised by adding "mitigation" to acknowledge that aspect as well. Houston, Texas is not in our region so cannot be used as an example not comparison here. However, other locations are highlighted throughout the chapter as to their sustainability or climate adaptation efforts. The information on flooding is somewhat disjointedly distributed throughout the chapter. For example p. 733 of the 1-5 states that "Sea level rise is already causing an increase in high tide flood events..." although high tide flooding was already discussed on p. 727. The paragraph starting on p. 734 the 23 discusses adaptive activities for flood management, although these activities are also in response to high tide flooding, not just extreme coastal floods. The text in this section was revised to incorporate the opportunity to mitigate greenhouse gas emissions in growing urban areas. Specifically, "mitigation" was added in the first paragraph. Mitigation activities are also discussed in the infrastructure section, however, because there is not a strong focus on greenhouse gas mitigation strategies in the Southeast chapter, this text was not included in the key message itself.

Given the vulnerability of the southeast to hurricanes and growing challenge of emergency response planning in urban areas like Houston, this should be included in Key Message 1. The case study doesn't currently fit well where it is placed in the chapter. It comes after the section on historical cases and certainly be included in the Southeast chapter. It's great that the report will reflect on the recent extreme events that affected the region. For this special topic, there is an opportunity to also reflect on the social vulnerability and what may have driven climate impacts, and how social vulnerability and resilience outcomes may vary across community and population groups, and why. One point that should be made is how adaptive capacity varies across community and population groups, which may have determined the outcome. Taking the case of Hurricane Harvey and Irma, with similar historical levels, the outcomes were very different - cities in FL, for example, had learned from past experience and implemented policies (such as building code, land use planning) to enhance resilience and infrastructure and the cities, whereas in regions affected by Hurricane Harvey in Texas, land use planning did not take into consideration the future risks of extreme weather events and the area displayed significant vulnerabilities and resulting damages from extreme events.

While Mitigation and Adaptation are not given equal attention in this document - it focused on impacts and possible adaptation actions, the text was revised by adding "mitigation" to acknowledge that aspect as well.

The text in this section was revised to incorporate the opportunity to mitigate greenhouse gas emissions in growing urban areas. Specifically, "mitigation" was added in the first paragraph. Mitigation activities are also discussed in the infrastructure section, however, because there is not a strong focus on greenhouse gas mitigation strategies in the Southeast chapter, this text was not included in the key message itself.

The case study doesn't currently fit well where it is placed in the chapter. It comes after the section on historical cases and certainly be included in the Southeast chapter. It's great that the report will reflect on the recent extreme events that affected the region. For this special topic, there is an opportunity to also reflect on the social vulnerability and what may have driven climate impacts, and how social vulnerability and resilience outcomes may vary across community and population groups, and why. One point that should be made is how adaptive capacity varies across community and population groups, which may have determined the outcome. Taking the case of Hurricane Harvey and Irma, with similar historical levels, the outcomes were very different - cities in FL, for example, had learned from past experience and implemented policies (such as building code, land use planning) to enhance resilience and infrastructure and the cities, whereas in regions affected by Hurricane Harvey in Texas, land use planning did not take into consideration the future risks of extreme weather events and the area displayed significant vulnerabilities and resulting damages from extreme events.

While Mitigation and Adaptation are not given equal attention in this document - it focused on impacts and possible adaptation actions, the text was revised by adding "mitigation" to acknowledge that aspect as well.

The text in this section was revised to incorporate the opportunity to mitigate greenhouse gas emissions in growing urban areas. Specifically, "mitigation" was added in the first paragraph. Mitigation activities are also discussed in the infrastructure section, however, because there is not a strong focus on greenhouse gas mitigation strategies in the Southeast chapter, this text was not included in the key message itself.

The case study doesn't currently fit well where it is placed in the chapter. It comes after the section on historical cases and certainly be included in the Southeast chapter. It's great that the report will reflect on the recent extreme events that affected the region. For this special topic, there is an opportunity to also reflect on the social vulnerability and what may have driven climate impacts, and how social vulnerability and resilience outcomes may vary across community and population groups, and why. One point that should be made is how adaptive capacity varies across community and population groups, which may have determined the outcome. Taking the case of Hurricane Harvey and Irma, with similar historical levels, the outcomes were very different - cities in FL, for example, had learned from past experience and implemented policies (such as building code, land use planning) to enhance resilience and infrastructure and the cities, whereas in regions affected by Hurricane Harvey in Texas, land use planning did not take into consideration the future risks of extreme weather events and the area displayed significant vulnerabilities and resulting damages from extreme events.
Michael MacCracken 144476 Test Region 19 - Southeast 194 198 24 26 A fire case study is mentioned, yet there is no fire case study. The paragraph should also mention the health risks from smoking wildfire smoke. [https://www.epa.gov/airquality/health-effects-wildfire-smoke-2016.pdf] The fire case study referenced in this chapter is not included. The text has been adjusted to clarify this.

Michael MacCracken 144477 Test Region 19 - Southeast 22 26 Perhaps a more detailed explanation of the forest ecosystem services value is important: Each of these services, such as oxygen, provides substantial benefits to ecosystems and society. This service value must be recognized to promote more sustainable forest management. The text has been adjusted to reflect this.

Andrea Galiano 144499 Test Region 19 - Southeast 714 718 15 It seems like there is quite a bit of overlap between Key messages 1. and 2. It does make sense to clarify Key message 2 further to make these two more distinct. We have changed Key 2 to be more specific about what is covered in this section and believe this addresses the overlap we had made.

Andrea Galiano 144590 Figure 19 - Southeast 132 Really like the chart on page 23, it shows how the above sea level estimate was established and compares to historic changes in other curves (Charles River, etc.). We greatly appreciate the reviewer's comment.

Andrea Galiano 144591 Table 19 - Southeast 13.1 133 Add Hurricane Harvey to table. The point the commenter is making is beyond the scope of this chapter/report and we have not revised the text. Hurricane Harvey should be covered in the SW chapter as there were much greater impacts in that region.

Andrea Galiano 144593 Test Region 19 - Southeast 739 742 16 Need to acknowledge that natural causes, including changing phase of the moon, do not account for any future flood risk due to the increasing frequency of more intense precipitation events, as well as new development and the rising seas. The floodplain's ability to manage stormwater is continually developing with natural controls and human interventions. The text has been revised to incorporate this perspective.

Andrea Galiano 144594 Test Region 19 - Southeast 781 785 2 Perhaps also summarize world’s ecosystem services value if still as well. [e.g. Mississippi River Delta is asked at $1.3 trillion dollars], in order to give readers a sense of the magnitude of value (vs. per acre). For example, a report published by Earth Economics (2010), states that the Mississippi River Delta provides at least $12–$47 billion in benefits to people each year: if this natural capital were treated like an economic asset, its value would be $390 billion to $1.3 trillion per year. Over a 100-year period, the value of the coast’s ecological services alone would be between $237 billion and $47 trillion. (Webler, D., Trim, J., Costanza, R., Swanson, P., Day, L., Bounoua, R., Riggs, K. (2016). Clearing Ground. Wetlands, Hurricanes and the Economy: The Value of Restoring the Mississippi River Delta, Earth Economics, Taxas, Ark.). The text has been revised as follows: “The coast’s benefits provided by coastal wetlands are enormous (Costanza et al. 2014). Hence, where coastal wetlands are abundant (for example, the Mississippi River Delta), their cumulative value can be worth billions of dollars each year and trillions of dollars over a 100-year period (Bounoua et al. 2016).”

Andrea Galiano 144595 Test Region 19 - Southeast 744 749 23 Update text to “However, between 1920–2015, Louisiana lost 2,006 square miles of land area (Couvillion et al. 2017...”). From [https://www.usgs.gov/news/usgs-louisiana-s-rate-coastal-wetland-loss-continues-slow]” We agree and greatly appreciate the reviewer’s observation and comment. We have updated as follows: “However, between 1920–2015, Louisiana lost 2,006 square miles of land area (Couvillion et al. 2017).”

Andrea Galiano 144596 Test Region 19 - Southeast 744 747 27 “...if fact, it would be fascinating to have a similar diagram of the changes in wet bulb temperatures over the various decades.” We agree and greatly appreciate the reviewer’s observation and comment. We have added Hurricane Harvey to table. The text has been adjusted to reflect this.

Andrea Galiano 144598 Test Region 19 - Southeast 754 756 6 “Add ‘New Orleans 2015’ to the list of plans to deal with climate change...” We agree and greatly appreciate the reviewer’s observation and comment. We have added “New Orleans 2015” to the list of plans to deal with climate change...”

Michael MacCracken 144476 Test Region 19 - Southeast 714 719 36 “It is not just the temperature that goes up, but also the absolute humidity, so the discomfort index goes up more than the temperature. This also has significant effects on electricity demands for air conditioning as it takes something like 20 times as much energy to cool moist air a degree as to cool dry air...” This text was updated as follows: “It is not just the temperature that goes up, but also the absolute humidity, so the discomfort index goes up more than the temperature. This also has significant effects on electricity demands for air conditioning as it takes something like 20 times as much energy to cool moist air a degree as to cool dry air...”

Michael MacCracken 144477 Test Region 19 - Southeast 718 720 29 “...and often humid” The text has been adjusted to include “and often humid” in the sentence - so “...it would be interesting to know what was happening to the wet bulb temperature...”

Michael MacCracken 144478 Test Region 19 - Southeast 719 720 3 “So, clearly, exactly...” We agree and greatly appreciate the reviewer’s observation and comment. The text has been adjusted to include “So, clearly, exactly...” in the sentence.

Michael MacCracken 144479 Test Region 19 - Southeast 728 729 12 “...and often humid” The text has been adjusted to include “...and often humid” in the sentence.

Michael MacCracken 144480 Test Region 19 - Southeast 728 729 37 “...it would be interesting to know what was happening to the wet bulb temperature...” We agree and greatly appreciate the reviewer’s observation and comment. The text has been adjusted to include “...it would be interesting to know what was happening to the wet bulb temperature...”

Michael MacCracken 144481 Test Region 19 - Southeast 728 732 37 “...and often humid” The text has been adjusted to include “...and often humid” in the sentence.

Michael MacCracken 144482 Test Region 19 - Southeast 729 736 2 Need to change “well-explorated” to “are projected to experience.” The text has been revised to include “well-explorated” to “are projected to experience.”

Michael MacCracken 144483 Test Region 19 - Southeast 731 736 4 “...is beyond the scope of this chapter.” We agree and greatly appreciate the reviewer’s observation and comment. The text has been revised to include “...is beyond the scope of this chapter.”

Michael MacCracken 144485 Test Region 19 - Southeast 734 736 23 “...or patterns” We agree and greatly appreciate the reviewer’s observation and comment. The text has been revised to include “...or patterns” in the sentence.
climate change will have negative impacts has yet to be determined and appears increasingly unlikely.\footnote{This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.}

Key Message 4: Social well-being, terrestrial ecosystems, agricultural services and socio-economic systems are threatened by rising temperatures. Increased key ecosystem services such as commercial and recreational fisheries and coastal protection. These systems are threatened by changes in ocean surface temperature and acidity, sea level rise, and changes in the frequency and intensity of storms. The impact of these changes on key ecosystem services, including those targeted for protection by the tribe, could be more severe if the tribe’s relocation is incomplete or unsuccessful. The tribe’s relocation is complete or a success; this is yet to be seen.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.

Comment: This entire message falsely states speculative projections of impacts as established physical facts. The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are “questionable”. All models produce results with inherent uncertainty, nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table/Number</th>
<th>Start Page</th>
<th>Start Line</th>
<th>End Page</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>David</td>
<td>MacCracken</td>
<td>244049</td>
<td>Text Region</td>
<td>20. US Caribbean</td>
<td>315</td>
<td>3</td>
<td>7</td>
<td>24 Key Message 5: Increasing frequency of extreme events threatens economies, property, and community in 26 the Caribbean. The frequency and intensity of extreme events such as hurricanes, tropical</td>
<td>The present text says this: 24 Key Message 5: Increasing frequency of extreme events threatens economies, property, and community in 26 the Caribbean. The frequency and intensity of extreme events such as hurricanes, tropical storms, flooding, heat waves, and droughts are expected to increase, affecting human health 27 and well-being, economic development, conservation, and agriculture. Resilience will 28 depend on collaboration and integrated planning, preparation, and responses across the 29 region.</td>
<td>The message does not state speculative projections of impacts as established physical facts. Projections by definition are predictions based on scientifically accepted models. The comment states that the computer models are questionable. All models produce results with inherent uncertainty; nevertheless, the models have been rigorously evaluated as part of the peer review process. The comment states “That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.” This comment is not consistent with consensus of the scientific community.</td>
<td></td>
</tr>
<tr>
<td>Xin</td>
<td>Chang</td>
<td>244304</td>
<td>Text Region</td>
<td>20. US Caribbean</td>
<td>305</td>
<td>3</td>
<td>7</td>
<td>Be Chap. 20 p 653-6 lines 2-7 (from sentence beginning with “When considering”) Please note that this statement appears to stand as the only reference to Indigenous and traditional communities for this region and that these populations may be underestimated for this assessment, given that they have not yet been included in previous assessments to date. Given the emphasis for inclusion of local, traditional and Indigenous forms of knowledge in the most recent IPCC working group [1] and recognition of the need for further inclusion of Indigenous peoples for NCA4 [2], chapter authors for the regional chapter could benefit from including additional data regarding unique impacts, considerations, and sources of knowledge for these communities. Are there any current or past case studies for this region addressing these concerns that the authors could consider including? Authors may also want to consider shifting to Key Message 5: Adaptive Capacity and Building Resilience, especially in regard to “shared knowledge, collaborative research and monitoring”. References: [1] Field CB, Barros VR, Dokken DJ et al. (2014) Technical summary: In Climate change 2014: Impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Field CB, Barros VR, Dokken DJ et al. (2014) Technical summary: In Climate change 2014: Impacts, adaptation, and vulnerability. Part A: Global and sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Field CB, Barros VR, Dokken DJ et al. Cambridge, United Kingdom and New York: Cambridge University Press, pp. 35-84. [2] Maldonado J, Bull Bennett TM, Chief F, Cofino P, Cotozotto K, Gough B, Haci Redsteer M, Lynn K, Maynard N, Viaggiato SJ (2017) Engagement with Indigenous peoples and founding traditional knowledge systems. Clim Chang, doi: 10.1007/s10584-015-1195-7.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian</td>
<td>Armstrong</td>
<td>244299</td>
<td>Text Region</td>
<td>20. US Caribbean</td>
<td>333</td>
<td>5</td>
<td>15</td>
<td>A description of OA already exists in Chapter 9, p 324. Doesn’t make sense to repeat it again here.</td>
<td>Thank you for your comment. The chapter text has been revised to incorporate your suggestion. “in rainfall” is replaced with “in rainfall in this region”. We also made the distinction between the projected declines in rainfall in the region and increases in the extreme rainfall events: “while extreme rainfall events are expected to increase in intensity (such as rainfall associated with hurricanes), which can increase freshwater flooding impacts.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aurore</td>
<td>Constible</td>
<td>244209</td>
<td>Text Region</td>
<td>20. US Caribbean</td>
<td>385</td>
<td>T95</td>
<td>2</td>
<td>6</td>
<td>Resilience doesn’t just reduce the need for disaster relief, but also improves the speed with which a place can recover from a disaster. Places like Puerto Rico, with very poor resiliency will be impacted for much longer, with significant impacts to the economy.</td>
<td>Thank you for your comment. The bio has been removed as more recent information regarding economic losses has been incorporated throughout the chapter.</td>
<td></td>
</tr>
<tr>
<td>Xin</td>
<td>Chang</td>
<td>244307</td>
<td>Text Region</td>
<td>20. US Caribbean</td>
<td>402</td>
<td>32</td>
<td>36</td>
<td>Key message II in page 622 is missing some text.</td>
<td>Thank you for your comment. The text has been revised to incorporate this comment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eve</td>
<td>March</td>
<td>244299</td>
<td>Text Region</td>
<td>20. US Caribbean</td>
<td>402</td>
<td>32</td>
<td>36</td>
<td>Key message II in page 622 is missing some text.</td>
<td>Thank you for your comment. The text has been revised to incorporate this comment. The missing text was added.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amanda</td>
<td>Lucasien</td>
<td>244203</td>
<td>Text Region</td>
<td>20. US Caribbean</td>
<td>385</td>
<td>3</td>
<td>7</td>
<td>Please add a citation to sentences referring to traditional knowledge being an important source of information for climate resilience that should be respected and incorporated. Please seek out additional references which exist in the peer-reviewed literature (additionally through ethnography, Museum of the American Indian). A statement should also be included regarding rural communities as integral to the Caribbean cultural heritage and the silo, agricultural and tourism industries across the islands.</td>
<td>Thank you for your comment. The text has been revised and has been added to the citation to traditional knowledge. David-Chavez, D.M. (2016). Indigenous agricultural knowledge, climate resilience and food security in the Caribbean. (unpublished draft in prep for <a href="https://globalchange.nceu.edu/research-spotlight/">https://globalchange.nceu.edu/research-spotlight/</a>).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>244093</td>
<td>Text Region</td>
<td>20. US Caribbean</td>
<td>384</td>
<td>T84</td>
<td>4</td>
<td>In this global rainfall will increase, it is recommended changing “in rainfall” to “in rainfall in this region” or “in this region’s rainfall” in order to make clear this comment is about this region. In that the report also talks about extreme rainfall going up, might be helpful to the reader to say “very-hazard-rainfall”.</td>
<td>Thank you for your comment. The paragraph has been deleted from the section since a description of OA in Chapter 9, p 324 and to go with suggested revisions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>244091</td>
<td>Text Region</td>
<td>20. US Caribbean</td>
<td>384</td>
<td>T84</td>
<td>12</td>
<td>If suggest changing “mobility” to “adaptability” as the phi will be above 0.7</td>
<td>Changed to “adaptability” as suggested.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>244092</td>
<td>Text Region</td>
<td>20. US Caribbean</td>
<td>384</td>
<td>T84</td>
<td>14</td>
<td>“In mobile species” seems like too much jargon if it is only or mainly fish, then perhaps just say fish and then the text better clarify what the term means and as the sentence does not now read very clearly. And don’t think “loss of cover” is a very clear term either—withe correlated is a key marine habitat at the start of the sentence, we don’t know what this is.</td>
<td>Thank you for your comment. The text has been revised to incorporate your suggestion. “In rainfall” is replaced with “in rainfall in this region”. We also made the distinction between the projected declines in rainfall in the region and increases in the extreme rainfall events: “while extreme rainfall events are expected to increase in intensity (such as rainfall associated with hurricanes), which can increase freshwater flooding impacts.”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>244093</td>
<td>Text Region</td>
<td>20. US Caribbean</td>
<td>384</td>
<td>T84</td>
<td>22</td>
<td>Regarding “decreased tourism revenue” I’d think it would be hard to get at the revenue aspect given there are how can it lose cover? “loss of cover” is a very clear term either—withe correlated is a key marine habitat at the start of the sentence, we don’t know what this is.</td>
<td>Thank you for your comment. The Key Message text has been revised to incorporate your suggestion. “decreased tourism appeal”.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
It seems to me that putting in the worst case sea level rise scenario here will make it seem very alarmist. Yes, this could happen—basically anything could happen. Using the words “could” and “may” are really poor practice. In assessments because they give no sense of likelihood. The sentence needs to be revised using the lexicon for likelihood. What also bothers me here is the focus on dates as if they really matter—what really perhaps matters is the commitment to future increase in sea level and not so much the exact decade it occurs. The type of sentence that I would suggest is something like: “Unless the rise in the CO2 concentration is soon stopped, sea level rise over the 21st and 22nd centuries is likely to be by far of order 5 to 10 feet or more, causing significant inundation of many Caribbean islands. For example, Puerto Rico…” just then tying the indicated amounts of rise to the specific dates will be criticized as alarmist, whereas it seems to me much harder to challenge the claim. We have more confidence in how much the coastline transforms in the future, when the sea will occur, so after the sentence so one can use the “likely” from the lexicon and just be looser on the dates. Indeed, does it really matter if my son or my grandson or his son will experience the rise (and note I am using “will” here as a conditional verb, as I think that is generally proper). The issue here is that the likelihood of events that are essentially non-repeatable over centuries is really nil.

PR-USVI sea level rise projections similar, yet, different. For planning purposes rounding to the nearest 0.5 ft seems reasonable. Change will be produced. This is a sentence that I would suggest is something like: “Unless the rise in the CO2 concentration is soon stopped, sea level rise over the 21st and 22nd centuries is likely to be by far of order 5 to 10 feet or more, causing significant inundation of many Caribbean islands. For example, Puerto Rico…” just then tying the indicated amounts of rise to the specific dates will be criticized as alarmist, whereas it seems to me much harder to challenge the claim. We have more confidence in how much the coastline transforms in the future, when the sea will occur, so after the sentence so one can use the “likely” from the lexicon and just be looser on the dates. Indeed, does it really matter if my son or my grandson or his son will experience the rise (and note I am using “will” here as a conditional verb, as I think that is generally proper). The issue here is that the likelihood of events that are essentially non-repeatable over centuries is really nil.

Thank you for your comment. The Key Message text has been revised to incorporate your suggestion. The Key Message text has been restructured and no longer contains this scenario description. The chapter text has been revised to remove confusion regarding the use of “future scenarios”. The chapter text has been revised to remove confusion regarding the use of “future scenarios”. The chapter text has been revised to remove confusion regarding the use of “future scenarios”. The chapter text has been revised to remove confusion regarding the use of “future scenarios”.

5. Suggest somewhere revising the phrase “reduce the need for disaster relief” when it is pretty clear that the levels now being provided have been so inadequate, especially in the Caribbean: very severe storms is increasing—so severe that the storms will just tear apart the natural vegetation even if the buildings were made much stronger. I would suggest it might be better to say: “have the potential to reduce the loss of life and speed recovery”. But it is not having more knowledge, doing research and monitoring and having better institutional adaptive capacity really does not say anything about helping stronger homes and buildings and only potentially imply that the electric, water, transportation systems will be more resistant. It seems to me that a terrible situation as we faced the past few months could be made somewhat less bad, but I don’t see how one can say that this would reduce the need for normal disaster relief, if so I urge caution in the statement here. If Maria were to return, what would be needed is more aid that has yet been provided, even now island systems made more resilient. If we look at Texas, which presumably was somewhat more resilient, the aid provided and time needed for recovery was very high and is overwhelming the present legal limits of reimbursing—so it is quite surprising a statement suggesting that these actions would reduce the need for aid. Our whole country needs to know that they really represent present commitments are going to be needed to deal with the impacts of climate change-induced extremes.

Increasing resiliency...—is total resiliency really possible?—Suggest treating resiliency here as an increment is desirable. Change will be produced.

It is pretty clear that the levels now being provided have been so inadequate, especially in the Caribbean: very severe storms is increasing—so severe that the storms will just tear apart the natural vegetation even if the buildings were made much stronger. I would suggest it might be better to say: “have the potential to reduce the loss of life and speed recovery”. But it is not having more knowledge, doing research and monitoring and having better institutional adaptive capacity really does not say anything about helping stronger homes and buildings and only potentially imply that the electric, water, transportation systems will be more resistant. It seems to me that a terrible situation as we faced the past few months could be made somewhat less bad, but I don’t see how one can say that this would reduce the need for normal disaster relief, if so I urge caution in the statement here. If Maria were to return, what would be needed is more aid that has yet been provided, even now island systems made more resilient. If we look at Texas, which presumably was somewhat more resilient, the aid provided and time needed for recovery was very high and is overwhelming the present legal limits of reimbursing—so it is quite surprising a statement suggesting that these actions would reduce the need for aid. Our whole country needs to know that they really represent present commitments are going to be needed to deal with the impacts of climate change-induced extremes.

Thank you for your comment. The chapter text has been revised to remove confusion regarding the use of “future scenarios”.

Increasing resiliency...—is total resiliency really possible?—Suggest treating resiliency here as an increment is desirable. Change will be produced.

Increasing resiliency...—is total resiliency really possible?—Suggest treating resiliency here as an increment is desirable. Change will be produced.

Increasing resiliency...—is total resiliency really possible?—Suggest treating resiliency here as an increment is desirable. Change will be produced.

Increasing resiliency...—is total resiliency really possible?—Suggest treating resiliency here as an increment is desirable. Change will be produced.

Increasing resiliency...—is total resiliency really possible?—Suggest treating resiliency here as an increment is desirable. Change will be produced.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144017</td>
<td>Figure 10</td>
<td>US Caribbean</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144008</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>89</td>
<td>189</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144009</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>89</td>
<td>189</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144010</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>89</td>
<td>189</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144011</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>89</td>
<td>189</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144012</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>790</td>
<td>790</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144013</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>790</td>
<td>790</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144014</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>790</td>
<td>790</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144015</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>790</td>
<td>790</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144016</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>791</td>
<td>791</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144017</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>791</td>
<td>791</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144018</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>792</td>
<td>792</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144019</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>792</td>
<td>792</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144020</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>793</td>
<td>793</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144021</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>793</td>
<td>793</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144022</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>795</td>
<td>795</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144023</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>799</td>
<td>799</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144024</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>803</td>
<td>803</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144025</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>803</td>
<td>803</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144026</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>803</td>
<td>803</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144027</td>
<td>Text Region</td>
<td>US Caribbean</td>
<td>809</td>
<td>809</td>
</tr>
</tbody>
</table>

Thank you for this comment. The figure has been updated to include organizations whose mission explicitly promotes climate research and/or climate risk management in Cuba, Dominican Republic and Haiti. Caption has been modified to indicate that not all organizations are represented (Some of the organizations... vs. Organizations...)
physiological drought, or compensating role of adequate moisture, should also be mentioned. Does the Hatfield reference address the role of moisture concomitant with high temperatures? It seems that sentence or somehow lead with point of occasional more moisture also at end of growing season. (Hurburgh 2016)." Doesn’t seem to follow thread of wetter springs. Maybe put ‘In addition’ at beginning of “Wet conditions at the end of the growing season can create elevated levels of mold, fungus, and toxins cite the figure on ice and lake temps “additional 380 premature deaths per year” I assume this is for Midwest only? Summer evaporation rates, combined with stresses from pollution, sediment and nutrient inputs, and invasive species are at risk from rising temperatures, changes in seasonal stratification of lake temperatures, and increased Line 21, after invasive species, add text to highlight Great Lakes: A major freshwater resource, the Great Lakes and $170,000 in cost of care are the upper bounds of those estimates. We have decided to report the projected numbers - rather than upper or lower bounds - listed in CIRA II. and $170,000 in cost of care are the upper bounds of those estimates. We have decided to report the projected numbers - rather than upper or lower bounds - listed in CIRA II. would also change drought to “Drought.” Thank you for your comment, however due to the size of the topic, and the page limit for the chapter, we focused on broad trends rather than delving too deeply or providing such a level of specificity. Thank you for your comment, however due to the size of the topic, and the page limit for the chapter, we focused on broad trends rather than delving too deeply or providing such a level of specificity. Thank you for this clarification. We have updated the text to reflect the latter comment, which is the cost of premature Midwestern deaths/year due to extreme heat (RCP8.5) estimated to be $260Billion. The concept of invasive species is addressed as a stressor, so we felt that not using “native” in the key message would also be appropriate to clarify that these values reflect estimates for 2040 (40 years of century, would also work. The words “by 2090” have been added to the sentence in question. We removed “wild” from the key message. We did not insert “native,” in part because the idea of “native” is a lot more in flux given the potential for species from areas farther south (but from the central US) to move in to our region can be considered an inversion of “native” or “non-native” species, depending on your perspective. The concept of invasive species is addressed as a stressor, so we felt that not using “native” in the key message was appropriate. We agree that the Great Lakes are a very important ecological resource, and they should be mentioned in this key message. Since there were overlapping components of the suggested edit and the existing text, and because the key message was already pretty long, we added the Great Lakes in without quite as much detail. Studies (typically greenhouse) on temperature effects on plants are conducted in such a way, that water and nutrients are not limiting so that the independent impact of temperature is revealed. The concept of invasive species is addressed as a stressor, so we felt that not using “native” in the key message was appropriate. We agree that the Great Lakes are a very important ecological resource, and they should be mentioned in this key message. Since there were overlapping components of the suggested edit and the existing text, and because the key message was already pretty long, we added the Great Lakes in without quite as much detail. The concept of invasive species is addressed as a stressor, so we felt that not using “native” in the key message was appropriate. We agree that the Great Lakes are a very important ecological resource, and they should be mentioned in this key message. Since there were overlapping components of the suggested edit and the existing text, and because the key message was already pretty long, we added the Great Lakes in without quite as much detail. Studies (typically greenhouse) on temperature effects on plants are conducted in such a way, that water and nutrients are not limiting so that the independent impact of temperature is revealed. The concept of invasive species is addressed as a stressor, so we felt that not using “native” in the key message was appropriate. We agree that the Great Lakes are a very important ecological resource, and they should be mentioned in this key message. Since there were overlapping components of the suggested edit and the existing text, and because the key message was already pretty long, we added the Great Lakes in without quite as much detail. Studies (typically greenhouse) on temperature effects on plants are conducted in such a way, that water and nutrients are not limiting so that the independent impact of temperature is revealed.
The text says this: 8. Key Message 6: Midwest forests provide numerous economic and ecological benefits, yet threats from a changing climate interacting with stresses from invasive species, pests, and pathogens are increasing. 17. Projected increases in wetland, coupled with rising sea levels and warmer temperatures, will be detrimental to riparian vegetation and the livelihoods of those who depend on it. 18. Actions by decision makers to mitigate these effects are needed to ensure forest health and ecosystem services, which are critical for the health and well-being of communities. 20. The Climate Science Special Report (NCA4 Volume 1, Chapter 10) addressed the confidence of use of climate model projections. They state, "Confidence in the projections generated by global climate models is based on multiple factors. These include the fundamental nature of the physical processes that model representations of these processes as well as the way in which these processes are represented, such as radiative transfer or geophysical fluid dynamics, which can be tested directly against measurements or theoretical calculations to demonstrate that model approximations are valid. They also include the vast body of literature dedicated to evaluating and assessing model abilities to simulate observed features of the earth system, including large scale modes of natural variability, and to reproducing their net response to external forcing that captures the interaction of many processes which produce observable climate system feedbacks." (See also: M. E. Flato et al., 2013). 2. The Climate Science Special Report (NCA4 Volume 1, Chapter 10) addressed the confidence of use of climate model projections. They state, "Confidence in the projections generated by global climate models is based on multiple factors. These include the fundamental nature of the physical processes that model representations of these processes as well as the way in which these processes are represented, such as radiative transfer or geophysical fluid dynamics, which can be tested directly against measurements or theoretical calculations to demonstrate that model approximations are valid. They also include the vast body of literature dedicated to evaluating and assessing model abilities to simulate observed features of the earth system, including large scale modes of natural variability, and to reproducing their net response to external forcing that captures the interaction of many processes which produce observable climate system feedbacks." (See also: M. E. Flato et al., 2013).
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>David</td>
<td>Peterson</td>
<td>14251</td>
<td>Whole Chapter</td>
<td>21. Midwest</td>
<td>2.1</td>
<td>1433</td>
<td>1463</td>
<td>11</td>
<td>16</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The forest component of this chapter (Key Message 2) projects the consequences for hardwood forests, based primarily on statistical modeling, which has low credibility because it does not consider multi-site processes and comparisons, and is almost guaranteed to show big changes. There is not much information about causation or mechanisms. Including the results of relevant process models would provide a broader scientific perspective and provide more mechanistic insight on the potential effects of climate change. Most Midwestern forests have high species diversity, which suggests that there should be options for persistence of hardwood forests and maintenance of functionality, even though species distribution and abundance may change.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The text encourages the reviewer to read the cited literature to gain an accurate understanding of the kinds of models used in the forest key message. In particular, discussion in the forest key message drew heavily from four process models and one species distribution model used in the following publications: Brandt et al. 2014, 2017; Henderliter et al. 2014, 2016; Henderliter et al. 2016; MacCracken et al. 2014, 2019; Swanston et al. 2017. The Brandt, Henderliter, Hurley, and Swanston publications provide detailed discussions of the relative structure and assumptions of the species distribution and process models; the combined results of these models were used in considered assessments of species and ecosystem vulnerability. As an example, the U.S. Geological and LANDIS-PRO process models work together using traits such as growing degree days, photosynthetically active radiation, and precipitation and temperature values (and many others) to simulate climate interactions with establishment, growth, mortality, competition, and succession. We appreciate the suggestion to include more discussion of ecological mechanisms and relative model structure in the forestry key message, but space is limited. We refer those interested in a deeper treatment of statistical or simulated modeling of ecosystem function to the cited publications. The authors emphasize that the cultural and economic interactions of people with Midwestern forests extends beyond viewing them simply as “hardwoods”; in fact, there are numerous forest types and communities that people value highly with the current species abundance and structure, and would consider a loss if the identities of those forest communities were to change. We encourage the reviewer to explore how many Midwesterners consider forest vulnerability and adaptation and the other forest cases included in the final key message (Brandt et al. 2017; MacCracken et al. 2014 and Drent et al. 2014).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142472</td>
<td>Whole Chapter</td>
<td>21. Midwest</td>
<td>2.2</td>
<td>1433</td>
<td>1463</td>
<td>11</td>
<td>16</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Here is a surprising lack of emphasis on harmful algal blooms in this chapter, given their importance to fisheries, recreation, and health. E.g., Please see these citations: <a href="https://www.ncbi.nlm.nih.gov/pubmed/28703476">https://www.ncbi.nlm.nih.gov/pubmed/28703476</a>; <a href="http://pubs.acs.org/doi/abs/10.1021/ac507014f">http://pubs.acs.org/doi/abs/10.1021/ac507014f</a>.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The text was altered on page 843, lines 1 through 12. I’m not sure if these references are needed. Do not reply – I agree these risks should come in again - I added a few lines (as suggested in a previous comment) in the beginning of the biodiversity section to highlight the Great Lakes as an ecosystem, and added a sentence on cyanobacteria in the Great Lakes box.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142673</td>
<td>Table Region 21. Midwest</td>
<td>841</td>
<td>842</td>
<td>12</td>
<td>2 Please provide citations for the paragraph.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the style of the Executive Summary to not include specific references and figures are meant to stand out that year.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142705</td>
<td>Table Region 21. Midwest</td>
<td>844</td>
<td>845</td>
<td>16</td>
<td>22 Please provide citations for the paragraph.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the style of the Executive Summary to not include specific references and the figures are meant to stand on their own.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142707</td>
<td>Table Region 21. Midwest</td>
<td>845</td>
<td>846</td>
<td>11</td>
<td>18 Please provide citations for this paragraph.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In the style of the Executive Summary to not include specific references and figures are meant to stand out that year.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142708</td>
<td>Figure 21. Midwest</td>
<td>846</td>
<td>Why does Figure 21.4 appear after Figure 21.7?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Figures 843-846 were the “Executive Summary” of the chapter which includes two graphics selected from the full chapter text, not necessarily in the same order.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142709</td>
<td>Figure 21. Midwest</td>
<td>848</td>
<td>849</td>
<td>12</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It would be useful to include a short explanation for why the Midwest will see the largest increase in heat-related mortality.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The estimate used in the EPA report are specific to heat-related illnesses, where the heating effect is modeled in isolation. We have clarified the text to refer to the <a href="https://science.sciencemag.org/content/356/6349/1362">https://science.sciencemag.org/content/356/6349/1362</a>, which found greater impacts in the Southeast.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142803</td>
<td>Figure 21. Midwest</td>
<td>850</td>
<td>851</td>
<td>11</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Please consider citing recent data about energy intensity: <a href="https://www.eia.gov/consumption/residential/reports/2015/intensity/">https://www.eia.gov/consumption/residential/reports/2015/intensity/</a> # Thank you for this suggestion. We have added some text that refers to energy intensity in the Midwest, as well as the citation provided.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142803</td>
<td>Figure 21. Midwest</td>
<td>850</td>
<td>851</td>
<td>12</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Please consider including the following paragraph: In the study by the IPCC, the impacts of climate change on agriculture were modelled across 34 countries, and the impact of climate change on agriculture in the Midwest was the second largest increase. We greatly appreciate the reviewer’s comments.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142803</td>
<td>Figure 21. Midwest</td>
<td>850</td>
<td>851</td>
<td>13</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Please consider including the following paragraph: The most recent analysis of the impacts of climate change on agriculture in the Midwest was by the IPCC, and the impact of climate change on agriculture in the Midwest was the second largest increase. We greatly appreciate the reviewer’s comments.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142803</td>
<td>Figure 21. Midwest</td>
<td>850</td>
<td>851</td>
<td>14</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Please consider including the following paragraph: The most recent analysis of the impacts of climate change on agriculture in the Midwest was by the IPCC, and the impact of climate change on agriculture in the Midwest was the second largest increase. We greatly appreciate the reviewer’s comments.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>142117</td>
<td>Key Message 21. Midwest</td>
<td>2.1</td>
<td>Appendix 6: Climate and Health Assessment -evaluates the detailed health impacts of consuming contaminated Hill drinking water. We have added some language listing the primary outcomes of drinking contaminated water, as well as citations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>142117</td>
<td>Key Message 21. Midwest</td>
<td>2.2</td>
<td>Thank you for this comment. We have added some language in this chapter (Abel et al. 2018) that addresses the potential co-benefits of pollution reduction by replacing electricity generation with solar photovoltaics.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>142117</td>
<td>Key Message 21. Midwest</td>
<td>2.3</td>
<td>Thank you for this comment. We have added some language in this chapter (Abel et al. 2018) that addresses the potential co-benefits of pollution reduction by replacing electricity generation with solar photovoltaics.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>142117</td>
<td>Key Message 21. Midwest</td>
<td>2.4</td>
<td>Thank you for this comment. We have added some language in this chapter (Abel et al. 2018) that addresses the potential co-benefits of pollution reduction by replacing electricity generation with solar photovoltaics.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>142117</td>
<td>Key Message 21. Midwest</td>
<td>2.5</td>
<td>Thank you for this comment. We have added some language in this chapter (Abel et al. 2018) that addresses the potential co-benefits of pollution reduction by replacing electricity generation with solar photovoltaics.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ben</td>
<td>Johnson</td>
<td>143005</td>
<td>Whole Page 21. Midwest</td>
<td>873</td>
<td></td>
<td>1433</td>
<td>1463</td>
<td>11</td>
<td>16</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The section gives an estimate of the monetary cost of climate change on infrastructure. The section also gives examples of how installing green infrastructure would reduce these costs. I think it would be interesting if the section also gave an estimate of how much money these green infrastructure examples saved with their installation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14532</td>
<td>Table Region 21. Midwest</td>
<td>843</td>
<td>843</td>
<td>16</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It is a cumulative cost per year per cost; if the former, it sounds small. If the latter, large (though not clear if this is inflation adjusted - so is this still billion?) A bit more specific indication is needed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14533</td>
<td>Table Region 21. Midwest</td>
<td>845</td>
<td>845</td>
<td>19</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I'd suggest changing &quot;using&quot; to &quot;based on the results of&quot;, as being more explanatory.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14533</td>
<td>Table Region 21. Midwest</td>
<td>845</td>
<td>845</td>
<td>20</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>This is a very clear and useful way to present this data.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14534</td>
<td>Table Region 21. Midwest</td>
<td>846</td>
<td>846</td>
<td>9</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I don’t understand what “central” applies to in the just the center of Lake Michigan, or also Ontario? And it is just the central portion of these lakes that, at present as opposed to in the past, rarely have ice cover? This is just not very clear.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14535</td>
<td>Table Region 21. Midwest</td>
<td>847</td>
<td>847</td>
<td>8</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I agree with the suggestion. It’s not clear what “agriculture” is in “agriculture.”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14536</td>
<td>Table Region 21. Midwest</td>
<td>847</td>
<td>847</td>
<td>10</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The text has been revised as suggested.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1997 the acreage of these crops was near zero. 2017 of these high value, plant-protein crops. Pulse crops demonstrate the capacity of agriculture to shift. in Pulse crops beyond ‘dry edible beans’ (i.e. dry pea, lentil, chickpea) should be included here since the northern
Number of days over what time period? Year? Summer? Month? decade? And is it truly change or the new
Overall, a very well done and well illustrated chapter. Nice job
emitting VOCs, NOx, etc.; or is it that even with just natural emissions from the vegetation there would be a
Rather a complicated sentence.
not withdrawals from the lakes be going up as warming occurs?
So, why did lake levels rise so much? The rest of the paragraph also needs explanation--levels of some lakes can
(2) and I had to explain that something like 11 of 12 modeling results showed this. Is this indication of sign now in
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
There is no literature source that gives a good explanation of why water rose during 2013-present. Gronewold
(hint: the literature until Lofgren et al. (2011, J. Great Lakes Res.), but was still taken lightly
never projected lake levels, but required the intermediary of the Croley method. During the Bush 2 era was when
The text was altered as suggested by the reviewer.
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
Alternatively, why would the ranges of particular tree species not be able to successfully shift to future suitable habitats within the Midwest? Also, note that because the word "possibility" is mid-lielihood wording from the lexicon--is used, then "May" becomes "will" or "will not"
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
A rather very well done and well illustrated chapter: Now why
This is split into two sentences, with some re-wording of the second
The text has been revised as suggested.
The text has been revised as suggested.
This is to optimize two sentences, with some re-working of the second
This is to optimize two sentences, with some re-working of the second
There is no literature source that gives a good explanation of why water rose during 2013-present. Gronewold
Here’s what happened with the 11 out of 12 cases: Each of those cases used data from a different GCM realization, but each
the Croley method. Here’s what happened with the 11 out of 12 cases: Each of those cases used data from a different GCM realization, but each
the Croley method. Here’s what happened with the 11 out of 12 cases: Each of those cases used data from a different GCM realization, but each
The 565 suns problem strongly suggests that this last one is wrong and, GCMs since the 1960s have had
The text has been revised as suggested.
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
The text has been revised as suggested.
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
The 565 suns problem strongly suggests that this last one is wrong and, GCMs since the 1960s have had
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
emitting VOCs, NOx, etc.; or is it that even with just natural emissions from the vegetation there would be a
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
There is no literature source that gives a good explanation of why water rose during 2013-present. Gronewold
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
A rather very well done and well illustrated chapter: Now why
This is split into two sentences, with some re-working of the second
The text has been revised as suggested.
The text has been revised as suggested.
This is to optimize two sentences, with some re-working of the second
There is no literature source that gives a good explanation of why water rose during 2013-present. Gronewold
Here’s what happened with the 11 out of 12 cases: Each of those cases used data from a different GCM realization, but each
the Croley method. Here’s what happened with the 11 out of 12 cases: Each of those cases used data from a different GCM realization, but each
the Croley method. Here’s what happened with the 11 out of 12 cases: Each of those cases used data from a different GCM realization, but each
The 565 suns problem strongly suggests that this last one is wrong and, GCMs since the 1960s have had
The text has been revised as suggested.
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
The text has been revised as suggested.
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
The 565 suns problem strongly suggests that this last one is wrong and, GCMs since the 1960s have had
The text has been revised as suggested.
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
The 565 suns problem strongly suggests that this last one is wrong and, GCMs since the 1960s have had
The text has been revised as suggested.
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
The 565 suns problem strongly suggests that this last one is wrong and, GCMs since the 1960s have had
The text has been revised as suggested.
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
The 565 suns problem strongly suggests that this last one is wrong and, GCMs since the 1960s have had
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
"May" is now changed to "will more likely than not" and citation of Lofgren and Rouhana (2016) is added at this
The 565 suns problem strongly suggests that this last one is wrong and, GCMs since the 1960s have had
The impacts of climate change on crop yields will vary geographically and temporally because of differences in temperature and precipitation changes. This section would benefit from discussion of the different factors influencing yield and the variability/uncertainty that these factors create. The impacts of climate change on crop yields will vary geographically and temporally because of differences in temperature and precipitation changes. This section would benefit from discussion of the different factors influencing yield and the variability/uncertainty that these factors create.
The text has been adjusted accordingly. The reviewer notes that there is a lack of information about this pathway on recreational fishers, but this is not established by the cited paper. However, the cited paper notes that the third pathway is theoretical, not established. The text now states the observation period.

We greatly appreciate the reviewer's comment, but it seems that almost all US hop production is in WA, OR, and CO. This comment does not appear to raise a question or suggest a revision. The text has been adjusted accordingly. The text now states the observation period.

We greatly appreciate the reviewer's comment, but it seems that almost all US hop production is in WA, OR, and CO. This comment does not appear to raise a question or suggest a revision. This section presents three pathways through which climate change will impact recreation, including direct impacts to ecosystems, changes in environmental conditions that affect recreationists, and effects of environmental policies on recreationists. The section closes with an example for these pathways. However, the cited paper notes that the third pathway is theoretical, not established. From Hunt et al. 2016: "We are unaware of any studies that have explicitly investigated this pathway. Given the lack of information about the pathway on recreational fisheries, we speculate about two potential cases whereby environmental policies may impact inland recreational fisheries and fisheries." This section would benefit from recognition of the limited evidence for the third case, to a lesser extent, the second pathway for impacts on recreationists. It would also benefit from additional emphasis that the first pathway is not only the most widely studied but also likely the most significant. This change is especially important because the current language implies that the negative impact of adaptation policies on recreation is comparable to the negative impact of the climate change itself, which is not true and could be misconstrued.
et al. 2013). Increasing population, changing land use and land cover, limited water supplies, and long-term drought (Garfin, et al. 2013) of hurricanes, especially in highly urbanized areas. Perhaps worth mentioning that variations in coastal morphology such as sea-level rise could magnify the effects of these extreme weather events, including floods, storms, and wildfires. The next message falsely states speculative projections of impacts as established physical facts. These projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

Response: This entire message falsely states speculative projections of impacts as established physical facts. These projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely. This concern is shared by the authors and is noted. This is why we included a box dedicated to Hurricane Harvey.

In summary, the authors' assessment of the science relevant to the Key Message is consistent with the findings presented in the USGCRP Climate Science Special Report, and using a significant body of peer-reviewed climate science literature, the authors have determined that the current research associated with this Key Message is valid. High quality observations of climate indicators over the past century clearly demonstrate how climate is changing. For global temperatures, multiple data set versions (e.g. NOAA, NASA, Hadley Center, Berkeley) of globally averaged surface temperature all show warming of approximately 1°C over the past 100 years. Other indicators expected to increase, such as sea level, atmospheric humidity, heavy precipitation events and deep ocean heat content are all increasing, and indicators expected to decrease, such as Arctic sea-ice, alpine glaciers, and continental ice sheet mass, are decreasing.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table/Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MiCracken</td>
<td>144050</td>
<td>Test Region</td>
<td>23. Southern Great Plains</td>
<td>966 966</td>
<td>11 12</td>
<td>The reviewer is correct that the wrong reference was used. The reference has been corrected.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MiCracken</td>
<td>144061</td>
<td>Test Region</td>
<td>23. Southern Great Plains</td>
<td>967 967</td>
<td>14 14</td>
<td>The text has been modified to distinguish the rivers in the SGAP that are not impacted by snow/melt.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MiCracken</td>
<td>144063</td>
<td>Test Region</td>
<td>23. Southern Great Plains</td>
<td>989 989</td>
<td>16 18</td>
<td>This perspective has been incorporated by the authors and modifications were made throughout the chapter.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MiCracken</td>
<td>144064</td>
<td>Test Region</td>
<td>23. Southern Great Plains</td>
<td>993 993</td>
<td>14 20</td>
<td>The text has been modified to distinguish the rivers in the SGAP that are not impacted by snow/melt.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MiCracken</td>
<td>144065</td>
<td>Test Region</td>
<td>23. Southern Great Plains</td>
<td>995 995</td>
<td>14 20</td>
<td>The perspective has been incorporated by the authors and modifications were made throughout the chapter.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MiCracken</td>
<td>144066</td>
<td>Test Region</td>
<td>23. Southern Great Plains</td>
<td>997 997</td>
<td>14 20</td>
<td>The text has been modified to distinguish the rivers in the SGAP that are not impacted by snow/melt.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MiCracken</td>
<td>144067</td>
<td>Test Region</td>
<td>23. Southern Great Plains</td>
<td>999 999</td>
<td>14 20</td>
<td>The perspective has been incorporated by the authors and modifications were made throughout the chapter.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MiCracken</td>
<td>144068</td>
<td>Test Region</td>
<td>23. Southern Great Plains</td>
<td>1001 1001</td>
<td>14 20</td>
<td>The text has been modified to distinguish the rivers in the SGAP that are not impacted by snow/melt.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
climate change will have negative impacts has yet to be determined and appears increasingly unlikely. These projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

It seems the authors have overlooked the fact that the climate system is complex and there are uncertainties in our understanding of climate change. This is why we should be cautious in interpreting projections and risks.

However, the decision to focus on impacts rather than physical mechanisms was intentional. The authors aimed to emphasize the need for adaptation and resilience rather than focusing solely on the physical mechanisms.

We appreciate the comment, but after careful consideration of this point, we have determined that the existing text is clear and accurate, and in-line with current literature and consistent usage. In recent literature and analysis across several disciplines the term "health co-benefits" has not been limited to clean energy measures but describes active transportation and green infrastructure as the activities that can have substantial co-benefits, (e.g., reduced ozone precursor emissions associated with cleaner energy generation). The traceable account of co-benefits is typically used to describe the indirect effects associated with reducing greenhouse gas emissions.

We appreciate the comment and thank you for your feedback. We will consider this in our future works.
We appreciate your comment. We have revised the caption and the photo selected for the box.

We disagree with this comment in its entirety. It is directly contradicted by the scientific literature as summarized in NCA4 Volume 1 (as well as many other prior analyses and assessments of the science). We refer the reviewer to Volume 1 for more information on the scientific basis for observed change, natural and anthropogenic forcing, and more. It is accessible at science2017.globalchange.gov.

We appreciate your comment. We have revised this paragraph and added a cross-reference to Chapter 9.

We appreciate your comment. Text was added to this sentence to show that the evidence of increased warming will have negative impacts has yet to be determined and appears increasingly unlikely.

We appreciate your comments, and we have revised the caption and the photo selected for the box.

We appreciate your comments. We have added additional citations to this paragraph, and added NOAA Fisheries 2016 to the reference list.

We appreciate your comment. A cross-reference to Chapter 9, Oceans and Marine Resources, has been added.

We appreciate your comment. A cross-reference to Chapter 9 has been added.

We appreciate your comment. We have added a citation for Bond et al 2015 (Bond NA, Cronin MF, Freeland H, Montes-H. 2015. Causes and impacts of the 2014 warm-summer anomaly in the NE Pacific. Geophysical Research Letters DOI: 10.1002/2015GL063306.)

We appreciate your comment. The text has been revised as suggested.

We appreciate your comment. Text was added to this sentence to show the evidence of increased preparedness across these stakeholders is evidenced by the presentations at the 6th and 7th Annual Northwest Climate Conference. A citation was added for the conference.

We appreciate your comment. Text was added to this sentence to show that the evidence of increased preparedness across these stakeholders is evidenced by the presentations at the 6th and 7th Annual Northwest Climate Conference. A citation was added for the conference.

We appreciate your comment. We have added additional citations to this paragraph, and added NOAA Fisheries 2016 to the reference list.

We appreciate your comments. We have added an additional citation for The Pacific Northwest Tribal Climate Change Network (https://tribalclimate.uoregon.edu/).

We appreciate your comments. We have simplified this paragraph and added a cross-reference to Chapter 9.

We appreciate your comments. We have simplified this paragraph and added a cross-reference to Chapter 9.

We appreciate your comments. The text has been revised as suggested.

We appreciate your comments. We appreciate your comments. We have simplified this paragraph and added a cross-reference to Chapter 9.

We appreciate your comments. We have simplified this paragraph and added a cross-reference to Chapter 9.

We appreciate your comments. We have simplified this paragraph and added a cross-reference to Chapter 9.

We appreciate your comments. We have simplified this paragraph and added a cross-reference to Chapter 9.

We appreciate your comments. We have simplified this paragraph and added a cross-reference to Chapter 9.

We appreciate your comments. We have simplified this paragraph and added a cross-reference to Chapter 9.


The meaning of this sentence about cultural practices vs health is not clear.

This rather stark claim could use more explanation (and citations): “Many of the changes to the ocean environment will be difficult to adapt to or reduce the risk of.”

Most of the impacts described in this chapter focus on extreme events. While obviously important, another more nuanced aspect of climate impacts is that of shifting baseline conditions (e.g., gradually warmer stream temperatures over time). These could have sustained impacts beyond acute events. Please consider noting in language about shifting baselines or sustained stresses where not just the extremes but the averaging will affect resource managers and species throughout the region. The geography of species will be shifting, and these changes affecting species will have impacts on ecosystems. These could have long-lasting impacts across ecosystems and species, as species shift their ranges.

Please consider expanding the idea that some forests may increase in productivity whereas others may decrease. The bulk of the paragraph seems to point to decreases in productivity, making that statement confusing without additional detail.

The meaning of this sentence about cultural practices vs health is not clear.

This entire paragraph could use some clarification. The first sentence suggests climate change could have a neutral effect, whereas the rest of the paragraph suggests a net negative effect, once the costs and difficulties of climate adaptation are factored in. Recommendation: Make it clear that the effects will be net negative OR that the net effects are unknown, given current research—but that regardless, crop and livestock producers will need to change how they do business.

We appreciate this comment. Clarification and detail were added to the sentence. In particular, the sentence addressed potential net growth, and did not address changes in abundance that the rest of the paragraph discussed. This was clarified and some exploration for increases and decreases was added. The geography of the potential changes is quite complex, so spatial details are not listed. Detailed coverage of these topics is beyond the scope of this report, and there are other reports that cover this topic in more detail.

Most of the impacts described in this chapter focus on extreme events. While obviously important, another more nuanced aspect of climate impacts is that of shifting baseline conditions (e.g., gradually warmer stream temperatures over time). These could have sustained impacts beyond acute events. Please consider noting in language about shifting baselines or sustained stresses where not just the extremes but the averaging will affect resource managers and species throughout the region. The geography of species will be shifting, and these changes affecting species will have impacts on ecosystems. These could have long-lasting impacts across ecosystems and species, as species shift their ranges.

We appreciate this comment. The paragraph was modified to be more concise and accessible to the key message. This paragraph was also modified in response to other public comments.

This entire paragraph could use some clarification. The first sentence suggests climate change could have a neutral effect, whereas the rest of the paragraph suggests a net negative effect, once the costs and difficulties of climate adaptation are factored in. Recommendation: Make it clear that the effects will be net negative OR that the net effects are unknown, given current research—but that regardless, crop and livestock producers will need to change how they do business.

We appreciate this comment. Clarification and detail were added to the sentence. In particular, the sentence addressed potential net growth, and did not address changes in abundance that the rest of the paragraph discussed. This was clarified and some exploration for increases and decreases was added. The geography of the potential changes is quite complex, so spatial details are not listed. Detailed coverage of these topics is beyond the scope of this report, and there are other reports that cover this topic in more detail.

We appreciate this comment. Clarification and detail were added to the sentence. In particular, the sentence addressed potential net growth, and did not address changes in abundance that the rest of the paragraph discussed. This was clarified and some exploration for increases and decreases was added. The geography of the potential changes is quite complex, so spatial details are not listed. Detailed coverage of these topics is beyond the scope of this report, and there are other reports that cover this topic in more detail.

We appreciate this comment. Clarification and detail were added to the sentence. In particular, the sentence addressed potential net growth, and did not address changes in abundance that the rest of the paragraph discussed. This was clarified and some exploration for increases and decreases was added. The geography of the potential changes is quite complex, so spatial details are not listed. Detailed coverage of these topics is beyond the scope of this report, and there are other reports that cover this topic in more detail.

We appreciate this comment. Clarification and detail were added to the sentence. In particular, the sentence addressed potential net growth, and did not address changes in abundance that the rest of the paragraph discussed. This was clarified and some exploration for increases and decreases was added. The geography of the potential changes is quite complex, so spatial details are not listed. Detailed coverage of these topics is beyond the scope of this report, and there are other reports that cover this topic in more detail.

We appreciate this comment. Clarification and detail were added to the sentence. In particular, the sentence addressed potential net growth, and did not address changes in abundance that the rest of the paragraph discussed. This was clarified and some exploration for increases and decreases was added. The geography of the potential changes is quite complex, so spatial details are not listed. Detailed coverage of these topics is beyond the scope of this report, and there are other reports that cover this topic in more detail.

We appreciate this comment. Clarification and detail were added to the sentence. In particular, the sentence addressed potential net growth, and did not address changes in abundance that the rest of the paragraph discussed. This was clarified and some exploration for increases and decreases was added. The geography of the potential changes is quite complex, so spatial details are not listed. Detailed coverage of these topics is beyond the scope of this report, and there are other reports that cover this topic in more detail.
We appreciate your comment. We agree that additional examples of existing barriers would be helpful, and have made these additions.

Thank you for this comment. We have re-written the Executive Summary and are reviewing including this figure.

Thank you for this comment. We have re-written the Executive Summary to better highlight the chapter, the broader themes, and the key messages.

Thank you for suggesting we name additional pathogens that could increase waterborne illness, we have made this change.

Thank you for this comment. We have modified this citation to Kossin et al. 2017 (Kossin, J.P., T. Hall, T. Knutson, M.F. Wehner, K.E. Kunkel, R.J. Trapp, D.E. Waliser, and M.F. Wehner. 2017: Extreme storms. In: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wardlow, D.T., D. Fahey, R.J. Marquis, K.K. Callaghan, B.A. Ch tearing heat events or heavy rainfall. That paper’s main finding is that one of the main components for heat waves in the coastal Northwest - offshore flow - may actually decrease the occurrence of heat events in the future.

We appreciate the comment. After consideration of this point, we have determined that the existing text is more accurate and reflective of the stations. In general, severe storms only occur during the winter. The suggested that change may cause confusion regarding the prevalence of storms in other seasons.

Thank you for this comment. The text has been revised as suggested.

Thank you for this comment. We have revised the reference as suggested. The Reference provides a map which indicates the locations of severe storms may also occur more often during winter" to avoid any confusion in that area.

We appreciate the comment. It is incredibly redundant to have two summary overview." It is a rather long sentence. Please separate into two sentences. So: "Earlier higher spring temperatures...". We appreciate this comment. After consideration of this point, we have determined that the existing text is more accurate and reflective of the stations. In general, severe storms only occur during the winter. The suggested that change may cause confusion regarding the prevalence of storms in other seasons.

Thank you for this comment. We have removed the word marine.


Thank you for this comment. The reference has been added to the list of references for this chapter.


Thank you for this comment. This is a good suggestion and the text has been revised.

Thank you for this comment. We have added text to discuss economic impacts and disruption from the Eagle Creek Fire.

Thank you for the comment. We have added a sentence in this section that highlights the success of water-shed partnerships in the Northwest.

Thank you for the comment. The text has been revised as suggested.

Thank you for the comment. We have added text to support the key messages.

We appreciate the comment. We have added a sentence in this section that highlights the success of cross-sector partnerships in the Northwest.

Great point. We have added a sentence in this section that highlights the success of cross-sector partnerships in the Northwest.

Thank you for the comment. The text has been revised as suggested.

Thank you for the comment. The text has been revised as suggested.

We appreciate the comment. The text has been revised as suggested.

We appreciate the comment. The text has been revised as suggested.


Thank you for the comment. We have added text to discuss economic impacts and disruption from the Eagle Creek Fire.

We appreciate the comment. The text has been revised as suggested.

We appreciate the comment. The text has been revised as suggested.


Thank you for the comment. The text has been revised as suggested.

We appreciate the comment. The text has been revised as suggested.
These two paragraphs focus heavily on Oregon impacts. Are there water and fish impacts that can be highlighted for Washington and Idaho as well?

We appreciate your comment. We have moved this discussion to MA regarding impacts to oysterfishery that occurred during the extreme El Nino winter of 2015-2016.

We appreciate your comment and the citation. We have added a statement to this paragraph that highlights that there will be both consequences and opportunities as the marine ecosystem responds to climate change. A cross-reference was also added to Chapter 3 as this chapter provides additional detail on the larger marine ecosystem and the shifting species trends that may occur.

We appreciate your comment and the citation. We have included the stated citation (Please note that the recommended station for this report is Bilenk et al. 2016).

We appreciate your comment. In response to this comment, as well as other comments, we have revised this paragraph and eliminated reference to the Cascadia Subduction Zone and tectonic uplift. Although this is an important topic, it cannot be treated sufficiently within the limited space in this chapter.

We appreciate your comment. If this tribal elder requested not to be quoted by name, it should be stated somewhere, otherwise it seems more appropriate to state the elder’s name and tribal affiliation.

We appreciate your comment. In response to this comment, we have made the following text changes to reflect Tribal sovereignty, which is an important topic, it cannot be treated sufficiently within the limited space in this chapter.

We appreciate your comment. We have added a statement that the marine ecosystem will evolve as the climate changes, and that there will be both consequences and opportunities as the marine ecosystem responds to climate change. A cross-reference was also added to Chapter 3 as this chapter provides additional detail on the larger marine ecosystem and the shifting species trends that may occur.

We appreciate your comment. We have added a statement highlighting this as a potential area of concern, and we provided an additional reference to this potential issue.

We appreciate your comment. We have revised the text to appropriately reflect this.

We appreciate your comment and the citation. We have added a statement to this paragraph that highlights that there will be both consequences and opportunities as the marine ecosystem responds to climate change. A cross-reference was also added to Chapter 3 as this chapter provides additional detail on the larger marine ecosystem and the shifting species trends that may occur.

We appreciate your comment and the citation. We have added a statement to this paragraph that highlights that there will be both consequences and opportunities as the marine ecosystem responds to climate change. A cross-reference was also added to Chapter 3 as this chapter provides additional detail on the larger marine ecosystem and the shifting species trends that may occur.

We appreciate your comment and the citation. We have added a statement to this paragraph that highlights that there will be both consequences and opportunities as the marine ecosystem responds to climate change. A cross-reference was also added to Chapter 3 as this chapter provides additional detail on the larger marine ecosystem and the shifting species trends that may occur.

We appreciate your comment. We have revised the text to appropriately reflect this.
So, in this paragraph, it would seem some time reference point is needed, etc. to add a qualifying phrase to do that. On the northward shift, do note that climate change will very likely (not just "could", but does the word "could"). Proper practice is to choose phrasing related to the likelihood lexicon, even if one needs to sacrifice some precision.

and citizen scientists to increase the geographic breadth and frequency of sampling for harmful algal blooms. This section could be strengthened by tying infrastructure to health and safety. When a severe storm knocks out power and roads, the first issues are health and safety, not the economy. Infrastructure was designed to address the topic in the NW. It would be helpful to begin by defining infrastructure, and perhaps breakdown some of the components of infrastructure that are most vulnerable to climate change. It is hard to identify specific vulnerabilities to infrastructure without a more robust understanding of the underlying socio-economic conditions. The text accompanying Key Message 3 on Infrastructures has few supporting citations, especially key citations for the Alaska chapter (Chapter 11: p411, Lines 32-33). In the NW chapter, we focus on transportation, water, and electricity infrastructure.

Groundwater Supply at Risk' is somewhat misleading. That phrasing may imply that the groundwater itself is at risk, which is not the main message being expressed with this figure. Instead, the figure is showing which infrastructure systems are most vulnerable to climate change. We would recommend using a cooler color scheme instead of "yellow/red" to better represent the severity of the risk.

not the main message being expressed with this figure. Rather, the figure is showing which infrastructure systems are most vulnerable to climate change. We would recommend using a cooler color scheme instead of "yellow/red" to better represent the severity of the risk.

"Harmful Algal Blooms in the Pacific Northwest: A Public Health / Health Sector and Growing Climate Change Capacity and Actions in the Pacific Northwest."

This text was prepared after discussions by subgroups of the University of Washington Program on Climate Change and the Public Comment Project in Seattle, WA. Among those who participated in discussions, the following were named by Fisher, Anne-Crawley, Dr. Michelle Tigchelaar, Dr. Ronola Strous, Ms. Deavila Witt, Dr. Richard Gammon.

The text was prepared after discussions by subgroups of the University of Washington Program on Climate Change and the Public Comment Project in Seattle, WA. Among those who participated in discussions, the following were named by Fisher, Anne-Crawley, Dr. Michelle Tigchelaar, Dr. Ronola Strous, Ms. Deavila Witt, Dr. Richard Gammon.

The text was prepared after discussions by subgroups of the University of Washington Program on Climate Change and the Public Comment Project in Seattle, WA. Among those who participated in discussions, the following were named by Fisher, Anne-Crawley, Dr. Michelle Tigchelaar, Dr. Ronola Strous, Ms. Deavila Witt, Dr. Richard Gammon.

The text was prepared after discussions by subgroups of the University of Washington Program on Climate Change and the Public Comment Project in Seattle, WA. Among those who participated in discussions, the following were named by Fisher, Anne-Crawley, Dr. Michelle Tigchelaar, Dr. Ronola Strous, Ms. Deavila Witt, Dr. Richard Gammon.

We appreciate this comment; however, this comment is outside the scope of the document. The aim of the National Climate Assessment (NCA) is assessing the state of understanding of climate change, the science behind it, and current and potential impacts on the United States. Volume 1 of NCA4 provides quantification of the magnitude of the projected climate changes. The Scoping Account for the chapter provides qualification of the breadth of the identified climate impacts occurring based on the current state of the science. However, this assessment is not aimed at the creation of adaptation legislation, or with promoting specific ideas for integrating or adapting to climate change.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144074</td>
<td>Cent Region</td>
<td>24. Northwest</td>
<td>2018</td>
<td>1018</td>
<td>19</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144075</td>
<td>Cent Region</td>
<td>24. Northwest</td>
<td>2019</td>
<td>1019</td>
<td>6</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144076</td>
<td>Cent Region</td>
<td>24. Northwest</td>
<td>2019</td>
<td>1019</td>
<td>7</td>
<td>5</td>
<td>&quot;are expected&quot; as subject's plural. Also, scenarios are about the future, so &quot;future&quot; can be dropped, especially as we have the scenarios now.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144077</td>
<td>Cent Region</td>
<td>24. Northwest</td>
<td>2019</td>
<td>1019</td>
<td>18</td>
<td>19</td>
<td>Need to replace &quot;may&quot; on lines 19, 21, and 24--using words from lesson. I try to restrain myself and use less a word on the chapter and words from the lesson be chosen so that there is some indication of likelihood (there are lots of places).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144078</td>
<td>Cent Region</td>
<td>24. Northwest</td>
<td>2022</td>
<td>1022</td>
<td>27</td>
<td>27</td>
<td>It seems to me it would be better here to say &quot;while changes in climate R's (replacing &quot;may, of course) and the phrase &quot;climate change&quot; is a singular to summarize; all is happening [line 1022, last 3 pages] as where the singular is used in an encompassing way--really confusing to use 3 in place.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144079</td>
<td>Cent Region</td>
<td>24. Northwest</td>
<td>2023</td>
<td>1023</td>
<td>1</td>
<td>3</td>
<td>Changes in climate would be better than &quot;climate changes&quot; in one as refers to particular aspects and not the overall problem. And another &quot;may&quot; on line 2--here one could indicate a condition or action that would make it likely to thrive (e.g., if one not overly restricted, or whatever) to make statement more meaningful.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144080</td>
<td>Cent Region</td>
<td>24. Northwest</td>
<td>2034</td>
<td>1034</td>
<td>5</td>
<td>5</td>
<td>The word &quot;could&quot; &quot;in meaningful as &quot;may&quot;--really want to pull words from the boxon to provide reader some useful insight as just about anything could occur. Again, a word to strike out from chapter as much as possible.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144081</td>
<td>Cent Region</td>
<td>24. Northwest</td>
<td>2035</td>
<td>1035</td>
<td>17</td>
<td>20</td>
<td>Is there some reason for this that could be offered as an explanation? Perhaps, the equitable climate. I actually think that the Southwest the effective risk is locally higher--i.e. that the needs for shelter are currently a good bit less because it's quite warm so even huts will do. As summer get hotter and the heat index goes up, my guess would be that the Southwest will have the most serious problem due to the share of population without air-conditioned living quarters. Perhaps those then homeless will head to the Northeast--its temperate climate might thus attract even more homeless.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144082</td>
<td>Cent Region</td>
<td>24. Northwest</td>
<td>2041</td>
<td>1041</td>
<td>10</td>
<td>14</td>
<td>These are pretty high-precision estimates, especially when there is then rounding to give the $500 million sum. I'd urge a bit of rounding to no more than two figure precision or something. Seems quite odd/hot way it is.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angela</td>
<td>Swift</td>
<td>146004</td>
<td>Mt. Region</td>
<td>25. Southeast</td>
<td>1086</td>
<td>1086</td>
<td>13</td>
<td></td>
<td>Overall, very well done, particularly in how the tribal and indigenous aspects were integrated throughout the chapter. We greatly appreciate the reviewer's comment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rose</td>
<td>Miller</td>
<td>146138</td>
<td>Mt. Region</td>
<td>25. Southeast</td>
<td>1094</td>
<td>1094</td>
<td>9</td>
<td>9</td>
<td>Use it &amp; 2 seem mighty out of place for this paragraph. It is recommended moving this line up and address is really not within the statement. We thank the reviewer for the comments.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rose</td>
<td>Miller</td>
<td>146139</td>
<td>Mt. Region</td>
<td>25. Southeast</td>
<td>1115</td>
<td>1115</td>
<td>18</td>
<td>24</td>
<td>Most of this page seems very redundant to the information on page 1095. It is unknown if it was the effect of the author to reiterate this information more than once. We thank the reviewer for the comments. We have revised the Traceable Account to reduce repetition and better clarify basis of the Key Message.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rose</td>
<td>Miller</td>
<td>146140</td>
<td>Mt. Region</td>
<td>25. Southeast</td>
<td>1095</td>
<td>1095</td>
<td>12</td>
<td>14</td>
<td>The sentence awkwardly summarizes the numerous references documenting tree mortality in Southeast forests and woodlands. We have found the sentence in question to be less precise and have revised it to better reflect the information provided.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jeremy</td>
<td>Martini</td>
<td>146141</td>
<td>Whistle Stop</td>
<td>25. Southeast</td>
<td>1094</td>
<td>1094</td>
<td>31</td>
<td>32</td>
<td>This is a very well written chapter pertaining to climate impacts in the Southwest. There is a plethora of information covering issues within California while not as much discussion over other parts of the southwest. We thank you for your comments. We agree and acknowledge that the chapter has much information pertaining to California, in contrast to the other southwestern states. This is because, since the 3rd National Climate Assessment, much new material, published studies, and climate impact stories have focused on California drought, the region's ( Draughn (California), and that state's renewable energy innovation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jeremy</td>
<td>Martini</td>
<td>146142</td>
<td>Mt. Region</td>
<td>25. Southeast</td>
<td>1094</td>
<td>1094</td>
<td>31</td>
<td>32</td>
<td>The following sentence is policy prescriptive and should be edited: &quot;Cutting greenhouse gas emissions through energy conservation and renewable energy can reduce ecological vulnerabilities.&quot; Adding a &quot;for example&quot; could probably fix it. We have added a prefix to the sentence to clarify that it is the subject of the text.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reul</td>
<td>Casimere</td>
<td>146143</td>
<td>Mt. Region</td>
<td>25. Southeast</td>
<td>1085</td>
<td>1085</td>
<td>2</td>
<td>2</td>
<td>There are some changes in the beginning of the sentence of Key Message 3 so that it starts with &quot;Greenhouse gas emission reductions...&quot; This word change will improve consistencies with other chapters, and remove confusion as to whether this sentence was referring to vegetation ecosystem carbon. We thank the reviewer for the comments. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Davide</td>
<td>Ripoli</td>
<td>147139</td>
<td>Mt. Region</td>
<td>25. Southeast</td>
<td>1091</td>
<td>1091</td>
<td>2</td>
<td>6</td>
<td>Here is the present text: 2 Key Message 1: Water supplies for people and nature in the Southwest are decreasing during drought due in part to human-caused climate change. Interfering droughts, increasingly heavy downpours, and reduced snowpack are combining with increasing water demands from a growing population, aging infrastructure, and groundwater depletion to reduce the future reliability of water supplies. Comment: This entire message falsely states speculative projections of impacts as established physical facts. These projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely. We thank the reviewer for the comments. We disagree with this statement. The text supporting this key message represents the scientific understanding of the Earth's climate system, its responses to forcing factors and physical drivers of climate, and the state of the art with respect to modeling the Earth's climate system—all of which has been drawn from peer-reviewed literature and summarized in NCA Volume 1, which was published in November 2017. We refer the reviewer to Volume 1, in particular Chapters 1, 2, 3, and 4, for more information on the scientific basis for causes of changes in climate and the use of climate models to project future climate changes. NCA Volume 1 includes relevant citations. With respect to the likelihood of negative impacts, we refer the reviewer to NCA Volume 1, Chapters 5, 6, 7, 8, and 9, in addition to the literature cited in this chapter's text, and the Traceable Account text associated with this key message.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Davide</td>
<td>Ripoli</td>
<td>147140</td>
<td>Mt. Region</td>
<td>25. Southeast</td>
<td>1093</td>
<td>1094</td>
<td>20</td>
<td>24</td>
<td>Thank you for this comment. This entire message represents the scientific understanding of the Earth's climate system, its responses to forcing factors and physical drivers of climate, and the state of the art with respect to modeling the Earth's climate system—all of which has been drawn from peer-reviewed literature and summarized in NCA Volume 1, which was published in November 2017. We refer the reviewer to Volume 1, in particular Chapters 1, 2, 3, and 4, for more information on the scientific basis for causes of changes in climate and the use of climate models to project future climate changes. NCA Volume 1 includes relevant citations. With respect to the likelihood of negative impacts, we refer the reviewer to NCA Volume 1, Chapters 5, 6, 7, 8, and 9, in addition to the literature cited in this chapter's text, and the Traceable Account text associated with this key message.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key Message 1: Water supplies for people and nature in the Southwest are decreasing during drought due in part to human-caused climate change. Interfering droughts, increasingly heavy downpours, and reduced snowpack are combining with increasing water demands from a growing population, aging infrastructure, and groundwater depletion to reduce the future reliability of water supplies. Comment: This entire message falsely states speculative projections of impacts as established physical facts. These projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely. We thank the reviewer for the comments. We disagree with this statement. The text supporting this key message represents the scientific understanding of the Earth's climate system, its responses to forcing factors and physical drivers of climate, and the state of the art with respect to modeling the Earth's climate system—all of which has been drawn from peer-reviewed literature and summarized in NCA Volume 1, which was published in November 2017. We refer the reviewer to Volume 1, in particular Chapters 1, 2, 3, and 4, for more information on the scientific basis for causes of changes in climate and the use of climate models to project future climate changes. NCA Volume 1 includes relevant citations. With respect to the likelihood of negative impacts, we refer the reviewer to NCA Volume 1, Chapters 5, 6, 7, 8, and 9, in addition to the literature cited in this chapter's text, and the Traceable Account text associated with this key message.
Comment: This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. Their climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

We thank the reviewer for this comment. This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. Their climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

David Wojick 141742 Test Region 25. Southwest 1102 1102 22 26 Present text: 25 Key Message 5: Renewable hydropower in the Southwest has shown declines during drought, 33 due in part to climate change. Continued temperature increases, energy use from a growing 14 population, and water competition with forms and cities reduce the future reliability of fossil 25 fuels and hydropower. Renewable solar and wind energy are increasing and offer future 36 options to cut carbon emissions and reduce water use.

Comment: This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. Their climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

We thank the reviewer for this comment. This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. Their climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

Comment: The Carter 2017 paper does not address the physical basis for climate change in the United States. We refer the reader to Volume 1, in particular Chapters 1, 2, 3 and 4, for more information on the scientific basis for changes in climate and the use of climate models to project future climate changes. NCA Volume 1 includes relevant citations. With respect to the likelihood of negative impacts, we refer the reader to NCA Volume 1, Chapters 6, 7, 8, and 9, in addition to the literature cited in this chapter's text, and the Tearable Account text associated with this key message.

We thank the reviewer for this comment. The text supporting the physical basis for climate change in the United States. We refer the reader to Volume 1, in particular Chapters 1, 2, 3 and 4, for more information on the scientific basis for changes in climate and the use of climate models to project future climate changes. NCA Volume 1 includes relevant citations. With respect to the likelihood of negative impacts, we refer the reader to NCA Volume 1, Chapters 6, 7, 8, and 9, in addition to the literature cited in this chapter's text, and the Tearable Account text associated with this key message.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Page Number</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>David</td>
<td>Petzold</td>
<td>142417</td>
<td>East Region</td>
<td>115</td>
<td>Refining the observed changes in subalpine forest to climate change is inappropriate. As stated in Miller et al. (2004), complex interactions of environmental variables, including climatic variation (e.g., PDO) were the neutral causes.</td>
<td>Miller et al. (2004) specifically analyze the relative contributions of temperature, precipitation, and the Pacific Decadal Oscillation. They find that “minimum temperature was the main effect related to accelerating annual branch growth in subalpine whitebark pine and initiation of pine invasion into formerly persistent snowfield openings.” Climate change caused the increase in minimum temperature. This example has been revised and moved in the IPCC Fifth Assessment Report (Sternlieb, K.J., H. Schuck, K.A. Berh, S. Burr, P. Enwezor, L. Neagstad, T. Overpeck, and M.A. Tudoska. 2014. Terrestrial and land-based waters. In Intergovernmental Panel on Climate Change. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY.]. This statement is this chapter is supported.</td>
</tr>
<tr>
<td>Warren</td>
<td>Eagle</td>
<td>142418</td>
<td>East Region</td>
<td>115</td>
<td>The notion of tripling area burned is mostly conceptual, because if that were true, the negative feedback of existing burned areas would eventually reduce the extent of wildfires as fires are reduced.</td>
<td>We thank the reviewer for the comment. We have revisited the sentence to make clear that the statement refers to a projection from a scenario.</td>
</tr>
<tr>
<td>David</td>
<td>Petzold</td>
<td>142429</td>
<td>East Region</td>
<td>116</td>
<td>Note that the area of the plot has been increased to reflect the published reference to it, which denotes demonstrated errors in the original analysis.</td>
<td>We thank the reviewer for the comment. The reference has been removed.</td>
</tr>
</tbody>
</table>

Austen Constible 142716 East Region 1085 1085 13 17 The first sentence of this message is confusing, largely because the worst "fit" makes it seem like things like the failed oxygen have affected people's homes. Recommended edit: "Multiple manifestations of human activity have accelerated climate change, including sea level rise, ocean heating, ocean acidification, and reduced oxygen have affected the Southeast's coastline and coastal resources. Marine plants and wildlife, people who depend on fishing, and coastal neighborhoods, businesses, and infrastructure face increased risks as the climate changes."

We thank the reviewer for the suggestion. We have revisited the sentence to make clear that the statement refers to a projection from a scenario. We thank the reviewer for this comment. The reference has been removed.

Austen Constible 142717 East Region 1086 1086 18 19 Recommended starting a new paragraph with the marine heat wave section.

We thank the reviewer for the suggestion. In addition to starting a new paragraph with the marine heat wave section, I added a new sentence describing the historical variations in ocean temperature in the northeast Pacific and off the coast of California.

Austen Constible 142718 East Region 1086 1086 17 18 Starting the 2nd sentence in this paragraph with "Fit" makes it seem like the tribs are developing adaptation and mitigation actions despite the increased drought and heat, instead of in reaction to the changes.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Austen Constible 142719 East Region 1087 Please consider adding more information to the Y-axis label. E.g., "Estimated cumulative forest fire area (million hectares)."

The text has been modified as suggested.

Austen Constible 142719 East Region 1086 1086 17 18 Please consider adding more information to the Y-axis label. E.g., "Estimated cumulative forest fire area (million hectares)."

The text has been modified as suggested.

Austen Constible 142720 East Region 1089 1089 7 8 The sentence about transferring water seems out of place. Is there a connection between installation of reusable and water transfers?

We thank the reviewer for the comment and have deleted the sentence.

Austen Constible 142721 East Region 1089 1089 7 11 Please provide citations for the latter half of this paragraph.

We thank the reviewer for the comment and have added supporting citations.

Austen Constible 142722 Whole Page East Region 1088 This section could be made more clear if it was reordered along these lines: Diversity of Southwest (currently lines 2-10, p 1088), diversity of ecosystems (currently lines 20-30, p 1088), California coast (currently lines 34-40 p 1088), projected species (currently lines 1-11, p 1088), hotspots (currently lines 25-31, p 1088), human health (currently lines 12-23, p 1088), heat and water (currently lines 32-39, p 1090), projected species (currently lines 1-11, p 1090), heavy rainfall (currently lines 12-16, p 1090), migration (currently lines 42-44, p 1089).

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Austen Constible 142723 East Region 1092 1092 25 25 An example of the new techniques to use would be helpful here.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion, and we have included references.

Austen Constible 142724 East Region 1093 1093 14 16 This sentence sounds like the title is only "natural because it's beautiful." Wildlife, which can build upon germination and initial seedlings, is a natural part of many ecosystems in the Southwest."

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Austen Constible 142725 East Region 1093 1093 18 18 The statement stating "Furthermore" is confusing. Recommended edit: "Furthermore, climate change made a larger contribution to burned area in the western United States from 1916 to 2003 than the suppression, local fire management, or other non-climate factors."

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Austen Constible 142726 East Region 1094 1094 12 12 The statement stating "While ecosystems..." is confusing. Recommended edit: "Although ecosystems can naturally slow climate change by storing carbon, recent wildfires have made California ecosystems and ecosystems in the Southwest less carbon sinks."

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Austen Constible 142727 East Region 1095 1095 14 16 It's not clear how this is thought to be an important driver of bark beetle outbreaks? E.g. http://online.library.westlaw.com/OS/00/1002/erc/1963/full

We thank the reviewer for the comment. Drafted is implied as an important driver of beetle outbreaks, as evidenced in the Hart et al. reference mentioned in the comment. We have added this information and citation to the sentence.

Austen Constible 142729 East Region 1100 1100 21 21 To what time frame are the elders referring?

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Austen Constible 142730 East Region 1101 1101 29 29 Starting the 2nd sentence in this paragraph with "Fit" makes it seem like the tribs are developing adaptation and mitigation actions despite the increased drought and heat, instead of in reaction to the changes.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Austen Constible 142731 East Region 1101 1101 36 Is fire currently being used as a climate adaptation tool? That's not clear from the paragraph.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Austen Constible 142732 East Region 1102 1102 8 13 The water supply section of this paragraph feels out of place in a paragraph that starts with climate adaptation plans. Recommend moving it earlier in the section, to group it with the other climate impact statements.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Austen Constible 142733 East Region 1103 1103 13 17 The sentence about the growth of wildfires is confusing in the middle of information about drought and heatwave. Recommend moving to page 1109, to the paragraph starting on page 116.

We thank the reviewer for the comment. The sentence moved further down.

Austen Constible 142734 East Region 1104 1104 9 10 Which is the biggest water user/source of "water supply stress": Agriculture, or energy? The first 2 sentences of this paragraph seem to contradict each other. Also, by "energy," do you specifically mean electricity production, census or fossil fuel extraction or other activities in the energy sector? (E.g., White (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY.) So, the statement in this chapter is problematic.

We thank the reviewer for the comment and have changed the second sentence to distinguish the varying proximal causes.

Austen Constible 142735 East Region 1105 1105 17 22 The paragraph begins the fact that transportation electrification provides a net reduction in fossil fuel use and emissions compared to driving on gasoline. Furthermore, electric vehicle baud can be aligned with intermittent generation to improve their capacity factors and help the economics in a way that can accelerate their deployment. For more information: https://www.epa.gov/energy/electric-drive-vehicles-benefits; https://www.nrdc.org/resources/america-clean-energy-frontier-pathway-u-s... and https://www.nrdc.org/resources/driving-out-pollution-how-electric-cars... We thank the reviewer for the comment. The text has been revised to incorporate this perspective.

Austen Constible 142736 East Region 1107 1107 10 10 Please consider explaining what "center pivot irrigation" is, or using a less technical term.

We thank the reviewer for the suggestion and have simplified the text.

Austen Constible 142737 East Region 1107 1107 7 29 Please add citations for the last two sentences in this paragraph.

We thank the reviewer for the suggestion. Citations were added to both sentences.
algae etc. which will be affected and are discussed further in the document. Consider marine flora and fauna more specific to Sierra Nevada, consider removing it in line 30 burned area in California could triple repeated in line 33 climate change could triple burned area. Line 33 is too vague.

appropriate at paragraph starting on line 18. Antagonistic argument of the first point, it is a completely different statement. The lead sentence is more Change being forced use it to being forced to use it replace, and filled some dams, with and filled dammed reservoirs. The word some is vague. Redundant temperatures of climate change intensified drought in the next sentence. Repeated. Remove one as it is Human caused climate change intensified the recent severe drought in first sentence and the higher What is a mega drought. Add a sentence north.

hotter, lower elevation area to the south, and forests and alpine meadows in cooler, higher elevation areas in the north.

Change being forced use it to being forced to use it replace, and filled some dams, with and filled dammed reservoirs. The word some is vague. Redundant temperatures of climate change intensified drought in the next sentence. Repeated. Remove one as it is Human caused climate change intensified the recent severe drought in first sentence and the higher What is a mega drought. Add a sentence north.

What is a mega drought. Add a sentence north.

Change being forced use it to being forced to use it replace, and filled some dams, with and filled dammed reservoirs. The word some is vague. Redundant temperatures of climate change intensified drought in the next sentence. Repeated. Remove one as it is Human caused climate change intensified the recent severe drought in first sentence and the higher What is a mega drought. Add a sentence north.

What is a mega drought. Add a sentence north.

Change being forced use it to being forced to use it replace, and filled some dams, with and filled dammed reservoirs. The word some is vague. Redundant temperatures of climate change intensified drought in the next sentence. Repeated. Remove one as it is Human caused climate change intensified the recent severe drought in first sentence and the higher What is a mega drought. Add a sentence north.

What is a mega drought. Add a sentence north.

Change being forced use it to being forced to use it replace, and filled some dams, with and filled dammed reservoirs. The word some is vague. Redundant temperatures of climate change intensified drought in the next sentence. Repeated. Remove one as it is Human caused climate change intensified the recent severe drought in first sentence and the higher What is a mega drought. Add a sentence north.

What is a mega drought. Add a sentence north.

Change being forced use it to being forced to use it replace, and filled some dams, with and filled dammed reservoirs. The word some is vague. Redundant temperatures of climate change intensified drought in the next sentence. Repeated. Remove one as it is Human caused climate change intensified the recent severe drought in first sentence and the higher What is a mega drought. Add a sentence north.

What is a mega drought. Add a sentence north.

Change being forced use it to being forced to use it replace, and filled some dams, with and filled dammed reservoirs. The word some is vague. Redundant temperatures of climate change intensified drought in the next sentence. Repeated. Remove one as it is Human caused climate change intensified the recent severe drought in first sentence and the higher What is a mega drought. Add a sentence north.

What is a mega drought. Add a sentence north.

Change being forced use it to being forced to use it replace, and filled some dams, with and filled dammed reservoirs. The word some is vague. Redundant temperatures of climate change intensified drought in the next sentence. Repeated. Remove one as it is Human caused climate change intensified the recent severe drought in first sentence and the higher What is a mega drought. Add a sentence north.

What is a mega drought. Add a sentence north.

Change being forced use it to being forced to use it replace, and filled some dams, with and filled dammed reservoirs. The word some is vague. Redundant temperatures of climate change intensified drought in the next sentence. Repeated. Remove one as it is Human caused climate change intensified the recent severe drought in first sentence and the higher What is a mega drought. Add a sentence north.

What is a mega drought. Add a sentence north.
This paragraph doesn't flow with the others, doesn't relate to climate change. It speaks to sea level rise but still doesn't really fit in with the paragraph. Consider removing or turning it into a simpler one-contrary sentence in one of the other paragraphs.

There is too much of this population is a very vague statement. What is meant by so much? Define more clearly.

This paragraph introduces a new idea, but doesn't tie into the paragraph. Consider removing or turning it into a simpler one-contrary sentence in one of the other paragraphs.

The paragraph doesn't flow with the others, doesn't relate to climate change. It speaks to sea level rise but still doesn't really fit in with the paragraph. Consider removing or turning it into a simpler one-contrary sentence in one of the other paragraphs.

The paragraph doesn't flow with the others, doesn't relate to climate change. It speaks to sea level rise but still doesn't really fit in with the paragraph. Consider removing or turning it into a simpler one-contrary sentence in one of the other paragraphs.

There is too much of this population is a very vague statement. What is meant by so much? Define more clearly.

There is too much of this population is a very vague statement. What is meant by so much? Define more clearly.

There is too much of this population is a very vague statement. What is meant by so much? Define more clearly.

There is too much of this population is a very vague statement. What is meant by so much? Define more clearly.

There is too much of this population is a very vague statement. What is meant by so much? Define more clearly.
was filled, not formed. Many references in this chapter are relied on too heavily. We recommend broadening your sources of information. For example, the findings consistent across states and within states?

We recommend removing, due to climate change, because these trends are linked elsewhere to climate change elevations not showing this trend in CO, but lower elevation’s in Sierra’s are.

Decreased snowpack is not a robust observation across the high elevation regions in Colorado. Snowpack is not declining water supplies. Perhaps, during droughts water supplies are declining in part due to climate warming hydrologic drought while average precipitation has stayed the same. Droughts can be caused by low precipitation or higher temperatures but in recent years warming climate appears to be a larger contributor to recent droughts.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

The impacts of climate change exacerbates this historical legacy because... We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Box 25.1: The language is overly definitive. Please be very specific with impact characterization. For example, the findings consistent across states and within states?

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. We have diversified the references, and have added some precision to the text, to note whether changes are region-wide, pertinent to parts of the region, pertinent to specific altitude bands, and pertinent to more mountainous or continental locations.

Not all of the droughts since the 2000s have low precipitation. Climate warming has enhanced the impacts of hydrologic drought while average precipitation has stayed the same. Droughts can be caused by low precipitation or higher temperatures but in recent years warming climate appears to be a larger contributor to recent droughts.

We thank the reviewer for the comment. The key points that increasing temperatures have interacted with precipitation variations, to reduce the effectiveness of precipitation in replenishing water supplies and soil moisture. A close reading of the literature indicates that recent episodes of hydrologic drought have been exacerbated by increasing temperatures, and that precipitation amounts have been below average—this is true of drought in California, the Colorado River Basin, and the Rio Grande Basin. When compared with earlier droughts, these recent droughts are characterized by low precipitation, just as low as during drought episodes of earlier periods, like the 1930s (e.g., Utah and Overpeck, 2017).

We thank the reviewer for the comment. Elsewhere in the chapter, we rated elevation-related variations in snowpack. Close 2010 found decreases in Colorado SWE using one technique. In addition, the Mote et al. 2018 study found significantly more decreases in Colorado than did Mote et al. 2003

We thank the reviewer for the comment. The chapter text has been revised and refined to reflect differences of drought in California, the Colorado River Basin, and the Rio Grande Basin. When compared with earlier droughts, these recent droughts are characterized by low precipitation, just as low as during drought episodes of earlier periods, like the 1930s (e.g., Utah and Overpeck, 2017).

We thank the reviewer for the comment. The chapter text has been revised and refined to reflect multiple climate and human factors, with less emphasis on only drought.

Decreased snowpack is not a robust observation across the high elevation regions in Colorado. Snowpack is not declining water supplies. Perhaps, during droughts water supplies are declining in part due to climate warming hydrologic drought while average precipitation has stayed the same. Droughts can be caused by low precipitation or higher temperatures but in recent years warming climate appears to be a larger contributor to recent droughts.

We thank the reviewer for the comment. The chapter text has been revised and refined to reflect multiple climate and human factors, with less emphasis on only drought.

Thank you for the helpful comment. "increased" added, "dropped" changed to "fallen"
California."

Effects of Climate Change on Cultural Resources Within Point Reyes National Seashore, Marin County, level rise and ecosystem change; see report by Newland 2012 for the National Park Service: "The Potential This statement/assessment should include recognition that archaeology is also at risk at Point Reyes due to sea key message and discussion that follows should recognize that it is not only ecosystems and modern advancements; the potential threat of flooding, erosion, and sea-level rise for the Point Reyes National Seashore. Our recommendation is to consider the impacts of climate change on cultural resources within the Point Reyes National Seashore, including those that are listed as National Historic Landmarks, National Monuments, and National Parks. These areas are of significant cultural and historical importance, and their preservation is essential to the cultural heritage of the surrounding communities and the broader society.

Archaeology)" is an analysis of heritage that is at risk as sea levels rise and communities both begin to build new communities and adapt to the changing environment. Relevant authors for the American Southwest include Tim Kohler, Scott Ingram, Margaret Nelson, and Jon Erlandson. The research on archaeology in this region has been conducted in conjunction with climate change studies, and the implications of these changes for cultural heritage disruption and loss are significant.

The phrasing "has already led to heat-associated deaths and illnesses" implies that occurrences of such in AZ and CA are novel, which they are not. What is new is "heat-related deaths and illnesses that are plausibly linked to hotter temperatures; e.g., an increasing trend?" We greatly appreciate the reviewer's comment. [NO CHANGES TO TEXT REQUIRED]

The recent system conservation efforts in the Colorado River Basin have been funded in large part by municipalities desiring to firm reservoir supplies. The Southwest is one of the fastest growing regions in the country and this growth drives at least some municipal entities to be proactive about their future needs even while they are making substantial progress on water conservation.

The 6-state Southwest region does not have a single "climate"; in fact, the huge climatic diversity of the SW is a key driver of the ecosystem, cultural, and economic diversity cited in this sentence. Thus, the notion that the SW is "under the hottest and driest climate" in the US is an unfortunate generalization that elides the enormous climate variability in temperature and precipitation regimes across the region—and it is not even true, if "hottest" is interpreted as "highest annual average temperature", for which the SW US is hotter overall.

The implication of this statement appears to be that SW, being already hot and dry, is especially vulnerable to further warming and drying. But that isn't uniformly true for the SW: the mountain snowpack of Utah and Colorado—which builds and melts in a cool/wet climate—is less vulnerable to the impacts of future warming than the snowpacks of the PNW or Northern Rockies, for example. Recommendation: Change the sentence to: "The Southwest encompasses diverse ecosystems, cultures, and economies, in part reflecting its enormous climatic diversity, including the hottest and driest climate in the U.S.," We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

The phrasing "has already led to heat-associated deaths and illnesses" implies that occurrences of such in AZ and CA are novel, which they are not. What is new is "heat-related deaths and illnesses that are plausibly linked to hotter temperatures; e.g., an increasing trend?" We greatly appreciate the reviewer's comment. [NO CHANGES TO TEXT REQUIRED]

A portion of Key Message 1--"increasing water demands from a growing population"—is not supported by the text in that section, and in fact is apparently contradicted by statements in J. 1992. River T. and, in particular, per-capita water use continues to increase in California (Chesky et al., 2001). Water use in California has now rebounded to pre-drought levels according to recent newspaper reports. See https://www.mercurynews.com/2020/07/30/california-water-use-continues-to-increase-in-colorado-s-snowpack-declines. The reviewer's comment is correct that per-capita and indeed total water use in many cities is either remaining the same, or decreasing (see J. J. and C. J. book). However, in other places, municipalities have been active in seeking new supplies. These actions in some cases have been forward looking, rather than to meet immediate needs. The Southern Nevada Water Authority continues the process of acquiring water rights in northeastern Nevada. St. George, Utah, is pursuing a ~100-kilometer pipeline from Lake Powell. The Metropolitan Water District of Southern California has continued to investigate following opportunities on the Colorado River (e.g., Bard summer flow releases program, admittedly small but potentially larger in the future). In the Front Range of Colorado, state planning documents indicate a large supply of demand gap of approximately 560 kaf to meet growth in the decades ahead, some of which is expected to come from the Colorado River. Colorado expects to add almost double population from 5 m to 10 m by 2050. A pipeline proposal from Wyoming to the Colorado-Front Range has recurred which would move 55 kaf/year for municipal use. See https://www.sthbg.com/news/ENVIRONMENT/20160227/entrepreneur-reviews-solar-landfill-proposal turns-green-native-water-from-utah-to-colorado/ The Central Arizona Project is pursuing the acquisition of new water supplies in Mohave County to assist with firming supplies for its canal, some of which is used for municipal use.

The recent system conservation efforts in the Colorado River Basin have been funded in large part by municipalities desiring to firm reservoir supplies. The Southwest is one of the fastest growing regions in the country and this growth drives at least some municipal entities to be proactive about their future needs even while they are making substantial progress on water conservation.

The recent system conservation efforts in the Colorado River Basin have been funded in large part by municipalities desiring to firm reservoir supplies. The Southwest is one of the fastest growing regions in the country and this growth drives at least some municipal entities to be proactive about their future needs even while they are making substantial progress on water conservation.

We thank the reviewer for the comment. We have modified the text to acknowledge the risk to archaeological sites, and have added the reference to work by Newland.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

We感谢 the reviewer for the comment. We have modified the text to acknowledge the risk to archaeological sites, and have added the reference to work by Newland.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>143320</td>
<td>Foot Region</td>
<td>25: Southwest</td>
<td>25.3</td>
<td>500</td>
<td>54</td>
<td>14</td>
<td>16</td>
<td>The framing of this key message should be re-assessed and filled out. Attention to Indigenous peoples is certainly important. However, it is not the only group with history, heritage, and attachment to landscape in the Southwest. The framing of this section leaves out contexts of Hispanic settlement and the history of other European arrivals and in this region. Other major themes that are missing include: Goldrush history and other mining/extractive industries; development of cattle ranching, early of water infrastructure. Authors should examine – why is Indigenous peoples are recognized as having history that is important and relevant to them and their adaptation, but other communities in the region do not? It may be appropriate to add another key message.</td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>143321</td>
<td>Foot Region</td>
<td>25: Southwest</td>
<td>25.3</td>
<td>1008</td>
<td>1108</td>
<td>34</td>
<td>34</td>
<td>1. Recommend connecting this section back to the Indigenous peoples section: what are the community-wide implications of losing or experiencing major reductions in significant food sources? 2. Review the phrasing of this section and whole key message with respect to urgency and social implications: loss of food sources can be socially devastating, and rapid adoption of new unfamiliar foods should accelerated food sources is not a given. Archaeological work in the Southwest by Margaret Beck and Matt Hill, for example, shows generational resilience of foodways by immigrants across the region.</td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>143322</td>
<td>Foot Region</td>
<td>25: Southwest</td>
<td>25.3</td>
<td>1112</td>
<td>1117</td>
<td>4</td>
<td>9</td>
<td>Recommend adding here discussion of status of research about non-Indigenous peoples connections to landscape/community/identity. Attention to Indigenous: ‘browsies’ is important, but so are ties to accustomed ‘browsies’ by non-Indigenous communities. Non-Indigenous identity and connection to ‘browsies’ also have strong implications for success of adaptation for these communities.</td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>143323</td>
<td>Foot Region</td>
<td>25: Southwest</td>
<td>25.3</td>
<td>1117</td>
<td>1117</td>
<td>34</td>
<td>34</td>
<td>Functions should include attention to the impacts of climate change on cultural heritage/cultural resources. Recommended reference is the National Park Service Climate Change Impacts on Cultural Resources (<a href="https://www.nps.gov/subjects/climatechange/impacts/culturalresources.html">https://www.nps.gov/subjects/climatechange/impacts/culturalresources.html</a>; also published in National Park Service Cultural Resources Climate Change Strategy: <a href="https://www.nps.gov/subjects/climatechange/culturalresourcesstrategy.htm">https://www.nps.gov/subjects/climatechange/culturalresourcesstrategy.htm</a>, see Goal 2).</td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>143324</td>
<td>Foot Region</td>
<td>25: Southwest</td>
<td>25.3</td>
<td>1119</td>
<td>1119</td>
<td>34</td>
<td>34</td>
<td>Recommend removing reference to both Indigenous and non-Indigenous communities. Non-Indigenous peoples also live in communities.</td>
</tr>
<tr>
<td>off</td>
<td>Lukas</td>
<td>143377</td>
<td>Foot Region</td>
<td>25: Southwest</td>
<td>25.3</td>
<td>1086</td>
<td>1108</td>
<td>17</td>
<td>18</td>
<td>The phrasing of this sentence presents the finding of the Abotzoglou and Williams (2016) study on wildfire damage relative to other years, consistent with the historically observed wildfire damage in the next sentence. But the AW 2016 finding, being based on climate model simulations, should be treated in the same way as future-oriented analysis that use climate model projections: as an estimate subject to uncertainties related to climate sensitivity, as well as uncertainties in the statistical association of particular climate conditions and burned area. Also, the use of ‘doubled’ is awkward as it implies a trend over time (e.g., 1984-2015), rather than a difference between two scenarios. Recommend changing to ‘The area that was burned by wildfire across the western United States from 1984-2015 is estimated to be twice what would have burned had human-caused climate change had not occurred.’</td>
</tr>
<tr>
<td>off</td>
<td>Lukas</td>
<td>143380</td>
<td>Foot Region</td>
<td>25: Southwest</td>
<td>25.3</td>
<td>1086</td>
<td>1108</td>
<td>17</td>
<td>18</td>
<td>The phrase ‘believe the U.S. Government forcibly located Southwest tribes’ is not inclusive of the many native nations in the Southwest who still occupy at least a portion of ancestral/pre-European homelands (e.g., Hopi, the New Mexico Puebloan nations, Tohono O’odham, Gila River Indian Tribes). That is, they currently live in ‘arid reservations and homelands of most of the Southwest tribes’ or similar. Recommend changing to ‘Increasing heat intensifies the arid conditions of, and drought impacts to, the reservations and homelands of most of the Southwest tribes’, or similar.</td>
</tr>
<tr>
<td>knw</td>
<td>Marsh</td>
<td>143395</td>
<td>Figure</td>
<td>25: Southwest</td>
<td>25.3</td>
<td>1087</td>
<td>1087</td>
<td>15</td>
<td>15</td>
<td>The adaptation of the figure is somewhat misleading. Indicate that the graph shows the estimated cumulative contribution due to anthropogenic climate change and other factors based on fuel toxicity.</td>
</tr>
<tr>
<td>knw</td>
<td>Marsh</td>
<td>143400</td>
<td>Foot Region</td>
<td>25: Southwest</td>
<td>25.3</td>
<td>1094</td>
<td>1095</td>
<td>17</td>
<td>17</td>
<td>The system may transition altering patterns of carbon uptake.</td>
</tr>
</tbody>
</table>

Response:

- We appreciate this comment. However, with limited space, it is necessary to focus on a few themes. This is not to imply that other themes are not important. Part of the determination to focus on Indigenous peoples was learning from the previous assessments, which included that Indigenous peoples and communities are among those experiencing and witnessing climate change impacts first and foremost, and among those leading in actions to adapt to and mitigate such impacts. As such, a distinct need was articulated to not only have a standalone Tribal and Indigenous Peoples Chapter, but that tribal-related issues are part of each region as well. Indigenous communities are certainly not the only frontline communities and not the only areas with important local knowledge. We recognize that there are other place-based subsistence communities whose livelihoods, practices, values, and life ways are also deeply rooted to the land. There are also other frontline communities in what locales that are at the forefront of climate impacts and environmental injustices. However, tribes and Indigenous peoples are particularly unique with their status as sovereign nations, extensive traditional homelands upon which they have dwelled for millennia, and Indigenous knowledge developed over generations of longitudinal observations about changes occurring to the ecosystems, water bodies, plant and animal species, etc. on said land. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has not been modified because this sentence is specifically about impacts on Indigenous peoples and Indigenous communities. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We appreciate this comment. However, with limited space, it is necessary to focus on a few themes. This is not to imply that other themes are not important. Part of the determination to focus on Indigenous peoples was learning from the previous assessments, which included that Indigenous peoples and communities are among those experiencing and witnessing climate change impacts first and foremost, and among those leading in actions to adapt to and mitigate such impacts. As such, a distinct need was articulated to not only have a standalone Tribal and Indigenous Peoples Chapter, but that tribal-related issues are part of each region as well. Indigenous communities are certainly not the only frontline communities and not the only areas with important local knowledge. We recognize that there are other place-based subsistence communities whose livelihoods, practices, values, and life ways are also deeply rooted to the land. There are also other frontline communities in what locales that are at the forefront of climate impacts and environmental injustices. However, tribes and Indigenous peoples are particularly unique with their status as sovereign nations, extensive traditional homelands upon which they have dwelled for millennia, and Indigenous knowledge developed over generations of longitudinal observations about changes occurring to the ecosystems, water bodies, plant and animal species, etc. on said land. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |

- We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion. |
We thank the reviewer for the comments. The chapter text has been revised to incorporate the suggestion—by diversifying the number of studies on this topic, adding more specific language about snow-related parameters and their associated observed impacts, and highlighting the spatial diversity in observed climate effects on snowpack within the Southwest region.

off Lukas 14:24:03 West Region 25: Southwest 1099 1089 16 26 The specific assertion that there has been a 54%-20% reduction of [Southwest] snowpack, and its water content since 1950/60 is not directly attributable to Fyfe et al. 2017 (hereafter F17) or Pierce et al. 2008 (hereafter P08) contrary to the citations of those two studies. F17 found that there was a 10%-20% reduction in annual maximum SWE (SWEmax) between the periods 1982-1991 and 2001-2010, over a domain that covers the entire Western US, i.e., about double the area of the 9-state SW region. F17 expressed their mask findings as a range since they analyzed two types of SWE data. 1. The 10% reduction was calculated from the in-situ SNOTEL observed network: this result is likely both more robust and more comparable with prior SWE analyses, though with the caveats about data emission and exclusion given below. 2. The 20% reduction was derived from the average of four gridfed snowpack databases; the robustness of the SWE output from these mesoscale has not been rigorously assessed. For 1 above, F17 analyzed only SNOTEL data from the NEXIS network, which has relatively few sites in California. Most of the in-situ SWE observations in CA are from the California Dept. of Water Resources'4 network (functionally equivalent to SNOTEL), whose data were not analyzed by F17. Thus California is under-represented in their analysis. 1. F17 also included a site below 5000', for unknown reasons. This excludes a handful of SNOTEL sites in CA, and many dozens of sites in OR, WA, ID, and MT, further affecting analysis 1. These issues, combined with the difference in coverage between the SW region and the much larger F17 domain (afflicting analyses 1 and 2), mean that it is unclear how the 5.77 findings for regionally averaged SWEmax/mass (both 1 and 2) might scale to the smaller SW region. We can say that F17 found (in Figure 5) that the vast majority of SNOTEL sites in the SW region declined in SWEmax between 1982-1991 and 2001-2010. Offhand, that from 1950-1990, the ratio of April 1 SWE to March-April precipitation (SWE/Pr), had declined from 5.20 to a West-wide domain similar to that used by F17. SWEmax was taken from manually measured snowcourses, which are mostly co-located with current SNOTEL sites. While the SWE/metric is exportable, arguably more so than SWE itself, it does not speak clearly to trends in SWE. In fact, P08 found that the site-based trends in SWE from 1950-1999 mainly ranged from 4% to 10%, with 73% of the trends

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

off Lukas 14:24:14 West Region 25: Southwest 1094 1084 3 28 This statement about the impacts of fire suppression involves an overly broad reading that reinforces common held and false beliefs about the extent of these impacts. Many mid- and high-elevation conifer forest types in the Southwest region, especially the lodgepole and sugar-larch types, but also many pinyon-juniper woodlands, have not been impacted by the exclusion as described in this sentence. Recommend adding a qualifier “in addition, historical fire suppression policies have caused unnatural accumulations of understory trees and coarse woody debris in many mid-elevation forest types, fueling more intense and extensive wildfires (Hessburg et al. 2016, Stephens and Rother 2000).”

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Michael MacCracken 14:24:07 West Region 25: Southwest 1086 1076 10 22 This seems a bit of a stretch. Won’t it take global action to really have an effect, or are there really such actions that could also help locally? I’d suggest a bit of clarification on the sentence about what is meant (reading on the next page), i.e., what is meant by reducing water demands—so perhaps the sentence could say “Reducing the water demands associated with the extraction and use of fossil fuels would make more water available for other uses and help reduce ecological vulnerabilities” to make clearer what the linkage is.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Michael MacCracken 14:24:08 West Region 25: Southwest 1086 1076 27 27 I agree agreeing about it makes it sound more in kind of suggesting there is accuracy to a quarter of an inch. And a natural question is going to be if there are effects were accounted for. On line 26, I would think that “has” could be stopped. And on line 27, why say “heated” why not say “warm”?

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Michael MacCracken 14:24:09 West Region 25: Southwest 1086 1076 19 29 I’d say “warmed” instead of “heated,” and wasn’t at least some of the already warmed water due to an Nino—which is presumably variability driven rather than due to human-induced climate change.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Michael MacCracken 14:24:10 West Region 25: Southwest 1086 1076 14 25 Perhaps change “provide” to “grow” or “attract”, and it might read more smoothly if it said “grew half of the existing fruits & oral” and leave off the entire country.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Michael MacCracken 14:24:01 West Region 25: Southwest 1086 1076 16 36 It needs to be phrased so that “increasing heat stress during a5 is likely to lead to increased incidences of crop failure.” Thats, state the coming effect, not just the variability.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Michael MacCracken 14:24:02 West Region 25: Southwest 1086 1076 17 38 I suggest changing “intensity” to “tail further intensity”, and it might help to add a time reference here, so add to the sentence something like “during the past several centuries” if that fits with what it was. I also expand it on line “that perhaps seeing something like “dispute the increasingly challenging conditions”

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Michael MacCracken 14:24:03 West Region 25: Southwest 1087 1077 2 4 I would suggest making this about reducing carbon emissions (as carbon capture and storage could conceivably do this, but requires a lot of water), but focus on the need for a shift away from water-consuming energy sources. The Key Messengers really emphasize that water is the key, so keep the focus on that being the reason to get away from use of fossil fuels.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

Michael MacCracken 14:24:04 West Region 25: Southwest 1087 1077 11 22 It is really important to explain a bit more about how the figure was developed, so based on models that considered the weather with and without climate change, etc.—just giving the reference I don’t think is convincing or informative enough.

Thank you for the comments. The main text of the energy section gives more detail, so we have made the figure caption concise.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>Start Line</th>
<th>End Page</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144595</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2017</td>
<td>14</td>
<td>2017</td>
<td>16</td>
<td>It'd imagine the photo is going to show water levels in Lake Mead--so this is what needs to be said. And then the next sentence explains what is happening, namely drought. Just a note that if I've going to say &quot;drought,&quot; that is usually used to describe a depression in water availability that's expected to end at some point in the future (and it is the case that then period should be qualified). With climate change, what it really happening is a destitution that is, the average amount of rainfall in the Basin, and therefore that there will be fluctuations about this declining baseline that is projected. So, I'd really suggest changing &quot;drought in the Colorado River.&quot; (by the way, it's not drought in the River, but in the Colorado River Basin). So I'd suggest saying &quot;Water withdrawal and the increasing aridity of the Southwest region caused by climate change have led to a drop in the level of Lake Mead to the lowest level since Hoover Dam was built in 1935.&quot;</td>
<td>We thank the reviewer for the comments. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144596</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2018</td>
<td>8</td>
<td>2018</td>
<td>8</td>
<td>I'm surprised this says &quot;fish&quot; and would instead, in its addition, say &quot;fruits and vegetables.&quot; Saying &quot;food&quot; sounds as if this means manufacturing of prepared items--so maybe say &quot;meat, fruits, and vegetables.&quot;</td>
<td>We thank the reviewer for the comments. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144597</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2018</td>
<td>12</td>
<td>2018</td>
<td>12</td>
<td>We thank the reviewer for the comments. We mention, a little further down in the text, that agricultural irrigation accounts for 70%. We regret that we lack the space to include a pie chart.</td>
<td>We thank the reviewer for the comments. We mention, a little further down in the text, that agricultural irrigation accounts for 70%. We regret that we lack the space to include a pie chart.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144598</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2018</td>
<td>19</td>
<td>2018</td>
<td>19</td>
<td>We thank the reviewer for the comments. We thank the reviewer for the comments.</td>
<td>We thank the reviewer for the comments. We thank the reviewer for the comments.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144599</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2018</td>
<td>26</td>
<td>2018</td>
<td>26</td>
<td>Sentence is not clear about the changing patterns of ecosystems.</td>
<td>We thank the reviewer for the comments. We have revised the text accordingly to be more clear.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144600</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2018</td>
<td>28</td>
<td>2018</td>
<td>28</td>
<td>While many wildlife are natural, not all are. I'd somehow suggest indicating that natural wildlife in the historic Basin habitat and now dormated here, but not the new one.</td>
<td>We thank the reviewer for the comments. We have revised the text accordingly to be more clear.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144601</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2018</td>
<td>36</td>
<td>2018</td>
<td>36</td>
<td>As of now and about LAS and San Diego airports? And then there is the whole Sacramento-San Joaquin River Delta region, with much of the land below river (and sea) level--the inland area is in very precarious shape and merits permanent attention.</td>
<td>We thank the reviewer for the comments. We have revised the text to address the reviewer's concern.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144602</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>8</td>
<td>2019</td>
<td>8</td>
<td>It's important to say that low amounts of energy. Furthermore, changes in climate are likely to introduce the availability of hydropower while also increasing the need for energy for air conditioning and moving water across the region.</td>
<td>We thank the reviewer for the comments. We have revised the text to address the reviewer's concern.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144603</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>12</td>
<td>2019</td>
<td>12</td>
<td>We thank the reviewer for the comments. We thank the reviewer for the comments.</td>
<td>We thank the reviewer for the comments. We thank the reviewer for the comments.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144604</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>27</td>
<td>2019</td>
<td>27</td>
<td>Thought the Middle East (incl.?) had gotten a better value--I would say &quot;some of the hottest.&quot;</td>
<td>Thank you for your comment. The World Meteorological Organization, verified global daily maximum temperature record in Furnace Creek Ranch, CA, USA 56.7°C (134°F). We cite the source, in the text, and we have double-checked it in response to your review comments.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144605</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>34</td>
<td>2019</td>
<td>34</td>
<td>So, what is the other half potentially attributable to? Perhaps say &quot;definitely attributed to...&quot; If I'd say &quot;definitely attributed to...&quot;</td>
<td>Thank you for your comment. We agree that the attribution to human caused climate change is definitive. However, the change only accounts for a fraction of the reduction in snowpack and snow water content. No change recommended for this comment.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144606</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>38</td>
<td>2019</td>
<td>38</td>
<td>What is really happening here is the aridification of the southwestern North America--and this is different than being struck by a drought. What is happening is that the baseline is changing, not just a variation in temperature that will soon end.</td>
<td>We thank the reviewer for the comments. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144607</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>14</td>
<td>2019</td>
<td>It's best to avoid the word &quot;fray&quot; as it is really meaningless--almost anything &quot;fray&quot; happens. Good practice is to please from the Biothielousal (On the 12, it would seem that &quot;fray&quot; should be replaced by &quot;is proposed to&quot; on line 14, perhaps say &quot;are expected to bring&quot; instead of &quot;may become.&quot; In general, the chapter should be reworded for the word &quot;may&quot; and a replacement term chosen from the likelihood lexicon (perhaps with an added qualifying phrase--so this, then that is Body line sentence.</td>
<td>We thank the reviewer for the comments. We have revised the text accordingly.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144608</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>20</td>
<td>2019</td>
<td>You already &quot;come drifted.&quot;</td>
<td>We thank the reviewer for the comments. We have revised the text accordingly.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144609</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>24</td>
<td>2019</td>
<td>24</td>
<td>I'd suggest saying that &quot;uses large amounts of energy. Furthermore, changes in climate are likely to introduce the availability of hydropower while also increasing the need for energy for air conditioning and moving water across the region.</td>
<td>We thank the reviewer for the comments. We have revised the text to address the reviewer's concern.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144610</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>19</td>
<td>2019</td>
<td>19</td>
<td>Indeed, &quot;years of low precipitation&quot; --another way to say this is increasing aridification. And note of paragraph might be better framed indicating an aridification trend due to human-induced climate change.</td>
<td>We thank the reviewer for the comments. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144611</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>26</td>
<td>2019</td>
<td>&quot;fray&quot; needs to be replaced--there is really no other alternative, so could say &quot;will cause&quot; or &quot;will lead to&quot;-- be direct and not vague.</td>
<td>We thank the reviewer for the comments. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144612</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>30</td>
<td>2019</td>
<td>This is a bit confused because the text is not clear that climate change is causing general aridification of the region (so a decline in the baseline) and then on top of that is the overall fluctuations that will create, basically, more dry and slightly less dry conditions, then perhaps with an occasional year think in (e.g., when locally the hurricanes might stream into parts of the region). How can it really be suggested that what is now considered to be a drought in the region will end when something is that the baseline for precipitation is declining as the climate changes? I just think some of the text and thinking here is needed to be clearer about trends and variations because how one responds would be different. If a longer or more intense drought, one might build big reservoirs to hold more in reserve from wet years; if instead a declining baseline is the trend, variations (e.g., AMSL. San Francisco (13 ft or 4 m AMSL), and Oakland (9 ft or 2.7 m AMSL). We changed this statement to reflect multiple airports and the Sacramento-San Joaquin River Delta.</td>
<td>We thank the reviewer for the comments. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144613</td>
<td>Ind Region</td>
<td>25</td>
<td>Southwest</td>
<td>2019</td>
<td>36</td>
<td>2019</td>
<td>We thank the reviewer for the comments. We thank the reviewer for the comments.</td>
<td>We thank the reviewer for the comments. We thank the reviewer for the comments.</td>
<td></td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
<td>Response</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>-------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------</td>
<td>---------</td>
<td>---------</td>
<td>----------</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144616</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1091</td>
<td>1091</td>
<td>57</td>
<td>57</td>
<td>True, and likely the only way to do this with the large-scale simulation required. X could be increased...</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144615</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1092</td>
<td>1092</td>
<td>2</td>
<td>3</td>
<td>The report really needs to tell the public this is not just a drought—don’t expect wet conditions to return. This is...</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144616</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1092</td>
<td>1092</td>
<td>24</td>
<td>36</td>
<td>Yes, I would suggest expanding this discussion a bit.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144617</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1092</td>
<td>1092</td>
<td>23</td>
<td>26</td>
<td>The text is correct to note that, on balance, the literature basins projections of future aridification, and we note this in...</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144618</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1094</td>
<td>1094</td>
<td>7</td>
<td>9</td>
<td>Yes. If “it does not limit...decrease in greenhouse gases...it’s not enough to just reduce emissions, one has to really do a lot.”</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144619</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1095</td>
<td>1095</td>
<td>22</td>
<td>22</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144620</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1095</td>
<td>1095</td>
<td>24</td>
<td>35</td>
<td>Yes. If “it does not limit...decrease in greenhouse gases...it’s not enough to just reduce emissions, one has to really do a lot.”</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144621</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1097</td>
<td>1097</td>
<td>18</td>
<td>18</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144622</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1098</td>
<td>1098</td>
<td>6</td>
<td>6</td>
<td>Yes. If “it does not limit...decrease in greenhouse gases...it’s not enough to just reduce emissions, one has to really do a lot.”</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144623</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1106</td>
<td>1106</td>
<td>3</td>
<td>2</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144624</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1108</td>
<td>1108</td>
<td>25</td>
<td>25</td>
<td>Yes. If “it does not limit...decrease in greenhouse gases...it’s not enough to just reduce emissions, one has to really do a lot.”</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Beth</td>
<td>StoryBoost</td>
<td>144625</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1108</td>
<td>1108</td>
<td>31</td>
<td>32</td>
<td>Thank you for your comment.</td>
<td>Thank you for your comment. The shifts will vary based upon both-scale (meteorological) and area. I removed “northward” because...</td>
</tr>
<tr>
<td>Beth</td>
<td>StoryBoost</td>
<td>144626</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1089</td>
<td>1089</td>
<td>12</td>
<td>12</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
</tr>
<tr>
<td>Beth</td>
<td>StoryBoost</td>
<td>144627</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1089</td>
<td>1089</td>
<td>25</td>
<td>25</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
</tr>
<tr>
<td>Beth</td>
<td>StoryBoost</td>
<td>144628</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1101</td>
<td>1101</td>
<td>28</td>
<td>29</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
</tr>
<tr>
<td>Beth</td>
<td>StoryBoost</td>
<td>144629</td>
<td>Text Region</td>
<td>25</td>
<td>Southwestern</td>
<td>1102</td>
<td>1102</td>
<td>19</td>
<td>19</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
</tbody>
</table>
increasingly unlikely. I predict.

3.7 Key Message 1: Retreating and thinning arctic summer sea ice plays an important role on Alaska's residents. These changes are anticipated to continue with unabated and rapid sea ice loss in the near term.

Figure/Table 1175

The authors appreciate this suggestion and the text has been modified slightly.

Sentence has been modified.

5.5 Key Message 4: Community adaptation to climate change is essential to the long-term well-being of Alaska's residents. The importance of partnership and involvement of communities is highlighted in this chapter.

6.2 Key Message 5: Climate change is already affecting Alaska's ecosystems, infrastructure, and economy, and will continue to do so in the future.

The authors appreciate this suggestion and the text has been modified slightly to reflect that Nuiqsut is one community among others to use this new technology.

The authors appreciate the suggestion and the text has been modified slightly to reflect that trumpet is one community among others to use this new technology.

The authors thank the reviewer for the comment. The recommendations cited from the State of Alaska are for the protection of Alaska residents.

The authors thank the reviewer for the comment and the text has been modified. We appreciate the point that communities with long-standing water scarcity are not technically adapting, rather, are coping with water shortages.

The authors appreciate the comment by the reviewer, but the paragraph is concerned with erosion. We have however, deleted the first sentence as it is not directly related to erosion.

I'm wondering why there is high confidence when there is limited evidence of successful, community-driven, adaptive strategies. Suggest replacing "episodes of episodes..." with an alternative terminology.

I'm not sure if it's accurate to see that people have had to "adapt" to decreased water in villages. Water has not been a major issue in the villages that I've visited.

I suggest replacing "riparian, but may only slow the erosion process" with "riparian. But these may only slow the erosion process, and other factors may also play a role in erosion.

Suggested text has been added.

The authors thank the reviewer for this comment and the text has been modified. We appreciate the point that communities with long-standing water scarcity are not technically adapting, rather, are coping with water shortages.

The authors appreciate this suggestion and the text has been modified slightly to reflect that Nuiqsut is one community among others to use this new technology.

The authors appreciate the suggestion and the text has been modified slightly to reflect that trumpet is one community among others to use this new technology.

The authors thank the reviewer for the comment and the text has been modified. We appreciate the point that communities with long-standing water scarcity are not technically adapting, rather, are coping with water shortages.

The authors appreciate the comment by the reviewer, but the paragraph is concerned with erosion. We have however, deleted the first sentence as it is not directly related to erosion.

The authors appreciated this comment. While the suggested change was not used, the text was modified to make the discussion more clear.

I'm not sure if it's accurate to see that people have had to "adapt" to decreased water in villages. Water has not been a major issue in the villages that I've visited.

I suggest replacing "riparian, but may only slow the erosion process" with "riparian. But these may only slow the erosion process, and other factors may also play a role in erosion.

Suggested text has been added.

The authors thank the reviewer for this comment and the text has been modified. We appreciate the point that communities with long-standing water scarcity are not technically adapting, rather, are coping with water shortages.

The authors appreciate this suggestion and the text has been modified slightly to reflect that Nuiqsut is one community among others to use this new technology.

The authors appreciate the suggestion and the text has been modified slightly to reflect that trumpet is one community among others to use this new technology.

The authors thank the reviewer for the comment and the text has been modified. We appreciate the point that communities with long-standing water scarcity are not technically adapting, rather, are coping with water shortages.

The authors appreciate the comment by the reviewer, but the paragraph is concerned with erosion. We have however, deleted the first sentence as it is not directly related to erosion.

The authors appreciated this comment. While the suggested change was not used, the text was modified to make the discussion more clear.

I'm not sure if it's accurate to see that people have had to "adapt" to decreased water in villages. Water has not been a major issue in the villages that I've visited.

I suggest replacing "riparian, but may only slow the erosion process" with "riparian. But these may only slow the erosion process, and other factors may also play a role in erosion.

Suggested text has been added.

The authors thank the reviewer for this comment and the text has been modified. We appreciate the point that communities with long-standing water scarcity are not technically adapting, rather, are coping with water shortages.

The authors appreciate this suggestion and the text has been modified slightly to reflect that Nuiqsut is one community among others to use this new technology.

The authors appreciate the suggestion and the text has been modified slightly to reflect that trumpet is one community among others to use this new technology.

The authors thank the reviewer for the comment and the text has been modified. We appreciate the point that communities with long-standing water scarcity are not technically adapting, rather, are coping with water shortages.

The authors appreciate the comment by the reviewer, but the paragraph is concerned with erosion. We have however, deleted the first sentence as it is not directly related to erosion.

The authors appreciated this comment. While the suggested change was not used, the text was modified to make the discussion more clear.

I'm not sure if it's accurate to see that people have had to "adapt" to decreased water in villages. Water has not been a major issue in the villages that I've visited.

I suggest replacing "riparian, but may only slow the erosion process" with "riparian. But these may only slow the erosion process, and other factors may also play a role in erosion.

Suggested text has been added.

The authors thank the reviewer for this comment and the text has been modified. We appreciate the point that communities with long-standing water scarcity are not technically adapting, rather, are coping with water shortages.

The authors appreciate this suggestion and the text has been modified slightly to reflect that Nuiqsut is one community among others to use this new technology.

The authors appreciate the suggestion and the text has been modified slightly to reflect that trumpet is one community among others to use this new technology.

The authors thank the reviewer for the comment and the text has been modified. We appreciate the point that communities with long-standing water scarcity are not technically adapting, rather, are coping with water shortages.

The authors appreciate the comment by the reviewer, but the paragraph is concerned with erosion. We have however, deleted the first sentence as it is not directly related to erosion.

The authors appreciated this comment. While the suggested change was not used, the text was modified to make the discussion more clear.

I'm not sure if it's accurate to see that people have had to "adapt" to decreased water in villages. Water has not been a major issue in the villages that I've visited.

I suggest replacing "riparian, but may only slow the erosion process" with "riparian. But these may only slow the erosion process, and other factors may also play a role in erosion.

Suggested text has been added.

The authors thank the reviewer for this comment and the text has been modified. We appreciate the point that communities with long-standing water scarcity are not technically adapting, rather, are coping with water shortages.

The authors appreciate this suggestion and the text has been modified slightly to reflect that Nuiqsut is one community among others to use this new technology.

The authors appreciate the suggestion and the text has been modified slightly to reflect that trumpet is one community among others to use this new technology.
Comment: This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

The authors appreciate this reviewer comment. Assumptions that climate projections at appropriate spatial scales do not accurately represent the scientific understanding of climate change or the assessment of the peer-reviewed literature as presented in NCA4 Vol. I. NCA4 Vol. 1, which provides the underlying scientific basis for the impacts analyzes in Vol. II, addresses observations of past trends in climate, including severe weather events, the ability of global climate models to reproduce those trends, and the projections of future changes in climate and the models used to make those projections. On models in general, it states: ‘Confidence in the usefulness of the future projections generated by global climate models is based on multiple factors. These include the fundamental nature of the physical processes they represent, such as radiative transfer or geophysical fluid dynamics, which can be tested directly against measurements or theoretical calculations [to demonstrate] that model approximations are valid. They also include the vast body of literature dedicated to evaluating and assessing model abilities to simulate observed features of the Earth system, including large scale modes of natural variability, and to reproduce their net response to external forcing that captures the interaction of many processes which produce observable climate system feedbacks (e.g., Flato et al. 2013).’ (Chapter 4) Regarding the specific performance of global climate models in reproducing observed trends, extreme precipitation events, high confidence for temperature, high confidence for extreme precipitation events. (Chapter 1) And over longer time scales, Vol. 1 concludes that: ‘While climate models incorporate important climate processes that can be well quantified, they do not include all of the processes that can contribute to feedbacks, compound extreme events, and abrupt and/or irreversible changes. For this reason, future changes outside the range projected by climate models cannot be ruled out (very high confidence). Moreover, the systematic tendency of climate models to underestimate temperature change during warm paleoclimates suggests that climate models are more likely to underestimate than to overestimate the amount of long-term future change (medium confidence).’ (Chapter 15) The supporting evidence and traceable accounts for these key messages are available from NCA4 Vol. I.
The economic consequences of climate change seem a bit too one-sided and narrow in this chapter. The Arctic is becoming a newly accessible ocean. Completely discounting the idea that technological change and economic conditions could not cause rapid unfolding consequences, possibly similar to those associated with the newly accessible Atlantic and the Pacific Oceans of the 15th century, seems overly focused on an exceptionality of the present. It is reminiscent of the idea: Time is Different: misgivings of modern financial markets. Although it is assumed in the report that climate will drastically different than the historical conditions, technology and economic conditions are treated as statistically fixed in the present. Physical and economic opportunity in a globalized world can induce rapid exploitation and technology advances that allow the counterpoint views to indicate a more problematic expansion of economic activities that reinforces itself, as well as creating require infrastructure. In Arctic Climate Change, Economy, and Society (ACCES): Integrated perspectives. Ambio, 40(1), 34-34. And GAT’Sанъя, Tamu. "Economic value of ecosystem services, minerals and oil in a melting Arctic: A preliminary assessment." Ecosystem Services 24 (2017): 180-186. And Melka, Nat, Keith Hamre, and Ed Hawkins. "Sea ice decline and ice century transfusion. Arctic shipping routes." Geophysical Research Letters 43, no. 18 (2016): 9709-9718. (The report notes Melka in a narrower context just a few lines above.) The use of arctic is becoming more realized as a viable alternative to vessels plowing through ice. Much of this literature is not peer-reviewed work rather than from industry itself. For example, see Lovech Martin https://www.lovecheamartin.com/products/nyinasik.html, https://www.aidc.com/business-economics/2017/05/sleuths-search-uleen-aleut-alaska-above-in-2016/ and偏爱 communities such as flooding and erosion are expected to increase as sea ice is forming later 16 in the future. Flexible, community-driven adaptation strategies may become necessary 15 by ensuring that climate risks are considered in the full context of the existing sociocultural 20 systems.

Comment: The entire message fairly states speculative attributions and projections of impacts as established physical facts. The attributions, projections, and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

The text has been modified for clarity.

The text has been modified for accuracy.

For the period covered by this report. The authors appreciate this review comment. Assertations that climate projections at appropriate spatial scales do not accurately represent the scientific understanding of climate change or the assessment of the perceived ecosystemal and cultural heritage described in these statements of the impacts analyses in Vol. 2, addresses observations of past trends in climate, including severe weather events, the ability of global climate models to reproduce these trends, and the projections of future changes in climate and the models used to make those projections. On models in general, it states: "Confidence in the usefulness of the future projections generated by global climate models is based on multiple factors. These include the fundamental nature of the physical processes they represent, such as radiative transfer or geophysical fluid dynamics, which can be tested directly against measurements or theoretical calculations to evaluate and assessing model abilities to simulate observed features of the earth system, including large scale modes of natural variability, and to reproduce their net response to external forcing that captures the interaction of many processes which produce observable climate system feedbacks (e.g., Piao et al. 2013).” (Chapter 1)

Regarding the specific characteristics of the global climate models in reproducing observed trends, on extreme precipitation, for example, Vol. 1 concludes: "The frequency and intensity of extreme heat and heavy precipitation events are increasing in most continental regions of the world (very high confidence). These trends are consistent with expected physical responses to a warming climate. Climate model studies are also consistent with these trends, although models tend to underestimate the observed trends, especially for the increase in extreme precipitation events (very high confidence for temperature, high confidence for extreme precipitation). “(Chapter 5) Find over longer time scales, Vol. 1 concludes that: "While climate models incorporate important climate processes that can well be quantified, they do not include all of the processes that can contribute to feedbacks, compound extreme events, and abrupt and/or irreversible changes. For this reason, future changes outside the range projected by climate models cannot be ruled out (very high confidence). Moreover, the systematic tendency of climate models to underestimate temperature change during warm paleoexcursions suggests that climate models are more likely to underestimate than to overestimate the amount of long-term future change (medium confidence). “ (Chapter 15) The supporting evidence and testable accounts for these key messages are available from NCA4 Vol. 1, Chapters 4, 6, and 15.

The text has been modified as suggested.

Perhaps “cultural resources or “tangible cultural heritage” instead of “cultural features”?

Perhaps rely is too strong a word. Denning studies show a lot of on-shore denning, with USFWS sources stating in rural areas, and the fact that a single storm could wipe out most of the infrastructure in a community, it doesn’t seem high enough.

Three to six billion seems likely to be an underestimate. Given that the Chukchi Shelf would cost at least $.5B to replace, and the cost of construction of homes, let alone public buildings like schools & clinics and water plants that are consistent with expected physical responses to a warming climate. Climate model studies are also consistent with these trends, although models tend to underestimate the observed trends, especially for the increase in extreme precipitation events (very high confidence for temperature, high confidence for extreme precipitation). “(Chapter 5) Find over longer time scales, Vol. 1 concludes that: "While climate models incorporate important climate processes that can well be quantified, they do not include all of the processes that can contribute to feedbacks, compound extreme events, and abrupt and/or irreversible changes. For this reason, future changes outside the range projected by climate models cannot be ruled out (very high confidence). Moreover, the systematic tendency of climate models to underestimate temperature change during warm paleoexcursions suggests that climate models are more likely to underestimate than to overestimate the amount of long-term future change (medium confidence). “ (Chapter 15) The supporting evidence and testable accounts for these key messages are available from NCA4 Vol. 1, Chapters 4, 6, and 15.

The text has been modified as suggested.

The text has been modified as suggested.

The text has been modified as suggested.

The text has been modified as suggested.

The text has been modified as suggested.

The text has been modified as suggested.

The text has been modified as suggested.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>414004</td>
<td>End Region</td>
<td>Alaska</td>
<td>118</td>
<td>118</td>
<td>2 17</td>
<td>More protection measures offer merely passive measures, which should perhaps be noted.</td>
<td>The text has been modified as suggested.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>414005</td>
<td>End Region</td>
<td>Alaska</td>
<td>118</td>
<td>118</td>
<td>25 35</td>
<td>The sea ice is also a platform for spring whaling in many North-Alaskan villages, so whaling should be mentioned here (or a problem for subsistence and melting of sea ice should also be noted).</td>
<td>The authors appreciate the suggestion and the text has been modified slightly to include the whaling of sea ice as also a problem for some.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>414006</td>
<td>End Region</td>
<td>Alaska</td>
<td>119</td>
<td>119</td>
<td>13 36</td>
<td>The sea ice in some very clear. The chapter A inside (all of Alaska with a big enough storm surge) cost $518/bbl in 1980 dollars. Total repair cannot $1M/tonne, so over that period a single community could easily spend 1/3 of the low 2017 estimate just repairing roads after storm surges with no/sea ice present.</td>
<td>After consideration of this point, the authors have determined that the existing text is clear and accurate. The authors appreciate the suggestion and the text has been modified as suggested.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>414007</td>
<td>End Region</td>
<td>Alaska</td>
<td>119</td>
<td>119</td>
<td>1 3</td>
<td>More recent estimates e.g. for Newtok and Nulato are a bit higher.</td>
<td>The authors appreciate the suggestion, but we are not aware of updated properly documented costs for innovation. The &quot;more recent estimates&quot; for Newtok and Nulato that mention a range from $300~$400 million appear to come from from a 2003 report, found at <a href="https://www.gpo.gov/products/SSA-04-14">https://www.gpo.gov/products/SSA-04-14</a>. The SSA study that was cited in the chapter was more recent and more detailed than the GAO report, so the authors determined that it provided a more reliable figure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>414008</td>
<td>End Region</td>
<td>Alaska</td>
<td>119</td>
<td>119</td>
<td>24 31</td>
<td>More recent estimates e.g. for Newtok and Nulato are a bit higher.</td>
<td>The authors appreciate this suggestion, but we are not aware of updated properly documented costs for innovation. The only ones we are aware of are those in the local media.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>414009</td>
<td>End Region</td>
<td>Alaska</td>
<td>118</td>
<td>118</td>
<td>25 8</td>
<td>This section omits any consideration of the loss of cultural heritage (archaeological sites, old cemeteries, TCPs, etc.) which can occur as a result of erosion or thawing. Such loss is of great concern to many rural communities. These places represent ties to a community’s history which connects people to their forebears. Many sites also contain information which could be useful in developing culturally appropriate adaptations, which is lost when the sites are lost.</td>
<td>The authors thank the reviewer for the suggestion and the text has been modified to include loss of cultural sites.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>414010</td>
<td>End Region</td>
<td>Alaska</td>
<td>118</td>
<td>118</td>
<td>6 14</td>
<td>Coastal consequences of thawing permafrost also include the loss of tangible cultural heritage, including archaeological sites, structures and objects and traditional cultural/property (TCPs). The consequences often include the thawing and decay of the artifacts and associated information which can be highly significant in connecting present-day people to their ancestors and their past.</td>
<td>The authors thank the reviewer for the suggestion and the text has been modified to include these terms.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anne</td>
<td>Jensen</td>
<td>415001</td>
<td>Figure</td>
<td>Alaska</td>
<td>171</td>
<td>171</td>
<td>11</td>
<td>Apparent twice</td>
<td>The Executive Summary is intended to repeat material from the chapter itself.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min</td>
<td>Zhang</td>
<td>415012</td>
<td>Figure</td>
<td>Alaska</td>
<td>181</td>
<td>181</td>
<td>11</td>
<td>This figure appears twice</td>
<td>The Executive Summary is intended to repeat material from the chapter itself.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian</td>
<td>Armstrong</td>
<td>414046</td>
<td>End Region</td>
<td>Alaska</td>
<td>170</td>
<td>170</td>
<td>11 21</td>
<td>Most reference to Chapter 8.</td>
<td>It is not appropriate to reference Chapter 8 here, but it has been referenced in other sections of the chapter.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian</td>
<td>Armstrong</td>
<td>414047</td>
<td>End Region</td>
<td>Alaska</td>
<td>117</td>
<td>117</td>
<td>17</td>
<td>cross reference to Chapter 7 and 9.</td>
<td>Key Messages are intended to stand alone and are not an appropriate place for cross referencing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian</td>
<td>Armstrong</td>
<td>414048</td>
<td>End Region</td>
<td>Alaska</td>
<td>118</td>
<td>118</td>
<td>7 12</td>
<td>Would be great to add to chapter of northward migration of species (Blue in Northeast chapter). Or maybe cross reference Northwest chapter for the idea.</td>
<td>The text has been modified and a reference provided that provides such a figure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christian</td>
<td>Armstrong</td>
<td>414049</td>
<td>End Region</td>
<td>Alaska</td>
<td>118</td>
<td>118</td>
<td>9 9</td>
<td>Also reference Chapter 9.</td>
<td>Reference to Chapter 9 has been added.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423029</td>
<td>End Region</td>
<td>Alaska</td>
<td>175</td>
<td>175</td>
<td>16 16</td>
<td>Remove comma after &quot;such as&quot;</td>
<td>Commas removed as suggested.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423060</td>
<td>End Region</td>
<td>Alaska</td>
<td>176</td>
<td>176</td>
<td>8 8</td>
<td>Add an &quot;s&quot; to water</td>
<td>The text has been modified as suggested.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423061</td>
<td>Alaskan Chapter</td>
<td>Alaska</td>
<td>181</td>
<td>181</td>
<td>11 11</td>
<td>Here is no citation for this statement.</td>
<td>The text has been modified as suggested.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423062</td>
<td>not Region</td>
<td>Alaska</td>
<td>181</td>
<td>181</td>
<td>24 17</td>
<td>This paragraph should be expanded greatly and should be the main focus of this section. The key message is focused on A.l. residents, communities, etc., but hardly any mention is made of the risks, impacts, and adaptation options of the people.</td>
<td>This is a good question and the authors appreciate this suggestion. Additional references have been provided to support these effects.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423063</td>
<td>End Region</td>
<td>Alaska</td>
<td>182</td>
<td>182</td>
<td>24 17</td>
<td>This paragraph should be expanded greatly and should be the main focus of this section. The key message is focused on A.l. residents, communities, etc., but hardly any mention is made of the risks, impacts, and adaptation options of the people.</td>
<td>This is a good question and the authors appreciate this suggestion. Additional references have been provided to support these effects.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423064</td>
<td>Alaskan Chapter</td>
<td>Alaska</td>
<td>182</td>
<td>182</td>
<td>26 26</td>
<td>Where are the citations for any of the statements in this paragraph?</td>
<td>This is a good question and the authors appreciate this suggestion. Additional references have been provided to support these effects.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423065</td>
<td>End Region</td>
<td>Alaska</td>
<td>183</td>
<td>183</td>
<td>13 18</td>
<td>Are there no citations for any of these statements?</td>
<td>The authors thank the reviewer for this suggestion. Additional references have been provided to support these effects.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423066</td>
<td>End Region</td>
<td>Alaska</td>
<td>186</td>
<td>186</td>
<td>10 13</td>
<td>This sentence is repeated.</td>
<td>Repeat sentence has been deleted from text.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423067</td>
<td>End Region</td>
<td>Alaska</td>
<td>118</td>
<td>118</td>
<td>8 15</td>
<td>What is appropriate the desire to have a KM focused on Indigenous communities, it means that much of the idea is present. KM’s are repeated in this section (and others). Is this the best approach?</td>
<td>This is a good question and the authors appreciate this suggestion. Additional references have been provided to support these effects.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423068</td>
<td>End Region</td>
<td>Alaska</td>
<td>118</td>
<td>118</td>
<td>9 15</td>
<td>Why are the decisions to have a KM focused on Indigenous communities important? KM’s are repeated in this section (and others). Is this the best approach?</td>
<td>The authors appreciate this suggestion and have modified both in various places.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423069</td>
<td>End Region</td>
<td>Alaska</td>
<td>119</td>
<td>119</td>
<td>15 15</td>
<td>I believe: ecosystem services is more widely accepted than &quot;environmental services&quot;</td>
<td>The authors appreciate these comments about the chapter and Key Messages and have modified both in various places.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science</td>
<td>Coordinating Committee</td>
<td>423070</td>
<td>End Region</td>
<td>Alaska</td>
<td>119</td>
<td>119</td>
<td>1 1</td>
<td>There are more challenges to education than just the costs. It would be worthwhile to mention the legal and social aspects as well.</td>
<td>A sentence has been added to the text to reflect this comment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marcia</td>
<td>Lonoff</td>
<td>414111</td>
<td>End Region</td>
<td>Alaska</td>
<td>119</td>
<td>119</td>
<td>3 7</td>
<td>Key message 1 could be improved for clarity. Suggestions:</td>
<td>The authors appreciate this suggestion and the Key Message has been modified.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanzy</td>
<td>Lonoff</td>
<td>415022</td>
<td>End Region</td>
<td>Alaska</td>
<td>119</td>
<td>119</td>
<td>14 16</td>
<td>Notes &quot;Further&quot;</td>
<td>Further &quot;has been deleted from the sentence.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The authors appreciate the reviewer's comment, and have made modifications to the EM.

Page 1172, line 20 - The authors appreciate these comments and the text has been modified.

Page 1172, line 27 - The Berkeley Earth dataset does not display uncertainty levels for its positive 1830s-
recent state transition, which is speculative has been informed primarily by model data with greater
extrapolation (given fewer data points) and a handful of historical measurements confined to Russian
activities in Alaska prior to the transfer to US control in 1867. In addition, we could not quickly find the peer-
reviewed obits for this dataset, which unfortunately, makes is less useful in our analysis. Thus, we decided
to include this citation without more comprehensive peer review and a distinct difference in the nature of the
information.

Page 1172, line 38-page 1173, Line 4 - NCA4 sets the task of reporting science new and relevant since NCA3. This
comparison points out that both average and extreme temperatures are responding faster in Alaska than the
rest of the US, a key consideration for adaptation.

Page 1173: Line 5-21 - Without clear direction, it is difficult to understand the reviewers comment. There are five
debate ideas presented here, all supported by the literature, and all required to present appropriate context: (1)
Temperature was variable, then has an obvious directional trend. (2) There is variation within Alaska as to how
large this trend is, but in all cases it is larger than the rest of the US; (3) Decadal variation is a key aspect still,
despite the trend; (4) That variability has a known cause, namely coupled North Pacific and Arctic variability, with
decadal persistence; and (5) Extrapolation is not clear as temperature. Most of these ideas get one, at most
two sentences, and the entirety is abstract length - 259 words. The authors respectfully do not think it wanders,
and have decided to make changes.

Pageafter Hertleman and Wender 2015 have been removed.

Page has been modified following suggestion.

Reference has been corrected here and in other locations.

Reference has been corrected here and in other locations.

Reference has been corrected here and in other locations.

An A statement about the likelihood of no sea ice has been added.

Page 1176, Line 5-21 - Without clear direction, it is difficult to understand the reviewers comment. There are five
debate ideas presented here, all supported by the literature, and all required to present appropriate context: (1)
Temperature was variable, then has an obvious directional trend. (2) There is variation within Alaska as to how
large this trend is, but in all cases it is larger than the rest of the US; (3) Decadal variation is a key aspect still,
despite the trend; (4) That variability has a known cause, namely coupled North Pacific and Arctic variability, with
decadal persistence; and (5) Extrapolation is not clear as temperature. Most of these ideas get one, at most
two sentences, and the entirety is abstract length - 259 words. The authors respectfully do not think it wanders,
and have decided to make changes.

Pageafter Hertleman and Wender 2015 have been removed.

Page has been modified following suggestion.

Reference has been corrected here and in other locations.

There are likelihood statements in the text except for address because we do not know how likely these will
occur in any particular geographic area.

The authors thank the reviewer for this comment. The additional material has been referenced and the section
has been modified to describe the anticipated increased risk of Vibrio infections due to sea surface temperature
rise.

The authors thank the reviewer for this suggestion. The additional material has been referenced and the section
has been modified to describe the anticipated increased risk of Vibrio infections due to sea surface temperature
rise.

Page has been modified following suggestion.

The authors thank the reviewer for this comment. The additional material has been referenced and the section
has been modified to describe the anticipated increased risk of Vibrio infections due to sea surface temperature
rise.

The authors thank the reviewer for these two comments. In regards to the second comment an economic analysis has not been verified and does not
account for the spontaneous adaptations such as adjusting hunting and fishing practices to changing conditions, which
do not necessarily have associated additional costs.

Page has been modified following suggestion.

Page has been modified following suggestion.

The authors thank the reviewer for this comment. The additional material has been referenced and the section
has been modified to describe the anticipated increased risk of Vibrio infections due to sea surface temperature
rise.

Page has been modified following suggestion.

The authors thank the reviewer for this comment. The additional material has been referenced and the section
has been modified to describe the anticipated increased risk of Vibrio infections due to sea surface temperature
rise.
This chapter was especially interesting because it focused on the climate change effects Alaska is experiencing. It mentions the effects on ecosystems, animal species, infrastructure, and human health. The chapter provides an interesting perspective of an area of the globe where not many people witness the effects of climate change.

The authors greatly appreciate the reviewer's comment about the chapter and hope that the content was useful.

The authors would like to thank the reviewer for this question; however, the evolution of glaciers is not fully understood, and that word should also be avoided.

Economics section of the chapter.

The text has been modified to state 'within this century'.

The text has been modified to indicate that the KM with more information. For example, KM3 discusses the uncertainty in projections of future wind and wave intensities.

The text was adjusted accordingly.

The authors greatly appreciate the reviewer's comment about the chapter and hope that the content was useful.

The authors would like to thank the reviewer for this question; however, the evolution of glaciers is not fully understood, and that word should also be avoided.

Economics section of the chapter.

The text has been modified to indicate that the KM with more information. For example, KM3 discusses the uncertainty in projections of future wind and wave intensities.

The text was adjusted accordingly.

The authors greatly appreciate the reviewer's comment about the chapter and hope that the content was useful.

The authors would like to thank the reviewer for this question; however, the evolution of glaciers is not fully understood, and that word should also be avoided.

Economics section of the chapter.

The text has been modified to indicate that the KM with more information. For example, KM3 discusses the uncertainty in projections of future wind and wave intensities.

The text was adjusted accordingly.

The authors greatly appreciate the reviewer's comment about the chapter and hope that the content was useful.

The authors would like to thank the reviewer for this question; however, the evolution of glaciers is not fully understood, and that word should also be avoided.

Economics section of the chapter.

The text has been modified to indicate that the KM with more information. For example, KM3 discusses the uncertainty in projections of future wind and wave intensities.

The text was adjusted accordingly.

The authors greatly appreciate the reviewer's comment about the chapter and hope that the content was useful.

The authors would like to thank the reviewer for this question; however, the evolution of glaciers is not fully understood, and that word should also be avoided.

Economics section of the chapter.

The text has been modified to indicate that the KM with more information. For example, KM3 discusses the uncertainty in projections of future wind and wave intensities.

The text was adjusted accordingly.

The authors greatly appreciate the reviewer's comment about the chapter and hope that the content was useful.

The authors would like to thank the reviewer for this question; however, the evolution of glaciers is not fully understood, and that word should also be avoided.

Economics section of the chapter.

The text has been modified to indicate that the KM with more information. For example, KM3 discusses the uncertainty in projections of future wind and wave intensities.

The text was adjusted accordingly.
We have made night changes to improve the sentence's readability. After considering the first point in this comment, we have determined that the existing text is clear and accurate. Thus, we have kept "such as changing rainfall patterns" (without parentheses) because it is central to the point being made in the sentence.

We appreciate the reviewer's comment. The text has been revised simplify/shorten the paragraph.

We thank the reviewer for this comment. The figure caption text has been revised to incorporate this suggestion.

We appreciate this comment. The text was revised to clarify that the sentence refers to the impacts of sea level rise.

We appreciate the reviewer's comment. The text has been revised simplify/shorten the paragraph.

We agree with this suggestion to rephrase and have changed the text to "shallow freshwater lenses."

We appreciate the reviewer for this comment. As we state in lines 36-37 we have seen bleaching annually recently and we have made night changes to improve the sentence's readability. After considering the first point in this comment, we have determined that the existing text is clear and accurate. Thus, we have kept "such as changing rainfall patterns" (without parentheses) because it is central to the point being made in the sentence.

We appreciate the reviewer for this comment. As we state in lines 36-37 we have seen bleaching annually recently and we have made night changes to improve the sentence's readability. After considering the first point in this comment, we have determined that the existing text is clear and accurate. Thus, we have kept "such as changing rainfall patterns" (without parentheses) because it is central to the point being made in the sentence.

We appreciate this comment. The text was revised to clarify that the sentence refers to the impacts of sea level rise.
Comment: This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

This comment is inconsistent with the author team's thorough assessment of the science. This statement represents the scientific understanding of climate change or the assessment of the peer-reviewed literature found in NCA4 Volume 1 (Climate Science Special Report, the CSSR); that volume provides the underlying scientific basis for the impacts analyses provided in Volume 2, and this Chapter and Key Message. The CSSR goes into extensive detail about the observations of past trends in climate, including severe weather events, and the projections of future changes in climate and the models used to make those projections. In turn, the global observations and models in the CSSR were used to drive the models in the Hawaii and Pacific Islands region, in conjunction with decades of observed data from weather stations and data used in studies on individual islands. Where appropriate, the author team has also included regionally observed impacts and case studies that detail how communities and ecosystems in the Pacific Islands are already being impacted by a changing climate, and how they are adapting or planning to adapt to those changes.

Comment: This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

This comment is inconsistent with the author team's thorough assessment of the science. This statement represents the scientific understanding of climate change or the assessment of the peer-reviewed literature found in NCA4 Volume 1 (Climate Science Special Report, the CSSR); that volume provides the underlying scientific basis for the impacts analyses provided in Volume 2, and this Chapter and Key Message. The CSSR goes into extensive detail about the observations of past trends in climate, including severe weather events, and the projections of future changes in climate and the models used to make those projections. In turn, the global observations and models in the CSSR were used to drive the models in the Hawaii and Pacific Islands region, in conjunction with decades of observed data from weather stations and data used in studies on individual islands. Where appropriate, the author team has also included regionally observed impacts and case studies that detail how communities and ecosystems in the Pacific Islands are already being impacted by a changing climate, and how they are adapting or planning to adapt to those changes.

Comment: This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

This comment is inconsistent with the author team's thorough assessment of the science. This statement represents the scientific understanding of climate change or the assessment of the peer-reviewed literature found in NCA4 Volume 1 (Climate Science Special Report, the CSSR); that volume provides the underlying scientific basis for the impacts analyses provided in Volume 2, and this Chapter and Key Message. The CSSR goes into extensive detail about the observations of past trends in climate, including severe weather events, and the projections of future changes in climate and the models used to make those projections. In turn, the global observations and models in the CSSR were used to drive the models in the Hawaii and Pacific Islands region, in conjunction with decades of observed data from weather stations and data used in studies on individual islands. Where appropriate, the author team has also included regionally observed impacts and case studies that detail how communities and ecosystems in the Pacific Islands are already being impacted by a changing climate, and how they are adapting or planning to adapt to those changes.

Comment: This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

This comment is inconsistent with the author team's thorough assessment of the science. This statement represents the scientific understanding of climate change or the assessment of the peer-reviewed literature found in NCA4 Volume 1 (Climate Science Special Report, the CSSR); that volume provides the underlying scientific basis for the impacts analyses provided in Volume 2, and this Chapter and Key Message. The CSSR goes into extensive detail about the observations of past trends in climate, including severe weather events, and the projections of future changes in climate and the models used to make those projections. In turn, the global observations and models in the CSSR were used to drive the models in the Hawaii and Pacific Islands region, in conjunction with decades of observed data from weather stations and data used in studies on individual islands. Where appropriate, the author team has also included regionally observed impacts and case studies that detail how communities and ecosystems in the Pacific Islands are already being impacted by a changing climate, and how they are adapting or planning to adapt to those changes.

Comment: This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

This comment is inconsistent with the author team's thorough assessment of the science. This statement represents the scientific understanding of climate change or the assessment of the peer-reviewed literature found in NCA4 Volume 1 (Climate Science Special Report, the CSSR); that volume provides the underlying scientific basis for the impacts analyses provided in Volume 2, and this Chapter and Key Message. The CSSR goes into extensive detail about the observations of past trends in climate, including severe weather events, and the projections of future changes in climate and the models used to make those projections. In turn, the global observations and models in the CSSR were used to drive the models in the Hawaii and Pacific Islands region, in conjunction with decades of observed data from weather stations and data used in studies on individual islands. Where appropriate, the author team has also included regionally observed impacts and case studies that detail how communities and ecosystems in the Pacific Islands are already being impacted by a changing climate, and how they are adapting or planning to adapt to those changes.

Comment: This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

This comment is inconsistent with the author team's thorough assessment of the science. This statement represents the scientific understanding of climate change or the assessment of the peer-reviewed literature found in NCA4 Volume 1 (Climate Science Special Report, the CSSR); that volume provides the underlying scientific basis for the impacts analyses provided in Volume 2, and this Chapter and Key Message. The CSSR goes into extensive detail about the observations of past trends in climate, including severe weather events, and the projections of future changes in climate and the models used to make those projections. In turn, the global observations and models in the CSSR were used to drive the models in the Hawaii and Pacific Islands region, in conjunction with decades of observed data from weather stations and data used in studies on individual islands. Where appropriate, the author team has also included regionally observed impacts and case studies that detail how communities and ecosystems in the Pacific Islands are already being impacted by a changing climate, and how they are adapting or planning to adapt to those changes.

Comment: This entire message falsely states speculative attributions and projections of impacts as established physical facts. These attributions, projections and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

This comment is inconsistent with the author team's thorough assessment of the science. This statement represents the scientific understanding of climate change or the assessment of the peer-reviewed literature found in NCA4 Volume 1 (Climate Science Special Report, the CSSR); that volume provides the underlying scientific basis for the impacts analyses provided in Volume 2, and this Chapter and Key Message. The CSSR goes into extensive detail about the observations of past trends in climate, including severe weather events, and the projections of future changes in climate and the models used to make those projections. In turn, the global observations and models in the CSSR were used to drive the models in the Hawaii and Pacific Islands region, in conjunction with decades of observed data from weather stations and data used in studies on individual islands. Where appropriate, the author team has also included regionally observed impacts and case studies that detail how communities and ecosystems in the Pacific Islands are already being impacted by a changing climate, and how they are adapting or planning to adapt to those changes.
Michael Fatoric 414151 Test Region 27. Hawai'i and Pacific Islands 144653 1450 19 12 Increased Resiliency

Adaptation Needs and Challenges

13 Key Message 6: Climate change impacts in the Pacific Islands are expected to amplify existing threats and lead to compounding economic, environmental, social, and cultural costs. For example, climate change impacts on ecosystems and social systems may result in severe disruptions to local livelihoods and the risk of human conflict on the move the refugia of climate migrants. Migration migration, already occurring in some places across the region, can have prevent costly and lengthy rebuilding of communities and livelihoods, and minimize the data and knowledge of climate migration and displacement. Comment: This entire message falsely states qualitative projections of impacts as established physical facts. These statements, projections, and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

We thank the reviewer for their comments. The text has been revised to include a chapter to the chapter key message, as follows: "The ocean around Hawai'i and the USAPI supports highly diverse marine ecosystems providing critical ecosystem services (Belart et al., 2010) for information about all ocean-systems relevant to the United States, see Ch. 5: Oceans.

Dave White 414151 Test Region 27. Hawai'i and Pacific Islands 144653 12 38 Extra reference Chapter 15

We thank the reviewer for their comment. A reference to Chapter 15 has been added in the first paragraph of the Key Message narrative, in the sentence, "Climate change threatens this fragile relationship with coastal communities..." (Simpson, 2010) and is disrupting the continuity that is required for the health and well-being of these communities (exemplified by many tribal and indigenous communities in the U.S., see Chapter 15.)

Austin Cornell 414151 Whole Chapter 27. Hawai'i and Pacific Islands

Suggest including recent Hawaiian Islands Climate Synthesis Project report and/or vulnerability assessment and adaptation planning products Available at: (Hi/Hawaii Climate) Suggest including Tim Clark’s Ofu Lagoon coral research May want to include National Marine Sanctuary of American Samoa vulnerability assessment and adaptation planning findings

We have added the suggested Hi Climate Synthesis Project report citation in the chapter, in the GM adaptation. (2) Space limitations currently limit us from adding additional case studies such as the OMs Lagoon report. While the author team has chosen not to include this case study, we recommend contacting the POGA to learn how to add it to the US National Climate Resilience Toolkit.

Michael MacClod 414151 Test Region 27. Hawai'i and Pacific Islands 144655 17 34 This ought to be alphabetized by last name, I would think.

We thank the reviewer for their suggestion. The text has been revised to incorporate this suggestion, Technical Contributors are now alphabetized by last name.

Michael MacClod 414151 Test Region 27. Hawai'i and Pacific Islands 144655 9 16 Another "could" needing to be replaced, perhaps adding a phrase to indicate what has to happen to make planning possible or unlikely.

We thank the reviewer for their comment. The text has been revised here and throughout the chapter to eliminate weak future conditional words such as "may" or "could" and to use more specific language to improve the reader's ability to understand the report.

Michael MacClod 414151 Test Region 27. Hawai'i and Pacific Islands 144655 10 13 Here are three instances of "may" to be changed: using the lesson. Good practices in assessment avoid words that can mean anything, even though it takes a bit of effort and may require adding a qualifying phrase. I'd try to avoid mentioning this too often in my comments—but the chapter needs to be scrupulous of words "may" and "could" that broadly anything could happen or could not happen—just unhelpful and informative word choices. Also line 23 on this page and line 4 on the next page, just looking at the key messages.

We thank the reviewer for their comments. We thank the reviewer for their correction. The text has been revised here and throughout the chapter to eliminate weak future conditional words such as "may" or "could" and to use more specific language to improve the reader's ability to understand the report.

Michael MacClod 414151 Test Region 27. Hawai'i and Pacific Islands 144656 18 16 We're easy to change "may" to "is likely"—so no places not at all hard to do.

We thank the reviewer for their comments. The text has been revised here and throughout the chapter to eliminate weak future conditional words such as "may" or "could" and to use more specific language to improve the reader's ability to understand the report.

Michael MacClod 414151 Test Region 27. Hawai'i and Pacific Islands 144656 15 13 This is the present text: "We thank the reviewer for their comments. The text has been revised here and throughout the chapter to eliminate weak future conditional words such as "may" or "could" and to use more specific language to improve the reader's ability to understand the report."

We thank the reviewer for their comments. The text has been revised here and throughout the chapter to eliminate weak future conditional words such as "may" or "could" and to use more specific language to improve the reader's ability to understand the report.

Michael Fatoric 414158 Whole Chapter 27. Hawai'i and Pacific Islands

A wonderfully done chapter with lots of input and examples from the region—very interesting.

We greatly appreciate the reviewer's comment about the Pacific Islands chapter and hope the content is useful.

Randi Fatoric 414158 Whole Chapter 27. Hawai'i and Pacific Islands

The whole chapter needs to focus more on cultural heritage or cultural resource adaptation sector. The National Park Service (NPS) estimated that over $50 billion dollars of coastal cultural resources and park infrastructure are at risk (Hedrick, 2018). From sea level rise (Peek et al., 2015) there are increasing number of scientific studies in the U.S focusing on how to preserve these resources for current and future generations. Please provide more targeted focus on climate adaptation planning and implementation, for example the following scholars have been focusing on developing novel approaches for designing climate adaptation planning for cultural resources (historic buildings, structures, landscapes) along the NC coastline. For example, climate change impacts on ecological and social systems may result in severe disruptions to local livelihoods and the risk of human conflict on the move the refugia of climate migrants. Migration migration, already occurring in some places across the region, can have prevent costly and lengthy rebuilding of communities and livelihoods, and minimize the data and knowledge of climate migration and displacement. Comment: This entire message falsely states qualitative projections of impacts as established physical facts. These statements, projections, and risks appear to be based primarily on the use of questionable computer models. That climate change will have negative impacts has yet to be determined and appears increasingly unlikely.

We now have more discussion of the experience of cultural heritage. We thank the reviewer for the suggestions, and the useful literature

Randi Fatoric 414158 Test Region 28. Near-Term Adaptation Needs and Increased Resilience

We thank the reviewer for their comments. The chapter text has been revised to incorporate the suggestions.

Randi Fatoric 414158 Test Region 28. Near-Term Adaptation Needs and Increased Resilience 144656 8 9 Please add cultural in the following sentence: "adjustments to natural and cultural resource management".

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.
The new sentence is: Such frameworks rely on and support participatory stakeholder processes, which can enhance transparency and foster decision making (Fatorić and Seekamp, 2017). Please add following sentence as:

Another example is a comprehensive decision support tool that is driven by annual budget allocations, measures of risk from climate change, measures of historical significance and use potential, and treatment costs for various adaptation actions has been developed and tested using set of historic buildings at Cape Lookout National Seashore, North Carolina (Fatorić and Seekamp, 2017).

We thank the reviewer for the suggestion. We will make changes to the text as suggested.

It could be helpful to add at least one paragraph explaining the relationship between adaptation and other frequently discussed concepts. One vulnerability, adaptive capacity, and resilience. Here is a suggested paragraph: Adaptation can help reduce vulnerability to climate change impacts, where "vulnerability" is a function of the character, magnitude, and rate of climate variations to which a system is exposed, its sensitivity, and its adaptive capacity" (Bierbaum et al. 2014, 672). Here, "adaptive capacity" means the "potential of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, take advantage of opportunities, and cope with the consequences." (Bierbaum et al. 2014, 672). Resilience can support successful adaptation and reduce long-term vulnerability. (Cutter et al. 2008, 600; Adger, Arnell, and Tompkins 2005, 79, 83; Nelson, Adger, and Brown, 2007, 400). Resilience is the idea that a community can weather through and bounce back from adversity by having the right kind of resources or "capitals" and the flexibility to draw on those most readily available. (Piers et al. 2006, 189; Walker et al. 2006, 22; Nelson, Adger, and Brown 2007, 607; Cutter et al. 2008, 509; Magaz 2010, 402).

We thank you. We have included this citation.

Another example is a comprehensive decision support tool that is driven by annual budget allocations, measures of risk from climate change, measures of historical significance and use potential, and treatment costs for various adaptation actions has been developed and tested using set of historic buildings at Cape Lookout National Seashore, North Carolina (Fatorić and Seekamp, 2017).

We thank the reviewer for the suggestion. We will make changes to the text as suggested.

"Another example is a comprehensive decision support tool that is driven by annual budget allocations, measures of risk from climate change, measures of historical significance and use potential, and treatment costs for various adaptation actions has been developed and tested using set of historic buildings at Cape Lookout National Seashore, North Carolina (Fatorić and Seekamp, 2017)."

We thank the reviewer for the suggestion. We will make changes to the text as suggested.

It could be helpful to add at least one paragraph explaining the relationship between adaptation and other frequently discussed concepts. Here is a suggested paragraph: Adaptation can help reduce vulnerability to climate change impacts, where "vulnerability" is a function of the character, magnitude, and rate of climate variations to which a system is exposed, its sensitivity, and its adaptive capacity" (Bierbaum et al. 2014, 672). Here, "adaptive capacity" means the "potential of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, take advantage of opportunities, and cope with the consequences." (Bierbaum et al. 2014, 672). Resilience can support successful adaptation and reduce long-term vulnerability. (Cutter et al. 2008, 600; Adger, Arnell, and Tompkins 2005, 79, 83; Nelson, Adger, and Brown, 2007, 400). Resilience is the idea that a community can weather through and bounce back from adversity by having the right kind of resources or "capitals" and the flexibility to draw on those most readily available. (Piers et al. 2006, 189; Walker et al. 2006, 22; Nelson, Adger, and Brown 2007, 607; Cutter et al. 2008, 509; Magaz 2010, 402).

We thank you. We have included this citation.

It could be helpful to add at least one paragraph explaining the relationship between adaptation and other frequently discussed concepts. Here is a suggested paragraph: Adaptation can help reduce vulnerability to climate change impacts, where "vulnerability" is a function of the character, magnitude, and rate of climate variations to which a system is exposed, its sensitivity, and its adaptive capacity" (Bierbaum et al. 2014, 672). Here, "adaptive capacity" means the "potential of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, take advantage of opportunities, and cope with the consequences." (Bierbaum et al. 2014, 672). Resilience can support successful adaptation and reduce long-term vulnerability. (Cutter et al. 2008, 600; Adger, Arnell, and Tompkins 2005, 79, 83; Nelson, Adger, and Brown, 2007, 400). Resilience is the idea that a community can weather through and bounce back from adversity by having the right kind of resources or "capitals" and the flexibility to draw on those most readily available. (Piers et al. 2006, 189; Walker et al. 2006, 22; Nelson, Adger, and Brown 2007, 607; Cutter et al. 2008, 509; Magaz 2010, 402).

We thank you. We have included this citation.

Another example is a comprehensive decision support tool that is driven by annual budget allocations, measures of risk from climate change, measures of historical significance and use potential, and treatment costs for various adaptation actions has been developed and tested using set of historic buildings at Cape Lookout National Seashore, North Carolina (Fatorić and Seekamp, 2017).

We thank the reviewer for the suggestion. We will make changes to the text as suggested.

Another example is a comprehensive decision support tool that is driven by annual budget allocations, measures of risk from climate change, measures of historical significance and use potential, and treatment costs for various adaptation actions has been developed and tested using set of historic buildings at Cape Lookout National Seashore, North Carolina (Fatorić and Seekamp, 2017).

We thank the reviewer for the suggestion. We will make changes to the text as suggested.

Another example is a comprehensive decision support tool that is driven by annual budget allocations, measures of risk from climate change, measures of historical significance and use potential, and treatment costs for various adaptation actions has been developed and tested using set of historic buildings at Cape Lookout National Seashore, North Carolina (Fatorić and Seekamp, 2017).

We thank the reviewer for the suggestion. We will make changes to the text as suggested.
suggest adding another sentence at the end of this sentence along these lines: "Only since 2015 has the Federal Emergency Management Agency encouraged state and local governments to consider climate change adaptation and resiliency in their planning and zoning efforts. Reference: FEMA, 2015. "Hazard Mitigation Assistance Program Update." http://www.fema.gov/media-library-data/1442420013000- 0d9684af474f7133.pdf. page 12

Deeks that there is an over-emphasis on uncertainties that can stall climate adaptation measures currently available to state, local, and tribal decision-makers. I would suggest adding something along the lines that there is room for "no regrets" strategies that provide benefits despite uncertain outcomes (Hirokawa 2009, 246; Berke and Lyles 2013, 196). Also, scenario planning can provide alternative actions that can be carried out if different scenarios occur (Bayley et al. 2015, 513; Berke and Lyles 2013, 196). References: Berke, Philip, and World Lyle. 2013. "Public Risks and the Challenges to Climate-Change Adaptation: A Proposed Framework for Planning in the Age of Uncertainty." "Cityscape, 15A-1-208. Boy, Emily, & Nydahl, Steve. Blog Post (2016) [Online].

We now try to address some of these themes in the discussion of EM5

suggest adding to end of “alternative adaptation actions” an additional phrase “that are difficult to quantify”


We have included the added text and cited to our revised “Beyond Incremental Change” section. Thank you!

suggest adding to end of “benefits” an additional phrase “that are difficult to quantify”

suggest adding to end of this line “and whether they actually lead to adaptive actions.”

We have revised this sentence along the lines suggested by this comment.

This is a really important chapter and great effort to tackle something so complex in a brief chapter. It might be helpful to include more citations after some of the assertions, especially on page 1124.

We appreciate this comment and modified the text to recognize the point.

suggest adding “by government or other related organizations” after the word “organizations”

We thank the reviewer for this comment. The chapter text has been revised to incorporate the suggestion.

This was consistent spelling of “judgment” as opposed to “judgement”

Thank you for this comment; we have included some of these points and cites in the text.

We appreciate the reviewer’s comments and agree with the point in the recommended citation that in some cases too many resources are spent on scientific assessments relative to adaptation implementation. That said, “assessment” is a broad term that goes beyond formal scientific studies. We doubt whether it is possible for human beings to take deliberate actions to adapt to climate change (or any type of risk) without some type of assessment.

This would be crucial about adhering to the linear step model for stages of adaptation. Many people, including Alaska Native tribes, have adapted for centuries and millennia without following the first 3 stages. I would change the second word in this sentence (has) to “may involve.” I also think it’s worth pointing out that US entities can sometimes overemphasize the assessment phase. A good citation for this is US climate change policy has relied primarily on more research to support future decision and action, deferring action on the knowledge that it is already there. S. Ekstrom (2010, 18) note that out of ten Barrow residents who were interviewed for the 2004 Arctic Climate Assessment, only two were aware of the synthesis and none had heard. They suggest that “A scientific excellence is no guarantee that an assessment of climate impacts will inform decisions on the ground. Conversely, a scientific assessment is not necessary for successful adaptations on the ground, though it can help.” Another example is FEMA-sponsored hazard mitigation plans, which are rich in risk assessment, but, based on my research, not well implemented. Possible citations: Ristroph, E.B. 2017. "An Approach to Alaska’s Natural Village Adaptation: A Methodology for Analysis." International Journal of Sociology and Anthropology 5(7): 775-775. Flatt, Rebecca, technical editor, and Amanda H. Lynch. 2010. Adaptive Governance and Climate Change. American Meteorological Society.

We have appreciated the reviewer’s comments and agree with the point in the recommended citation that in some cases too many resources are spent on scientific assessments relative to adaptation implementation. That said, “assessment” is a broad term that goes beyond formal scientific studies. We doubt whether it is possible for human beings to take deliberate actions to adapt to climate change (or any type of risk) without some type of assessment.

This would be crucial about adhering to the linear step model for stages of adaptation. Many people, including Alaska Native tribes, have adapted for centuries and millennia without following the first 3 stages. I would change the second word in this sentence (has) to “may involve.” I also think it’s worth pointing out that US entities can sometimes overemphasize the assessment phase. A good citation for this is US climate change policy has relied primarily on more research to support future decision and action, deferring action on the knowledge that it is already there. S. Ekstrom (2010, 18) note that out of ten Barrow residents who were interviewed for the 2004 Arctic Climate Assessment, only two were aware of the synthesis and none had heard. They suggest that “A scientific excellence is no guarantee that an assessment of climate impacts will inform decisions on the ground. Conversely, a scientific assessment is not necessary for successful adaptations on the ground, though it can help.” Another example is FEMA-sponsored hazard mitigation plans, which are rich in risk assessment, but, based on my research, not well implemented. Possible citations: Ristroph, E.B. 2017. "An Approach to Alaska’s Natural Village Adaptation: A Methodology for Analysis." International Journal of Sociology and Anthropology 5(7): 775-775. Flatt, Rebecca, technical editor, and Amanda H. Lynch. 2010. Adaptive Governance and Climate Change. American Meteorological Society.

We have appreciated the reviewer’s comments and agree with the point in the recommended citation that in some cases too many resources are spent on scientific assessments relative to adaptation implementation. That said, “assessment” is a broad term that goes beyond formal scientific studies. We doubt whether it is possible for human beings to take deliberate actions to adapt to climate change (or any type of risk) without some type of assessment.
the long term, reducing climate-related risks and taking advantage of the opportunities

likely. Adaptation to these speculations is unwarranted.

likely. Adaptation to these speculations is unwarranted.

likely. Adaptation to these speculations is unwarranted.

likely. Adaptation to these speculations is unwarranted.

likely. Adaptation to these speculations is unwarranted.

likely. Adaptation to these speculations is unwarranted.

likely. Adaptation to these speculations is unwarranted.

likely. Adaptation to these speculations is unwarranted.

likely. Adaptation to these speculations is unwarranted.

likely. Adaptation to these speculations is unwarranted.

likely. Adaptation to these speculations is unwarranted.

likely. Adaptation to these speculations is unwarranted.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susanne</td>
<td>Moser</td>
<td>141795</td>
<td>Whole Chapter</td>
<td>28. Near-Term Adaptation Needs and Increased Resilience</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Adaptation chapter as a whole does not constitute an objective or well-informed assessment. It reads more often like a textbook rather than an assessment; in many places it is vague - something the "may, can, could, or might policy" in NCA3 was various about avoiding - and therefore is unhelpful for researchers or decision-makers; and it includes a number of overt or hidden normative statements. What is it more serious flaw, however, is that it is dated, uninformed, does not provide adequate perspective, and is in many instances rosy-eyed and unsupported by evidence. I will provide a few sample passages where that is the case, but having just completed a serious assessment of the state of adaptation as a field of practice in the US, I find this chapter simply to be a document of wishful thinking. It is wholly inadequate as a definitive federal document reflecting the state of adaptation in the US. It simply and categorically does not.

The traceable account suggests the author team did a "comprehensive" literature review and consulted experts who are not named or counted, so this does not provide very convincing evidence that this search and consultation was thorough.

For example, the current reference list consists of 109 references (it is incomplete, but I can only work with what is presented); more than half (52) of these references are pre-NCA3. So, a total of 52 references are post 2014. By comparison, a quick Web of Science search for these terms yields 223 references. So, a first indication that the literature search was not comprehensive.

More importantly, SO MUCH of what is going on in the adaptation arena is reflected in non-peer-reviewed journal articles, and yet often well-researched and peer-reviewed. This body of work is generally termed "grey literature" but is permissible (and other chapters in the assessments rely on such references). That body of work is 100% missing from this assessment. It reads therefore like the authors simply do not know what is going on in America.

I will make more specific comments separately to reflect how these omissions make this chapter essentially biased or useless. I am sorry to have to say this.

I will send several documents to the review email and urge the author team to read those documents to sharpen the assessment.

My comment pertains to KM 1 and the text that goes with it. This is a good example of how this chapter is biased or useless. The section claims early on that since NCA3 adaptation has "increased significantly" in scale and scope, which is graphically depicted in Figure 28.1. I want to know where the author team came up with that conclusion. Its PRIMARY reference given as evidence is the Berkhout article which was commissioned PRIOR to 2014 for NCA3 and it concluded - see the title of the paper - that adaptation is progressing but not enough. Its key takeaway message was tempered down even further by all the other evidence accumulated in all the chapters of NCA3 to the conclusion that Melillo et al 2014 came to, namely that we were not seeing many examples of implementation. So, one pre-NCA3 paper is given as evidence that we have progressed beyond the NCA3 message.

Several more paragraphs on p. 1313 claim there is evidence of progress, but provide not a single reference. Then at the top of p. 1314, there are several other references - one about progress of federal agencies - which was mandated under Obama and is now seriously curtailed and this is not in any way acknowledged; and then two legal papers and the tribal chapter. In the accompanying traceable account, the paper also refers to Vogel et al (2014) - a compilation of case studies expressly claiming NOT to be representative of the US and including case studies that do NOT consider anthropogenic climate change or forward-looking climate information; and a review article by Smith and Meinore that explicitly says that implementation is seriously hindered. Nor does it include a broader set of references of barrier studies or reviews of case studies or other reviews that conclude just the opposite of the author team.

How in the world can the authors claim that the country as a whole has moved into implementation? Because of maybe 2 or 3 dozen projects that have been successful in overcoming major funding and institutional hurdles? How can I claim that these are funded, many more, communities can't get beyond the planning stage, and when thousands have even begun yet?? This comment exemplifies (and note, there are many more unsupported statements like this throughout the chapter) what I call wishful thinking, bias, and lack of prudencelessness in the reality of adaptation in the US.

A better informed chapter would consider the long list of studies and reviews on barriers to adaptation; it would seriously consider a comprehensive review of the adaptation field just published by the Kresge Foundation (as

We thank the reviewer for the comment. We have included more citations in our revised draft, have removed at least some of the "may, can, and woulds", and revised those sections that might have led the reviewer to consider us as "rosy-eyed." The chapter did and now we more so draw heavily on the grey literature.
Dear [Name],

Thank you for your comments on our draft manuscript. We appreciate the time and effort you took to provide your insights. Below are our responses to your feedback.

1. Adaptation Needs and Increased Resiliency
   - Page 4: We have updated the text to include additional references to support our claims and have added examples of iterative risk assessment frameworks.
   - Page 5: We have revised the KM and included examples to illustrate the points made.

Thank you, [Name], for your time and effort. We have updated the manuscript to address your concerns.

Best regards,

[Your Name]
The wording of the KM is vague ("can exceed") and therefore not particularly helpful or powerful. Can’t the team sharpen that?

More problematic is that most of the text is textbookish, rather than assessing the available information, how good it is, what therefore can/can’t be said and not said about cost-effectiveness; and says practically nothing about the challenges local communities have making the economic case for adaptation, even if adaptation is cost-effective. I urge the author team to carefully read documents sent to the review email - one is a US-wide assessment of the adaptation field, where the difficulty of making the economic case was carefully addressed. And the second is a study of adaptation finance challenges experienced by local governments in CA. It includes an extensive literature review of the pertinent literature globally and the US, and shows - on the basis of a document analysis - what adaptation really costs. It is by far more expensive than is typically claimed; many cost items of the adaptation process are not included; AND YET it is cost-effective, compared to the cost of inaction (which is also seriously lacking in how it is assessed).

The point is, the author team could do MUCH more thorough job of actually saying something serious, useful and really-based. There are serious problems with Table 28.1, one being that most of the sources are pre-NCA3. Furthermore the text contextualizes NOTHING about these studies (e.g., property buy-outs are not cost-effective given the underlying constraints on who CBA should be done, they often are absolutely cost-effective if the full life cycle of a structure is considered, but the author team discusses none of this, which either illustrates lack of awareness of bias; all the items in black ink have no references at all; the message it sends is therefore is truly problematic! The text should be searched systematically for all mentions of “can” or “could” or “appears to” or “may” etc, and be replaced with serious conditional statements as when something does or doesn’t do x, y, z. Each should be backed up by literature - yet again; this type of language creates a textbook feeling, not an assessment. The chapter should have something serious to say about where, to what extent and under what scenarios adaptation has been shown to be cost-effective. And the references should be mostly post NCA3. The ones cited here are mostly pre-2012.

The section claims on p.1323 that there is "considerable literature on the cost of actions", but there is practically no evidence of that in this section. That cost is not exemplified; there is no discussion of how incomplete or our list being non-exhaustive.

For example, the Kresge field assessment just released makes exceedingly clear that the field doesn’t know what best practices are, and if anything, that would be useful to say in an assessment chapter, but then the chapter goes into a textbookish treatment (inadequate at that!) of mainstreaming and ultimately says it may not be enough. Well, that is so unhelpful.

An assessment could assess how widespread mainstreaming is. It could assess how well it is going and what the outcomes of that approach is. It could assess whether there are drawbacks. It could assess up to what point that is a good idea and provide insights when it is not. And since it mentions that there is something beyond mainstreaming, it could actually draw on the growing transformational adaptation literature and say what that is about, why and when it’s needed, and to what extent that has advanced since NCA3.

This chapter fails on every single point. It does none of this. It also conflates mainstreaming with incremental change with changes that the authors are not familiar with the literature on mainstreaming or the literature on transformational change. Transformational change can begin very much in an incremental fashion, in fact, most transformations proceed that way.

The chapter is also full of "can" and "may" statements; all of which should be replaced with hard-hitting conditional statements that explain when something does x,y,z and when it does not, and be followed by supporting references, e.g. evidence. A series of instances these words just look like wishful attempts to avoid saying some hard truth (e.g., without GES reductions we “may” favor to do more extensive changes... an argument "may be" required to use Historical climate information -", both of these are facts!). This section seems to be an advocacy for mainstreaming without a single critical eye thrown on it. Really?

My mark up of this section has it completely red - there are just so many details that are wrong, inappropriate or over-stated, I just don’t know where to begin. Melillo et al 2014 is not an appropriate reference for scenario planning, but there are fabulous ones and great examples of using it since NCA3. The "engineering community"

We have rewritten the key message and deleted the Table

The challenge local communities have making the economic case for adaptation, even if adaptation is cost-effective. I urge the author team to carefully read documents sent to the review email - one is a US-wide assessment of the adaptation field, where the difficulty of making the economic case was carefully addressed. And the second is a study of adaptation finance challenges experienced by local governments in CA. It includes an extensive literature review of the pertinent literature globally and the US, and shows - on the basis of a document analysis - what adaptation really costs. It is by far more expensive than is typically claimed; many cost items of the adaptation process are not included; AND YET it is cost-effective, compared to the cost of inaction (which is also seriously lacking in how it is assessed).

The point is, the author team could do MUCH more thorough job of actually saying something serious, useful and really-based. There are serious problems with Table 28.1, one being that most of the sources are pre-NCA3. Furthermore the text contextualizes NOTHING about these studies (e.g., property buy-outs are not cost-effective given the underlying constraints on who CBA should be done, they often are absolutely cost-effective if the full life cycle of a structure is considered, but the author team discusses none of this, which either illustrates lack of awareness of bias; all the items in black ink have no references at all; the message it sends is therefore is truly problematic! The text should be searched systematically for all mentions of “can” or “could” or “appears to” or “may” etc, and be replaced with serious conditional statements as when something does or doesn’t do x, y, z. Each should be backed up by literature - yet again; this type of language creates a textbook feeling, not an assessment. The chapter should have something serious to say about where, to what extent and under what scenarios adaptation has been shown to be cost-effective. And the references should be mostly post NCA3. The ones cited here are mostly pre-2012.

The section claims on p.1323 that there is "considerable literature on the cost of actions", but there is practically no evidence of that in this section. That cost is not exemplified; there is no discussion of how incomplete or our list being non-exhaustive.

For example, the Kresge field assessment just released makes exceedingly clear that the field doesn’t know what best practices are, and if anything, that would be useful to say in an assessment chapter, but then the chapter goes into a textbookish treatment (inadequate at that!) of mainstreaming and ultimately says it may not be enough. Well, that is so unhelpful.

An assessment could assess how widespread mainstreaming is. It could assess how well it is going and what the outcomes of that approach is. It could assess whether there are drawbacks. It could assess up to what point that is a good idea and provide insights when it is not. And since it mentions that there is something beyond mainstreaming, it could actually draw on the growing transformational adaptation literature and say what that is about, why and when it’s needed, and to what extent that has advanced since NCA3.

This chapter fails on every single point. It does none of this. It also conflates mainstreaming with incremental change with changes that the authors are not familiar with the literature on mainstreaming or the literature on transformational change. Transformational change can begin very much in an incremental fashion, in fact, most transformations proceed that way.

The chapter is also full of "can" and "may" statements; all of which should be replaced with hard-hitting conditional statements that explain when something does x,y,z and when it does not, and be followed by supporting references, e.g. evidence. A series of instances these words just look like wishful attempts to avoid saying some hard truth (e.g., without GES reductions we “may” favor to do more extensive changes... an argument "may be" required to use Historical climate information -", both of these are facts!). This section seems to be an advocacy for mainstreaming without a single critical eye thrown on it. Really?

My mark up of this section has it completely red - there are just so many details that are wrong, inappropriate or over-stated, I just don’t know where to begin. Melillo et al 2014 is not an appropriate reference for scenario planning, but there are fabulous ones and great examples of using it since NCA3. The "engineering community"
we have tried to address some of these comments in our revised discussion of KM5. We thank the reviewer for the suggestion.

We have added a new sentence.

We have altered this statement. Thank you for the comment.

We have reviewed this section. Thank you for the comments.

We now provide a better-cited discussion of mainstreaming, and discuss some of the reasons for pursuing an alternative approach. We thank the reviewer for the suggestion.

The formatting and presentation of references will be done in the final layout of the report development process.

We have tried to address some of these comments in our revised discussion of KM5. We thank the reviewer for the suggestion.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.

I have commented on test passages how the argument here is incomplete. The stealthiness in discussion continues in the Traceable Account. Only an evidence base for non-stationarity is offered, but no evidence base for how the non-recognition of that non-stationarity is hindering adaptation. That, however, is what the message is about. Hard to justify when the argument in the chapter is unclear, and hence there is no reliance on relevant literature to back it up. The description of the confidence level relies on pre-NCA3 studies (and hence pre-NCA3 knowledge). Really? That is what this is about? Seems dated and undercut by relevant recent science.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>George</td>
<td>Backus</td>
<td>241069</td>
<td>Whole Chapter</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1321</td>
<td>1321  3  19</td>
<td>This section should include an example from the drinking water and wastewater sector. Such an example could include the loss of service and the cascading effects on other sectors.</td>
<td>We thank the reviewer for the comment and have incorporated change to the text.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holly</td>
<td>Brown</td>
<td>242453</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>3  14  3  0</td>
<td>1. Assessment of adaptation responses or climate impacts? I appreciate the team’s attempt to assess the state of adaptation in the U.S. It’s a tough job to do! However, I read this chapter; I felt as though most of the chapter was focused on assessing the impacts and convincing the reader that there are risks and examples of why adaptation is needed versus what adaptation actions are being taken and assessing where we are in adapting to changes in climate and extreme weather events. I came away asking myself: Is the objective of this chapter to “assess adaptation responses” or “assess the impacts of climate change”? The way it’s written in this current draft is more towards the latter. I wanted to see concrete examples of the “significant” adaptation actions being implemented across the U.S. at a variety of scales. Also the chapter title says: “Near-Term Adaptation Needs and Increased Resiliency” but when downloading the actual chapter, it’s labeled as “Adaptation Responses.” “This is confusing in itself. In 1. What does “significant” mean? In Key Message 1, you open up by stating that “implementation has significantly increased, but is not yet commonplace.” Throughout the entire chapter, I really don’t get a sense that “significant” implementation has occurred since the Third NDA. How do you quantify “significant”? What does “significant” mean to the chapter author? And what data and information do you have to back that up? It wasn’t clear to me through the examples that were provided in the current draft. The term “significant” is used throughout the draft without evidence to back that up. (If it’s used, I would recommend adding in some concrete examples to support that statement. Having the traceable accounts is incredibly helpful so that backs it up with literature. But I wanted to see a quantifiable approach with evidence illustrating that “significant” meant a certain number of on-the-ground projects, etc. I. Include more concrete examples of adaptation being implemented at a variety of scales. Similar to my previous comment of the entire draft, I was looking for more examples of adaptation actions being implemented throughout the U.S. (even just pulled out the actual text if they’re embedded in there and put into call-out boxes). Given that this is supposed to be an assessment of adaptation responses and increased resiliency, I would have hoped to have seen more examples. I would also recommend that you explain the difference between adaptation and resilience as these terms mean different things to different people, sectors, and organizations. 2. To friendly the images throughout. Most of the images captured were related to water and flooding. Try and find images that align better with the key messages.</td>
<td>We have dropped “significant” from the language of NAD. We are assessing adaptation responses. Hopefully our revised chapter makes that clear.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emily</td>
<td>Seyller</td>
<td>242807</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>3  18  3  27</td>
<td>The “Summary Overview” section does not actually summarize what’s in the chapter. In that the intent it also doesn’t create the sense of urgency that I think is truly needed for this chapter to open up. The reader needs to understand why it’s so critical to invest in adaptation actions now because we’re ALREADY experiencing changes in our climate and extreme weather events. A “Summary Overview” should highlight the core components covered throughout the entire chapter instead of being a technical description of why we need to adapt. That can be put after the summary overview, and beef up the summary overview with reasons why this is so important and the urgency here to truly grab the readers attention from the start. The Summary Overview should also give the reader some hope illustrating how beneficial adaptation can be to people, places, and things — highlighting co-benefits to adaptation actions and the economic savings that go along with investing in adaptation now.</td>
<td>We have re-written the summary. We thank the reviewer for the suggestion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emily</td>
<td>Seyller</td>
<td>242808</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>3  1328  3  24</td>
<td>When you include the term “significant” in a key message, you need to back it up with evidence. It’s not clear how you define significant and there aren’t enough examples throughout the chapter to support that statement. It’s giving people a false sense of security that there is significant implementation on adaptation where there really isn’t.</td>
<td>We thank the reviewer for the comment. We have removed the word significant.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emily</td>
<td>Seyller</td>
<td>242809</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>3  13  3  14</td>
<td>I would recommend using the phrase “continuously improving” instead of “learning over time.” The former phrase is more of an active statement than the latter.</td>
<td>Thank you for this comment. We revised Key Message 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emily</td>
<td>Seyller</td>
<td>242900</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>3  1302  3  17</td>
<td>There is no citation associated with the statement “adaptation” has five general stages: 1) awareness, 2) assessment, 3) planning, 4) implementation and monitoring, and 5) evaluation and response.” It would help to have citations from a variety of different sources that help the reader understand how you got to these 5 stages. In the Third NDA Adaptation chapter, there are a few examples that were provided so that the reader understand where the general steps originated for further transparency. It’s also a little strange that monitoring and evaluation are separated...most adaptation processes I’ve seen combine those two. And what does “response” if adaptation itself is not a response? The figure on page 1310, figure 3 also doesn’t align with those 5 stages so it’s confusing.</td>
<td>We appreciate these comments and modified the text and the graphics accordingly and added citations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emily</td>
<td>Seyller</td>
<td>242901</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>3  1  3  9</td>
<td>The phrase “has increased significantly” gives the reader a false sense of security that implementation on adaptation is far underway and would misrepresent that more is not necessarily needed - which is very much not the case.</td>
<td>Thank you for this comment; we removed the word “significantly”.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emily</td>
<td>Seyller</td>
<td>242902</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>3  1309  3  11</td>
<td>The list of “important implications” should be framed as examples not a comprehensive list because it’s very heavily focused on built infrastructure. I would suggest using the phase “to name a few” at the end of this list so the reader knows that the list is not exhaustive.</td>
<td>Thank you for this comment; we made this change.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emily</td>
<td>Seyller</td>
<td>242903</td>
<td>Whole Chapter</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>3  1303  3  11</td>
<td>We would recommend including a glossary of terms so the reader can refer to those terms throughout the chapter...perhaps this is being included for the entire NDA draft, but some terms are defined throughout the chapter and others are not which could be confusing to the reader.</td>
<td>A glossary of terms is available on the USGCRP website.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tim</td>
<td>Boldin</td>
<td>242904</td>
<td>Whole Chapter</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>3  13  3  11</td>
<td>As I was reading through the chapter, I kept wanting to see more tangible examples across the board (public, private, NGO, foundation, etc.) to back up the key message statement that “significant” adaptation implementation is taking place. This was not the case in this current draft so I hope the next draft has a lot more examples for the reader to see that this phrase may be the case and that action is occurring.</td>
<td>We have tried to add more examples. We thank the reviewer for the suggestion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In 2015 FEMA began requiring states to assess the impacts of climate change and how the frequency and magnitude of natural disasters may change in the future and what actions the state may take to reduce their communities' risks and vulnerabilities to these natural disasters. More information on this policy change can be found here (https://www.epa.gov/crwu/build-resilience-your-utility). Thank you for the suggestion.

We now cite (see https://www.epa.gov/crwu/build-resilience-your-utility). Thank you for the suggestion.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142763</td>
<td>Whole Chapter</td>
<td>28</td>
<td></td>
<td>1308</td>
<td>10</td>
<td>11</td>
<td></td>
<td>Suggest reviewing use of &quot;same&quot; throughout document. It is often unnecessary and not specific enough. For example, p.1316 line 34-37: &quot;suggestions must deeper and decades older than reflected in some of the more recent data (some could be removed without loss of detail) and then used by some of the management agencies.&quot; (There, the same is not specific enough, &quot;water management agencies in the region&quot; may be clearer.)</td>
<td>Due to space constraints we dropped the sentence mentioned.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142794</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1308</td>
<td>10</td>
<td>11</td>
<td></td>
<td>In this context, does infrastructure mean physical infrastructure or social/planning infrastructure (i.e., established processes)? If the former, consider adding &quot;planning frameworks or processes&quot; or something similar.</td>
<td>Thank you for your request for clarification; we have reviewed Message 2.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142795</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1308</td>
<td>11</td>
<td>11</td>
<td></td>
<td>Consider changing to frequency of heat waves. The definition of extreme heat has not changed over time, the occurrence has.</td>
<td>Thank you for your comments. We revised the text to address this recommendation.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142796</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1308</td>
<td>13</td>
<td>14</td>
<td></td>
<td>Confusing wording. Consider changing to &quot;Because some GHGs reside in the atmosphere for decades or longer, many climate-influenced variables would continue to change through 2050 even if greenhouse gas emissions immediately stopped.&quot;</td>
<td>We thank the reviewer for this comment and revised this paragraph.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142797</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1309</td>
<td>9</td>
<td>9</td>
<td></td>
<td>Built human infrastructure means redundant. Consider changing to built infrastructure.</td>
<td>We agree that this was redundant and changed this sentence.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142798</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1309</td>
<td>10</td>
<td>11</td>
<td></td>
<td>Consider changing &quot;alternative adaptation options&quot; to &quot;adaptation alternatives&quot; or &quot;adaptation options.&quot; In the first, it is not clear what adaptation is an alternative to. The proposed change seems to reflect the paragraph description.</td>
<td>Thank you for your recommendation; we revised this paragraph, and removed this phrase.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142799</td>
<td>Figure</td>
<td>28.1</td>
<td></td>
<td>1310</td>
<td></td>
<td></td>
<td></td>
<td>Is there a reason why this figure does not align with the five steps mentioned on p. 1308, line 1-2 and p.1312 line 26-27?</td>
<td>We thank the reviewer for the comment. The figure has been revised to incorporate the suggestion and align with the text.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142800</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1311</td>
<td>8</td>
<td>12</td>
<td></td>
<td>Suggest choosing one definition instead of offering two in order to avoid confusion.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142791</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1311</td>
<td>21</td>
<td>21</td>
<td></td>
<td>Word missing.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142792</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1311</td>
<td>14</td>
<td>19</td>
<td></td>
<td>Consider changing to frequency of heat waves. The definition of extreme heat has not changed over time, the occurrence has.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142794</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1312</td>
<td>17</td>
<td>17</td>
<td></td>
<td>Confusing wording. Consider changing to &quot;Because some GHGs reside in the atmosphere for decades or longer, many climate-influenced variables would continue to change through 2050 even if greenhouse gas emissions immediately stopped.&quot;</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142795</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1312</td>
<td>19</td>
<td>19</td>
<td></td>
<td>The sentence &quot;Achieving the benefits of deep uncertainty&quot; seems to fit better in the paragraph above (lines 7-12).</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142796</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1312</td>
<td>26</td>
<td>36</td>
<td></td>
<td>Link appears to be broken.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142798</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1312</td>
<td>28</td>
<td>38</td>
<td></td>
<td>Link appears to be broken.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142799</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1313</td>
<td>13</td>
<td>13</td>
<td></td>
<td>Other actions are vague. Consider specifying or deleting.</td>
<td>We thank the reviewer for this comment and have incorporated changes to the text.</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142801</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1314</td>
<td>10</td>
<td>11</td>
<td></td>
<td>It would be great to have an example of other climate impacts that could be better integrated into coastal adaptation (e.g., extreme heat's effect on coastal tourism, ocean acidification impact on coastal fisheries).</td>
<td>We thank the reviewer for the comment, but were unable to add additional examples due to lack of space with the text.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142802</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1314</td>
<td>27</td>
<td>28</td>
<td></td>
<td>In this context, does infrastructure mean physical infrastructure or social/planning infrastructure (i.e., established processes)? If the former, consider adding &quot;planning frameworks or processes&quot; or something similar.</td>
<td>This text has been revised.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142804</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1314</td>
<td>29</td>
<td>36</td>
<td></td>
<td>There are two distinct points that could be better differentiated here: (1) there has been more natural variability over the last millennium than previously thought; (2) climate change will push parameters outside of the normal range. EvG/H could correct for an updated understanding of past variability. (I, e., our planning models will need to be dynamically updated to account for future variability). Suggest splitting into two separate paragraphs. In addition, the exploration of climate lags is clearer in the previous descriptions on pages 1308 and 1312. Suggest replacing with previous description of breaking up and shifting p. 1312 line 26.</td>
<td>We thank the reviewer for the comment, and have rewritten the text to make our point clearer.</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142800</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1315</td>
<td>12</td>
<td>12</td>
<td></td>
<td>Built human infrastructure means redundant. Consider changing to built infrastructure.</td>
<td>Built infrastructure is a common term to differentiate to natural infrastructure.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142807</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1315</td>
<td>24</td>
<td>24</td>
<td></td>
<td>Contradictory statements. In risk management familiar or not familiar to decisionmakers, businesses, and communities? Suggest starting line 20 with &quot;on the other hand, climate adaptation also less familiar,&quot; or something similar.</td>
<td>We thank the reviewer for the comment; modified text accordingly.</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142809</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1317</td>
<td>9</td>
<td>15</td>
<td></td>
<td>Suggest adding examples for reduced sensitivity and increased adaptive capacity to match format of reduced exposure.</td>
<td>Thank you. Each of the three types is defined in the bulleted 14-15, from the references in the citation. In addition, we provide and discuss examples in the paragraphs immediately below the bulleted list.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142818</td>
<td>Test Region</td>
<td>28</td>
<td></td>
<td>1324</td>
<td>19</td>
<td>24</td>
<td></td>
<td>May be worth mentioning a few of the models developed already so readers don't think they have to start from scratch.</td>
<td>We now make the mention.</td>
</tr>
</tbody>
</table>
Climate vulnerability assessments are part of all the other frameworks, it is not its own framework. This sentence is confusing because all decisions are judgements at single points in time. Please reframe.

correct and complete range an organization should plan for.

limiting adaptation.

It is more than societal expectations and rules etc, it is also the state of climate science and deep uncertainty paleorecord with climate projections. All records should be considered in planning to get the full picture.

more important to articulate as a challenge. It is not smart planning to fully replace the observed and instead of stationarity. Adaptation, hindered by assumptions of a stationary climate, is not the correct framing, Please note that including climate change in planning practices in itself is an adaptation action.

A third is the experience of extreme events.

These stages are not independent and build on each other. Same comment with use of figure on page 1313.

recommend the authors note mitigation be considered in adaptation strategies.


released in 2017. The climate projections reference the 2010 report, "Climate change adaptation in New York City." The 2017 guidelines use the IPCC 2013 report projections, "Building the Knowledge for Climate Resiliency. Thank you for this comment; the text has been updated accordingly.

Often investments in adaptation increase GHG footprint of organizations adapting to climate change. We recommend the authors note mitigation be considered in adaptation strategies.

We now mention co-benefits that can occur when an organization simultaneously plans for adaptation and mitigation.

While the authors acknowledge this point, other considerations, the author team determined that the primary emphasis of this paragraph should remain on the importance of considering future climate impacts, since that is a less established practice than considering past conditions.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

We appreciate this comment and added this concept to the text.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

We have significantly expanded our use of adaptation examples. Due to space constraints, however, we were unable to add any such examples to the benefit cost section.

Unfortunately, due to space constraints we had to drop all our pictures

The text has been modified as suggested.

We thank the reviewer for the suggestion but were unable to include it due to space constraints.

We thank the reviewer for this comment and have incorporated change to the text.

We thank the reviewer for this comment and have incorporated change to the text.

We thank the reviewer for the suggestion but were unable to include it due to space constraints.

We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.

We thank the reviewer for the comment and have incorporated it into the text.

We thank the reviewer for the comment and have incorporated it into the text.

We have deleted this line

We now mention co-benefits that can occur when an organization simultaneously plans for adaptation and mitigation.

May be worth noting that these also factors of success for non-climate actions. In other words, adaptation is applying the same toolkit to new challenges.

We thank the reviewer for the suggestion but were unable to include it due to space constraints.

We thank the reviewer for this comment and have incorporated change to the text.

We thank the reviewer for this comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated it into the text.

We have deleted this text.

We have deleted this text.

Unfortunately, due to space constraints we had to drop all our pictures

We have deleted this text.

We have deleted this text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We have deleted this line

We have deleted this line

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142001</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1517</td>
<td>1517</td>
<td>9</td>
<td>11</td>
<td>Please consider combining reduce exposure and reduce sensitivity to reduce exposure and sensitivity. Though these concepts differ, they are very similar enough to combine for this purpose. This will help reduce confusion as referenced in the assessment citations given. Additionally, we take your point about Figure 28.1 and we have substantially revised it to enhance its legibility and coherence with the text discussion.</td>
<td>Thank you. We disagree that combining exposure and sensitivity will help the meaning or transmission of meaning of our point here. In addition, these terms have very well-defined meaning. End line 10.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142002</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1515</td>
<td>1515</td>
<td>7</td>
<td>9</td>
<td>Please retain: we recommend changing, many decisionmakers do not appreciate. To some decisionmakers do not mean...</td>
<td>Thank you. We have changed &quot;many decisionmakers do for &quot;some decisionmakers may &quot;.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142003</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1518</td>
<td>1518</td>
<td>9</td>
<td>11</td>
<td>Add to sentence, and impact different decision making processes (such as annual operations). We thank the reviewer for the comment but were unable to add this text due to space constraints.</td>
<td>We thank the reviewer for the comment but were unable to add this text due to space constraints.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142004</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1518</td>
<td>1518</td>
<td>14</td>
<td>16</td>
<td>Consider changing the worldview to research. We thank the reviewer for the comment and have incorporated change to the text.</td>
<td>We thank the reviewer for the comment and have incorporated change to the text.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142005</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1518</td>
<td>1518</td>
<td>14</td>
<td>16</td>
<td>Please consider combining reduce exposure and reduce sensitivity. To reduce exposure and sensitivity. Though these concepts differ, they are very similar enough to combine for this purpose. This will help reduce confusion between the difference in the table. We had to delete the entire table due to space constraints.</td>
<td>We thank the reviewer for the comment and have incorporated change to the text.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142006</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1521</td>
<td>1521</td>
<td>9</td>
<td>9</td>
<td>Add environmental following societal. Please retain. We thank the reviewer for the comment and have incorporated change to the text.</td>
<td>We thank the reviewer for the comment and have incorporated change to the text.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142007</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1523</td>
<td>1523</td>
<td>14</td>
<td>14</td>
<td>Add past and current and future. Post information should be part of the information considered. The sentence is accurate as it. Planners should definitely use past information, but they should design for current and future conditions.</td>
<td>This work is now highlighted later in the chapter.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142008</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1514</td>
<td>1514</td>
<td>2</td>
<td>2</td>
<td>Support mentioning the pioneering work of the water utility sector in adaptation planning by adding the following sentence to the end of this text section: The sector is pioneering approaches in using different decision support systems for water utility adaptation. Reference is Kaatz, L., Boucher, K., Boucher, R. 2015. Embracing Uncertainty: A Case Study Examination of How Climate Change is Shifting Water Utility Planning. Water Utility Climate Alliance, American Water Works Association, Water Research Foundation, and the Association of Metropolitan Water Agencies. We now cite this document in the discussion of KM3.</td>
<td>Thank you for this comment. We have updated the text with additional examples.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142009</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1530</td>
<td>1530</td>
<td>14</td>
<td>14</td>
<td>This sentence could also mention other sector. Suggest adding to read: Federal agencies, non-governmental organizations, water utilities, engineering industry associations, transportation and public works departments, and private sector consultants.</td>
<td>Thank you for this comment; we have updated the text with additional examples.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142010</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1530</td>
<td>1530</td>
<td>14</td>
<td>14</td>
<td>The paragraph could also mention other sectors. Suggest adding to read: Federal agencies, non-governmental organizations, water utilities, engineering industry associations, transportation and public works departments, and private sector consultants.</td>
<td>Thank you for this comment; we have updated the text with additional examples.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142021</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1508</td>
<td>1508</td>
<td>7</td>
<td>7</td>
<td>I understand the point being made, but I don't know of any adaptation programs that aren't looking at future conditions and projections. We thank the reviewer for the comment and revised Key Message 1.</td>
<td>Thank you for this comment. We will incorporate this recommendation.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142043</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1509</td>
<td>1509</td>
<td>18</td>
<td>22</td>
<td>Different risk management is required in both climate adaptation frameworks. Climate vulnerability assessment is not an adaptation framework. It is a process element under a climate adaptation framework. Risk governance should be added to the box. We thank you for this comment; we revised the text to incorporate this recommendation.</td>
<td>Thank you for this comment; we revised the text to incorporate this recommendation.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142044</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1509</td>
<td>1509</td>
<td>26</td>
<td>28</td>
<td>The author must also be honest about the fact that adaptation will Body take substantial investment, which could be hard or prohibitive for certain communities. Could be framed as future loss savings. We agree with this comment and rephrased this paragraph.</td>
<td>Thank you for this comment; we revised the text to incorporate this recommendation.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142045</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1509</td>
<td>1509</td>
<td>26</td>
<td>30</td>
<td>Language here is very abstract. It would be helpful to give practical examples so the reader can better understand what those actions look like. We have rewritten the summary to make it less abstract. The chapter also now has additional, concrete examples of adaptation actions.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate these suggestions.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142046</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1509</td>
<td>1509</td>
<td>15</td>
<td>16</td>
<td>If traditional planning is based on outdated then it is not possible to mainstream or integrate climate change into a traditional planning process. Consider removing the word traditional to simplify says planning processes. We thank you for this recommendation; we modified the text accordingly.</td>
<td>Thank you for this recommendation; we modified the text accordingly.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142047</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1509</td>
<td>1509</td>
<td>15</td>
<td>16</td>
<td>Maintaining is a concept that has been used widely in many sectors and often used in the context of international development and over the last years applied in the climate change field. However, there is no standard definition of mainstreaming in the context of climate change adaptation. Maintaining climate change adaptation goes beyond integration of it into planning processes. For example the United Nations define it as the iterative process of integrating considerations of climate change adaptation into policy making, budgeting, implementation and monitoring processes at national, sector and subnational levels. Suggest adding a definition of mainstreaming which addresses its holistic nature. We thank you for this comment. We broadened the description of mainstreaming to be more comprehensive.</td>
<td>Thank you for this comment. We broadened the definition of mainstreaming to be more comprehensive.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142048</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1511</td>
<td>1511</td>
<td>4</td>
<td>4</td>
<td>Funding has become more frequent also driven coastal areas. We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td>Thank you for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
</tr>
<tr>
<td>Mikko</td>
<td>McFeely</td>
<td>142049</td>
<td>Text Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1511</td>
<td>1511</td>
<td>11</td>
<td>14</td>
<td>Abstract language. Be more precise, give examples. We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td>Thank you for this comment. We have updated the text with additional examples.</td>
<td></td>
</tr>
</tbody>
</table>
Key message 2: social science is key for outlining current social expectations and identifying which components of society are critical. Per Adger et al. 2009 (“Are there social limits to adaptation?”), when adaptation is considered from perspective of material or physical sciences. This concept should be incorporated into this chapter.

The discussion of EMS now contains such examples

Increased Resiliency Adaption Needs and Increased Resiliency.

This process differs from the process explained in Figure 28.1. Three different processes or stages of climate change adaptation are mentioned in this chapter which is confusing. These processes should be harmonized into one process. First step should be assessing vulnerabilities.

Mainstreaming is defined differently across this document. Use one definition which embraces other definitions used in this chapter.

Managing climate risk also requires the use of all information available. Past records, current climate and future climate projections. There is no debate in the necessity of incorporating nonstatistical but it’s critical to also note the importance of continuing to evaluate historic records in planning and decision making.

Thank you. The text was altered to include the importance of historical and paleoclimate information.

Managing climate risk also requires the use of all information available. Past records, current climate and future climate projections. There is no debate in the necessity of incorporating nonstatistical but it’s critical to also note the importance of continuing to evaluate historic records in planning and decision making.

Thank you. We do not agree that this text is very repetitive so have left as is.

Thank you. We have added language noting the need for ability and capacity building.

Thank you. We have increased discussion of obstacles to adaptation throughout the chapter to include this one.

This figure is repeated. We assume that one will be removed in the final version and the text will reference the final version of the document, the summary will not be so close to the main body of the text.

We agree with the reviewer that this is confusing. The summary includes a figure from the main text. In the final version of the document, the summary will not be so close to the main body of the text.

We have revised the wording.

We have removed this text due to space constraints.

We have now tried to use one consistent definition.

We have revised the wording.

We deleted the table due to space constraints, but do now include this cite in the text. Thanks!

We deleted the table due to space constraints, but do now include this cite in the text. Thanks!

We thank the reviewer for this comment and have incorporated change to the text.

We thank the reviewer for this comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table/Line</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443329</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1309</td>
<td>1309</td>
<td>14</td>
<td>25</td>
<td>This statement is missing the concept that all of these phenomena (calling out sense of place, safeguarding cultural resources and resources, social connectivity for example) are actually also components that enable effective adaptation. Cultural resources (even for example) should not be framed as solely “elements” of climate change that need to be protected by means of adaptation; rather, through the social connectivity, sense of place, scientific data they provide, they are in fact part of society’s means of adapting. Starting reference for this: National Park Service-Cultural Resources Climate Change Strategy (<a href="https://www.nps.gov/about/index.htm">https://www.nps.gov/about/index.htm</a>).</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443330</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1312</td>
<td>1312</td>
<td>26</td>
<td>28</td>
<td>As noted above, this key message is missing self-reflection about the feasibility of human systems/human components of systems.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443331</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1315</td>
<td>1315</td>
<td>5</td>
<td>11</td>
<td>It is important to note the range of recent recorded natural variability and the relevance of socioeconomic factors that influence variability.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443332</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1315</td>
<td>1315</td>
<td>14</td>
<td>19</td>
<td>This statement implies that many organizations that deal with weather-related phenomena currently do not have the ability to forecast or to do something to avoid these phenomena.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443333</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1316</td>
<td>1316</td>
<td>5</td>
<td>4</td>
<td>This section is completely missing discussion of what is meant by society’s expectations and rules, as set out in the key message.</td>
<td>We thank the reviewers for the comments and have incorporated the findings of the recommended study into our chapter.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443334</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1316</td>
<td>1316</td>
<td>21</td>
<td>22</td>
<td>This is a basic statement of the need for risk communication.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443335</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1317</td>
<td>1317</td>
<td>26</td>
<td>26</td>
<td>Strongly recommend rewriting this section with reference to US Global Change Research Program Social Science Coordinating Committee white paper on vulnerability, which provides a well-grounded interdisciplinary social science approach to vulnerability: the diverse historical and social forces that shape community vulnerability, community capacity to respond.</td>
<td>We now discuss some of these issues in full, in particular the points made by Aigler et al., in the discussion of NAS 2019.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443336</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1318</td>
<td>1318</td>
<td>11</td>
<td>12</td>
<td>This chapter uses a mechanistic review of adaptation, but does not provide an assessment of where the US is in terms of efforts to adapt.</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443337</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1319</td>
<td>1319</td>
<td>1</td>
<td>11</td>
<td>This section is inadequate in describing the deficiencies that come from describing adaptation in terms of cost-benefits or a single monetary signal.</td>
<td>We thank the reviewer for the comment and have incorporated the findings of the recommended study into our chapter.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443338</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1319</td>
<td>1319</td>
<td>16</td>
<td>18</td>
<td>The sentence implies that there is a single community in which members are equal.</td>
<td>We thank the reviewer for the suggestion. We now cite this report and discuss its findings.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443339</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1322</td>
<td>1322</td>
<td>1</td>
<td>11</td>
<td>This section is inadequate in describing the deficiencies that come from describing adaptation in terms of cost-benefits or a single monetary signal.</td>
<td>We now discuss Adger et al. in our Beyond Incremental Change section and the USGCRP Social Science white paper on vulnerability later in this section.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443420</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1322</td>
<td>1322</td>
<td>26</td>
<td>28</td>
<td>Cross-reference this section with the US Global Change Research Program Social Science Coordinating Committee white paper on vulnerability.</td>
<td>We now discuss Adger et al. in our Beyond Incremental Change section and the USGCRP Social Science white paper on vulnerability later in this section.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443421</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1324</td>
<td>1324</td>
<td>12</td>
<td>24</td>
<td>This section emphasizes/promotes “getting the data right” -- does not capture system interdependencies and irreducible on taking action/determining what actions to take.</td>
<td>We now discuss Adger et al. in our Beyond Incremental Change section and the USGCRP Social Science white paper on vulnerability later in this section.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443422</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1325</td>
<td>1325</td>
<td>29</td>
<td>30</td>
<td>Strongly recommend connecting this section to NCAF chapter 17.</td>
<td>We now discuss Adger et al. in our Beyond Incremental Change section and the USGCRP Social Science white paper on vulnerability later in this section.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>443433</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1328</td>
<td>1328</td>
<td>6</td>
<td>7</td>
<td>The example used here emphasizes engineering components of a road--but completely misses the social implications of the road.</td>
<td>We have re-written this text. NAS 2019 echoes the points made here.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The social implications of the road are of course vital, but are not relevant to the point of this example, which is focused on the (very small) road engineer's need for technical climate change information in choosing the material with which to resurface their roads. If the engineers are doing their job properly, the broader social implications will be intrinsic to this particular design choice.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>Start Line</th>
<th>End Page</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Science Coordinating Committee</td>
<td>143544</td>
<td>Field Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resilience</td>
<td>1331</td>
<td>1335</td>
<td>5</td>
<td>15</td>
<td>As noted per cover page of this chapter, social sciences are not represented as principal training of any of the authors listed. The resulting lack of attention to social sciences and social systems is evident in the organization and discussion of this chapter. This gap should be addressed by adding social scientists to the writing team for revision of this chapter.</td>
<td>Thank you for your comment. We are not able to add additional authors at this time but have consulted a wide range of experts beyond those included as authors when setting this chapter.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>143545</td>
<td>Field Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resilience</td>
<td>1333</td>
<td>1338</td>
<td>16</td>
<td>27</td>
<td>Please clarify: whose judgments about organizations?</td>
<td>Thanks for this comment; we attempted to clarify this section.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>143546</td>
<td>Field Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resilience</td>
<td>1334</td>
<td>1339</td>
<td>13</td>
<td>25</td>
<td>Please clarify: new techniques for what? This section notes a very passive fashion that ways of understanding how a society can deal with uncertainty and variability are behind recognition that assumptions of environmental consistency no longer work. This is actually still for more social science and improved integration of social science with adaptation planning. Please be clear about this. It's not clear from the reference listed that the authors are creating these social science approaches.</td>
<td>We have revised this section. We agree that social science needs to be more extensively integrated into adaptation planning, a point which is reflected in topics covered in the chapter. However this is also not the place in the chapter to recommend research needs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>143547</td>
<td>Field Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resilience</td>
<td>1337</td>
<td>1337</td>
<td>15</td>
<td>5</td>
<td>There is an extensive literature about identifying and understanding transformative change in societies – it is found in archaeology, regarding the development of complex societies and civilizations, and the challenges these societies and civilizations have faced due to environmental change, and how to understand these developments and challenges through modeling and evolutionary theory. Experts in these topics should be brought into this work on the chapter.</td>
<td>We thank the reviewer for the comment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>143548</td>
<td>Field Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resilience</td>
<td>1337</td>
<td>1337</td>
<td>12</td>
<td>16</td>
<td>Strongly recommend weaving this with reference to US Global Change Research Program Social Science Coordinating Committee white paper on vulnerability, which provides a well-grounded interdisciplinary social science approach to vulnerability, particularly the diverse historical and social forces that shape community vulnerability, community capacity to respond.</td>
<td>We now cite this white paper. Thank you for the suggestion.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>143571</td>
<td>Whole Chapter</td>
<td>28. Near-Term Adaptation Needs and Increased Resilience</td>
<td>Since NCA3, there has been progress made in interdisciplinary research to enhance understanding of drivers and social vulnerabilities of climate change and responses. As an example, in March 2017, the U.S. Global Change Research Program Social Science Coordinating Committee organized a workshop “Social Science Perspectives on Climate Change,” that brought together federal researchers and managers as well as academic social scientists to discuss understanding of drivers, vulnerability of, and responses to climate change from four disciplines – anthropology, geography, geology, and sociology. The workshop resulted in three (USGCRP white papers Social Science Perspectives on Climate Change USGCRP 2016, Part 1, 2 &amp; 3 – upcoming), each on (1) social vulnerability under climate change; (2) drivers of, and responses to climate change; and (3) innovative methods and tools to evaluate coupled natural and human systems. Paper (1) “Social Vulnerability sweaty the essential role of social science research and discusses key factors (e.g, resource access, culture, governance, and information) that influence vulnerabilities within and across communities as well as insights for effective adaptation. Paper (2) discusses the underlying drivers of climate change and how these factors interact dynamically over space and time. These white papers collectively highlight the importance to consider social, cultural, political, and economic factors and past decisions for understanding drivers and vulnerability of climate change, and the need for multi- scale, multi-dimensional approaches and governance structures for mitigation and adaptation responses. Discussions in this chapter can be enhanced by incorporating key insights from the white papers.</td>
<td>We now cite this white paper. Thank you for the suggestion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td>143572</td>
<td>Whole Chapter</td>
<td>28. Near-Term Adaptation Needs and Increased Resilience</td>
<td>Since NCA3, there has been progress made in interdisciplinary research to enhance understanding of drivers and social vulnerabilities of climate change and responses. As an example, in March 2017, the U.S. Global Change Research Program Social Science Coordinating Committee organized a workshop “Social Science Perspectives on Climate Change,” that brought together federal researchers and managers as well as academic social scientists to discuss understanding of drivers, vulnerability of, and responses to climate change from four disciplines – anthropology, geography, geology, and sociology. The workshop resulted in three (USGCRP white papers Social Science Perspectives on Climate Change USGCRP 2016, Part 1, 2 &amp; 3 – upcoming), each on (1) social vulnerability under climate change; (2) drivers of, and responses to climate change; and (3) innovative methods and tools to evaluate coupled natural and human systems. Paper (1) “Social Vulnerability sweaty the essential role of social science research and discusses key factors (e.g, resource access, culture, governance, and information) that influence vulnerabilities within and across communities as well as insights for effective adaptation. Paper (2) discusses the underlying drivers of climate change and how these factors interact dynamically over space and time. These white papers collectively highlight the importance to consider social, cultural, political, and economic factors and past decisions for understanding drivers and vulnerability of climate change, and the need for multi- scale, multi-dimensional approaches and governance structures for mitigation and adaptation responses. Discussions in this chapter can be enhanced by incorporating key insights from the white papers.</td>
<td>We now cite this white paper. Thank you for the suggestion.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alison Comments</td>
<td>143473</td>
<td>Whole Chapter</td>
<td>28. Near-Term Adaptation Needs and Increased Resilience</td>
<td>This chapter is a lot of work. Unfortunately, it is well behind the progress of many of the other chapters I’ve read. It is incredibly repetitive and full of jargon. It reads like policy works: it were a brochure for other policy works, not like it were the literature the authors used. It is not well-structured and is not easy to follow. The legibility of redundancy it could easily be chopped in half. There is only one figure and one table in this chapter and both are very poorly conceived. Most frustrating was the number of bits in this chapter (many of which repeated themselves) and some controversy within bits. There were so many different frameworks posed: first five steps, then a different five steps in Figure 2, then a different five steps in the next flowchart. Two different frameworks, then a framework of exposure, sensitivity, adaptive capacity, then a table of current and future changes that were incomprehensible, then another bit of climate adaptation processes beginning on page 1324 (with a separate numbered list within the first bullet of this list), then a mainstreaming (as a verb), then the framework of important factors of an adaptation plan…. I’ve completely lost how many frameworks there are. I’m not even sure why this chapter focuses on all these different types of frameworks instead of just defining and describing what adaptation is and why it’s needed. Most readers will not care what conceptual framework is better than another—that isn’t the role of a scientific assessment. This chapter could use more, and better, purposes. It would also benefit from more quantitative descriptions and especially descriptions of whether the numerous examples (almost all in NV, California, or Florida) have been effective. I suggest the authors rework their key messages and give careful thought to the messages they want to convey to this audience based on the literature assessed. It may be as simple as (1) adaptation is needed (2) adaptation is cost effective (3) there are examples of this being done.</td>
<td>We thank the reviewer for their comments and note that this differs from other feedback we have received, such as that by the National Academy of Sciences review panel. That said, we have taken steps to reduce redundancies, focus our key messages, and reduce the use of jargon.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alison Comments</td>
<td>143474</td>
<td>Field Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resilience</td>
<td>These key messages need a complete revision, most of all it combines and simplifies them down to three messages that are key. They are also a bit wordy and in too academic language. The authors may also want to revisit the guidance on risk framing, and rewriting these with those in mind (e.g., what is the risk of not adapting? What is the risk of adapting only to current climate conditions?)</td>
<td>We thank the reviewer for these comments and note that it differs from other feedback we have received, such as that by the National Academy of Sciences review panel. That said, we have taken steps to reduce redundancies, focus our key messages, and reduce the use of jargon.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alison Comments</td>
<td>143475</td>
<td>Field Region</td>
<td>28. Near-Term Adaptation Needs and Increased Resilience</td>
<td>We now have citations to this helpful literature throughout the chapter. These key messages need a complete revision, most of all it combines and simplifies them down to three messages that are key. They are also a bit wordy and in too academic language. The authors may also want to revisit the guidance on risk framing, and rewriting these with those in mind (e.g., what is the risk of not adapting? What is the risk of adapting only to current climate conditions?)</td>
<td>We thank the reviewer for their comments and revised key message 1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Allison Crimmins 14.0476 Text Region 28. Near-Term Adaptation Needs and Increased Resiliency 143483 14:12 28 11 You say over and over again over again in this chapter that people are adapting to current conditions instead of future climate impacts, but you never say "so what?" So what? In other words, are you trying to say that current climate adaptations are not enough, that they won't work, that they will be a waste of money, that people should do more? "Successful adaptation is hindered" is a stiffed way to write this I suggest boldly stating what you mean in plain language. For example: "Adaptation that only consider current climate conditions will fall short in protecting people from future risks." Or "Adaptations made to current climate conditions will quickly become outdated, requiring additional steps to re-adapt to changing conditions." On line 9, does the words "similar to" in fact mean "within the range of"? The second sentence of this key message is not needed and confusing. You could delete the word "current," as it is not needed. But also, it seems odd for the authors to be talking about trying to find an alternative assumption (what?) that will fit into society's current expectations/values/practices when most of the chapter discusses that we should be CHANGING expectations/values/practices, not trying to fit a square peg in a round hole. Suggest deleting this sentence. Since the first sentence is already in Key Message 1 and the second sentence is not needed, this entire key message could be dropped. We agree that this was confusing and revised Key Messages 1 and 2.


Allison Crimmins 14.0478 Text Region 28. Near-Term Adaptation Needs and Increased Resiliency 143485 14:26 13 This key message, and the underlying text, is walking tremendously close to policy advocacy, as the authors (and therefore the federal government) is endorsing one type of adaptation approach. I cringed at "apparent frameworks" as this is straight out advocacy (as other frameworks are therefore inappropriate). It is a confusing message, since earlier messages talk about thinking ahead to consider future ranges of climate change so that adaptation decisions can be made that last. Now, the authors are saying something different, that people should take smaller iterative steps. Most of all, I don't understand why this is a key message. There are likely many frameworks out there that would work for different people, places, and things. Why is knowing about one of them so key as to be a key message? If the authors had taken the approach of explaining how adaptation options are something that no one does once and is done, but rather is something that communities need to forever plan for, that would be more interesting. We thank you for this comment; we removed this sentence from Key Message 3.

Allison Crimmins 14.0479 Text Region 28. Near-Term Adaptation Needs and Increased Resiliency 143486 14:26 10 Again, this last sentence of key message 6 seems to contradict key message 2. CSSR says to be iterative, SMS says incremental changes aren't enough (though it doesn't explain why it isn't enough or what "beyond incremental change" entails). Very confusing to the reader.

Allison Crimmins 14.0480 Whole Chapter 28. Near-Term Adaptation Needs and Increased Resiliency 143487 14:26 10 It is disappointing that all the adaptation options discussed in this chapter, and all the examples, are being done by federal, state/local, or maybe businesses. There is no discussion of what an individual should or could do to protect themselves or their family. Most people reading this chapter will not see anything of themselves or their own lives in it- just big actions [like seawalls] that are beyond one person or one family or often one community's reach. Thus leaves an entire branch of adaptation options off the table. We have now included a box suggesting what actions individuals can take. We thank the reviewer for the suggestion.

Allison Crimmins 14.0481 Text Region 28. Near-Term Adaptation Needs and Increased Resiliency 143488 14:31 12 These sentences alluded to the CSSR, hence the "this is" here does not make sense. It does not follow for the reader why this is a thus or therefore to connect their thoughts.

Allison Crimmins 14.0482 Text Region 28. Near-Term Adaptation Needs and Increased Resiliency 143489 14:31 12 The "Thus" here does not make sense. It does not follow for the reader why this is a thus or therefore to connect their thoughts. We thank you for this comment.

Allison Crimmins 14.0483 Text Region 28. Near-Term Adaptation Needs and Increased Resiliency 143490 14:31 12 This is not a hard and fast established framework that everyone must follow. Maybe the CDC or others see this as helpful, but there are many other ways that this could be done and other ideas may work better for other people/places/times. Why this endorsement? And are all these 5 stages different from the 5 stages in figure 17?

Allison Crimmins 14.0484 Text Region 28. Near-Term Adaptation Needs and Increased Resiliency 143491 14:31 12 The states stages were "underway throughout the United States." By what? Also, how is stage/underway? We thank the reviewer for this comment; we revised the text to note that these are common steps, but that specific terms and processes may differ.

Allison Crimmins 14.0485 Text Region 28. Near-Term Adaptation Needs and Increased Resiliency 143492 14:31 8 This is a better phrase than in the key message. We have retained and expanded on this language, and revised Key Message 2.

Allison Crimmins 14.0486 Text Region 28. Near-Term Adaptation Needs and Increased Resiliency 143493 14:31 14 Not sure I'm following this. Are you saying people already know how to adapt? This seems redundant to the rest of your key messages. This is so vague as to be rather useless- suggest deleting or else explaining what attributes you mean. We thank the reviewer for this comment; the text has been revised. For additional information, we refer the reviewer to the Supporting Evidence in NCA3, Key Message 1.

Allison Crimmins 14.0487 Text Region 28. Near-Term Adaptation Needs and Increased Resiliency 143494 14:31 15 The paragraph is too long and too confusing. It is also filled with sterile buzzwords. Suggest getting rid of all the "frameworks," for example "comprehensive framework" or "on the 22," which is an empty phrase. Delete sentence on lines 17-19. If you must, just use this paragraph to define what you mean by iterative risk management, though I'm not sure why this framework is being touted above all the rest (you get to key message 5) or why this is important to the audience. Also, people will understand what the word iterative means.


Allison Crimmins 14.0489 Text Region 28. Near-Term Adaptation Needs and Increased Resiliency 143496 14:31 15 What you use mainstreaming as a verb? It's placed to read, sounds like a policy-world cliché, and in most places could be completely removed. For instance, on line 35, deleting "mainstreaming," that is, could after deleted without losing meaning of the sentence. The term is defined here, so why is it in the key message when people reading it won't understand what it means? Suggest using plain language suited to the audience.

We appreciate the reviewer's comment, and modified the text accordingly. Because this remains a prevalent concept and term among adaptation practitioners, we did retain it in some places.

Response
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143490</td>
<td>Figure</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1310</td>
<td></td>
<td>7</td>
<td></td>
<td>This figure needs replacing with something more useful to the chapter’s audience, or at least a lot of revision. As the only figure in this chapter, it is unfortunate that the figure is focused on yet another framework, one that differs from the one just discussed in the text and from the IPCC-AR5 framework and from the next 3-5 frameworks discussed in this chapter. What about an image of a home with suggested examples of ways an individual or family could take adaptation steps in their own home (neighborhood)? What about a map with successful adaptation measures marked on it? How about a graph or map showing how many cities and states have adaptation plans? Anything but another conceptual diagram with boxes and arrows. This figure is confusing, not least because every project, everywhere would have a different mix and order of these stages and they would all be at different stages. In other words, not every adaptation action is in the implementation stage now. So how can you say NCA3 is NCA4? This figure was already in NCA3 and in the 2014 IPCC, but it will not be so it gets by the team report is released. I think the authors can do better and be more creative than recycling this old conceptual diagram for each other. Beyond that, if the authors feel they must keep this diagram, there are many issues to work on. First, these are not the same five stages outlined in the text. Second, the best ways that we can see the first three stages occurring in NCA3, but here it only shows two. Third, the dotted dark blue arrow seems to imply that we have not made it any further than NCA3 with NCA4. Is this the author’s assessment of all the analyses of national adaptation actions so far? If so, where are those citations? Fourth, why are the light blue arrows bi-directional? Fifth, what does the stakeholder万多 with the blue words mean, and why is it the middle and who are these “stakeholders” (another policy wonk buzzword)? Lastly, all the words in the blue circles are different terms.</td>
<td>We have revised the figure to make it more accessible and rewritten the supporting text to make the meaning clearer.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143491</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1311 1311</td>
<td>15 15</td>
<td>10 26</td>
<td>Delete this paragraph, it is not needed.</td>
<td>We have shortened this paragraph and focused it more on the chapter’s main themes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143492</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1311 1311</td>
<td>15 15</td>
<td>10 26</td>
<td>Delete this paragraph, it is not needed. Just use the existing NCA glossary which already has this term.</td>
<td>The term now incorporates the definition as part of a larger exposition on the benefits of climate risk management.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143493</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1312 1312</td>
<td>1 6</td>
<td>1 6</td>
<td>This is a better pass than the executive summary</td>
<td>We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143494</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1312 1312</td>
<td>19 19</td>
<td>28 28</td>
<td>Suggest deleting both these paragraphs. Not sure what “old society” is supposed to mean, nor why schools and communities were left out of this box (line 7). None of the examples listed were relevant to individuals. The second box lacks a reference to the NCA4 process framework discussion in this chapter.</td>
<td>We have revised this text.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143495</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1312 1312</td>
<td>26 27</td>
<td>28 28</td>
<td>Suggest deleting this sentence and avoid ending this one framework. This is also redundant to the previous section and at the same time contradicts Figure 2B 1.</td>
<td>After consideration of this point, we have determined that the framework is helpful to understand the process of adaptation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143496</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1312 1312</td>
<td>31 31</td>
<td>31 31</td>
<td>This sentence starts with “Since then” as is “since NCA3”, but the references listed here are all from 2013, which is BEFORE NCA3.</td>
<td>We have revised the references.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143497</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1312 1312</td>
<td>34 38</td>
<td>38 38</td>
<td>Delete text and just provide the references. This is also redundant to text in the key message 5 section, so not sure it needs to be said twice.</td>
<td>We thank the reviewer for this comment and have modified the text accordingly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143498</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1312 1312</td>
<td>39 39</td>
<td>39 39</td>
<td>I’m not sure this statement is true. Most of the chapters I’ve read must include adaptation actions, examples of implementation, and even evaluations of how effective these actions have been. Suggest reviewing other chapters.</td>
<td>We thank the reviewer for this comment and have modified the text accordingly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143499</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1313 1313</td>
<td>12 12</td>
<td>12 12</td>
<td>Suggest deleting “(1) awareness... And (2)” and just having the sentence read: “Adaptation actions in the United States have increased in part due to growing recognition that investing in adaptation provides economic and social benefits that exceed costs.” This assertion needs citations to support it. Please provide citations that adaptation action have increased as well as citations that show the cause of this to be awareness and recognition of cost benefits.</td>
<td>These reasons are important. We have added a citation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143500</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1314 1314</td>
<td>14 14</td>
<td>14 14</td>
<td>Suggest changing “stakeholders” to “partnerships”. What studies? How many studies were analyzed to come to these conclusions? Please provide citations. This entire paragraph needs better referencing. This paragraph is also full of vague language, like “many” (line 9), “few” (line 12), and “off” (line 13). Where are the citations for these and can you be more specific?</td>
<td>We moved the figure citation to make the source for this paragraph clear.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143501</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1314 1314</td>
<td>18 18</td>
<td>18 18</td>
<td>The reference is quite old — does it still stand true for NCA4? Where are the other citations for this section? Also why is this paragraph above the Key Message?</td>
<td>Yes, this citation still holds. The point it makes now seems relevant for the remainder of the Anthropocene.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143502</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1314 1314</td>
<td>25 25</td>
<td>25 25</td>
<td>There are zero citations for more than one entire page. Please provide citations of the literature the authors assessed to come to these conclusions.</td>
<td>Citations provided.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143503</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1314 1314</td>
<td>30 30</td>
<td>30 30</td>
<td>The phrase “no longer reliable” should be deleted. This was true in NCA3, either, so this is not a new thing</td>
<td>The phrase is true and needed. In some cases stationarity turns out to be a reasonable assumption (e.g. the current best science suggests the average annual rainfall in Los Angeles will stay constant at its historical average over the next decades). But the stationarity assumption is not reliably true in general.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143504</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1314 1314</td>
<td>33 33</td>
<td>33 33</td>
<td>Suggestion removed.</td>
<td>Citations provided.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143505</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1315 1315</td>
<td>37 37</td>
<td>37 37</td>
<td>Suggestion removed.</td>
<td>Clarity added.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143506</td>
<td>Footnotes</td>
<td>2B: Near-Term Adaptation Needs and Increased Resilience</td>
<td>1315 1315</td>
<td>41 41</td>
<td>41 41</td>
<td>Suggestion removed.</td>
<td>Thank you. We have added reference to the relevant chapters in NCA3 vol 3, the Climate Science Special Report.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
<td>Response</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------------------</td>
<td>------------</td>
<td>----------</td>
<td>------------</td>
<td>----------</td>
<td>---------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143508</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1515</td>
<td>1515</td>
<td>9</td>
<td>9</td>
<td>This could be</td>
<td>Thank you. We have tightened language throughout the chapter including this sentence.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143509</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1515</td>
<td>1515</td>
<td>14</td>
<td>21</td>
<td>This section</td>
<td>Thank you. The text correctly states that the stationarity assumption has been commonly used in the past and must be changed now to prepare properly for climate-changed futures. We have tightened text throughout the chapter including to make this point more directly; see comments and resolution 143507-08.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143510</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1515</td>
<td>1515</td>
<td>14</td>
<td>21</td>
<td>Suggest</td>
<td>Thank you. We disagree that this paragraph is long and redundant in that it re-sets up discussion of the difference between long- and short-term planning and the experience inside organizations with the climate-related weather events for which they plan.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143511</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1515</td>
<td>1515</td>
<td>14</td>
<td>26</td>
<td>Suggest using a different word than &quot;slow&quot; that doesn't seem exactly accurate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143512</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1516</td>
<td>1516</td>
<td>17</td>
<td>23</td>
<td>This subheading seems to contradict the title to the key message itself. Adaptation is a form of iterative management, or iterative management is a form of adaptation? Which is it?</td>
<td>Thank you. We disagree that the paragraph is jargon-laden and long. Nonetheless we have re-written sentences within it to make our points more succinctly, and we have defined the improvements to stakeholder processes more completely here and given a citation.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143513</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1516</td>
<td>1516</td>
<td>14</td>
<td>39</td>
<td>This paragraph is long and full of jargon. It would be more helpful to the reader to just explain what iterative risk management is, and why you want to marry it. Suggest deleting lines 18-22 and 22-36. Also, who are the &quot;stakeholders&quot; you are referring to in line 20?</td>
<td>Thank you. We disagree that the paragraph is jargon-laden and long. Nonetheless we have re-written sentences within it to make our points more succinctly, and we have defined the improvements to stakeholder processes more completely here and given a citation.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143514</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1516</td>
<td>1516</td>
<td>31</td>
<td>39</td>
<td>This sentence refers to &quot;half your jargon (consideration?)&quot; and more about why this one approach is so great, but the text has not yet explained what this approach is. The first half is confusing and lines 36-39 can be deleted.</td>
<td>Thank you. We disagree that the paragraph is jargon-laden and long and that we have not defined what iterative management means in the climate adaptation context. We disagree that lines 36-39 can be deleted without doing violence to our message that taking an iterative management approach can be useful for communities and organizations undertaking climate adaptation because many of these communities and organizations understand and use iterative management for many other actions already.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143515</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1517</td>
<td>1517</td>
<td>8</td>
<td>15</td>
<td>This is yet another framework, but at least one that is easier to digest and more familiar, as it was defined in the US climate and health assessment (suggest citing that here). Also, delete the example on lines 9-10, as it is too specific here in this list.</td>
<td>Thank you. We have removed the hyper-specific example of stream temperature effects. And we have added a citation to the 2016 USGCRP report on human health effects.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143516</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1517</td>
<td>1517</td>
<td>16</td>
<td>21</td>
<td>This is a great few sentences that really help the reader digest and relate to the three types of action. It just needs some citations!</td>
<td>Thank you. We have added additional citations to the section on effects in NYC.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143517</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1517</td>
<td>1517</td>
<td>12</td>
<td>16</td>
<td>This section is a little awkward and it is unclear why all the emphasis is just on the third adaptation action (adaptive capacity). Also, why the quote?</td>
<td>Thank you. We included additional detail on adaptive capacity because it is the least commonly known of the three elements and often the most difficult to define. The included quote is there to say most succinctly what we need to use from the cited reference.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143518</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1518</td>
<td>1518</td>
<td>27</td>
<td>2</td>
<td>Please delete all the italicized words, starting from &quot;dynamic, multi-sector, and multi-hazard-...&quot;. The whole paragraph can be deleted and the point about doing all three actions can be added to the previous paragraph. Please remember the NCA audience when revising the language of this chapter.</td>
<td>Thank you. We removed this paragraph.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143519</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1518</td>
<td>1518</td>
<td>4</td>
<td>4</td>
<td>This sentence refers to &quot;Adaptation literature&quot;. Where is that literature? Please provide citations.</td>
<td>Adaptation literature refers to much of the literature already cited in this chapter. We do not believe we need to repeat all those cites here.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143520</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1518</td>
<td>1518</td>
<td>8</td>
<td>8</td>
<td>Here is yet another numbered list.</td>
<td>Noted</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143521</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1518</td>
<td>1518</td>
<td>8</td>
<td>14</td>
<td>So, is there no stationarity assumption? This seems to contradict earlier state ments. The exemplar case has overcome the stationarity assumption, as have most of the exemplar cases mentioned in this chapter</td>
<td>The exemplar case has overcome the stationarity assumption, as have most of the exemplar cases mentioned in the chapter</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143522</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1518</td>
<td>1518</td>
<td>14</td>
<td>14</td>
<td>Citation needed</td>
<td>The note provided</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143523</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1518</td>
<td>1518</td>
<td>14</td>
<td>15</td>
<td>What does &quot;investment&quot; mean? I don't think this is a commonly known word.</td>
<td>We thank the reviewer for this comment and have incorporated change to the text.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143524</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1518</td>
<td>1518</td>
<td>21</td>
<td>25</td>
<td>Delete these sentences. They are all inside baseball.</td>
<td>We thank the reviewer for this comment and have incorporated change to the text.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143525</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1518</td>
<td>1518</td>
<td>10</td>
<td>11</td>
<td>I'm not sure this statement is true, nor why the only citation listed here is from 2014.</td>
<td>Added a more recent citation</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143526</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1518</td>
<td>1518</td>
<td>11</td>
<td>11</td>
<td>This sentence refers to &quot;a growing body of literature&quot;. Where is that literature? Please provide citations.</td>
<td>We thank the reviewer for this comment and have incorporated change to the text.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>143527</td>
<td>Ed Region</td>
<td>2B. Near-Term</td>
<td>1518</td>
<td>1518</td>
<td>14</td>
<td>13</td>
<td>This is a very confusing statement. If there is not yet sufficient evidence, how can the authors possibly assert the key message that directly follows this statement? Suggest deleting and/or deleting this entire paragraph.</td>
<td>We thank the reviewer for this comment and have incorporated change to the text.</td>
<td></td>
</tr>
</tbody>
</table>
By "resources" do you mean water? make? That you have to choose between climate adaptation actions and social equity? Suggest dropping this.

There are not citations in this paragraph. Citations are needed at the end of the sentences on line 32, 33, and 34.

Delete “As one ... multiobjective approach”. This part of the sentence is not needed and another word that

Please replace jargon like “mulitresource integrated adaptation planning” and “multiple partners and

This sentence says there is “considerable literature”. Where is this literature? Please provide citations.

But it begs the question why is Figure 28.1 in this chapter then? What was the ratio in Florida for Irma? In the Gulf for Maria? On line 24, the text says climate adaptation is extremely local in nature for both risks and responses. I agree with this, but it begs the question why is Figure 28.1 in this chapter then?

The authors need to explain what they mean by “sandbags”. Explain what sandbags are used for and how they are adaptation tools. Also, please explain why there is a discrepancy in benefit-cost ratios in these areas. This paragraph provides one box 24-25 seem to be favorites of the authors, but they are also very old. How the values still hold true with current events? What was the ratio in Florida for Irma? In the Gulf for Maria? On line 14, the text says climate adaptation is extremely local in nature for both risks and responses. I agree with this, but it begs the question why is Figure 28.1 in this chapter then?

The two examples in this sentence are too disparate to include together in one sentence. Suggest dropping this.

Citation needed

Please provide multiple examples of this. This will allow for dropping the subheading on line 16 as well as the subheadings on page 1321 line 6 and line 16. The subheading on page 1320 line 16 is what the entire section is meant to be about.

This sentence says there is “considerable literature”. Where is this literature? Please provide citations.

We thank the reviewer for this comment and have incorporated change to the text.

We thank the reviewer for this comment and have incorporated change to the text.

We deleted the table due to space constraints, but explain what we mean by sandbags in the text.

We deleted the paragraph, it said “many action” and here it says “in some cases”, which seems rather contradictory.

We thank the reviewer for the comment and have incorporated change to the text.

We thank the reviewer for the comment and have incorporated change to the text.

We deleted the paragraph due to space constraints, but explain what we mean by sandbags in the text.

We deleted this entire paragraph and moved the first sentence somewhere more appropriate. The authors have already included multiple examples of this. This will allow for dropping the subheading on line 6 as well as the subheadings on page 1320 line 6 and Box 5. The subheading on page 1320 line 16 is what the entire section is meant to be about.

We have significantly rewritten this section.

We thank the reviewer for this comment and have incorporated change to the text.

We thank the reviewer for this comment and have incorporated change to the text.

We deleted this entire paragraph. Especially the jargon phrase “multiobjective or multicriteria analysis”. This paragraph does not add to the narrative and lack enough citations.

We thank the reviewer for this comment and have incorporated change to the text.

We deleted this entire paragraph. Especially the jargon phrase “multiobjective or multicriteria analysis”. This paragraph does not add to the narrative and lack enough citations.

We respectfully disagree. The literature is emphatic on the importance of participatory engagement. Analysis that makes different types of outcomes explicit, rather than rolling them up into a single measure, is important for participatory engagement. Thus we believe this paragraph is important. The technical terms multi-objective and multi-criteria are important to mention in order to be respectful to the full range of realms of this chapter.

We deleted this entire paragraph. Especially the jargon phrase “multiobjective or multicriteria analysis”. This paragraph does not add to the narrative and lack enough citations.

We have added some cites, and made edits to try to address your concerns.

We respectfully disagree. The literature is emphatic on the importance of participatory engagement. Analysis that makes different types of outcomes explicit, rather than rolling them up into a single measure, is important for participatory engagement. Thus we believe this paragraph is important. The technical terms multi-objective and multi-criteria are important to mention in order to be respectful to the full range of realms of this chapter.

We deleted the sentence.

We thank the reviewer for this comment and have incorporated change to the text.

We deleted the sentence due to space constraints.

We have added the table due to space constraints.

We deleted this entire paragraph. It is very confusing and not helpful to the reader. It introduces yet another framework (actually one framework is the roses and another framework is the column). How the authors determined what falls in each box is unclear. The caption says that the green text holds true for every single global location, which can not be true. Are the authors suggesting that these adaptation steps can be taken and the roses should not be taken? Or is the authors suggesting we should NOT restore wetlands? The black text says there is no US estimates, but the red and green text legend suggest there are on a global scale. Other bullet points seem to just be random words like "sandbagging". While some bullet points have more simplefied phrases like "bolder human capital" (what on earth is that?) There are no red or green text in the bottom section, and it is very unclear why the adoption capacity row also has bullets that span both categories (I guess these don’t fit the framework? But there are no examples for this for exposure or sensitivity?) Even the citations listed are limited, with almost all of the bullet points coming from 2 or 3 sources primarily from 2000 and 2010. Most importantly, this table takes up a huge amount of room in the chapter without contributing anything the comprehension of the message and potentially introducing many errors and contentions about whether an adaptation action has higher benefits than costs in applications and all times. Suggest replacing with any number of figures that would enhance the readers understanding of the types of adaptation options out there (e.g. maps with examples of actions taken around the US, graphs of cities or states with adaptation plans, the table from the EPA CIRA report that quantifies adaptation costs for infrastructure in the US, etc.)

We deleted this entire paragraph and moved the first sentence somewhere more appropriate. The authors have already included multiple examples of this. This will allow for dropping the subheading on line 6 as well as the subheadings on page 1320 line 6 and line 16. The subheading on page 1320 line 16 is what the entire section is meant to be about.

This text describes norms and expectations that currently exist in other sectors and suggests that climate adaptation would be advanced if these norms and expectations come include adaptation as well. This text is not focused on any particular sector.

We deleted this entire paragraph. Especially the jargon phrase “multiobjective or multicriteria analysis”. This paragraph does not add to the narrative and lack enough citations.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>Start Line</th>
<th>End Page</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142945</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1209</td>
<td>10 1</td>
<td>1204</td>
<td>24</td>
<td>There are zero citations on this page. Please provide citations of the literature the authors assessed to come to these conclusions. We have re-written this text, which now includes many citations.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142946</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1208</td>
<td>9 1</td>
<td>1205</td>
<td>19</td>
<td>This outlaiding (in bold) is way too long. We thank the reviewer for the comment. We have shortened the key message</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142947</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1204</td>
<td>6 6</td>
<td>1205</td>
<td>13</td>
<td>The word mainstreaming is defined here in the text, so it should not be used in the key message since readers won’t know what it is. I would suggest not even using this jargon if/why... We thank the reviewer for the comment. We have taken the word mainstreaming out of the KMs, but included it in the KM summary. We have adapted a consistent definition of this term across the chapter.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142948</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1209</td>
<td>13 13</td>
<td>1207</td>
<td>6</td>
<td>Here we have another list (framework??) and even a list within a list [lines 13-18]. The text has been revised</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142949</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1207</td>
<td>19 19</td>
<td>1206</td>
<td>5</td>
<td>Both these paragraphs can be completely deleted. They repeat information already in the chapter. The first paragraph starts out with “Second,” but it is redundant, not second. The second paragraph has yet another list. Overall, these two paragraphs did not contribute to the understanding of this message. We think the reviewer for the comment. We have deleted this text due to space constraints</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142950</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1206</td>
<td>19 19</td>
<td>1206</td>
<td>5</td>
<td>These were very good examples. Wonder if they would better serve as individual text boxes spread throughout the chapter? Also, as much as possible, please note whether these adaptation actions worked. Were they effective? We thank the reviewer. We have added more examples, including several text boxes. Evaluating the extent to which adaptation actions worked is non-trivial, and we were unable to do so in this chapter.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142951</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1207</td>
<td>11 11</td>
<td>1207</td>
<td>9</td>
<td>And another list. Agreed. We thank the reviewer for the comment</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142952</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1207</td>
<td>13 24</td>
<td>1207</td>
<td>14</td>
<td>And another list. Agreed. We thank the reviewer for the comment</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142953</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1207</td>
<td>14 14</td>
<td>1207</td>
<td>19</td>
<td>Strongly suggest deleting this bullet point. This seems very much like policy advocacy. Why must it be approved by elected officials? Yikes. If the authors must keep it, at least change “professional staff” to “dedicated staff” so it doesn’t sound so elitist. This bullet point really drives home that the adaptation actions listed in this chapter are not relevant to individuals or families, but only by made by larger organizations or governments. We thank the reviewer for the comment. We have added the phrase “by public sector organizations” to make it clear that these statements are focused on these types of entities: re: elected officials, see Madison et. al. 1787, Article I</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142954</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1207</td>
<td>11 16</td>
<td>1207</td>
<td>36</td>
<td>This must be at least the 8th time I’ve read this exact sentence in this chapter. The second sentence is also repetitive. Delete both. We re-wrote this paragraph</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142955</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1206</td>
<td>6 7</td>
<td>1207</td>
<td>7</td>
<td>This entire paragraph is redundant to other text in the chapter. Drop it. We do re-write it</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142956</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1208</td>
<td>8 21</td>
<td>1208</td>
<td>8</td>
<td>Curious that the examples here are from other countries. It seems like the Southeast would have ample drought and flood examples that could be used in place of Australia. And the Mississippi river area would have plenty of actions to highlight instead of the Rhine. Almost all the examples in this chapter are California, New York, or Florida. Suggest the authors do more research to find literature in other parts of the country. We dropped the Dutch example. The Australian example appears to be one of the most dramatic in terms of consolidating jurisdictions to address climate-related impacts. We have added examples to the chapter from all over the country.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142957</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1208</td>
<td>13 16</td>
<td>1208</td>
<td>14</td>
<td>The section is long and somewhat repetitive to other parts of the chapter. Please look for ways to cut down on length. We have re-written this section</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142958</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1209</td>
<td>13 16</td>
<td>1209</td>
<td>15</td>
<td>Please provide the years when Sandy and Katrina happened. This may be fresh in the mind of east-coasters, but not people in the west. The text has been modified as suggested.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142959</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1209</td>
<td>13 26</td>
<td>1209</td>
<td>23</td>
<td>Delete - repetitive: We have shortened this discussion.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142960</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1209</td>
<td>13 32</td>
<td>1209</td>
<td>30</td>
<td>Delete - irrelevant. Thank you for this comment - we agree the sentence was not necessary to the paragraph and have deleted it.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142961</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1209</td>
<td>13 36</td>
<td>1210</td>
<td>12</td>
<td>Delete - not needed. Thank you for this comment, we disagree and believe these examples are useful to illustrate the point.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142962</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1211</td>
<td>13 6</td>
<td>1211</td>
<td>6</td>
<td>The sentence talks about “long-standing research.” Where is this research? Please provide citations at the end of the sentence on line 8. We have deleted this text due to space constraints.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142963</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1211</td>
<td>13 13</td>
<td>1211</td>
<td>13</td>
<td>I’m not sure “federal, state, tribal, local, private, and academia” are “interested.” We have deleted this text due to space constraints.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142964</td>
<td>Text Region</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1211</td>
<td>13 13</td>
<td>1211</td>
<td>13</td>
<td>Government - fan? include % We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142965</td>
<td>Crosswise Account</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1332</td>
<td>13 17</td>
<td>1332</td>
<td>13</td>
<td>Citation needed. The text mentions “survey,” but citations for those surveys are absent. Delete lines 14-27, which is already in the Uncertainty section. That last sentence in particular is a rather wild assertion with no supporting evidence. We have re-written this section</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142966</td>
<td>Crosswise Account</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1334</td>
<td>20 23</td>
<td>1334</td>
<td>20</td>
<td>Confidence and likelihood rankings are not provided here - please add. Thank you for your comment, we did include confidence rankings for key messages 2 in the “description of confidence and likelihood” section.</td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Commins</td>
<td>142967</td>
<td>Crosswise Account</td>
<td>2B. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1334</td>
<td>23 31</td>
<td>1334</td>
<td>23</td>
<td>Deleter lines 20-27 and 30-31. They don’t belong in this section. The middle sentence says there is “strong” evidence, but only one citation is provided. Please provide citations for this strong evidence. Thank you for this comment. We feel the explanatory sentences on the stationarity assumption are necessary to round out this section.</td>
<td></td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>---------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>14056</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1334 1335</td>
<td>15 16</td>
<td>1 2</td>
<td>Delete this text is not appropriate for the Uncertainties section. This can be moved to the Description of evidence section.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140569</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1335 1335</td>
<td>15 15</td>
<td>15</td>
<td>agreement about what?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140570</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1335 1335</td>
<td>17 17</td>
<td>17</td>
<td>This sentence says there is a &quot;large body of literature and observations&quot;. Where? Please provide citations for this large body of literature. This section needs to be expanded to include DESCRIPTIONS of the evidence. Not just that the literature exists, but whether it is consensus or contentious, old or new, emerging or established, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140571</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1335 1335</td>
<td>22 26</td>
<td>26</td>
<td>None of this is relevant to the Uncertainties section. Move or delete.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140572</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1335 1335</td>
<td>30 36</td>
<td>36</td>
<td>The phrase &quot;appropriate conceptual approach&quot; is an outright endorsement and advocacy by the federal government for this approach, which is not appropriate for a scientific assessment.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140573</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1335 1335</td>
<td>34 34</td>
<td>34</td>
<td>The first and second sentence in this paragraph completely contradict one another. There is high confidence that this approach is appropriate (sentence 1) and also medium confidence that this approach is appropriate (sentence 2). None of this is describing the reasons behind the confidence rankings given. Please revisit this TA and the rest of the TAs and revise according to NCA guidelines.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140574</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1336 1336</td>
<td>8 14</td>
<td>14</td>
<td>There are 4 cases of the word &quot;judgments&quot; in this section, though it is unclear why, or what judgments are being referred to. Judgments also seems like the wrong word choice- are you trying to say (for the first time here in the TA) that decisions should be made using cost-benefit assessments?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140575</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1336 1336</td>
<td>14 17</td>
<td>17</td>
<td>This text is not appropriate for the Uncertainties section.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140576</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1337 1337</td>
<td>2 1</td>
<td>1</td>
<td>Citations needed for these &quot;studies&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140577</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1337 1337</td>
<td>5 5</td>
<td>5</td>
<td>Citations needed for this &quot;literature&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140578</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1337 1337</td>
<td>9 9</td>
<td>9</td>
<td>Citations needed for this &quot;literature&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140579</td>
<td>Traceable Account</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1337 1337</td>
<td>14 14</td>
<td>14</td>
<td>This paragraph should be moved to the Description of Evidence section.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140581</td>
<td>Whole Chapter</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1337 1337</td>
<td>22 22</td>
<td>22</td>
<td>Please be judicious with the pictures and use only ones that help explain or show adaptation actions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allison</td>
<td>Crimmins</td>
<td>140582</td>
<td>Whole Chapter</td>
<td>28. Near-Term Adaptation Needs and Increased Resiliency</td>
<td>1337 1337</td>
<td>22 22</td>
<td>22</td>
<td>Please be judicious with the pictures and use only ones that help explain or show adaptation actions.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Response: We have deleted this text.
Adaptation efforts will ultimately be essential if we are to protect valuable infrastructure, homes, businesses, natural spaces, and individual livelihoods from climate change impacts. In order to deploy these efforts, substantial commitments to both capital investments and institutional arrangements of adaptation strategies must occur. Such is already discussed in the Adaptation Response chapter. However, of great importance, but not discussed in the chapter is who should be held responsible for deploying adaptation strategies. Considering the amount of investment that will be required, there will ultimately be disagreement over who should supply capital. Should it be those who will be most impacted if they do not adapt, or should it be those whose behavior is responsible for worsening climate change and therefore created the need for adaptation? The issue with placing the burden on the people most impacted is that those individuals may not have the means to effectively adapt. As discussed throughout the draft NCA, the people who will be most impacted are likely to be the most disadvantaged, including the poor, the elderly, and communities of color.

It would be wrong to place the burden of adaptation on those most vulnerable to climate change. The burden should therefore be placed on those who are most responsible for bringing about climate change. A study that analyzed emissions primarily from companies that produce fossil fuels found that 63 percent of global industrial CO2 and methane emissions between 1751 and 2010 came from just 90 international entities. These entities included 56 crude oil and natural gas producers, 37 coal extractors, and 7 cement producers (Heede, R., Tracking Anthropogenic Carbon Dioxide and Methane Emissions to Fossil Fuel and Cement Producers, 1849-2010, 132 Climatic Change 229 (2015)). Based on historical data and climate modeling, emissions from these 90 fossil fuel entities have contributed an estimated 57 percent to the observed rise in atmospheric CO2, approximately 50 percent to the rise in global mean surface temperature, and approximately 25 percent to global mean sea level rise between 1751 and 2010 (Heede, R. et al., The rise in global atmospheric CO2, surface temperature, and sea level from emissions traced to major carbon producers, 144 Climatic Change 579 (2017)). A separate study attributed 71 percent of global industrial greenhouse gas emissions since 1988 to just 100 fossil fuel producers, with 51 percent of emissions since 1988 attributed to just 25 corporate and state producers, including ExxonMobil, Shell, BP, Chevron, and Peabody (EDF and Climate Accountability Institute, The Carbon Majors Database, CDI Carbon Majors Report 2017, 2017). Therefore, fossil fuel companies can be directly linked to climate change based on their extraction and distribution of fossil fuel resources.

We agree. This is one reason why we included the section on Broader Measures of Well-Being under EFM. We have also increased our discussion of equity issues throughout the chapter. We thank the reviewer for the suggestion.

Carole said

Thank you for the comment. We revised the section to include these points.

Andrew said

Thank you for this comment. We revised the text to include these points.

Andrew said

Thank you the reviewer for this comment and have incorporated change to the text.

Andrew said

We deleted this paragraph but discuss the Master Plan elsewhere.

Andrew said

We thank the reviewer for this comment and have incorporated change to the text.

Andrew said

Thank you for this suggestion. However, we are unable to cite all the valuable literature in our chapter.

Andrew said

Thank you for this comment. We revised Key Message 4 accordingly, and minimized use of these words throughout the document.

Michael said

We greatly appreciate the reviewer’s comment.

Michael said

We moved the Key Messages 4 accordingly, and minimized use of these words throughout the document.

Michael said

Thank you for the comment. We revised the text to include these points.

Michael said

We appreciate the reviewer’s comment and revised the text accordingly.

Michael said

Thank you for this comment. We revised the text to include these points.

Michael said

We revised the text to include these points.

Michael said

We thank the reviewer for this comment and have incorporated change to the text.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184665</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1309</td>
<td>1309</td>
<td>7</td>
<td></td>
<td>This is the case for proactive adaptation. For reactive adaptation, the impact occurs first and then the struggle to figure out what to do to keep from being whacked again and again. Basically proactive adaptation is picking up a safety net before one goes into waters with a storm coming in one's way, or choosing not to go in the water at all, and reactive adaptation is yelling for help when water is trapped in a ridge. I'd encourage describing the difference—and noting that many regions in US are trying to do the former, and the putting off until facing the issue through denial and turning away is doing the latter—and imposing this on the whole population to the extent it can (except for this assessment trying to bring sense to national policy makers). We thank the reviewer for the comments. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184666</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1309</td>
<td>1309</td>
<td>7</td>
<td></td>
<td>This assumption is no longer true as a point first made at the Vilas Review in 1982, it is now before. The discussion here makes the same point again. I'd urge referencing the Vilas NOAA UNFCCC report regarding this point, just to fix a road to the extensive efforts to get this point across. The chapter text (Section 28.2) has adequate references on this point, which also show that this is not a recent finding. We nevertheless thank the reviewer for the comment and interesting cite.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184667</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1311</td>
<td>1311</td>
<td>4</td>
<td></td>
<td>I think a clarification is needed here about how &quot;extreme&quot; conditions can become more common—-it seems to imply the ball curve is simply flattening instead of shifting (and maybe also flattening; and the needs to be made very clear to readers). NOAA's practice is to embrace each decade update its normal to the past three decades, and this has the effect of understating the intensity of the extreme for those aspects of society and the environment (e.g., city location with respect to sea level and mix of trees in the forest, respectively) that have time horizons longer than three decades. If one looks at the Hasenfratz et al. shifting ball curve, one gets a good sense of this—looking at the current decade compared to the mid-20th century normals the usual (actually 1951-80), we are now experiencing five to seven times the number of events. Use of summer average temperature anomalies for land areas in the US—those deviations imply in several million bushels—very rare and very impactful on ecosystems etc. that were established in the mid-20th century (so after World War II when much of developed nation infrastructure was built) and before (when most ecosystems became established). Indeed, Hansen et al. results indicate that warm extremes that were 1 in 1000 bicentennial in the mid-20th century are now occurring 1/10th of the time. I make this point here because I think it is important to, especially here and in this context, to give some explanation of what &quot;extreme&quot; means and how it is that communities can be having, for example, 200-year storms in successively warmer (basically, the statistical analysis for flooding was based on mid-20th century, and the bell curve has shifted such that it is now at the 100-year mark and with successive rain multiple occasions of what was once rare—especially shown that until at least a few years ago it was required practice of civil engineers to only use past data in their analysis and building/bridge designs—not to look ahead. I guess my main point here is that the discussion, at least so far in the chapter, is quite idealistic and what I think is needed is some real discussion of reality and the situation we are now in. We deleted this sentence since the point it makes is better covered elsewhere in NCA NCA report.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184668</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1311</td>
<td>1311</td>
<td>0</td>
<td></td>
<td>Some way, saying &quot;from climate change&quot; does not seem right, what is happening is an increase in the amount of annual losses due to climate change—it was not as if there were not losses before. And it likely needs to be said in a bit of hope, even if even optimistes that adaptation has the potential to moderate this, so this sentence I propose: Assuming no adaptation (i.e., HO). We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184669</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1311</td>
<td>1311</td>
<td>13</td>
<td></td>
<td>Need to rephrase to use location and not &quot;may&quot;—-and do throughout the chapter [i.e. I think an issue in every instance] We thank the reviewer for the comment. We have reduced the use of &quot;may&quot; throughout the chapter.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184670</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1311</td>
<td>1311</td>
<td>12</td>
<td></td>
<td>Need to rephrase to use location and not &quot;may&quot;—-and do throughout the chapter [i.e. I think an issue in every instance] We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184671</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1311</td>
<td>1311</td>
<td>25</td>
<td></td>
<td>Need to rephrase to use location and not &quot;may&quot;—-and do throughout the chapter [i.e. I think an issue in every instance] We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184672</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1312</td>
<td>1312</td>
<td>2</td>
<td></td>
<td>Need to rephrase to use location and not &quot;may&quot;—-and do throughout the chapter [i.e. I think an issue in every instance] We thank the reviewer for the comment. The chapter text has been revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184674</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1312</td>
<td>1312</td>
<td>2</td>
<td></td>
<td>Partly true—cutting emissions of short-lived species can start to have an effect well before 2050 if we would only do it (and use GWP-100 as a way to combine the effects of GHGs). Is there any way to insert a footnote about what &quot;largely unalterable&quot; means and indicate that short-lived gas emissions reductions can make a difference. And then, of course, there is climate intervention, which could make an early difference. I'd suggest adding a qualifying phrase at the end of the sentence ending on line 2. I agree, however, on the conclusion on line 3, and then on line 4, urge mention of both carbon dioxide reduction and climate intervention. We thank the reviewer for the comment; have modified sentence to reflect input.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184675</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1312</td>
<td>1312</td>
<td>7</td>
<td></td>
<td>Don't you need to indicate that there is also the potential for mitigation here, and indicate the difference? We thank the reviewer for this comment but the suggestion is outside the scope of this chapter.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184676</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1312</td>
<td>1312</td>
<td>14</td>
<td></td>
<td>Regarding the phrase &quot;successful adaptation measures&quot;—it's general, what has been accomplished to date doesn't really put the problem. I'd be cautious calling these &quot;successful&quot; unless one adds some sort of qualification. We rewrite this paragraph, which no longer includes the phrase mentioned here.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>184677</td>
<td>Text Region</td>
<td>28.1</td>
<td></td>
<td>1313</td>
<td>1313</td>
<td>13</td>
<td></td>
<td>This is because impacts are being felt—-for example, in Newport News, raising road height is a response to flooding etc. I think it needs to be made clearer that impacts requiring response are already occurring—reactive adaptation. The chapter has been revised to emphasize that implementation is occurring in response to observed increases.</td>
</tr>
</tbody>
</table>
| Michael   | MacCracken| 184678     | Text Region  | 28.1    |                     | 1314       | 1314    | 19          |         | Regarding "may use", in addition to getting rid of "may," the real problem has been that using past dates is required good practice in the particular professional field. Hopefully, this is changing. Agreed that this is a problem. We too hope it is changing...as discussed on p. 117/17 & 121/22
Robert MacCracken 144081 Text Region 28. Near-Term Adaptation Needs and increased Resilience 1315 1315 1 2 Well, no non-essential comment

Robert MacCracken 144080 Text Region 28. Near-Term Adaptation Needs and increased Resilience 1315 1315 1 2

Robert MacCracken 144081 Text Region 28. Near-Term Adaptation Needs and increased Resilience 1317 1317 13 12 Should not “climate impacts” here be “changes in climate” – is it the system that suffers the impacts that we want to reduce? Thank you. We do not entirely understand this comment but think our use of “climate impacts” is the correct representation of changes in climate affecting human and natural systems we seek to adapt to.

Robert MacCracken 144081 Text Region 28. Near-Term Adaptation Needs and increased Resilience 1319 1319 13 16 Would it not be better for the insurer to set rates looking ahead to future risks – which might help keep future risks down? We thank the reviewer for the comment. We discuss time horizons in several places in this chapter, in particular in the section on “Adapting to Current Variability and Preparing for Future Change”

Rachel Oleson Text Region 28. Near-Term Adaptation Needs and increased Resilience 1320 1320 28 28 Indeed. Somewhere I think it would be helpful to be making more of a point about the time horizon—find it will build a gazebo on the beach as its time horizon is short; building a sewage treatment plant to be there many decades at two levels of planning, especially as that can set the parameters for depths of boring pipes, etc. for whole neighborhoods/sites so the sewage will keep flowing.

Kate Larson 144033 Table 28. Mitigation: Avoiding and Reducing Long-Term Risks 1323 1323 13 12 Just 10 to 20 years—#pretty short-lived; though easier to fix water supply than sewage.

Kate Larson 144033 Table 28. Mitigation: Avoiding and Reducing Long-Term Risks 1323 1323 13 12

Richard Kopp 144107 Table 28. Mitigation: Avoiding and Reducing Long-Term Risks 1347 1347 13 32 Throughout the report, the document refers to results from the American Climate Prospects-or the Risky Business Report, cited alternatively as Gordon, 2014; Risky Business, 2014; Houser et al., 2014; and Houser et al., 2015. The American Climate Prospects is the peer-reviewed technical analysis, whereas the Risky Business Report is a summary for policymakers; I would therefore suggest stiping the ACP instead of the Risky Business Report. The final version of the ACP was published in 2015 by Columbia University Press, the 2014 version is a Hudson Group report. Citations should be to Houser et al., 2015; H. Houser, S. Hsiang, R. Kopp, K. Larson and others, (2015). Economic Risks of Climate Change: An American Prospects. New York: Columbia University Press, 386 pp. The change to the reference has been made.

Richard Kopp 144107 Table 28. Mitigation: Avoiding and Reducing Long-Term Risks 1347 1347 13 32

Robert Kopp 144130 Table 28. Mitigation: Avoiding and Reducing Long-Term Risks 1350 1350 4 7 Suggest citing the analysis of Kopp et al 2017 (pdx: 10.1002/2017EF005686) regarding the sea-level impacts of Deco and Pollitt 2016. More generally, chapter 15 of the CS2 is an extensive discussion of critical thresholds. The CS2 chapter 15 reference has been added earlier in this paragraph where the potential for climate surprises is mentioned, and the Kopp et al 2017 sea-level impact reference has been added to the sea-level sentence through the closing paragraph.

Robert Kopp 144130 Table 28. Mitigation: Avoiding and Reducing Long-Term Risks 1350 1350 4 7

Robert Kopp 144130 Table 28. Mitigation: Avoiding and Reducing Long-Term Risks 1355 1355 16 28 We also kopp et al at 2017 (pdx: 10.1002/2017EF005661) regarding the sea-level impacts of Uncinto and Pollitt 2016. We have added the suggested citation to the chapter assessment.

Robert Kopp 144130 Table 28. Mitigation: Avoiding and Reducing Long-Term Risks 1355 1355 16 28

Robert Kopp 144130 Table 28. Mitigation: Avoiding and Reducing Long-Term Risks 1357 1357 4 4 Property, the “National Academies of Sciences, Engineering and Medicine” We have made this change to the citation.

Robert Kopp 144130 Table 28. Mitigation: Avoiding and Reducing Long-Term Risks 1357 1357 4 4
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert</td>
<td>Kapp</td>
<td>241202</td>
<td>Text Region</td>
<td>20</td>
<td>Mitigation:Avoiding and Reducing Long-Term Risks</td>
<td>1391</td>
<td>1391</td>
<td>2</td>
<td>6</td>
<td>29. Mitigation:</td>
<td>We have reviewed Chapter 15 of the CSIR and have included it as a citation.</td>
</tr>
<tr>
<td>Rashidi</td>
<td>Shadi</td>
<td>241240</td>
<td>Text Region</td>
<td>20</td>
<td>Mitigation:Avoiding and Reducing Long-Term Risks</td>
<td>1359</td>
<td>1359</td>
<td>20</td>
<td>29</td>
<td>You might add following sentence to the last part of chapter 29.5.1:</td>
<td>Since the suggested paper is about the situation in Indonesia, Kenya, and Sri Lanka, we feel that it is not directly applicable to the USA. However, since there is a large literature about economic co-benefits of GHG mitigation actions, we added a note making this point.</td>
</tr>
<tr>
<td>Rashidi</td>
<td>Shadi</td>
<td>241291</td>
<td>Text Region</td>
<td>20</td>
<td>Mitigation:Avoiding and Reducing Long-Term Risks</td>
<td>1359</td>
<td>1359</td>
<td>23</td>
<td>24</td>
<td>You might further edit first paragraph of 29.5.1:</td>
<td>Thank you very much for this comment. However, since the paper is about the situation in Indonesia, Kenya, and Sri Lanka, we feel that it is not directly applicable to this assessment of US risks.</td>
</tr>
<tr>
<td>Richard</td>
<td>Wojick</td>
<td>241262</td>
<td>Whole Chapter</td>
<td>20</td>
<td>Mitigation:Avoiding and Reducing Long-Term Risks</td>
<td>1359</td>
<td>1359</td>
<td>9</td>
<td>9</td>
<td>It is my perspective, much stronger emphasis is required on the concept of co-benefits of climate mitigation policies. Co-benefits are key drivers of climate policy adopters and urban governments find attractive (K. Rashidi &amp; Patt, 2017). This makes their work much easier when dealing with public for GHG reduction projects. In the absence of national/federal supports or commitments, these are the cities who should take the lead. This actually what is happening in the US right now.</td>
<td>We agree with the commenter regarding the importance of co-benefits to climate change mitigation. This discussion is presented in 29.5.1, where we take a broader focus on &quot;Co-effects of Mitigation Actions&quot;, and include effects beyond health (e.g., energy security). We believe the current coverage of co-effects is appropriate in the context of the different issues presented in the chapter and overall space constraints. However, in response to this comment we have included additional references to the co-benefits literature. We may note that health co-benefits are discussed in greater detail in the Air-Quality and Health chapters, as well as a number of the regional chapters.</td>
</tr>
<tr>
<td>David</td>
<td>Kropid</td>
<td>241701</td>
<td>Text Region</td>
<td>20</td>
<td>Mitigation:Avoiding and Reducing Long-Term Risks</td>
<td>1351</td>
<td>1351</td>
<td>3</td>
<td>9</td>
<td>How is the present text:</td>
<td>After careful consideration of this point, we have determined that the content of this key message is fully supported by the peer-reviewed literature described and cited in the main text and reasonable account. We note that the commenter did not provide any literature, documentation, or additional data to support the assertions made, and therefore the author team is unable to substantiate the points. No changes have been made to the key message in response to this comment.</td>
</tr>
<tr>
<td>David</td>
<td>Kropid</td>
<td>241702</td>
<td>Text Region</td>
<td>20</td>
<td>Mitigation:Avoiding and Reducing Long-Term Risks</td>
<td>1355</td>
<td>1355</td>
<td>2</td>
<td>4</td>
<td>Agreement with this text:</td>
<td>After careful consideration of this point, we have determined that the content of this key message is fully supported by the peer-reviewed literature described and cited in the main text and reasonable account. We note that the commenter did not provide any literature, documentation, or additional data to support the assertions made, and therefore the author team is unable to substantiate the points. No changes have been made to the key message in response to this comment.</td>
</tr>
<tr>
<td>Sarah</td>
<td>Pittard</td>
<td>241703</td>
<td>Text Region</td>
<td>20</td>
<td>Mitigation:Avoiding and Reducing Long-Term Risks</td>
<td>1357</td>
<td>1357</td>
<td>10</td>
<td>25</td>
<td>Percent text:</td>
<td>After careful consideration of this point, we have determined that the content of this key message is fully supported by the peer-reviewed literature described and cited in the main text and reasonable account. We note that the commenter did not provide any literature, documentation, or additional data to support the assertions made, and therefore the author team is unable to substantiate the points. No changes have been made to the key message in response to this comment.</td>
</tr>
<tr>
<td>Rebecca</td>
<td>Ambrose</td>
<td>241018</td>
<td>Figure</td>
<td>20</td>
<td>Mitigation:Avoiding and Reducing Long-Term Risks</td>
<td>1296</td>
<td>1296</td>
<td>28</td>
<td>2</td>
<td>This is an excellent figure.</td>
<td>The authors are grateful for this positive comment. No changes made to the chapter.</td>
</tr>
<tr>
<td>Susanne</td>
<td>Moser</td>
<td>241019</td>
<td>Whole Chapter</td>
<td>20</td>
<td>Mitigation:Avoiding and Reducing Long-Term Risks</td>
<td>1348</td>
<td>1348</td>
<td>2</td>
<td>2</td>
<td>This was a very well written chapter. It was very concise in addressing its key points while providing evidence,</td>
<td>The authors are grateful for this positive comment. No changes made to the chapter.</td>
</tr>
<tr>
<td>Andrew</td>
<td>Fennig</td>
<td>241020</td>
<td>Text Region</td>
<td>20</td>
<td>Mitigation:Avoiding and Reducing Long-Term Risks</td>
<td>1355</td>
<td>1355</td>
<td>24</td>
<td>29</td>
<td>Are there any US efforts to reduce population or help it stabilize in developing countries which are experiencing massive growth like China and India?</td>
<td>While some federal agencies support family planning programs, we are not aware of any such programs being part of a climate program or having an explicit climate linkage. As a result, we have not revisited the text to address this comment.</td>
</tr>
</tbody>
</table>
Thank you for this comment. We have included the example of carbon pricing through taxes and cap and trade in the expanded call-out box on mitigation. However, we note that a longer discussion of the efficacy and implementation of these measures and inclusion of the citations provided is beyond the scope of this chapter, which focuses on the consequences of mitigation. Furthermore, the chapter title has been changed from "Mitigating Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" for two reasons: 1) to better inform readers' expectations about the chapter focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking, and 2) to clarify "emissions mitigation" as distinct from other uses of the word mitigation in the risk management community.

In response to this comment and other comments raised during public review, the following sentence has been added to Key Message 2: "In general, the difference in climate impact outcomes between emission scenarios is more modest through the first half of the century, and the effect of near-term mitigation in avoiding damages increases substantially in magnitude after 2050." The other topics raised by the reviewer regarding the timing of emission reductions are too specific for use in the key message.

The following sentence has been added to the Executive Summary in response to this comment. "Research supports that early and substantial mitigation offers a greater chance of avoiding these adverse impacts."

The authors have clarified the role of this section in addition to the changes we have made. We have included the example of carbon pricing through taxes and cap and trade in the expanded call-out box on mitigation. However, we note that a longer discussion of the efficacy and implementation of these measures and inclusion of the citations provided is beyond the scope of this chapter, which focuses on the consequences of mitigation. Furthermore, the chapter title has been changed from "Mitigating Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" for two reasons: 1) to better inform readers' expectations about the chapter focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking, and 2) to clarify "emissions mitigation" as distinct from other uses of the word mitigation in the risk management community.

The authors have clarified the role of this section in addition to the changes we have made. We have included the example of carbon pricing through taxes and cap and trade in the expanded call-out box on mitigation. However, we note that a longer discussion of the efficacy and implementation of these measures and inclusion of the citations provided is beyond the scope of this chapter, which focuses on the consequences of mitigation. Furthermore, the chapter title has been changed from "Mitigating Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" for two reasons: 1) to better inform readers' expectations about the chapter focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking, and 2) to clarify "emissions mitigation" as distinct from other uses of the word mitigation in the risk management community.

In response to this comment and other comments raised during public review, the following sentence has been added to Key Message 2: "In general, the difference in climate impact outcomes between emission scenarios is more modest through the first half of the century, and the effect of near-term mitigation in avoiding damages increases substantially in magnitude after 2050." The other topics raised by the reviewer regarding the timing of emission reductions are too specific for use in the key message.

The following sentence has been added to the Executive Summary in response to this comment. "Research supports that early and substantial mitigation offers a greater chance of avoiding these adverse impacts."

The authors have clarified the role of this section in addition to the changes we have made. We have included the example of carbon pricing through taxes and cap and trade in the expanded call-out box on mitigation. However, we note that a longer discussion of the efficacy and implementation of these measures and inclusion of the citations provided is beyond the scope of this chapter, which focuses on the consequences of mitigation. Furthermore, the chapter title has been changed from "Mitigating Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" for two reasons: 1) to better inform readers' expectations about the chapter focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking, and 2) to clarify "emissions mitigation" as distinct from other uses of the word mitigation in the risk management community.

The authors have clarified the role of this section in addition to the changes we have made. We have included the example of carbon pricing through taxes and cap and trade in the expanded call-out box on mitigation. However, we note that a longer discussion of the efficacy and implementation of these measures and inclusion of the citations provided is beyond the scope of this chapter, which focuses on the consequences of mitigation. Furthermore, the chapter title has been changed from "Mitigating Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" for two reasons: 1) to better inform readers' expectations about the chapter focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking, and 2) to clarify "emissions mitigation" as distinct from other uses of the word mitigation in the risk management community.

The authors have clarified the role of this section in addition to the changes we have made. We have included the example of carbon pricing through taxes and cap and trade in the expanded call-out box on mitigation. However, we note that a longer discussion of the efficacy and implementation of these measures and inclusion of the citations provided is beyond the scope of this chapter, which focuses on the consequences of mitigation. Furthermore, the chapter title has been changed from "Mitigating Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" for two reasons: 1) to better inform readers' expectations about the chapter focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking, and 2) to clarify "emissions mitigation" as distinct from other uses of the word mitigation in the risk management community.

The authors have clarified the role of this section in addition to the changes we have made. We have included the example of carbon pricing through taxes and cap and trade in the expanded call-out box on mitigation. However, we note that a longer discussion of the efficacy and implementation of these measures and inclusion of the citations provided is beyond the scope of this chapter, which focuses on the consequences of mitigation. Furthermore, the chapter title has been changed from "Mitigating Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" for two reasons: 1) to better inform readers' expectations about the chapter focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking, and 2) to clarify "emissions mitigation" as distinct from other uses of the word mitigation in the risk management community.

The authors have clarified the role of this section in addition to the changes we have made. We have included the example of carbon pricing through taxes and cap and trade in the expanded call-out box on mitigation. However, we note that a longer discussion of the efficacy and implementation of these measures and inclusion of the citations provided is beyond the scope of this chapter, which focuses on the consequences of mitigation. Furthermore, the chapter title has been changed from "Mitigating Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" for two reasons: 1) to better inform readers' expectations about the chapter focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking, and 2) to clarify "emissions mitigation" as distinct from other uses of the word mitigation in the risk management community.
The text is not legible due to the quality of the image. It appears to be a page from a document discussing various topics such as climate change, mitigation, and adaptation. The page includes sections on avoiding and reducing long-term risks, discussing specific impacts and the need for coordination and collaboration. The text mentions the importance of understanding the implications of climate change and the need for robust adaptation strategies. It also references various sources and data, including statistical figures and studies. The page contains numbered sections, tables, and references to earlier parts of the document. The text is fragmented and lacks clear structure, making it difficult to extract meaningful content. The page seems to be part of a larger discussion on environmental policy and the implications of climate change for various sectors.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaye Wolf</td>
<td>Wolf</td>
<td>14-4629</td>
<td>White Paper Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
</tr>
<tr>
<td>Shaye Wolf</td>
<td>Wolf</td>
<td>14-4631</td>
<td>White Paper Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
</tr>
<tr>
<td>Shaye Wolf</td>
<td>Wolf</td>
<td>14-4632</td>
<td>White Paper Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42424</td>
<td>White Paper Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42427</td>
<td>White Paper Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42430</td>
<td>White Paper Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42433</td>
<td>White Paper Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42434</td>
<td>White Paper Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42436</td>
<td>White Paper Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42437</td>
<td>White Paper Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42439</td>
<td>White Paper Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
</tr>
</tbody>
</table>

**Table:**

<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaye Wolf</td>
<td>Wolf</td>
<td>14-4629</td>
<td>White Paper</td>
<td>Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaye Wolf</td>
<td>Wolf</td>
<td>14-4631</td>
<td>White Paper</td>
<td>Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaye Wolf</td>
<td>Wolf</td>
<td>14-4632</td>
<td>White Paper</td>
<td>Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42424</td>
<td>White Paper</td>
<td>Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42427</td>
<td>White Paper</td>
<td>Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42430</td>
<td>White Paper</td>
<td>Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42433</td>
<td>White Paper</td>
<td>Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42434</td>
<td>White Paper</td>
<td>Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42436</td>
<td>White Paper</td>
<td>Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42437</td>
<td>White Paper</td>
<td>Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Science Coordinating Committee</td>
<td></td>
<td>42439</td>
<td>White Paper</td>
<td>Chapter 25: Mitigation: Avoiding and Reducing Long-Term Risks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Shaye Wolf

**ID:** 14-0024  
**Role:** End-Region  
**Chapter:** Mitigation: Avoiding and Reducing Long-Term Risks  
**Comment/Table Number:** 1349  
**Page:** 12  
**Line:** 3-4

The chapter states that "This chapter does not evaluate technology options, costs, or the adequacy of existing or planned mitigation efforts relative to meeting specific policy targets as those topics have been the subject of domestic and international assessments such as the Intergovernmental Panel on Climate Change (IPCC) and the National Climate Assessment (NCA)." Furthermore, none of these cited references provides an updated overview of the adequacy of existing or planned mitigation efforts relative to meeting specific climate targets. This should be a key job of the Mitigation chapter.

**Response:** Thank you for this comment. We note that the chapter title has been changed from "Mitigation: Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" in order to better inform readers about the focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking. Furthermore, the chapter now cites projections of US GHG emissions and places them in the context of the US role in the 2015 Paris Agreement meeting. It is beyond the scope of the chapter to evaluate the climate policies of the US and other countries.

### Shaye Wolf

**ID:** 14-0184  
**Role:** End-Region  
**Chapter:** Mitigation: Avoiding and Reducing Long-Term Risks  
**Comment/Table Number:** 1349, 1359  
**Initial Line:** 14-15

This section briefly mentions “negative emissions” in the first paragraph as playing a potential role in future mitigation strategies. In doing so, the section should also acknowledge (even if briefly) the critiques and limitations of “negative emissions”. These steps represent a severe backtrack and an abrogation of the United States’ responsibility to the world’s second largest emitter at a time when more, not less, commitment is needed from all governments to avert the worst impacts of climate change

**Response:** We note that the chapter title has been changed from "Mitigation: Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" in order to better inform readers about the focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking. Furthermore, the chapter now cites projections of US GHG emissions and places them in the context of the US role in the 2015 Paris Agreement meeting. It is beyond the scope of the chapter to evaluate the climate policies of the US and other countries.

### Shaye Wolf

**ID:** 14-0188  
**Role:** End-Region  
**Chapter:** Mitigation: Avoiding and Reducing Long-Term Risks  
**Comment/Table Number:** 1349  
**Initial Line:** 16-17

A key purpose of the Mitigation chapter should be to clearly spell out the mitigation pathways needed to achieve specific climate change targets, most notably staying "well below 2°C" temperature rise to avoid the worst changes of climate change, as required by the Paris Agreement, to which the US is a legally bound country. Two common and useful ways to do this are (1) describe the emissions pathways for staying well below 2°C and (2) describe the carbon budget needed for a reasonable probability of meeting this temperature target, including both the global carbon budget and U.S. carbon budget. This section must do a better job of including clear information on pathways and carbon budgets, to illustrate the urgency of action and the strength of the action that is needed.

**Response:** We note that the chapter title has been changed from "Mitigation: Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" in order to better inform readers about the focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking. Furthermore, the chapter now cites projections of US GHG emissions and places them in the context of the US role in the 2015 Paris Agreement meeting. It is beyond the scope of the chapter to evaluate the climate policies of the US and other countries.

### Shaye Wolf

**ID:** 14-0940  
**Role:** End-Region  
**Chapter:** Mitigation: Avoiding and Reducing Long-Term Risks  
**Comment/Table Number:** 1249,

The section briefly mentions “negative emissions” in the first paragraph as playing a potential role in future mitigation strategies. In doing so, the section should also acknowledge (even if briefly) the critiques and limitations of “negative emissions”. Important resources include the following studies: 

**Response:** We note that the chapter title has been changed from "Mitigation: Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" in order to better inform readers about the focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking. Furthermore, the chapter now cites projections of US GHG emissions and places them in the context of the US role in the 2015 Paris Agreement meeting. It is beyond the scope of the chapter to evaluate the climate policies of the US and other countries.

### Shaye Wolf

**ID:** 14-0940  
**Role:** End-Region  
**Chapter:** Mitigation: Avoiding and Reducing Long-Term Risks  
**Comment/Table Number:** 1349  
**Initial Line:** 14-16

This section should provide the critical context of the U.S.'s dominant contribution to global climate change, and is in parallel, its responsibility for taking strong climate action. The U.S. is currently the world's second-highest emitter on an annual and per capita basis. It is beyond the scope and mandate of the RCE to provide any particular policy action, or to suggest the magnitude of the role the US should play in global scale mitigation.

**Response:** We note that the chapter title has been changed from "Mitigation: Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" in order to better inform readers about the focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking. Furthermore, the chapter now cites projections of US GHG emissions and places them in the context of the US role in the 2015 Paris Agreement meeting. It is beyond the scope of the chapter to evaluate the climate policies of the US and other countries.

### Shaye Wolf

**ID:** 14-0940  
**Role:** End-Region  
**Chapter:** Mitigation: Avoiding and Reducing Long-Term Risks  
**Comment/Table Number:** 1349  
**Initial Line:** 14-16

This section should provide the critical context of the U.S.'s dominant contribution to global climate change, and is in parallel, its responsibility for taking strong climate action. The U.S. is currently the world's second-highest emitter on an annual and per capita basis. It is beyond the scope and mandate of the RCE to provide any particular policy action, or to suggest the magnitude of the role the US should play in global scale mitigation.

**Response:** We note that the chapter title has been changed from "Mitigation: Avoiding and Reducing Long-term Risks" to "Reducing Risks Through Emissions Mitigation" in order to better inform readers about the focus being on the consequences of mitigation (e.g., the potential for risk reduction) rather than the mitigation undertaking. Furthermore, the chapter now cites projections of US GHG emissions and places them in the context of the US role in the 2015 Paris Agreement meeting. It is beyond the scope of the chapter to evaluate the climate policies of the US and other countries.
The State of Mitigation section should acknowledge the need to phase out fossil fuel use as an essential part of mitigation action. The National Climate Assessment identifies the primary cause of climate change as GHG emissions coming from the burning of fossil fuels. Therefore, it is an unacceptable omission for the mitigation chapter to not recognize the necessity of keeping most of the world’s fossil fuels in the ground and unabused to avoid the worst dangers of climate change.

There is an important body of scientific literature on this issue that this section should review and discuss. For example, the IPCC Fifth Assessment estimates that global fossil fuel reserves exceed the remaining 275 GtC carbon budget (from 2011 onward) for staying below 2°C by 4 to 7 times, while fossil fuel reserves exceed the carbon budget for 2°C by 33 to 50 times. (See Bruckner, Thomas et al., 2014: Energy Systems. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press (2014), http://ipcc.ch/pdf/syr2014/syr2014.pdf; Table 7.2.)

Studies estimate that 60 to 80 percent of global fossil fuel reserves must not be extracted and burned to limit temperature rise to 2°C based on a 1,000 GtCO2 carbon budget. For a 50 percent chance of limiting temperature rise to 1.5°C, 85 percent of known fossil fuel reserves must stay in the ground. To limit temperature rise to 2°C based on a 1,000 GtCO2 carbon budget from 2011 onward, studies indicate variously that 80 percent (Carbon Tracker Initiative, Unburnable Carbon 2013), 70 percent (Rogelj, Michael et al. 2014), and 68 percent (Oil Change International, The Sky’s Limit 2015) of global fossil fuel reserves must stay in the ground. See Carbon Tracker Initiative, Unburnable Carbon: Are the world’s financial markets carrying a carbon bubble? (2013), http://www.carbontracker.org/wp-content/uploads/2014/09/Unburnable-Carbon-v2-1.pdf; Rogelj, Michael et al., Sharing a quota on cumulative carbon emissions, 6 Nature Climate Change 873 (2014); Oil Change International, The Sky’s Limit: Why the Paris Climate Goals Require a Managed Decline of Fossil Fuel Production (September 2016), http://www.oilchange.org/2016/08/23/the-skys-limit-report/.)

Effectively, fossil fuel emissions must be phased out globally within the next few decades to keep global temperatures rise well below 2°C. Rogelj et al. (2015) estimated that a reasonable likelihood of limiting warming to 1.5°C or 2°C requires global CO2 emissions to be phased out by mid-century and likely as early as 2040-2045. Rogelj, Joeri et al., Energy system transformations for limiting end-of-century warming to below 1.5°C, 5 Nature Climate Change 519 (2015). The State of Mitigation section should describe key actions that must be taken to reduce global emissions to meet a “well below 2°C” target and avoid the worst dangers of climate change. A larger body of scientific research has identified key climate change actions, including two recent studies:

Xu, Yangyang and Veerabhadran Ramanathan, Well Below 2°C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PNAS (2017), https://doi.org/10.1073/pnas.1618481114


For example, Kuramochi et al. (2017) identifies and quantifies the 10 most important benchmarks for climate action to be taken by 2020/2025 to keep the window open for a 1.5°C-consistent GHG emission pathway. The identified benchmarks include: A1. Sustain the current growth rate of renewables and other zero and low-carbon power generation until 2025 to reach 100% share by 2050.
A2. No new coal power plants, reduce emissions from existing coal fleet by 30% by 2015; A3. All new buildings fossil-free and net-zero energy by 2020; A4. Introduce building renovation rates from less than 1% in 2015 to 1% by 2020; A5. All new installations in emissions-intensive sectors low-carbon after 2020; A6. Maximize material efficiency; A7. Increase building renovation rates from less than 1% in 2015 to 5% by 2020.
A8. Develop and agree on a 1.5°C temperature target and avoid the worst dangers of climate change. A large body of scientific research has identified key climate change actions, including two recent studies:

Xu, Yangyang and Veerabhadran Ramanathan, Well Below 2°C: Mitigation strategies for avoiding dangerous to catastrophic climate changes, PNAS (2017),...
The section on the Paris Agreement must recognize the global significance of the agreement, which was adopted by most of the world’s countries, and should recognize the significance of its climate target. Under the Paris Agreement, most of the world’s countries committed to the climate change target of holding the long-term global average temperature “…to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels.” On December 12, 2015, 195 nation-states and supra-national organizations engaged in Paris at the 2015 United Nations Framework Convention on Climate Change Conference of the Parties committed their parties to take action so as to avoid dangerous climate change. The United States signed the Paris Agreement on April 22, 2016, as a legally binding instrument through executive agreement, and the treaty entered into force on November 4, 2016. The Paris Agreement confers the international consensus that climate change is an “urgent threat” of global concern, stating that “climate change represents an urgent and potentially irreversible threat to human societies and the planet and thus requires the widest possible cooperation by all countries, and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions.” See Recitals of the Paris Agreement. 

The Agreement requires net zero emissions globally by mid-century, “...so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty.” See Article 4 of the Paris Agreement. The Agreement requires a “well below 2°C” climate target because 2°C of warming is no longer considered a safe guard against avoiding catastrophic climate impacts and runaway climate change. See for example: Hansen, James et al., Assessing “dangerous climate change”. Required reduction of carbon emissions to protect young people, future, generations and nature. B. Iul. ONE-WS448 (2012). IPCC (Intergovernmental Panel on Climate Change), Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2014.

The section on Mitigation-Related Regulatory and Non-Regulatory Actions within the United States is incomplete. This statement should be changed in two ways to make it accurate: (1) President Trump or the Trump administration, since this was an Executive Action, and since many sub-national actors in the US are still committed to the Paris goals; (2) change “citing” to “claiming” since “citing” commonly means that authoritative sources of information are being used as evidence for making a statement, whereas in this case it was not the case. Alternately recommend removing the entire phrase “citing economic costs and competitiveness concerns” so as not to imply that this is evidence-based.

The section states that “In June 2017, the United States announced its intent to withdraw from the Paris Agreement, citing economic costs and competitiveness concerns.” This statement should be changed in two ways to make it accurate: (1) President Trump or the Trump administration, since this was an Executive Action, and since many sub-national actors in the US are still committed to the Paris goals; (2) change “citing” to “claiming” since “citing” commonly means that authoritative sources of information are being used as evidence for making a statement, whereas in this case it was not the case. Alternately recommend removing the entire phrase “citing economic costs and competitiveness concerns” so as not to imply that this is evidence-based.

The section states that “In June 2017, the United States announced its intent to withdraw from the Paris Agreement, citing economic costs and competitiveness concerns.” This statement should be changed in two ways to make it accurate: (1) President Trump or the Trump administration, since this was an Executive Action, and since many sub-national actors in the US are still committed to the Paris goals; (2) change “citing” to “claiming” since “citing” commonly means that authoritative sources of information are being used as evidence for making a statement, whereas in this case it was not the case. Alternately recommend removing the entire phrase “citing economic costs and competitiveness concerns” so as not to imply that this is evidence-based.
Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 It should be acknowledged elsewhere in this section that we are already seeing the impacts and costs of climate change and extreme weather. For example, data from NOAA show that 2017 tied for the second-highest costs of damages in US history, with a total of $37 billion in damages. The highest damage was the hurricanes Harvey, Irma, and Maria, which collectively caused an estimated $232 billion in damages.

200 Figure/Table 1360: This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

201 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

202 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

203 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

204 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

205 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

206 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

207 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

208 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

209 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

210 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

211 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

212 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

213 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

214 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

215 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

216 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.

217 Michael MacCracken

20 Mitigation: Avoiding and Reducing Long-Term Risks

12012013 ./20 Mitigation: Avoiding and Reducing Long-Term Risks

199 This is a quite limited view about CDR, there being a number of approaches that might be less expensive. The real challenge is really the scaling up of CDR, especially when emissions are not brought down. So, while mitigation can likely be a lot more cost-effective if the emissions are fixed here, then the front of the chapter needs to reflect the more integrated view of approaches I'm urging here.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14A093</td>
<td>Text Region</td>
<td>29</td>
<td></td>
<td>190</td>
<td>190</td>
<td>12</td>
<td>12</td>
<td>Given all the impacts described in this assessment, it needs to be made quite clear that the notion of 1.5 to 2 C as the long term stabilization level for the Earth's temperature (especially in light of the change over land and mid- and high-latitude areas are greater than the global average) would have very, very severe consequences of the environment and society (the equilibrium sea level sensitivity from paleoclimate information is 15 to 20 meters per degree), as Hansen and colleagues made clear in a paper a few years ago. The global average temperature needs to be brought back down to less than 0.5 C, and that would not likely be seen even level with a range that would not require very substantial impacts to most of the world's coastal sites. The Paris Accord can be considered a start, but much is politically one and cannot scientifically based.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14A094</td>
<td>Text Region</td>
<td>29</td>
<td></td>
<td>190</td>
<td>190</td>
<td>12</td>
<td>12</td>
<td>Another statement that really is strong: we get global warming up and up and up and up on the global basis. We have significant overstatements of the Paris objectives, much less of the 0.5 C value that was when major impacts started to occur. It would be just as unwise to say now that everyone might stop mitigation so why even try it any. Given that it is important to the world and is relatively easily done, it would seem for better or for worse, that the fog is just starting even though there is of course the chance that someone might put the fog back in the past. The world, however, to a bit of people's surprise, has kept from having an all-out nuclear war, and yet it shows some degree of wisdom. Given the advance consequences of climate change without RRM, the situation looks pretty bleak. Given that staying below 1.5 C likely requires ending global fossil fuel use in a decade or two, and this is without considering the warming effect of losing the sulfate cooling offset, this particular sentence I think should simply be deleted, or rephrased to say that RRM can provide an early time warming offset, and the phasing out of it could then be accomplished by combined mitigation and CDR--not the overall issue with an integrated response, not thinking of the approaches being singly applied--it is far too late for each thinking.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14A095</td>
<td>Text Region</td>
<td>29</td>
<td></td>
<td>339</td>
<td>339</td>
<td>31</td>
<td>31</td>
<td>This is really a very narrow way of thinking about these approaches. Various of the approaches could probably be applied regionally to moderate the projected increase in tropical ocean intensity, to moderate amplified Arctic warming, to make up for loss of the sulfate cooling offset, to moderate increases in water temperature over sensitive areas like the Great Barrier Reef. To moderate loss of sea from the ice sheets, etc., given how little funded study there has been, we just do not know, but there quite possibly are a number of specialized types of activities that might be pursued. And given that variations in orbital parameters involving changes in the amount of radiation at various latitudes by several percent are apparently what drives (with feedbacks) the growth and decay of ice sheets for glacial-interglacial cycling, that human stimulated changes of a few percent, so comparable to what might occasionally occur, would seem worth investigating. Were we chance Nature to cause the eruption of volcanic eruptions over a period of time. I don't know of any studies suggesting that such an event would not be welcomed to limit the cooling, so what is it that so summarily is divorcing the potential saving of humans to intentionally do this--is this the sake of demystifying situation that we are in which this chapter does not really seem to highlight very well? I just think the overall presentation on this issue (in this section) is totally inadequate in laying out the alternative that we have. Indeed, climate intervention is not perfect, but that is not the issue to be considered. What needs to be considered is it if makes more sense to be doing mitigation plus CDR and adaptation with or without a role played by global and regional RRM. One can hope that every other approach is adequate and so and so it is not needed, but this is not the way that things look now. If we want to keep the temperature increase below the former objectives and then come back quickly, as is essential, to below 0.5 C this and section simply does not hit the mark.</td>
</tr>
<tr>
<td>David</td>
<td>Napili</td>
<td>14A017</td>
<td>Text Region</td>
<td>5</td>
<td></td>
<td>1361</td>
<td>1361</td>
<td>13</td>
<td>13</td>
<td>Here are the two as written: Shows Key Message 1: Changes in land cover, which may be driven by societal choices concerning land use, continue to impact local to global-scale weather and climate by altering the flow of energy and water between ecosystems and the atmosphere, with important feedback effects to the climate system. Comment: The understanding in the text actually refers to a speculatively claimed as an established physical fact. The text is not what it is not fact known that changes in land cover change climate. This text probably violates the Information Quality Act requirement that federal agencies ensure and maintain the “quality, objectivity, utility, and integrity of information disseminated by the agency.” This text exhibits neither quality, objectivity, utility nor integrity. To begin with there is a material interest or integrity, as these errors have been pointed out repeatedly during the previous series of National Assessments (revisions should not be necessary), yet they persist. As a result there is no quality or utility.</td>
</tr>
<tr>
<td>David</td>
<td>Napili</td>
<td>14A018</td>
<td>Text Region</td>
<td>5</td>
<td></td>
<td>138</td>
<td>138</td>
<td>34</td>
<td>34</td>
<td>33 However, climate change is expected to directly and indirectly impact land use and cover by altering disturbance patterns, species distributions, and suitability of land use. Comment: The text fairly states a speculation as an established physical fact. The stated expectation is not an abstract probability being explored via computer modeling. This comment is inconsistent with the author team’s thorough assessment of the science and is inconsistent with the current state of the science on this topic. Thank you for your comment. This key message is strongly supported by recent scientific literature as evidenced by the extensive number of references that we’ve cited throughout this section of the chapter. Additional support is provided in the chapter’s Traceable Account. Lastly, we refer you to NAPA’s Chapter 2: Our Changing Climate for additional details on the supporting science.</td>
</tr>
<tr>
<td>Dave</td>
<td>North</td>
<td>14A021</td>
<td>Text Region</td>
<td>5</td>
<td></td>
<td>207</td>
<td>207</td>
<td>44</td>
<td>44</td>
<td>Most of the discussion on future vegetation depends on citations of the literature based on statistical modeling. This approach has been largely discredited over the past decade because it does not include any biophysical processes, which are the drivers of vegetation change. This is also inconsistent with other chapters in the report. It would be appropriate to substitute citations of process-based vegetation modeling that provide a more credible foundation for inferences about climate change effects. The references provided in this section include studies using dynamic vegetation models, as well as statistical approaches. We recognize the difficulty in making projections of vegetation/land cover change in this context, and have added a sentence at the end emphasizing the limitations of projections and some of the other driving forces driving these changes. We have also included a reference to the review by Pearson and Oryan (2003) which discusses the limitations of species niche modeling.</td>
</tr>
</tbody>
</table>
The definition of land use here used is to distil so mucho from academic, IPCC guidance for reporting to national greenhouse gas inventories, and official statistics of the US usage that it is difficult to follow. Allow Grant (Bonne, the Forest Service author, the opportunity to contribute properly to this and fix it.

The authors disagree. The first sentence of the chapter says: "Climate can affect and be affected by changes in land cover—the physical characteristics of land such as trees or pavement, and land use—human management and activities on land, such as mining or recreation." The IPCC describes land use as "the total of all activities, arrangements, and inputs that people undertake in a certain land-cover type" and land cover as "the observed physical and biological cover of the earth's land, as vegetation or non-vegetated." We believe these definitions are entirely consistent. No changes have been made to the definition of land cover and land use. However, we have added additional identification to the caption of Figure 5.1 to describe the classification of land use in the National Land Use Dataset, which provides a hierarchical classification scheme for understanding land use.

Tomi Heath 142622 Whole Chapter S. Land Cover and Land Use Change 192 102 11 11 Lid et al (2012) does not say that decisions about land use, cover, and management can help determine... The key message has been modified to focus on how climate change affects land use which can in turn affect the ability of ecosystems to produce goods and services.

Tomi Heath 142623 Whole Chapter S. Land Cover and Land Use Change 192 198 18 18 Due to the size of the topic and the page limit for the chapter, we focused on broad trends rather than providing a level of specificity. We have updated the text with a reference to the "Forests" chapter for a more thorough discussion of forest management and carbon dynamics.

Sarah Thunberg 142630 Whole Chapter S. Land Cover and Land Use Change 201 201 18 21 We assume this comment is in reference to P192 Line 18-19. The citation was in reference to land management strategies but we see how ever could be confused also applying to land use and cover. We have removed the reference.

Peter Caudill 142631 Whole Chapter S. Land Cover and Land Use Change 201 201 7 10 We believe the comment refers to P192, L18. We do not feel that the word "class" needs to be included in the sentence. The sentence refers to cover, use, and management in general terms. After consideration of this point, we have determined that the existing text is clear and accurate.

Peter Caudill 142633 Whole Chapter S. Land Cover and Land Use Change 201 202 10 11 This chapter is showing the well accepted and used literature based on the official forest land statistics of the US (Oswalt et al 2014), such as Dave Wiser's work with the Forest Service, Southern Research Station. IPCC's national greenhouse gas inventory guidance is quite clear about land cover and land change and land management. It does still have its own issues in terms of classifying vegetation on the land. Allow the Forest Service author on the whole to fix the chapter.

Peter Caudill 142635 Whole Chapter S. Land Cover and Land Use Change 201 201 11 11 We believe the comment refers to P192, L18. We do not feel that the word "class" needs to be included in the sentence. The sentence refers to cover, use, and management in general terms. After consideration of this point, we have determined that the existing text is clear and accurate.

Tom Court 142793 Whole Chapter S. Land Cover and Land Use Change 191 191 28 We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information and illustrations to include and therefore have not revised the chapter. We have also checked the paper for inconsistencies in references and corrections where appropriate.

Tom Court 142797 Whole Chapter S. Land Cover and Land Use Change 191 191 11 We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information and illustrations to include and therefore have not revised the chapter. We have also checked the paper for inconsistencies in references and corrections where appropriate.

Tom Court 142800 Whole Chapter S. Land Cover and Land Use Change 191 191 11 We appreciate this suggestion, but space is limited. The author team has deliberated and agreed on the most relevant information and illustrations to include and therefore have not revised the chapter. We have also checked the paper for inconsistencies in references and corrections where appropriate.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142803</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>191</td>
<td>194</td>
<td>14</td>
<td>14</td>
<td>After consideration of this point, we have determined that the existing test is clear and accurate.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142805</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>195</td>
<td>196</td>
<td>10</td>
<td>11</td>
<td>We thank the reviewer for their comment and included reference to volunteered in this section, citing the complete NCA4 Chapter.</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142808</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>195</td>
<td>195</td>
<td>17</td>
<td></td>
<td>Thank you. We specifically mention W4 in addition to disturbance (pg 197).</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142810</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>195</td>
<td>195</td>
<td>17</td>
<td>20</td>
<td>The chapter focuses on broad trends for the topic. We refer those interested in a deeper treatment of the topic to the Forest Chapter of this report. With respect to the second comment on transitions, good suggestion and we have modified the text to qualify the statement that transitions can occur for many reasons.</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142811</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>196</td>
<td>196</td>
<td>11</td>
<td>12</td>
<td>Thank you. This station has been corrected.</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142812</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>197</td>
<td>197</td>
<td>6</td>
<td></td>
<td>We can also change the abbreviation of the surface itself, consider including.</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142813</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>199</td>
<td>199</td>
<td>2</td>
<td>4</td>
<td>Rather than single out one or two individuals/our we have listed a few different classes of models which are currently used to estimate changes in yields and/or land use allocations. We have also change “rising temperatures” to “climate change.”</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142814</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>200</td>
<td>200</td>
<td>3</td>
<td>6</td>
<td>The sentence provides estimates of land cover change (in 1982), land use changes (in 1985), for the categories listed, and illustrates how the different classifications result in differing estimates of change. Due to the size of the topic and the page limit for this chapter, we focused on broad trends rather than providing such a level of specificity. Introducing percent changes would have necessitated introducing additional detail which we did not have the space for.</td>
</tr>
<tr>
<td>Anne</td>
<td>Marsh</td>
<td>142815</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>200</td>
<td>200</td>
<td>6</td>
<td>7</td>
<td>Good suggestion. We have modified the sentence accordingly.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142816</td>
<td>Figure</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>197</td>
<td>197</td>
<td></td>
<td></td>
<td>This would be helpful for the specific citations and dates for the LULC data in the legend and include dates on the figure. Corrections for figures will be provided according to information Quality Art guidelines for an NISA.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142817</td>
<td>Text Region</td>
<td>S.</td>
<td>Traversable Account</td>
<td>193</td>
<td>193</td>
<td>14</td>
<td></td>
<td>We have added the reference, 2009 Science paper reference at the end of the sentence.</td>
</tr>
<tr>
<td>Social Science Committee</td>
<td></td>
<td>143349</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>191</td>
<td>191</td>
<td>30</td>
<td>34</td>
<td>The 2013 reference represents an update since the last assessment (this paper was not cited in NCA4). The authors do not feel an updated reference is necessary since the concept of land use change being driven by economic factors is fairly well-established.</td>
</tr>
<tr>
<td>Social Science Committee</td>
<td></td>
<td>143250</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>193</td>
<td>193</td>
<td>14</td>
<td>18</td>
<td>Throughout this section it is hard to know what proportion the numbers reported in sq. miles are of the total, perhaps, express as a percentage. I do not understand what is meant by the phrase “and an estimated loss in land-use area of about 20-29 square miles over the same period.”</td>
</tr>
<tr>
<td>Social Science Committee</td>
<td></td>
<td>143251</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>195</td>
<td>195</td>
<td>7</td>
<td>9</td>
<td>The sentence provides estimates of land cover change (1982), land use changes (1985), for the categories listed, and illustrates how the different classifications result in differing estimates of change. Due to the size of the topic and the page limit for this chapter, we focused on broad trends rather than providing such a level of specificity. Introducing percent changes would have necessitated introducing additional detail which we did not have the space for.</td>
</tr>
<tr>
<td>Social Science Committee</td>
<td></td>
<td>143252</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>195</td>
<td>195</td>
<td>17</td>
<td>20</td>
<td>The intention was not to discuss only forest disturbances. However, the wording in the second sentence certainly made it appear that way. We have modified the sentence to be clearer that one example of disturbances altering land cover results from forest disturbance events. We do also present more specific data on forest disturbance events which draws upon national-scale data. These data are not available for non-forest classes.</td>
</tr>
<tr>
<td>Social Science Committee</td>
<td></td>
<td>143253</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>196</td>
<td>196</td>
<td>29</td>
<td>32</td>
<td>The main examples given seem to come from California. Are there examples from other regions of the US?</td>
</tr>
<tr>
<td>Social Science Committee</td>
<td></td>
<td>143254</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>196</td>
<td>196</td>
<td>29</td>
<td>32</td>
<td>We agree with the comment and have modified the key message, removing the reference to societal choices, societal choices.</td>
</tr>
<tr>
<td>Social Science Committee</td>
<td></td>
<td>143255</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>199</td>
<td>199</td>
<td>4</td>
<td>7</td>
<td>Are there no citations for any of the statements in this paragraph?</td>
</tr>
<tr>
<td>Michelle Sgobberi</td>
<td></td>
<td>143376</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>195</td>
<td>195</td>
<td>5</td>
<td>5</td>
<td>This comment was prepared after discussions by subgroups of the University of Washington Program on Climate and the Environment’s Project on Ecosystem Change and Advancement in the United States. Among those who participated in discussions, the following were involved or named: Mary Fisher, Megan Freidel, Dr. Michelle Sgobberi, Dr. Cecilia Atz, Dr. Richard Gammon. P. 195, line 5: please define how %O-riestBei/region% is 23% of the contiguous U.S. land area. Is this figure the total land area of all coastal states combined? The total area of %O-riestBei/region% is defined differently in Ch. 8, based on countries with coastline. Consistency between chapters would be useful for clarity.</td>
</tr>
<tr>
<td>Mean of concerned scientists</td>
<td>Union of Concerned Scientists</td>
<td>143095</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>189</td>
<td>190</td>
<td>11</td>
<td>11</td>
<td>As soon as “land-use” and/or “land cover” are introduced, it would be helpful to explicitly define them within the context of this report.</td>
</tr>
<tr>
<td>Mean of concerned scientists</td>
<td>Union of Concerned Scientists</td>
<td>143046</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>191</td>
<td>191</td>
<td>4</td>
<td>4</td>
<td>For example, “farmland.” I would suggest completing the example by comparing it to a different intensity of land use.</td>
</tr>
<tr>
<td>Mean of concerned scientists</td>
<td>Union of Concerned Scientists</td>
<td>143097</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>192</td>
<td>192</td>
<td>1</td>
<td></td>
<td>Because the chapter does not go into detail on the topic of land use intensity, we have removed this sentence. We also believe this improves the flow between definitions of cover and use and how the two concepts are inherently coupled.</td>
</tr>
<tr>
<td>Mean of concerned scientists</td>
<td>Union of Concerned Scientists</td>
<td>143088</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>192</td>
<td>192</td>
<td>21</td>
<td>25</td>
<td>The chapter focuses on broad trends for the topic. We refer those interested in a deeper treatment of the topic to the provided citations.</td>
</tr>
<tr>
<td>Mean of concerned scientists</td>
<td>Union of Concerned Scientists</td>
<td>143099</td>
<td>Text Region</td>
<td>S.</td>
<td>Land Cover and Land</td>
<td>192</td>
<td>192</td>
<td>28</td>
<td>30</td>
<td>This paints the commenter’s words beyond the scope of this chapter/report and we have removed the text. The chapter, paragraph in particular, focus on how changes in LULC management can impact mitigation and adaptation. While climate impacts on all C are certainly important, they are beyond the scope of this chapter.</td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>---------------------</td>
<td>------------</td>
<td>----------</td>
<td>------------</td>
<td>----------</td>
<td>---------</td>
</tr>
<tr>
<td>Michael</td>
<td>MicCracken</td>
<td>144266</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>189</td>
<td>191</td>
<td>14</td>
<td>14</td>
<td>&quot;Earth&quot; the planet needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is. Just because some old style guides adopted the convention not to capitalize earth, marine, and sun, is not a reason not to do so.</td>
</tr>
<tr>
<td>Michael</td>
<td>MicCracken</td>
<td>144266</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>189</td>
<td>191</td>
<td>14</td>
<td>14</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144262</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>189</td>
<td>191</td>
<td>10</td>
<td>10</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144263</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>189</td>
<td>191</td>
<td>12</td>
<td>12</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144264</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>189</td>
<td>191</td>
<td>14</td>
<td>14</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144265</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>189</td>
<td>191</td>
<td>27</td>
<td>27</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144266</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>190</td>
<td></td>
<td></td>
<td></td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144267</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>191</td>
<td>193</td>
<td>16</td>
<td>16</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144268</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>191</td>
<td>193</td>
<td>21</td>
<td>21</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144269</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>191</td>
<td>193</td>
<td>20</td>
<td>20</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144270</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>192</td>
<td>194</td>
<td>14</td>
<td>14</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144271</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>192</td>
<td>194</td>
<td>14</td>
<td>14</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144272</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>194</td>
<td>196</td>
<td>6</td>
<td>6</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144273</td>
<td>Figure</td>
<td>5.1</td>
<td>S. Land Cover and Land Use Change</td>
<td>194</td>
<td>196</td>
<td>6</td>
<td>6</td>
<td>&quot;Earth&quot; needs to be capitalized--although perhaps on the secondline the text is suffering just a bit of the part of the sentence it is fine as it is.</td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Region</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
<td>------------</td>
<td>----------------</td>
<td>--------------</td>
<td>---------</td>
<td>-------------</td>
<td>------------</td>
<td>---------</td>
<td>------------</td>
<td>----------</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144274</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>194 194 22 22</td>
<td>I think you want &quot;are the large drains&quot;.</td>
<td>We believe the text is correct as is.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144276</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>195 195 22 22</td>
<td>Again, a lot of confusion (or inconsistency with other chapters, etc.) over linking to references.</td>
<td>All references will be formatted consistently across the report.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144277</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>196 196 9 9</td>
<td>In judge significants, it would be helpful to also be provided what the new percentage covers would they be, not just how much the change was.</td>
<td>Due to the size of the topic and the page limit for the chapter, we focused on broad trends rather than providing such a level of specificity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144278</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>196 196 23 23</td>
<td>It would be helpful to provide the percentage of the total terrain in order to judge how important this is as a signature for the major water consumer in California.</td>
<td>The chapter focuses on broad trends for the topic. We refer those interested in a deeper treatment of the topic to the provided citations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144279</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>197 197 5 5</td>
<td>Change &quot;temperatures&quot; to &quot;temperate&quot;.</td>
<td>Thank you for catching the typo/italics error. It was fixed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144280</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>197 197 6 6</td>
<td>While this wording might be technically correct, it is, in my view a bit misleading. I'd suggest that what would happen would be a moderation of the warming, which is a cooling influence, but the latter thing implies that warming will not generally be occurring. And another thing that going to heaven will be to increase the absolute humidity, and so the wet bulb temperature will rise and overall comfort index would also be affected in ways that would make the coolness for humans less comfortable.</td>
<td>We appreciate the reviewer's comment. However, each of the 8 studies cited shows that modeled or observed temperature for cooler are closer than those associated with herbaceous cover. After consideration of this point, we have determined that the existing text is clear and accurate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144281</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>197 197 21 22</td>
<td>Change &quot;may&quot; to something like &quot;can, in some situations,&quot;.</td>
<td>This sentence has been removed in the 4th order draft.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144282</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>198 198 23 25</td>
<td>You might change &quot;eforts&quot; to &quot;investigations&quot;.</td>
<td>The text has been revised and the word is no longer used.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144283</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>198 198 23 25</td>
<td>In addition to previous comments about adding ecological reviews to the list on line 34, I don't understand why the word &quot;however&quot; is included here- why not a direct sentence?</td>
<td>We agree with the comment and have removed &quot;however&quot; from the key Message.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144284</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>199 199 23 23</td>
<td>Change &quot;may&quot; to &quot;can&quot; or have the potential for! it's not a question of permission, but ability.</td>
<td>The authors agree and have made the suggested change (&quot;have the potential for&quot;).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144285</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>199 199 28 28</td>
<td>No need for word &quot;future&quot;-you actually have the scenarios now.</td>
<td>After consideration of this point, we have determined that the existing text is clear and accurate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144286</td>
<td>Tot Region</td>
<td>S. Land Cover and Land Use Change</td>
<td>199 199 28 28</td>
<td>This whole section is really quite under-developed given its importance.</td>
<td>Due to the size of the topic and the page limit for the chapter, we focused on broad trends rather than providing such a level of specificity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thomas</td>
<td>Moore</td>
<td>144062</td>
<td>Whole Chapter</td>
<td>S. Land Cover and Land Use Change</td>
<td>200 200 25 25</td>
<td>Great! Please make sure we have the table.</td>
<td>Thank you for your comment; we edited the text to better reflect the actual volume of publications such as the NCA.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Niki</td>
<td>McFarling</td>
<td>144212</td>
<td>Whole Chapter</td>
<td>S. Land Cover and Land Use Change</td>
<td>205 205 5 5</td>
<td>Despite your advice, I think it is important to include the, high confidence, and critical evaluation (key points, etc.).</td>
<td>Thanks for the comment, we replaced this figure with one that shows CO2 over the past 800k years.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robert</td>
<td>Kepp</td>
<td>141203</td>
<td>Figure 1</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>206 206 18 18</td>
<td>This section shows the overwhelming nature of global sea level rise in the 20th and 21st centuries.</td>
<td>Due to the size of the topic and the page limit for the chapter, we focused on broad trends rather than providing such a level of specificity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robert</td>
<td>Kepp</td>
<td>141204</td>
<td>Figure 1</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>206 206 18 18</td>
<td>Consider also showing the six core CO2 record of the last 800k years and the ice core CO2 record of the last 800kyr for context.</td>
<td>Thank you for the comment, we have a separate FAQ on sea level rise so we choose not to include two different and leave the figure in this chapter.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robert</td>
<td>Kepp</td>
<td>141205</td>
<td>Figure 1</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>206 206 18 18</td>
<td>As discussed in previous comments, approximations associated with parameterizations are not the only source of model uncertainty.</td>
<td>Thank you for the comment, a reference to that FAQ was added.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Navin</td>
<td>Kharchi</td>
<td>144296</td>
<td>Whole Chapter</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>206 206 25 25</td>
<td>Many of the questions categorized under &quot;Ecological effects&quot; have more to do with the cryosphere than ecology.</td>
<td>Thank you for the comment, we assessed the questions in each category and will come up with appropriate headings based on the final version of each question.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laurin</td>
<td>Constable</td>
<td>142700</td>
<td>Tot Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>207 207 7 8</td>
<td>Numerous independent studies provide vague and underwhelming, when the reality is, many hundreds of studies show evidence of warming. Consider rewording to better reflect the volume of research.</td>
<td>Thank you for your comment, we edited the text to better reflect the actual volume of publications such as the NCA.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laurin</td>
<td>Constable</td>
<td>142705</td>
<td>Tot Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>207 207 22 22</td>
<td>Does a cooling, like atmospheric have different implications for the planet or atmosphere? CO2 being trapped near the surface and surface warming makes sense, but some clarification of the importance/relevance of a cool upper atmosphere would be helpful.</td>
<td>Thank you for the comment, we revised the text to clarify, cooling of the upper atmosphere due to the greenhouse gases.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laurin</td>
<td>Constable</td>
<td>142706</td>
<td>Tot Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>207 207 22 22</td>
<td>Consider rewording. &quot;increases in heavy winter events show that the atmosphere's ability to hold water vapor has increased with its temperature...&quot;</td>
<td>Thank you for the comment, the text was edited to be more clear for non-technical readers and it was changed to: &quot;increases in heavy winter events show that the atmosphere's ability to hold water vapor has increased with its temperature...&quot;.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laurin</td>
<td>Constable</td>
<td>142707</td>
<td>Tot Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>207 207 22 22</td>
<td>Consider changing the color of the grey indicator arrows (showing an increase or decrease) to a more eye-catching color. Due to the bright and colorful colors used in the images themselves, the arrows get lost. Either, the graphics convey a set of fantastic information, or not.</td>
<td>Thank you for the comment, the graphics is being revised to match the same graphics on the Overview chapter. It will contain very similar information, just presented on a more compelling basis [based on comments received not adding this figure in the overview].</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laurin</td>
<td>Constable</td>
<td>142708</td>
<td>Tot Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>207 207 17 17</td>
<td>Please add a year estimate or reference to when the global industrial revolution started.</td>
<td>Thank you for the comment, we edited to add the reference to the industrial revolution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laurin</td>
<td>Constable</td>
<td>142709</td>
<td>Tot Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>207 207 13 13</td>
<td>Add &quot;GHG&quot; after the first mention of greenhouse gases in the intro paragraph, rather than in the first main paragraph after already using the abbreviation.</td>
<td>We included GHG after the first mention of greenhouse gases.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>---------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Michael</td>
<td>Constible</td>
<td>142756</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1455</td>
<td>1455</td>
<td>10 12</td>
<td></td>
<td>This heat-trapping gas is a part of the carbon cycle and is released and absorbed through natural processes on seasonal to multicadal time scales and longer. “Carbon is cut off, or rising the ending of the sentence. Consider removing “and longer” or correcting the thought.</td>
<td>Thanks for the comment, “and longer” was deleted and the sentence was edited for clarity</td>
</tr>
<tr>
<td>Michael</td>
<td>Constible</td>
<td>142760</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1456</td>
<td>1456</td>
<td>11 13</td>
<td></td>
<td>consider rewording or splitting up this sentence, it’s somewhat confusing and hard to follow.</td>
<td>Thanks for the comment, the sentence was edited for clarity</td>
</tr>
<tr>
<td>George</td>
<td>MacCracken</td>
<td>142708</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1458</td>
<td>1458</td>
<td>1 1</td>
<td></td>
<td>“lower,” and “upper atmosphere” have been used previously in the chapter without being noted (stratosphere) and (atmosphere), consider introducing these terms earlier in the chapter for clarity and context.</td>
<td>Thanks for the comment, we edited the text to introduce troposphere and stratosphere earlier in the chapter Appendix 5: Frequently Asked Questions</td>
</tr>
<tr>
<td>Michael</td>
<td>Bakken</td>
<td>142709</td>
<td>Table Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1462</td>
<td></td>
<td></td>
<td></td>
<td>While there is mention of “sensor” and “data” regions, it may be helpful to be in some context regarding these implications on drought/flooding, and touching on the risks associated with these. This may try a little closer to home, in that they are damaging phenomena rather than just “more rain” and “less rain.”</td>
<td>Thank you for the comment, we edited the text to include mentions of droughts and floods.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142770</td>
<td>Figure</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1471</td>
<td></td>
<td></td>
<td></td>
<td>At this point, it appears the paragraph in the discussion paragraph, “result of the 17 warmest years” is out of place.</td>
<td>Thanks for the comment, we added a sentence in the figure caption to clarify this confusion.</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142771</td>
<td>Figure</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1476</td>
<td></td>
<td></td>
<td></td>
<td>I would be helpful to include in the description of this figure if the cost of these events was adjusted for inflation.</td>
<td>Thanks for the comment, we included a note in the figure captions saying these values are adjusted for inflation</td>
</tr>
<tr>
<td>Michael</td>
<td>Bakken</td>
<td>142772</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1478</td>
<td>1478</td>
<td>14 23</td>
<td></td>
<td>The use of “people” makes these impacts sound very detached from the population as a whole, and makes it easy to think “someone will be impacted, but not me” when this is affecting everyone to some extent. Consider changing to “we” or “everyone.”</td>
<td>Thank you for the comment, the answer was edited to be more connected to the population as a whole</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142773</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1482</td>
<td>1482</td>
<td>4 6</td>
<td></td>
<td>Consider rewording this sentence, for clarity.</td>
<td>Thank you for the comment, the sentence was rewarded for clarity</td>
</tr>
<tr>
<td>Juanita</td>
<td>Constible</td>
<td>142774</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1482</td>
<td>1482</td>
<td>17 31</td>
<td></td>
<td>It would be worth mentioning how much more potent these short-lived pollutants are compared to carbon, to add a layer of understanding.</td>
<td>Thanks for the comment, we added a statement about potency: short lived species</td>
</tr>
<tr>
<td>George</td>
<td>Bakken</td>
<td>142775</td>
<td>Figure</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1486</td>
<td></td>
<td></td>
<td></td>
<td>What is BCP 6.5 and BCP 4.5 stand for?</td>
<td>Thank you for the comment, in the foot matter of the report all representative concentration pathways scenarios are detailed.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142776</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1492</td>
<td>1492</td>
<td>18 38</td>
<td></td>
<td>How does it impact marine life? Examples would be helpful before diving into the specific question on page 1493.</td>
<td>Thank you for the comment, since there is an entire question devoted to ocean acidification, we just linked to that question for more details.</td>
</tr>
<tr>
<td>Tomi</td>
<td>Vest</td>
<td>142777</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1496</td>
<td>1496</td>
<td>3 4</td>
<td></td>
<td>How does CO2 reduce the efficacy of herbicides?</td>
<td>Thank you for the comment, we edited the text for clarity. I will refer you to Ziska et al. 2013 Revise and Preferred increases in Atmospheric CO2 Concentration Can Enhance Gene Flow between Wild and Genetically Altered Rice (Oryza sativa).</td>
</tr>
<tr>
<td>Michael</td>
<td>Bakken</td>
<td>14908</td>
<td>Figure</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1512</td>
<td></td>
<td></td>
<td></td>
<td>I’m not sure what the best way to explain this to the general public is, as the actual processes are a complex web of additions from various depths within the atmosphere, etc. Nevertheless, the figure AS.6 is open to criticism because, although it was intended to be schematic, taken literally it is obviously wrong, or at least requires a lot of re-interpretation that is not provided. Figure AS.6 shows the same amount of solar radiation (arrow width) in both panels, but says “less heat escapes into space” in the text in the right panel. In fact, the same amount of shortwave solar energy from the sun that is not immediately scattered or reflected must necessarily be re-radiated into space by the earth as thermal radiation (less a minute fraction stored on earth as it warms – maybe that is what it is intended to show). Plus, the temperature of the earth would be very extremely rapidly built up if you thought a professional figure something similar to my poor, hasty PowerPoint efforts sent separately might be a little closer. The sum of the widths of the outgoing arrows equals the width of the incoming solar array. I show that it is re-radiated from the atmosphere at a lower level causing near-surface warming. Of course, one cannot show the entire series in the figure. So, the skinny downward arrow at the left end of the sequence represents the stored fraction and terminates the series logically. Suggested revision fig AS.6 entitled separately as “pdf Bakken fig AS.6 suggestion”?</td>
<td>Thank you for the comment, we included some of your suggestions in a new figure that is hopefully a better way to explain the concept to the general public.</td>
</tr>
<tr>
<td>George</td>
<td>Bakken</td>
<td>15074</td>
<td>Figure</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1571</td>
<td></td>
<td></td>
<td></td>
<td>Figure AS.22 page 1471 line 1 “The 2016 on the figure appears misplaced as it appears when you look at the page – should be above and somewhere right the curve to indicate the top line in 2016. This is if it is interpreted as a static figure (as it would be in the print edition). I know it looks ok when you run the video, but to cover all bases I’d move it to upper right of curve in the video. Or eliminate it from the static figure.</td>
<td>Thanks for the comment, we will fix the placement of “2016”</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144007</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1444</td>
<td>1444</td>
<td>11 11</td>
<td></td>
<td>It’s true that in some nations the observations are by paid observers, etc. Text here is too limited.</td>
<td>Thank you for the comment, the sentence was edited for clarity</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144008</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1444</td>
<td>1444</td>
<td>12 14</td>
<td></td>
<td>I would think it better to reverse the order of these two sentences.</td>
<td>Thank you for your comment; we revised the two sentences</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144009</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1444</td>
<td>1444</td>
<td>17 18</td>
<td></td>
<td>Actually, the foot go up and down as we not always shifting on deep ocean currents.</td>
<td>Thank you for your comment; we revised the text to incorporate movement of buoy</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144010</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1444</td>
<td>1444</td>
<td>23 25</td>
<td></td>
<td>No? The atmosphere cools because the ozone absorption of color UV rays causes constant while the added CO2 increases that capacity for the layer to radiate away.</td>
<td>Thank you for the comment, the sentence of the text has been removed based off of suggestions by other reviewers</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144011</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1444</td>
<td>1444</td>
<td>25 27</td>
<td></td>
<td>This is not plain wrong. Most of CO2’s influence is in the upper troposphere where the water vapor concentration is low. And the exploration does not mention the effect of the added water vapor and the importance of the convective coupling of the troposphere. And this idea of less heat coming up to warm the atmosphere is just wrong—that is not at all the major influence.</td>
<td>Thanks for the comment, the section of the text has been removed based off of suggestions by other reviewers</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144012</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1444</td>
<td>1444</td>
<td>31 31</td>
<td></td>
<td>If I just note that for some mountain glaciers, warming can lead to glacial growth as snow accumulation can increase as long as temperature is below freezing. So, the statistic, hard to say the other 90% are not responding. Warming can also lead to thinning and spreading, so just calculating area is not adequate.</td>
<td>Thank you for the comment, we added text about the other 90% responding and pointed the reader to the FAQ on Glaciers for more information</td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>---------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144701</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1445</td>
<td>1445</td>
<td>8</td>
<td>15</td>
<td>This is hardly enough to explain the attribution issue.</td>
<td>Thanks for the comment; the text was revised to include water-vapor absorption.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144704</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1445</td>
<td>1445</td>
<td>8</td>
<td>4</td>
<td>Actually, with respect to the question and point 1, what I think is important is that the change in global average temperature is quite consistent with the types of changes that have occurred in the past when one considers the roles of the various natural and human-induced forcing factors. It is actually the similarity of the magnitude of the responses that raises the concern — did the past show no or only a small response to changes in forcing comparable to ones that humans are responsible for, or might one well be too concerned. But what past temperature changes show is that large changes can result from relatively small changes in forcing, and that is really not concerning. So, I think the first part of the question is answered incorrectly — and the question is posed incorrectly. The second point is indeed the case. Because of the need to change the first point, some of the following text needs revision.</td>
<td>Thank you for the comment. We understand the point you are making, however we want to emphasize that the current period of warming is being driven by human emissions, which is captured in the first part of the question. We did change the question from &quot;how is it &quot; to &quot;what makes&quot; to get at the point that human emissions are the driver.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144705</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1447</td>
<td>1447</td>
<td>26</td>
<td>15</td>
<td>I think one says &quot;only processes&quot; when earlier in sentence it says &quot;such as&quot; meaning the list won’t be complete, and it isn’t complete — changes due to deforestation, natural vegetation, soil, atmospheric circulation, landscape change, etc. There is strong evidence that some of these processes are not really very significant.</td>
<td>Thanks for the comment; the text was edited to be more inclusive of natural processes.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144706</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1447</td>
<td>1447</td>
<td>10</td>
<td>13</td>
<td>Actually the process is quite different -- greenhouse effect is due to the solar flux trapped in the atmosphere and the surface temperature increases. But the atmospheric gases themselves don’t really “trap” radiation.</td>
<td>Thank you for the comment, but it does not appear a suggestion is being made, although it is a good factoid.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144707</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1447</td>
<td>1447</td>
<td>17</td>
<td>17</td>
<td>This changed atmospheric composition -- be precise.</td>
<td>Thank you for the comment, the text was edited to be more precise.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144708</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1447</td>
<td>1447</td>
<td>19</td>
<td>19</td>
<td>I’d at this point leave out “and future” — we are talking here about what has happened.</td>
<td>Thank you for the comment, we left out “future” to stick with the current message of the answer.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144709</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1447</td>
<td>1447</td>
<td>25</td>
<td>25</td>
<td>Change “values” to “look” — this is about the past.</td>
<td>Thank you for the comment, we changed “take” to “took”</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144710</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1447</td>
<td>1447</td>
<td>26</td>
<td>26</td>
<td>Miss what needs to be stated.</td>
<td>we added “than the average rate of warming from a glacial maximum to a warm interglacial period”</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144711</td>
<td>Figure</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1449</td>
<td>1449</td>
<td>11</td>
<td>12</td>
<td>Why a figure only going to 2009. Needs to be updated.</td>
<td>Thanks for the comment, we updated this figure with the most recent data that goes through 2014.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144712</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1450</td>
<td>1450</td>
<td>20</td>
<td>13</td>
<td>While the scientific community did not come to consensus on this, there were prominent individual scientists suggesting that the world might go into a cooling phase, and doing so for a couple of reasons. First, the ice core evidence from Antarctica shows that the average temperature of the Earth was colder than present at the average temperature is colder than about 100,000 years ago, with the Icehouse being about 200,000 years old, we were possibly due to head into a glacial period; more detailed analyses of the sediment cores indicate that the length of interglacials can vary from a few thousand to perhaps 40,000 years and our present situation is most like the oldest interglacial that led to the 40,000 year duration. Second, during the 1960s there was a continuation of the buildup of tropospheric aerosols that resulted from going to tall stacks to emit the gases from coal-fired power plants and it was thought the resulting cooling influence would be longer than the long-term CO2 warming influence because it was only beginning to be understood that the persistence time of at least some of the CO2 perturbations is many millennia whereas the average time between glacial and interglacial periods is about 100,000 years.</td>
<td>Thank you for the comment. We are certainly right that there was discussion of possible explanation for cooling phases early on the development of the climate community. In the interest of keeping the FAQs short, readable, and targeted to a one-click audience, we did not include the details of your comment to the question. However, we did clarify in the answer that there was scientific discussion around understanding this from the beginning.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144713</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1451</td>
<td>1451</td>
<td>11</td>
<td>12</td>
<td>This needs to be more precise. I suggest change to “atmospheric gases that absorb and emit thermal,” (i.e. heat) infrared radiation.” Then leave off the last phrase. The want “trapping” is not really correct -- because the atmosphere gets warmer, the atmosphere actually emits more radiation than it did before. Because more radiation is now emitted back to the surface, this leads to the surface warming, and emitting more radiation, etc.</td>
<td>Thank you for the comment, we included all of the suggested changes.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144714</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1451</td>
<td>1451</td>
<td>14</td>
<td>16</td>
<td>Actually the process is quite different -- greenhouse effect is due to the solar flux trapped in the atmosphere and the surface temperature increases. But the atmospheric gases themselves don’t really “trap” radiation.</td>
<td>Thank you for the comment, we included all of the suggested changes.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144715</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1451</td>
<td>1451</td>
<td>12</td>
<td>17</td>
<td>Actually, the process is quite different -- greenhouse effect is due to the solar flux trapped in the atmosphere and the surface temperature increases. But the atmospheric gases themselves don’t really “trap” radiation.</td>
<td>We used the word analogous rather than similar.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144716</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1451</td>
<td>1451</td>
<td>20</td>
<td>21</td>
<td>Again, get rid of “trap” and say “absorbs and re-emit”</td>
<td>We used the word analogous instead of trap.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144717</td>
<td>Test Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1452</td>
<td>1452</td>
<td>5</td>
<td>15</td>
<td>And on Mars there is CO2, but no water vapor, so the GH effect is small and Mars is generally too cold for habitation.</td>
<td>Thank you for the comment, but it does not appear a suggestion is being made, although it is a good factoid.</td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment ID Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>----------------</td>
<td>---------</td>
<td>---------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144718</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1452</td>
<td>1452</td>
<td>8</td>
<td>9</td>
<td>No, only about half of the Sun's energy reaches the surface. About 30% is reflected and about 20% is absorbed in the atmosphere.</td>
<td>Thank you for the comment, we included the suggested changes</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144719</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1452</td>
<td>1452</td>
<td>8</td>
<td>9</td>
<td>Should also be mentioned--indeed, it might be worth noting that all gases made of or more atoms are greenhouse gases (so including CO2 etc).</td>
<td>Thank you for the comment, we incorporated your suggestion into the main text</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144720</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1452</td>
<td>1452</td>
<td>8</td>
<td>9</td>
<td>There are no degrees of certainty. Replace &quot;variable&quot; by &quot;confidence&quot; as there are degrees of confidence.</td>
<td>Thank you for the comment, &quot;variable&quot; was replaced with &quot;confidence&quot;</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144721</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1455</td>
<td>1455</td>
<td>16</td>
<td>16</td>
<td>100,000 billion tons = the amount of CO2 in the atmosphere. The 10 billion tons per year of CO2 is not counting the oxygen atoms. So, consistent with be used.</td>
<td>Thank you for your comment, this question was combined with the previous FAQ, and this section was deleted</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144722</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1455</td>
<td>1455</td>
<td>17</td>
<td>17</td>
<td>100,000 billion tons = the amount of CO2 in the atmosphere. The 10 billion tons per year of CO2 is not counting the oxygen atoms. So, consistent with be used.</td>
<td>Thank you for your comment, this question was combined with the previous FAQ, and this section was deleted</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144723</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1455</td>
<td>1455</td>
<td>18</td>
<td>18</td>
<td>Annual net best used to be using. Natural processes mainly involve exchanges into and out of the ocean and into and out of the biosphere, when we mean CO2 concentrations are steadily below human emissions from fossil fuels were essentially equal and opposite, so not net exchange. With human activities only emitting CO2, the natural system is having to adjust to this persistent push, and is leading to the increase in atmospheric concentration going up by an equivalent of what would result from half of the omitted CO2 remaining in the atmosphere.</td>
<td>Thank you for the comment, &quot;cyclical&quot; was replaced with balanced.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144724</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1456</td>
<td>1456</td>
<td>14</td>
<td>16</td>
<td>It doesn't seem to me that you are comparing equivalent items--I don't understand.</td>
<td>Thanks for the comment, the sentence was edited for clarity</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144725</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1456</td>
<td>1456</td>
<td>17</td>
<td>17</td>
<td>Change &quot;there&quot; to &quot;CO2 and&quot; for clarity</td>
<td>Thanks for the comment, the sentence was edited for clarity</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144726</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1456</td>
<td>1456</td>
<td>10</td>
<td>10</td>
<td>Yes, humans do add water vapor to the atmosphere, but breathing it out as well. However, the atmospheric loading is controlled by the atmospheric circulation, plus to the extent that we directly raise the concentration in the lower atmosphere, this reduces the pressure of water vapor concentration from surface to atmosphere, and so this suppresses evaporation. The typical lifetime of an atmospheric molecule in the atmosphere is of order 7-10 days, so it is not very hard to balance the concentration.</td>
<td>Thanks for your comment, the sentence was edited to include the life span of water vapor in the atmosphere.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144727</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1456</td>
<td>1456</td>
<td>11</td>
<td>12</td>
<td>I suggest the answer should be: &quot;This is not starting to become possible with respect to the large-scale factors that influence the local climate. &quot; The go to &quot;With advances in computing power, ALAs&quot; and say can start to be designed. I'd really redo the question and use the word regions instead of communities.</td>
<td>Thank you for the comment, we incorporated some of what you suggested into the answer and changed &quot;communities&quot; to &quot;regions&quot;</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144728</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1467</td>
<td>1467</td>
<td>7</td>
<td>7</td>
<td>The example of volcanic eruptions might get you.</td>
<td>Thank you for the comment, a volcanic eruption was added as an example</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144729</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1467</td>
<td>1467</td>
<td>10</td>
<td>14</td>
<td>Another example to list might be aerosol effects.</td>
<td>Thank you for the comment, we included aerosol effects as an example</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144730</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1468</td>
<td>1468</td>
<td>20</td>
<td>22</td>
<td>I would think an important point to make would be with respect to the cold spells over eastern North America, which scientific research is suggesting is at least in part due to the effects of Arctic warming on the atmospheric circulation in the Arctic, the historical vortex not being strong enough to keep the cold air in the Arctic.</td>
<td>Thank you for the comment, however this question is related to longer term trends not short (days-weeks) cold snaps. The comment was noted and we included a sentence about polar veers in the question about climate vs. weather.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144731</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1471</td>
<td>1471</td>
<td>9</td>
<td>14</td>
<td>We are actually making climate projections, not predictions--so that means we are saying if we keep non-human influences constant. There have been studies asking scientists to predict, so including what possible natural influences they think might happen and do, and the range of future temperatures broadens out in response (see Delphi study done by Granger Morgan perhaps 25 years ago).</td>
<td>Thank you for the comment, we changed &quot;predictions&quot; to &quot;forecasts&quot;, the second part of the comment is outside the scope of this question</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144732</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1473</td>
<td>1473</td>
<td>5</td>
<td>5</td>
<td>This is a pretty strong statement--it didn't appear that may be the case due to some flaws in the observing network that have been found and fixed, and due to the effects of some small volcanic eruptions. What really persisted is the warming influences of CO2 and other greenhouse gases (so including CO2) just ended up a bit hidden for a while and did not persist for 30 years, so not really appropriate to call a hiatus.</td>
<td>Thank you for the comment, however, this comment does not appear to raise a question or suggest a revision.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144733</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1473</td>
<td>1473</td>
<td>17</td>
<td>18</td>
<td>And quite likely some warm biases in the ocean record from the years during World War II that have yet to be fully investigated and corrected for.</td>
<td>Thank you for the comment, however, this comment does not appear to raise a question or suggest a revision.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144734</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1475</td>
<td>1475</td>
<td>20</td>
<td>25</td>
<td>It might well be important to explain that the increase in warm extremes (and decrease in cold extremes) if one compares this warming to the mid-20th century. If one instead keeps updating ones normal/baseline, there is still a bell-shaped distribution of decadal temperature anomalies, etc. So, when making the statement, it is important to say with respect to what that normal/baseline was and the impact of baselining the normal/baseline.</td>
<td>Thank you for the comment, we included a statement regarding reference points in the answer</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144735</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1476</td>
<td>1476</td>
<td>11</td>
<td>15</td>
<td>As thoroughly has noted, with so much influence as the increased CO2 is having, everything is already being affected somewhat by human influences and nothing is truly natural. What the attribution studies look at is the relative likelihood of an even occurring in the past to the relative likelihood in the present, and indeed, there are events occurring now that seem very rare in the past, if they occurred at all.</td>
<td>Thank you for the comment, we incorporated the second half of this statement into the answer. The first part of the comment is a bit out of the scope of this question.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144736</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1477</td>
<td>1477</td>
<td>14</td>
<td>16</td>
<td>I'm not sure variability caused the event--it is that the likelihood of it occurring in the past is about the same as it occurring today--&quot;caused&quot; is the wrong word.</td>
<td>Thank you for the comment, the sentence was edited and recast to remove the word &quot;caused&quot;.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144737</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1479</td>
<td>1479</td>
<td>14</td>
<td>19</td>
<td>Actually, the projections do include situations where the same area could have both more floods and droughts at the same time, and this should be noted. An example is California with general drought, and then some local atmospheric events.</td>
<td>Thank you for the comment, we included a statement regarding dry areas with increased flooding</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144738</td>
<td>Field Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1481</td>
<td>1481</td>
<td>14</td>
<td>14</td>
<td>A statement drawing on title to report a number of us authored a decade ago [Gris-Foundation and Sigma Xi sponsored the activity].</td>
<td>Thank you for the comment, however, this comment does not appear to raise a question or suggest a revision.</td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
</tr>
<tr>
<td>------------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>---------------------</td>
<td>------------</td>
<td>---------</td>
<td>------------</td>
<td>---------</td>
<td>----------</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144759</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1492</td>
<td>1495</td>
<td>5</td>
<td>12</td>
<td>I would suggest that what really matters is reducing emissions of short-lived species. If we do it, we can have an effect before 2050. For CO2, generally it is total emissions that matter – a bit less on the timing.</td>
<td>Thanks for the comment, we added a sentence about reducing short-lived species.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144760</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1494</td>
<td>1496</td>
<td>24</td>
<td>32</td>
<td>I was not surprised to see food and food prices on them. If there are food shortages, this will pull money out of it being used for other purposes like funding the ongoing academy, and a global recession or worse could result.</td>
<td>Thanks for the comment, in the body text we discuss drought as it relates to agriculture.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144761</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1495</td>
<td>1497</td>
<td>17</td>
<td>24</td>
<td>You may answer leaves off the potential for geoengineering as a complement to mitigation and adaptation, both SRM for the short-term and CDR for the longer term so SRM could be phased out.</td>
<td>Thanks for the comment, we incorporated your suggestions of including CDR and SRM in combination with mitigation and adaptation, then phasing out SRM.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144762</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1487</td>
<td>1487</td>
<td>10</td>
<td>12</td>
<td>The answer is focused on using these approaches alone, and no one advocates this. The question is whether they can complement mitigation and adaptation, not if they can do it alone. I would note that neither mitigation nor adaptation can do what is needed alone either – and so it really matters to be considering geoengineering approaches alone. Given where we are, we need a comprehensive approach that considers the potential role of each and relative costs, and I’d suggest when we do this, the geoengineering has a very important role to play, and the answer here is just inappropriate. For example, there appears to be no practical way for mitigation to keep the temperature to 1.5°C, which will lead to impacts such as ongoing sea level rise that adaptation cannot possibly cope with except at very, very high cost. The global average temperature increase really needs to be below 1.5°C as rapidly as possible (see Hansen et al paper on consequences of order 1.25-2.25 meters per degree at equilibrium). And there is no way mitigation and adaptation can do this. CDRs are likely over many decades, though there are efforts to find ways to get to negative emissions faster but aggressive mitigation is also required. The notion is that one might use SRM to do it, and then phase it out as CDR takes over, so a much smaller role for SRM (global, or perhaps just regional) than is covered in most of the papers to date that are very exploratory as virtually no research has been funded.</td>
<td>Thanks for the comment, we added the response to incorporate some of your suggestions, such as complementing geoengineering with adaptation and mitigation and noting that most of the geoengineering research is still in the developmental phase. We cannot, however, advocate for the use of any particular geoengineering method even if we need to use geoengineering at all.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144763</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1487</td>
<td>1487</td>
<td>21</td>
<td>24</td>
<td>Iron fertilization is only one of suggested approaches. There are a number of others that would have much more capability and could be done in the open ocean where little marine life is in present. Basically, what is said here is no up-to-date. And the question is how the supposed “harmful consequences” would compare with not doing harm from which is apparently huge.</td>
<td>Thanks for the comment, we noted that this was one of the first proposed methods and that there are cost benefits to all approaches.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144764</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1487</td>
<td>1487</td>
<td>28</td>
<td>29</td>
<td>This is simply WRONG! (1) It is widely agreed that the cost would likely be far less than mitigation (the costs existing for at least in some form). (2) There are limits in understanding as virtually no research has gone into it, but if I suggest that we should have more confidence in models simulations for SRM, which keeps the climate near to what we know and experience, and for ongoing GHG driven climate change, where the climate is headed to conditions for which we have no experience – the uncertainty situation is backwards compared to the driven. (3) Indeed SRM is not perfect but the question is whether one would better off with mitigation plus CDR and SRM or with mitigation without CDR and/or SRM. I don’t know anyone who, except those with mirror-based color systems would be upset if they just happened to be on a long series of minor volcanic eruptions going on to keep the temperatures a bit cooler than they otherwise would be – yet if this were done by humans, there is all this fear of unintended consequences.</td>
<td>We modified the text to simply state what SRM is and that it is a under researched. This section of the report is not meant to go into detailed analysis of these techniques or what we should or should not do, it is here to engage the reader to hopefully use the resources suggested to learn more.</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144765</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1492</td>
<td>1492</td>
<td>15</td>
<td>15</td>
<td>Agree saying “the oceans have absorbed over 90% of the 39% is too precise and there is no assurance this will continue in the future as emissions change, so we need to be changed.</td>
<td>Thank you for the comment, we revised the sentence to say “the oceans have absorbed...”</td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144766</td>
<td>Text Region</td>
<td>Appendix 5: Frequently Asked Questions</td>
<td>1495</td>
<td>1495</td>
<td>15</td>
<td>15</td>
<td>A qualifying phrase needs to be added, saying “growth, assuming other factors like water and nutrients are not limiting”</td>
<td>Thank you for the comment, the test was revised to incorporate the suggestion.</td>
</tr>
<tr>
<td>First Name</td>
<td>Last Name</td>
<td>Comment ID</td>
<td>Comment Type</td>
<td>Chapter</td>
<td>Figure/Table Number</td>
<td>Start Page</td>
<td>End Page</td>
<td>Start Line</td>
<td>End Line</td>
<td>Comment</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
<td>------------</td>
<td>--------------</td>
<td>---------</td>
<td>---------------------</td>
<td>-----------</td>
<td>---------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Clifford</td>
<td>Thompson</td>
<td>140528</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Concern: With global ice melting far faster than predicted, our plight seems relatively dim &amp; the time to turn things around fairly short.</td>
</tr>
<tr>
<td>Kate</td>
<td>Larsen</td>
<td>140534</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I found Madeleine and real brothers!!! His false name is Raquel Ludeúa uncB.com, which will be created according to the international treaty of central banks. United Central Banks will create the public bank, Phoenix Bank, pbank.com The currency will be issued and regulated by United Central Banks, and the currency will be paid to the employees of the eighth sector and Edvi knowledge sportsmen through the digital currency. It is a non-profit organization, for real democracy and the development of humanity, independent of political parties and the basis of the salary received.</td>
</tr>
<tr>
<td>Xavier Lennart Galindo Ozuna</td>
<td>140554</td>
<td>Whole Document</td>
<td>Phoenix.org</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Phoenix.org is a member of the Climate Impact Lab and one of the authors of our American Climate Prospectus work. Our team wanted to make sure the correct citation is used. The report is cited as a working paper (2014) throughout the NCA, but should instead be the book which was subsequently published in 2015. The correct citation for the American Climate Prospectus should be: Houser, T., Hoing, S., Cipps, R.S., Larsen, K., Delgado, M., Jin, A., Mandovala, M., Atikhan, C., Sh-Wood, R., Ramesh, D.R., Rising, J. and P. Wilson. (2015). Economic Risks of Climate Change: An American Prospectus. New York, NY: Columbia University Press. All references to Houser et al. 2014 throughout the report should be changed to Houser et al. 2015.</td>
</tr>
<tr>
<td>Xavier Lennart Galindo Ozuna</td>
<td>140555</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Houser et al. 2014 throughout the report should be changed to Houser et al. 2015.</td>
</tr>
<tr>
<td>Pei-Lin</td>
<td>Yu</td>
<td>140601</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Introduce a new program agreement with universities and a school learning center, as well as aid for their one on. You can choose a workday and complete the hours that best suit your needs, both face-to-face and online. Annual basic income, it will be an option of conformists in the coming years, because the fourth industrial revolution is a reality. Text: xivi.com Will be the e-Sports of knowledge, where you decide the limits of your e-mail. The amount of the lot is decided by bets and pursuers. Phoenix virtual currency This digital currency will be paid to the employees of the eighth sector and Edvi knowledge sportsmen through the Phoenix Bank, Phoenix Bank, pbank.com The currency will be issued and regulated by United Central Banks.</td>
</tr>
</tbody>
</table>
There is no global warming. Mostly northern-hemisphere warming. You can see these NASA graphs here: http://cri-thru.org/index.php/data/. The oceans will not rise anymore then the past. The satellite data shows the same rate. (you can see the EPA graph at cttuth.org at the bottom): Increased evaporation due to less salty water and warmer oceans is keeping the rate the same. This same evaporation increase is making more and more severe storms. These increase the clouds. The clouds historically reflect 20% of the sun's energy. With increased clouds more will be reflected until an equilibrium is reached. Also with Pearson regression we received a 0.10 factor for co2 emissions as the cause of the co2 increase. We received a 0.90 for destruction of the rain forest as the cause. That paper is under review at a climate journal. You can see all the truth about climate change on the reports page. CO2 does not go into the ocean. The diffusion coefficient in air is 10000 times that in water. It just waits in the atmosphere until a plant goes to it. You should write about diffusion in Shelly Watts and Wilson. Fundamentals of Momentum, Heat and Mass transfer.

Great work. Thank you.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artannesaybr</td>
<td></td>
<td>141203</td>
<td>Whole Document</td>
<td>Chapter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Climate change is a false premise for regulating or taxing carbon dioxide emissions. Political leaders who advocate unwarranted taxes and regulations on fossil fuels will be seen as fools or knaves. Nature converts CO2 to limestone.</td>
<td>We disagree with this comment as it is directly contradicted by the scientific literature as summarized in NCA4 Volume 1 (as well as many prior analyses and assessments of the science). We refer the reviewer to Volume 1 for more information on the scientific basis for international carbon dioxide emissions. The bottom line is that the effects of ocean cycles are not unexpected, but the modeling studies were not at all consistent with reality. The slowdown in the rate of temperature increase that occurred between about 2000-2013 is not the result of high fossil fuel usage. We disagree on almost all of the diverse statements made in this comment. First, there was no bias at all in the author selection process. The authors were selected after an open process for nominations through a Federal Register announcement. The selection of the authors by the Federal Steering Committee considered a variety of criteria, the most important of which were the accomplishments of the prospective authors and their likelihood for accurately assessing the state of understanding of the changes in climate and resulting impacts for the chapters they were selected for as an author. Early in the commentary, there was also mention that &quot;physical climate scientists have been replaced by social/geochemical scientists&quot;. That is not true of NCA4 Volume 1 on the science of climate change or the associated chapter 2 in Volume II. It should be noted that Chapter 2 in Volume II is a short summary of findings from the now-published Volume 1. Uncertainties of the science are extensively discussed in Volume I. It is important to recognize that Volume II builds on Volume I and does not replace it. Volume 3 does discuss the issues raised by the reviewers related to the science of climate change, including the concerns about models and associated uncertainties (for example, note that for the first time in an assessment a weighting was applied to the models in NCA4 based on how well they represented observations that has not been found in any previous assessment – see Chapter 4 and Appendix B of NCA4 Volume 1). We also refer the reviewer to the Traceable Accounts, which describe in greater detail than is possible – or intended – for the narrative text just how &quot;st眯&quot; the authors are in a given conclusion – and why / how they came to that level of certainty in a given conclusion. Traceable Accounts are found for any key finding made in both Volume 1 and Volume II. Comments about models overestimating the observed trends in globally averaged temperature primarily relate to the slowdown in the rate of temperature increase that occurred between about 2000-2013. The slowdown in temperature change during the 2000-2013 time period and why that is not fully represented in the modeling studies is extensively discussed in NCA4 Volume 1, especially in Chapter 1 but is also discussed in later chapters.</td>
</tr>
</tbody>
</table>

Lack of Deep Atmospheric Warming: While the NCA-4 contains a litany of weather phenomena and impacts that are linked to climate change, the fundamental fact remains that actual global warming is proceeding at a pace well below the model projections that have been made by the climate change community over the last three decades. For all the concerns about changes listed in the assessment, the basic tenet of GHG climate change as understood by the scientific community is that the atmosphere is warming. There is no empirical evidence that fossil fuels use affects climate. Likely and well-documented causes include sunspot cycles, earth/sun orbital changes, cosmic ray effects on clouds and terrestrial plate activity. The further proof here is that earth naturally cycles all carbon dioxide. Fossil fuels emit only 3% of total CO2 emissions. 95% comes from rotting vegetation and other sources. All the ambient CO2 in the atmosphere is promptly converted in the oceans to solidate (breezotin and other utoxorns mostly through biological/pohtic. CO2 + CO + CO3 (heatherm). The conversion rate increases with increasing CO2 partial pressure. A dynamic equilibrium seeking mechanism. The organisms that convert dissolved CO2 to soluble all have short Weapons. At the most basic level they include cyanobacteria and sea butterflies. Higher elves include corals, billabongs and other crustaceans. An act of system or systems can create 300 tons of soluble in a single season. 99.84% of all carbon on earth is already sequestered as sediments in earth's crust. The biosphere is a massive hungry carbon sink that converts ambient CO2 into carbonate almost as soon as it is emitted. Dickinson and Farquhar estimated that CO2 could be stored at 3.3 trillion tons or 80% of the carbon in the biosphere. It is time to put this foolishness behind us and deal with real life issues. |

In the last 25 years climate science assessment documents from the IPCC to the Present NCA-4 have devolved from a careful weighing of pros and cons to a present-day agenda for action. The climate scientists who have dealt with the complex physical climate system directly understands that known and unknown interactions produce large uncertainty in both near-term and long-term climate forecasts. There seems to be standard grade school education. CO2 does not control the jet streams; it does not control the ocean currents, the sun or cosmic rays. There are much greater forces at work, none of which we have any control over. It's time to put this foolishness behind us and deal with real life issues. |

Temperature changes cause changes in ambient CO2; not vice versa. Temperature caused by natural forces cause changes in CO2. Since 95% of CO2 air emissions are emitted by rotting vegetation, of course some emissions will be higher at higher temperatures. There is no empirical evidence that fossil fuels use affects climate. Likely and well-documented causes include sunspot cycles, earth/sun orbital changes, cosmic ray effects on clouds and terrestrial plate activity. The further proof here is that earth naturally cycles all carbon dioxide. Fossil fuels emit only 3% of total CO2 emissions. 95% comes from rotting vegetation and other sources. All the ambient CO2 in the atmosphere is promptly converted in the oceans to solidate (breezotin and other utoxorns mostly through biological/pohtic. CO2 + CO + CO3 (heatherm). The conversion rate increases with increasing CO2 partial pressure. A dynamic equilibrium seeking mechanism. The organisms that convert dissolved CO2 to soluble all have short Weapons. At the most basic level they include cyanobacteria and sea butterflies. Higher elves include corals, billabongs and other crustaceans. An act of system or systems can create 300 tons of soluble in a single season. 99.84% of all carbon on earth is already sequestered as sediments in earth's crust. The biosphere is a massive hungry carbon sink that converts ambient CO2 into carbonate almost as soon as it is emitted. Dickinson and Farquhar estimated that CO2 could be stored at 3.3 trillion tons or 80% of the carbon in the biosphere. It is time to put this foolishness behind us and deal with real life issues. |

In the last 25 years climate science assessment documents from the IPCC to the Present NCA-4 have devolved from a careful weighing of pros and cons to a present-day agenda for action. The climate scientists who have dealt with the complex physical climate system directly understands that known and unknown interactions produce large uncertainty in both near-term and long-term climate forecasts. There seems to be standard grade school education. CO2 does not control the jet streams; it does not control the ocean currents, the sun or cosmic rays. There are much greater forces at work, none of which we have any control over. It's time to put this foolishness behind us and deal with real life issues. |

Lack of Deep Atmospheric Warming: While the NCA-4 contains a litany of weather phenomena and impacts that are linked to climate change, the fundamental fact remains that actual global warming is proceeding at a pace well below the model projections that have been made by the climate change community over the last three decades. For all the concerns about changes listed in the assessment, the basic tenet of GHG climate change as understood by the scientific community is that the atmosphere is warming. There is no empirical evidence that fossil fuels use affects climate. Likely and well-documented causes include sunspot cycles, earth/sun orbital changes, cosmic ray effects on clouds and terrestrial plate activity. The further proof here is that earth naturally cycles all carbon dioxide. Fossil fuels emit only 3% of total CO2 emissions. 95% comes from rotting vegetation and other sources. All the ambient CO2 in the atmosphere is promptly converted in the oceans to solidate (breezotin and other utoxorns mostly through biological/pohtic. CO2 + CO + CO3 (heatherm). The conversion rate increases with increasing CO2 partial pressure. A dynamic equilibrium seeking mechanism. The organisms that convert dissolved CO2 to soluble all have short Weapons. At the most basic level they include cyanobacteria and sea butterflies. Higher elves include corals, billabongs and other crustaceans. An act of system or systems can create 300 tons of soluble in a single season. 99.84% of all carbon on earth is already sequestered as sediments in earth's crust. The biosphere is a massive hungry carbon sink that converts ambient CO2 into carbonate almost as soon as it is emitted. Dickinson and Farquhar estimated that CO2 could be stored at 3.3 trillion tons or 80% of the carbon in the biosphere. It is time to put this foolishness behind us and deal with real life issues. |
Therefore, claims of future impacts based on regional projections of climate models should be disallowed in the simple validation exercise which we have published in the peer-reviewed literature. These models have not passed ‰ÛÒ surface temperature. As such, NA4 has no scientifically-defensible basis to go forward and use such climate change projections to cause substantial damage to the U.S. economy. (2) The effects described here are not uniformly negative; no change. (0) This text has been updated to better reflect mitigation opportunities. (5) The suggested text is not appropriate for this section of the Overview, but similar text has been added later in the Overview that reads: “Actions not taken today will increase risks for future generations and limit their available options to reduce risks.” (6) This comment has been accepted and this sentence has been edited to read: “The long-term warming trend observed over the past century can only be explained by the effects that human activities, especially emissions of greenhouse gases from burning fossil fuels and to a much lesser extent, deforestation, have had on the climate.” (0) This region of text has been removed. (9) The authors have determined that this broad statement is not supported by the underlying chapters and does not fit in this context. However, this point is made elsewhere in the Overview for example: “[NCA4] concludes that the evidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans’ physical, social, and economic well-being are rising.” No change. (10) This region has been removed. No change. (11) This text has been moved to a different section of the Overview and the suggested change has been implemented.

**Comment:** While we agree that the global CMIP5 models largely do not represent the observed temperature changes in Alabama and various parts of the Southeast (the lack of warming in parts of that region over the last century relative to the extensive warming of most other parts of the United States is discussed in Chapter 6 of NCA4 Volume 1), a major result from Volume 1 was high resolution downscaled evaluations of the regional climate changes that combine model results with observational data. There has been discussion in the science community of whether there are processes not being considered in the global models (e.g., the deforestation of the Amazon or the growth of tropical forests), but the exact causes of the lack of warming in the Alabama region remain uncertain. The downscaled analyses provide an enhanced evaluation of the past and projected future changes for the authors to use in the regional analyses in Volume 2. Since they have a strong tie back to the observations at the local scale, there is more confidence in those analyses relative to just using the results from the global models at the local scales for some regions. We refer readers to the Report Findings, Front Matter, or Overview comment responses to see specific responses: (1) This comment has been accepted and this sentence has been edited to read: “The climate-related threats to Americans’ physical, social, and economic well-being are rising.” No change. (10) This region has been removed. No change. (11) This text has been moved to a different section of the Overview and the suggested change has been implemented.

**Comment:** There are a number of individual comments contained within this single comment. All of them pertain to specific sections of either the Front Matter, Report Findings, or the first part of Chapter 1 (Overview). Readers are directed to the Report Findings, Front Matter, or Overview comment responses to see specific responses: (1) This text has been edited to read: “More intense weather and climate extremes, expected in a warmer world, will continue to damage the infrastructure, ecosystems, and social systems that provide essential goods and services to communities. Climate change will further disrupt many areas of life, exacerbating existing and revealing new challenges to prosperity posed by aging infrastructure, stressed ecosystems, and social inequality.” (5) It is unclear what change this comment is recommending. Based on another comment, this sentence has been revised to read: “While a few aspects of our economy may see slight improvements in a warmer world, without efforts to reduce greenhouse gas emissions and adapt to climate impacts, climate change is projected to cause substantial damage to the U.S. economy.” (9) The effects described here are not uniformly negative; no change. (0) This text has been updated to better reflect mitigation opportunities. (5) The suggested text is not appropriate for this section of the Overview, but similar text has been added later in the Overview that reads: “Actions not taken today will increase risks for future generations and limit their available options to reduce risks.” (6) This comment has been accepted and this sentence has been edited to read: “The long-term warming trend observed over the past century can only be explained by the effects that human activities, especially emissions of greenhouse gases from burning fossil fuels and to a much lesser extent, deforestation, have had on the climate.” (0) This region of text has been removed. (9) The authors have determined that this broad statement is not supported by the underlying chapters and does not fit in this context. However, this point is made elsewhere in the Overview for example: “[NCA4] concludes that the evidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans’ physical, social, and economic well-being are rising.” No change. (10) This region has been removed. No change. (11) This text has been moved to a different section of the Overview and the suggested change has been implemented.

*Comment:* We thus demonstrated that all of the models failed a simple statistical validation test of a critical parameter skill level was actually negative. This result is generally true for the Southeastern US as a whole. (emphasis added) One key result is given in Fig. 12 and emailed as part of this response (with annotations for clarity). We examined 76 simulations for 1855 to 2013 from the CMIP5 models for the state of Alabama as a test of their ability. (Though these runs utilized the rcp8.5 forcing, the period examined (1885-2013) had common forcing in all of the six scenarios.) As can be seen, the output for model trends indicated all models produced very positive temperature trends (red) when in fact the observed trend was negative (±0.09°C/decade 1 and virtually identical between the time series constructed by us in this paper and that of NCEI/NOAA). Thus, 100 percent of the models were in error on the most basic of parameters, µ°C the sign of the temperature trend. Additionally, the great majority of simulations were in error on the trend in precipitation (blue) over the period. Our conclusion stated, “NAA/CMDP climate model runs are examined for Alabama and indicate no skill in replicating long-term temperature and precipitation changes since 1895” (emphasis added). Indeed the skill level was actually negative. This result is generally true for the Southeastern US as a whole. We thus demonstrated that all of the models failed a simple statistical validation test of a critical parameter µ°C surface temperature. As such, NAA has no scientifically-defensible basis to go forward and use such simulations to project future climate changes and impacts from those changes. These models have not passed a simple validation exercise which we have published in the peer-reviewed literature.

*Comment:* While we agree that the global CMIP5 models largely do not represent the observed temperature changes in Alabama and various parts of the Southeast (the lack of warming in parts of that region over the last century relative to the extensive warming of most other parts of the United States is discussed in Chapter 6 of NCA4 Volume 1), a major result from Volume 1 was high resolution downscaled evaluations of the regional climate changes that combine model results with observational data. There has been discussion in the science community of whether there are processes not being considered in the global models (e.g., the deforestation of the Amazon or the growth of tropical forests), but the exact causes of the lack of warming in the Alabama region remain uncertain. The downscaled analyses provide an enhanced evaluation of the past and projected future changes for the authors to use in the regional analyses in Volume 2. Since they have a strong tie back to the observations at the local scale, there is more confidence in those analyses relative to just using the results from the global models at the local scales for some regions. We refer readers to the Report Findings, Front Matter, or Overview comment responses to see specific responses: (1) This comment has been accepted and this sentence has been edited to read: “The climate-related threats to Americans’ physical, social, and economic well-being are rising.” No change. (10) This region has been removed. No change. (11) This text has been moved to a different section of the Overview and the suggested change has been implemented.

*Comment:* While we agree that the global CMIP5 models largely do not represent the observed temperature changes in Alabama and various parts of the Southeast (the lack of warming in parts of that region over the last century relative to the extensive warming of most other parts of the United States is discussed in Chapter 6 of NCA4 Volume 1), a major result from Volume 1 was high resolution downscaled evaluations of the regional climate changes that combine model results with observational data. There has been discussion in the science community of whether there are processes not being considered in the global models (e.g., the deforestation of the Amazon or the growth of tropical forests), but the exact causes of the lack of warming in the Alabama region remain uncertain. The downscaled analyses provide an enhanced evaluation of the past and projected future changes for the authors to use in the regional analyses in Volume 2. Since they have a strong tie back to the observations at the local scale, there is more confidence in those analyses relative to just using the results from the global models at the local scales for some regions. We refer readers to the Report Findings, Front Matter, or Overview comment responses to see specific responses: (1) This comment has been accepted and this sentence has been edited to read: “The climate-related threats to Americans’ physical, social, and economic well-being are rising.” No change. (10) This region has been removed. No change. (11) This text has been moved to a different section of the Overview and the suggested change has been implemented.

*Comment:* Therefore, claims of future impacts based on regional projections of climate models should be disallowed in the simple validation exercise which we have published in the peer-reviewed literature. These models have not passed ‰ÛÒ surface temperature. As such, NA4 has no scientifically-defensible basis to go forward and use such climate change projections to cause substantial damage to the U.S. economy. (2) The effects described here are not uniformly negative; no change. (0) This text has been updated to better reflect mitigation opportunities. (5) The suggested text is not appropriate for this section of the Overview, but similar text has been added later in the Overview that reads: “Actions not taken today will increase risks for future generations and limit their available options to reduce risks.” (6) This comment has been accepted and this sentence has been edited to read: “The long-term warming trend observed over the past century can only be explained by the effects that human activities, especially emissions of greenhouse gases from burning fossil fuels and to a much lesser extent, deforestation, have had on the climate.” (0) This region of text has been removed. (9) The authors have determined that this broad statement is not supported by the underlying chapters and does not fit in this context. However, this point is made elsewhere in the Overview for example: “[NCA4] concludes that the evidence of human-caused climate change is overwhelming and continues to strengthen, that the impacts of climate change are intensifying across the country, and that climate-related threats to Americans’ physical, social, and economic well-being are rising.” No change. (10) This region has been removed. No change. (11) This text has been moved to a different section of the Overview and the suggested change has been implemented.

*Comment:* We thus demonstrated that all of the models failed a simple statistical validation test of a critical parameter µ°C surface temperature. As such, NAA has no scientifically-defensible basis to go forward and use such simulations to project future climate changes and impacts from those changes. These models have not passed a simple validation exercise which we have published in the peer-reviewed literature.
As this is the fourth NCA it would be fitting to include a review of predictions from previous reports to see how well or badly they played out. The 1st NCA in 2000 predicted (p. 17) that the US would warm between 0.3 and 0.6°F per decade. 10 years later, 2010 data for the US is available at https://data.giss.nasa.gov/gistemp/graphs/. Regressing the data from 1979 to 2007 on a time trend yields a warmer temperature increase of 0.4°F per decade, well below the bottom end of your predicted range. If you use the 1986 NCEI analysis you use the 2013-2017 data set, the rate is only 0.2°F per decade, still well below the low end of your predicted range, even with a big El Nino year at the end.

Speaking of the El Ninos, in places you say that US average temperatures have risen by 1.2°F over the last few decades. This is what the whole idea of the time trend is to capture the average temperature change over a number of years. It also means that the average temperature over the past two decades is 1.2°F higher than 1981-1990, which means that the entire increase you are referring to happened in the last 24 months as a result of the El Nino of the end of the sample. These examples point to a pattern of one-sidedness that pervades the document. In the sections I read I saw no attempt to give the reader a balanced understanding of major systemic uncertainties or model findings. The document seems to assume that any change throughout a time period is a change in climate sensitivity based on model projections which are nowhere acknowledged to have a history of overstating warming trends. The failure of the catastrophes outlined in NCA-1 to materialize deserves a full paragraph in the conclusion. That the scientific consensus on climate change is alive and well.

This also has to do with the NCA naming system. NCA-1 was titled "Climate Impacts on the U.S.: Agriculture, Natural Resources, and Energy - A Report to the Congress". NCA-2 was titled "Climate Impacts on the U.S.: State and Regional Issues - A Report to the Congress". NCA-4 was titled "Climate Change Impacts on the U.S.: The Third National Assessment - A Report to the Congress". NCA-4 Volume 1 was titled "Climate Change Impacts: Benefits, Risks, and Costs - A Report to the Congress". This is an example of the excessive over-precision of the NCA naming system. It is also asked to be included at all, it should be placed in an appendix.

Even more specifically, given that the IPCC Assessments emphasize the global scale, including regional and sector-specific analyses such as those in NCAs is in some cases almost doubles this length. Moreover, as it relates to the national vs global scale, it appears that the U.S. is a consistent number across the world. The NCA-1 report was titled "Climate Impacts on the U.S.: Agriculture, Natural Resources, and Energy - A Report to the Congress". This is the only report of the series that does not explicitly mention the NCA-1 report.

The National Research Council (NRC) of the National Academies of Sciences, Engineering, and Medicine was asked to update NCA-1 to incorporate recent and future climate change information. The NRC released its findings in July 2016. The NRC report was titled "Climate Impacts on the U.S.: The Third National Assessment - A Report to the Congress". This is an example of the excessive over-precision of the NCA naming system. It is also asked to be included at all, it should be placed in an appendix.

The NRC report was titled "Climate Impacts on the U.S.: The Third National Assessment - A Report to the Congress". This is an example of the excessive over-precision of the NCA naming system. It is also asked to be included at all, it should be placed in an appendix.

The NRC report was titled "Climate Impacts on the U.S.: The Third National Assessment - A Report to the Congress". This is an example of the excessive over-precision of the NCA naming system. It is also asked to be included at all, it should be placed in an appendix.
AMWA urges all authors to consider how the science and information is being synthesized in the final report to avoid generalizations and unduly deterministic conclusions about the sector, region or topic that is being discussed. The authors must be careful to ensure that the conclusions that are being made are scientifically robust and defendable. Blanket or specific statements that are made in this report without the evidence to back them up will only reduce the report’s credibility.

We fully agree with this comment and have re-doubled our efforts to ensure our confidence in findings is stated clearly and accurately and that all findings have adequate support as found in the peer-reviewed scientific literature or other resources that fulfills Information Quality Act Requirements (see Appendix 2).

The NCA4 is a complementary continuation of NCA3 and the Climate Science Special Report, and the 2018 NCA4 has to be seen as a whole report as opposed to individual parts. We therefore understand that the climate change projections are integral to the implementation of all the climate resiliency initiatives that were completely inappropriate for the sentences to which they were attached. That represents a major flaw in the climate change projections that were supported by NCA3.

We have reviewed the text in the First Matter and the Overview (in particular in the what’s happened since the last NCA box) to include explicit language about how this report relates to both the Climate Science Special Report (i.e., the CCSR Volume I of NCA) and this report (Volume II of NCA) as well as NCA3 (i.e., NCA4 builds on – does not necessarily replace - info in that report).

We appreciate this comment and hearing from stakeholders how USGCRP products are used to inform decisions.

We have identified some chapters that need a strong review editing as well. For example, the health chapter had a number of citations that were completely inappropriate for the sentences to which they were attached. That represents a major flaw in the health chapter.

We fully agree with this comment and have re-doubled our efforts to ensure our confidence in findings is stated clearly and accurately and that all findings have adequate support as found in the peer-reviewed scientific literature or other resources that fulfills Information Quality Act Requirements (see Appendix 2).

The traceable accounts sections of each chapter really need to be reviewed - maybe by one review editor or one person who looks across all the chapters. These varied widely - sometimes each TA varied widely within a chapter. These are one of the few places that were oftenmixed with mistakes (e.g. listing a high confidence in the key message only to say there was medium confidence in the Description of Confidence and Likelihood section later within the same TA). Some were missing opening paragraphs, some had new references not in the chapter, and some had no references, etc. And there needs to be an eye for consistent use of these sections: what is medium confidence in one chapter needs to be medium confidence in another. This is hard, as different authors will have different levels of risk aversion, but some independent review of these would make the entire report stronger.

We appreciate this comment and hearing from stakeholders how USGCRP products are used to inform decisions.

The Natural Resources Defense Council (NRDC) would like to be able to support to the NCA/National Climate Assessment (NCA) effort. The NCA4 is the most comprehensive scientific report on climate change in the United States. It provides a clearly stated, reliable source of information for policy makers, business leaders, and the public, in addition to those within the scientific community. As such, it represents a vital link between current scientific understanding of the observed changes in extreme weather and environment, climate change, and the well-being of Americans. We strongly urge the Administration to honor the scientific integrity and transparency embodied by the NCA process and content, and to let its rigorous scientific and public review process proceed unimpeded - a process that has been strengthened and clarified since its establishment under the Global Change Research Act of 1990.

We appreciate this comment and hearing from stakeholders how USGCRP products are used to inform decisions.
There are several instances where a single number is used to describe the magnitude of an impact. For instance, a single value of sea level rise is used for the Northeast region. We recommend using a range where possible. Additionally, at the beginning of the document and again in the regional chapters please emphasize that trends occurring at the regional scale may not be consistent with local scale studies.

In many instances only a single number is given, but authors ensured text around it provided appropriate context so as to relay an overly precise level of confidence in a given number. In other instances, ranges were included directly in the text, though many authors feared this would interrupt the flow and, as a result, relegated that information to the Traceable Accounts. Since we felt each chapter “knew” its (regional / sectoral) audience best, we did not seek to overly precise how this issue was dealt with throughout the report.

The traceable accounts are frequently the same text used in the chapter, verbatim. Please review the traceable accounts to include the logic used to arrive at the KM and confidence level.

Greater attention has been given to the Traceable Accounts (TA) during this stage of revision. While some text being similar between the actual chapter and the TA itself is unavoidable and intentional, authors have improved the clarity of the TAs to ensure they meet the objective of providing the reader with a deeper dive into the deliberative process among the author team to understand how they arrive at the conclusions they did, while the evidence base is for those conclusions and major uncertainties that precluded more definitive statements.

The purpose of this document and how it can be used by stakeholders should be addressed at the beginning of the document. This should appear in every chapter.

A key focus during this round of revision was to sharpen the connections across chapters. An All-Author Meeting held in Bethesda, MD in late March 2018 facilitated a number of cross-chapter discussions that enabled greater cross-referencing of chapters.

There is a significant amount of repeated text in the Regional Chapters. For instance, the Background in Northeast Chapter 24 is verbatim text from the Summary Overview. This is unnecessarily repetitive.

There has been a tendency to reduce redundancy; however, the example cited in this comment is somewhat intentional. The Executive Summaries for each chapter are intended to be stand-alone overviews of each individual chapter. As such, chapter teams have been instructed to develop these Executive Summaries using verbatim text from the Key Messages and underlying chapter to ensure the content is accurate and consistent.

As a water utility managed within local government, the Portland Water Bureau is strongly supportive of the value of this report to drinking water managers and city planners. The Fourth National Climate Assessment and its authors are to be commended for summarizing the state of the science and adaptation responses for different regions and sectors of the Nation.

We appreciate this kind comment.

There are a number of instances where 100 feet appears in the text. In each instance, 100 feet is converted to meters and rounded to the nearest 10 meters. 100 feet is equivalent to 30.48 meters. However, sometimes the text states 100 meters and other times 48.77 meters. For example page 1002, line 33 states 50, whereas page 1108, line 7 states 50 m. Please be consistent in your conversions throughout the document.

We have worked to ensure that unit conversions are consistent and accurate across the report.

There are 184 pages of Appendixes. A number of these pages are verbatim text from the actual chapter, including the water chapters. This represents a significant increase in the amount of verbatim text from chapters to the Appendixes. We are working to reduce this verbatim text.

We appreciate the commenter highlighting additional resources where these topics are covered.

We disagree on almost all of the diverse statements made in this comment. The comments by this reviewer really relate almost entirely to NCA Volume I (which was extensively reviewed before publication in November 2017), but the reviewer must not have actually read Volume I or perhaps did not understand it, or the commentary provided on Volume II would have been much different. First of all, the reviewer would have noticed that the discussion of past changes in climate are entirely based on observations, that the models were then evaluated relative to those observations throughout the assessment, and that the analyses of future changes were analyzed further than prior assessments by weighting the models relative to how well they represent observations.

Then, regarding the authors, there is actually only a small overlap between authors in NCA3 and those in NCA4 (7 out of the 51 authors of NCA4 Volume I were authors of the science sections for NCA3). There was no bias at all in the author selection process. The authors were selected after an open process for nominations (through a Federal Register announcement). This was the case for both NCA4 Volume 1 and Volume II. The selection of the authors by the Federal Register Committee considered a variety of criteria, the most important of which were the accomplishments of the prospective authors and their expertise, and their likelihood for accurately assessing the state of understanding of the changes in climate and resulting impacts for the chapters they were selected for as an author.

Most of the commentary relates to the state of models used for the future projections. First, it should be noted that Chapter 2 in Volume II is a short summary of findings from the now published Volume I. Uncertainties of the science are extensively discussed in Volume 1.

It is important to recognize that volume II builds on Volume I and does not replace it. Volume 3 does discuss the issues raised by the reviewers related to the science of climate change, including the concerns about models and associated uncertainties (for example, note that for the first time in an assessment a weighting was applied to the models in NCA3 based on how well they represented observations that have not been found in any previous assessment – see Chapter 4 and Appendices B & D of NCA4 Volume I).

The comments about models oversimplifying the observed trends in globally averaged temperature primarily relate to the slowdown in the rate of temperature increase that occurred between about 2000-2013. Figure 1 in the commentary is a distinct look at the comparison of temperature with observations, largely because it only
Thank you for the opportunity to review the U.S. Global Change Research Program Forth National Climate Assessment (NCA4). We provide comment. The Society for Historical Archaeology (SHA) has increased its attention on heritage at risk in an effort to raise awareness within our discipline and the communities we serve on the impacts of climate change on cultural resources.

SHA is the world’s leading scholarly society devoted to the archaeology and material culture of the modern world (AD 1400-present). Most of our 2,300 members are professional archaeologists who teach, work in museums or consulting firms, or who have government posts. We have a close relationship with the Advisory Council for Underwater Archaeology and our members include many of the world’s leading underwater archaeologists.

The Society for Historical Archaeology supports the NCA4 attempt to integrate cultural resources into the regional chapters, adaptation, and complex systems discussion. The assessment mentions archaeology only once but archaeological sites are included under cultural resources and heritage. We appreciate the assessments attention in the overall document to tribal and indigenous communities, as well as maritime heritage in the northeast chapter.

SHA recommends a cultural resources section under national topics or increased content on the impact of climate change on cultural resources in the coastal effects, oceans and marine resources, rural communities, built environment, and tribal and indigenous communities chapters. Other areas where research on impacts to archaeological sites can impact the effectiveness of the assessment are economics. For example, in Florida heritage tourism is a $6 billion dollar industry, and a majority of the sites are threatened in the coastal zone.

Another area where research on archaeological sites can provide meaningful content is conditions of archaeological sites themselves as indicators of climate change. Groups like SCAPE in Scotland, CHERSHi in Ireland and Wales, and TICCA in England are currently using conditions of submerged and coastal archaeological sites as indicators of climate change. The assessment looks to historical data on climate change, but archaeologists also collect data on the interaction of human cultures with the environment in the United States over 14,000 years and these data can be useful in adaptation and mitigation planning.

SHA requests the editors to consider inclusion of an archaeologist in each regional chapter to contribute to the final draft. Data are available for the eastern seaboard that can be included in this report. In November of David Anderson et al. (2017) published quantitative data on archaeological sites to be impacted by sea level rise on the eastern seaboard that can be included in this report. In November of 2017, the National Park Service (NPS) and the National Oceanic and Atmospheric Administration (NOAA) conducted an archaeological survey of a site in eastern Massachusetts that was occupied by the Wampanoag people from AD 1621 to 1624. This site is threatened by changing sea levels, and the findings could be useful in future assessments.

The draft fourth National Climate Assessment addresses a great deal of important scientific information as well as considerations for taking action on mitigation and adaption. We strongly support the continuation of the National Climate Assessment. The draft outlines the myriad of ways climate change has and could increasingly affect the lives of virtually all Americans and sectors of the economy. In general, we believe that this draft assessment does a good job of balancing the need to provide specific scientific information that is specific enough to encourage reasonable action and laying out the limitations and uncertainties contained within the assessment. A thorough analysis of uncertainties and limitations is exceptionally important to the water sector, as its infrastructure projects are often in place for many decades and the entire range of plausible futures must be known to those designing them to make the most informed decisions possible. However, we believe that the assessment could improve in how it discusses implications to, actions taken by, and other aspects of the water sector as portrayed in the report. Several specific suggestions are described here to follow the best available information. The water sector is working to address climate-related issues and vulnerability to extreme events, while recognizing that there are also many other public health, environmental, and social issues that the sector must also address with its limited resources. AWWA supports the water sector’s inclusion in regional analysis and the integration of information on the effects of drinking water quality on human health and wellbeing. We believe the NCA is a valuable assessment that provides action and research across many sectors. AWWA would like to offer the following comments to enhance the effectiveness of the assessment.

We appreciate the opportunity to provide comment on this matter. Please feel free to contact myself or Adam Carpenter at AWWA (202-628-8300, acarpenter@awwa.org) if you have any questions regarding these comments.

Respectfully,
S. Tracy Meyer, III
Executive Director of Government Affairs
American Water Works Association

About AWWA: AWWA is an international, nonprofit, scientific and educational society dedicated to providing total water solutions assuring the effective management of water. Founded in 1881, the Association is the largest organization of water supply professionals in the world. Our membership includes nearly 4,000 utilities that total water solutions assuring the effective management of water.
Concerned Scientists

George Fleming

14,644

14,648

Whole Document

Whole Document

Principal Authors: M. Kammen, C. Rosenzweig, and Peter Detz, University of California, Berkeley, and Distinguished Professor of Arts and Science George S. Bakken, Indiana State University, Department of Biology, and Professor Emeritus

13 January 2018

U.S. Global Change Research Program,
3737 Pennsylvania Ave. NW., Suite 255,
Washington, DC 20006

Submitted via online portal
Dear U.S. Global Change Research Program:

In behalf of our 3.2 million members and supporters nationwide, we thank you for the opportunity to provide input on the Third Order Draft of the Fourth National Climate Assessment (NCA4), Volume II (62 Fed. Reg. 31364). Defenders of Wildlife is a national conservation organization dedicated to protecting native plants and animals from a range of threats, including climate change and related effects. We value National Climate Assessments as an important resource for understanding and communicating the reality of climate change and its multifarious impacts at national and regional scales.

We wish to maintain the creation of the %U.S. Climate Change Special Report (CSSR) to better inform the sectoral and regional impacts discussed in the current Assessment substantively improved the utility of the current volume by providing a knowledge base, and we were pleased to have the opportunity to comment on that volume during its development. We support the new %U.S. scenario product(s) that have been developed as part of the %U.S. assessment process, including documented changes in both averages and extremes of key climate variables like temperature and precipitation, and updated information about changes in local sea level rise along the U.S. coastline. Additionally, because climate change impacts do not occur in a vacuum, we are glad to see that the new scenarios support integrated information that shows the interactions between climate change and other factors, like changes in human population as a function of demographic shifts and migration and land use changes driven by these population changes. We also found the regional roll-ups within the %U.S. sector(s) to be a useful summary of those impacts. In fact, our primary recommendation for improving the Assessment is to make a %U.S. roll-up of these summaries that address biodiversity and habitat impacts of for each Sector topic.

A case in point is the %U.S.Water% chapter, which currently mentions the effects of climate changes on aquatic species and biodiversity, despite the fact that the degradation of wetland, stream and other aquatic species is also a major factor that leads to biodiversity loss.

Please be sure that all percent changes or other such projections be coupled with a baseline. There were some instances in which this was not the case, e.g., Page 41, Lines 20-26.

The Front Matter explains what the Traceable Accounts are, how they are developed, and the information they provide. The “Traceable Account” sections for each chapter all contained details on likelihood and confidence, embedded summaries that provide the American public, the private sector, and decision makers alike with critical information to manage climate change. We appreciate the platform that the report provides for the consideration of diverse perspectives from across the country through, for example, this review process.

The primary recommendation here is to include “roll-ups summaries that address biodiversity and habitat impacts of for each Sector topic.” Since the scope of this report is focused on climate change (both human-induced and natural), having each a section in each chapter is deemed to be outside the remit for the particular assessment.

The commenter is directed to other assessment efforts (e.g., IPBES - including that organization’s recent Global Assessment report) for coverage of these issues. Also, we appreciate the praise for the Coastal chapter. Finally, we note that the concern raised about the Ecosystems chapter (i.e., the fact that its focus was too constrained) has been addressed through a fairly substantial reframing of the content around issues beyond those described by the %U.S. Climate Assessment process to focus the assessment of RCP4.5 and RCP8.5 to provide the reader with a sense of the range of projected outcomes while not overwhelming the reader with multiple scenarios.

Thank you for the kind comment.

Care has been taken to ensure that percent changes are pegged to a baseline to provide clarity for the reader.

The Front Matter explains what the Traceable Accounts are, how they are developed, and the information they are intended to relay. Greater attention has been given by authors to the Traceable Accounts in this stage of the process for their consistency, and level of detail has been greatly improved, as a result.

The most recent round of the commented drafts of the report have been made available online at https://nca2018.globalchange.gov. Please be sure that all percent changes or other such projections be coupled with a baseline.

Thank you for the kind comment.

John Fleming

14,646

Whole Document

Whole Document

U.S. Global Change Research Program,
3737 Pennsylvania Ave. NW., Suite 255,
Washington, DC 20006

Submitted via online portal
Dear U.S. Global Change Research Program:

Thank you for the kind comment; we have responded to the comments you submitted on Chapter 7.

Please be sure that all percent changes or other such projections be coupled with a baseline. There were some instances in which this was not the case, e.g., Page 41, Lines 20-26.

Whole Document

Whole Document

U.S. Global Change Research Program,
3737 Pennsylvania Ave. NW., Suite 255,
Washington, DC 20006

Submitted via online portal
Dear U.S. Global Change Research Program:

While some readers seek to have that calibrated likelihood and confidence language embedded in the Key Messages as they appear in the main chapter text, we wish to maintain the creation of the Key Messages wherever they appear in the Traceable Accounts. This was done to make the Key Messages as they appear in the main chapter text read as smoothly as possible.

While some readers seek to have that calibrated likelihood and confidence language embedded in the Key Messages wherever they appear, NCA leadership made the decision early in the NCA4 development process to focus the assessment of RCP4.5 and RCP8.5 to provide the reader with a sense of the range of projected outcomes while not overwhelming the reader with multiple scenarios.

Thank you for the kind comment.

Aimee Delach

14,695

Whole Document

Whole Document

Please be sure that all percent changes or other such projections be coupled with a baseline. There were some instances in which this was not the case, e.g., Page 41, Lines 20-26.

We wish to maintain the creation of the %U.S. Climate Change Special Report (CSSR) to better inform the sectoral and regional impacts discussed in the current Assessment substantively improved the utility of the current volume by providing a knowledge base, and we were pleased to have the opportunity to comment on that volume during its development. We support the new %U.S. scenario product(s) that have been developed as part of the %U.S. assessment process, including documented changes in both averages and extremes of key climate variables like temperature and precipitation, and updated information about changes in local sea level rise along the U.S. coastline. Additionally, because climate change impacts do not occur in a vacuum, we are glad to see that the new scenarios support integrated information that shows the interactions between climate change and other factors, like changes in human population as a function of demographic shifts and migration and land use changes driven by these population changes. We also found the regional roll-ups within the %U.S. sector(s) to be a useful summary of those impacts. In fact, our primary recommendation for improving the Assessment is to make a %U.S. roll-up of these summaries that address biodiversity and habitat impacts of for each Sector topic.

A case in point is the %U.S.Water% chapter, which currently mentions the effects of climate changes on aquatic species and biodiversity, despite the fact that the degradation of wetland, stream and other aquatic species is also a major factor that leads to biodiversity loss.

Please be sure that all percent changes or other such projections be coupled with a baseline. There were some instances in which this was not the case, e.g., Page 41, Lines 20-26.

The primary recommendation here is to include “roll-ups summaries that address biodiversity and habitat impacts of for each Sector topic.” Since the scope of this report is focused on climate change (both human-induced and natural), having each a section in each chapter is deemed to be outside the remit for the particular assessment.

The commenter is directed to other assessment efforts (e.g., IPBES - including that organization’s recent Global Assessment report) for coverage of these issues. Also, we appreciate the praise for the Coastal chapter. Finally, we note that the concern raised about the Ecosystems chapter (i.e., the fact that its focus was too constrained) has been addressed through a fairly substantial reframing of the content around issues beyond those described by the %U.S. Climate Assessment process to focus the assessment of RCP4.5 and RCP8.5 to provide the reader with a sense of the range of projected outcomes while not overwhelming the reader with multiple scenarios.

Thank you for the kind comment.

George Bakken

14,693

Whole Document

Whole Document

U.S. Global Change Research Program,
3737 Pennsylvania Ave. NW., Suite 255,
Washington, DC 20006

Submitted via online portal
Dear U.S. Global Change Research Program:

In behalf of our 3.2 million members and supporters nationwide, we thank you for the opportunity to provide input on the Third Order Draft of the Fourth National Climate Assessment (NCA4), Volume II (62 Fed. Reg. 31364). Defenders of Wildlife is a national conservation organization dedicated to protecting native plants and animals from a range of threats, including climate change and related effects. We value National Climate Assessments as an important resource for understanding and communicating the reality of climate change and its multifarious impacts at national and regional scales.

We wish to maintain the creation of the %U.S. Climate Change Special Report (CSSR) to better inform the sectoral and regional impacts discussed in the current Assessment substantively improved the utility of the current volume by providing a knowledge base, and we were pleased to have the opportunity to comment on that volume during its development. We support the new %U.S. scenario product(s) that have been developed as part of the %U.S. assessment process, including documented changes in both averages and extremes of key climate variables like temperature and precipitation, and updated information about changes in local sea level rise along the U.S. coastline. Additionally, because climate change impacts do not occur in a vacuum, we are glad to see that the new scenarios support integrated information that shows the interactions between climate change and other factors, like changes in human population as a function of demographic shifts and migration and land use changes driven by these population changes. We also found the regional roll-ups within the %U.S. sector(s) to be a useful summary of those impacts. In fact, our primary recommendation for improving the Assessment is to make a %U.S. roll-up of these summaries that address biodiversity and habitat impacts of for each Sector topic.

A case in point is the %U.S.Water% chapter, which currently mentions the effects of climate changes on aquatic species and biodiversity, despite the fact that the degradation of wetland, stream and other aquatic species is also a major factor that leads to biodiversity loss.

Please be sure that all percent changes or other such projections be coupled with a baseline. There were some instances in which this was not the case, e.g., Page 41, Lines 20-26.

The primary recommendation here is to include “roll-ups summaries that address biodiversity and habitat impacts of for each Sector topic.” Since the scope of this report is focused on climate change (both human-induced and natural), having each a section in each chapter is deemed to be outside the remit for the particular assessment.

The commenter is directed to other assessment efforts (e.g., IPBES - including that organization’s recent Global Assessment report) for coverage of these issues. Also, we appreciate the praise for the Coastal chapter. Finally, we note that the concern raised about the Ecosystems chapter (i.e., the fact that its focus was too constrained) has been addressed through a fairly substantial reframing of the content around issues beyond those described by the %U.S. Climate Assessment process to focus the assessment of RCP4.5 and RCP8.5 to provide the reader with a sense of the range of projected outcomes while not overwhelming the reader with multiple scenarios.

Thank you for the kind comment.

George Bakken

14,619

Whole Document

Whole Document

U.S. Global Change Research Program,
3737 Pennsylvania Ave. NW., Suite 255,
Washington, DC 20006

Submitted via online portal
Dear U.S. Global Change Research Program:

The most recent round of the commented drafts of the report have been made available online at https://nca2018.globalchange.gov. Please be sure that all percent changes or other such projections be coupled with a baseline.

Thank you for the kind comment.
<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
<th>Comment ID</th>
<th>Comment Type</th>
<th>Chapter</th>
<th>Figure/Table Number</th>
<th>Start Page</th>
<th>End Page</th>
<th>Start Line</th>
<th>End Line</th>
<th>Comment</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144575</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>This is an important document that gathers current, relevant science and makes it available to the people who shape the future (including policy-makers, educators, researchers, farmers, land managers, business people, community organisations and the public). Society will benefit from this report and from efforts to make the data and conclusions accessible to everyone. Thank you to the researchers and authors who have prepared this document.</td>
<td></td>
</tr>
<tr>
<td>Syomi</td>
<td>Shrestha</td>
<td>14460</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In addition to updating the current cross-references to SOCCR-2 in NCA4, please conduct a thorough assessment of all carbon and SOCCR-2 pertinent contents of NCA4 Vol 2 to ensure proper cross-referencing and consistency of information between both reports. Where more cross-referencing is not enough, boxes summarizing pertinent SOCCR-2 information could be developed and inserted strategically in relevant sections of NCA4 Vol II chapters, including current or new appendices, as needed. A quick search of the NCA4 vol 2 draft reveal only 8 instances of the cross-references to SOCCR-2: Pages: 410 Page: 429 Page: 468 Page: 1533 Page: 1150</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14460</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Among the 421 instances of the term carbon used across NCA4 Vol I, I found several instances where SOCCR-2 has not cross-references and/or should have been should be cross-referenced more appropriately. E.g. pages 20-40, pages 48-75, pages 83-102, pages 193-207, pages 222-246, pages 300-326, pages 351-395 pages 524-581, pages 821-941 pages 1089-1125 pages 1137-1325 Please ensure adequate and consistent cross-referencing with SOCCR-2 across NCA4 Vol II.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14460</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>There are very little coverage of the Caribbean Islands in the sectoral chapters of this document, so about Puerto Rico, Virgin Islands, etc. Inserting some examples of the problems they are facing would likely be beneficial.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14460</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>There are very little coverage of the Caribbean Islands in the sectoral chapters of this document, so about Puerto Rico, Virgin Islands, etc. Inserting some examples of the problems they are facing would likely be beneficial. We have sought to provide greater and more consistent regional coverage and references in the sectoral chapters, as well as in the Overview. In some instances, however, a lack of data, science, or other information precludes a more holistic coverage of some regions for some sectors. This is particularly true for the US Caribbean, Hawaii, US Affiliated Pacific Islands, and Alaska regions of NCA4.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>14454</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The Traceable Accounts are an indispensable component of NCA4 Vol II as they provide the reader with greater transparency of the deliberative process taken by the authors to come to the conclusions they did. As a result, although many decisions will take the time for 1500 pages of information. Some suggestions: 1) The traceable accounts sections should be pulled from the text and published as a second report or an appendix. The chapter-by-chapter sections on uncertainties are my favorite addition to the assessment, but the overall traceable account section naturally contains some redundancies with the core report, and the text is too cumbersome at its current length, so splitting out the traceable accounts and shortening the core report makes sense. 2) I realize the authors were trying not to tell the research community what to study, but hints at critical gaps in data or understanding occur throughout the report (e.g page 356, lines 12-17; p 430, lines 35-36; p 550, lines 26-31; and Chapter 29) has a unique format with a section on &quot;Directions for Future Research&quot;. The chapter authors must currently have a strong sense of what the critical gaps are in data and understanding that, if corrected, would significantly improve uncertainties in NCA-5. It is a shame not to capture that knowledge in a form that allows us to improve and/or defend both our research and our long-term monitoring over the next 4 years. That said, a synthesis of the Traceable accounts sections, with a set of overall recommendations for critical new or existing research, essential studies or monitoring under threat of termination, and recommendations for core measurements to track change in whole systems, and notify detected of resilience changes across landscapes and waters is a gap in the current report. The knowledge just gathered by the NCA-4 authors provides a short-term opportunity to generate that synthesis and 2) More detailed cross-check between the draft SOCCR-2 report and the draft NCA4 was conducted to determine where one report’s findings are relevant to the other. Authors were provided with this information to facilitate conversation between relevant authors and ensure accuracy and consistency in how scientific findings are presented.</td>
<td></td>
</tr>
<tr>
<td>Syomi</td>
<td>Shrestha</td>
<td>14460</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In addition to updating the current cross-references to SOCCR-2 in NCA4, please conduct a thorough assessment of all carbon and SOCCR-2 pertinent contents of NCA4 Vol 2 to ensure proper cross-referencing and consistency of information between both reports. Where more cross-referencing is not enough, boxes summarizing pertinent SOCCR-2 information could be developed and inserted strategically in relevant sections of NCA4 Vol II chapters, including current or new appendices, as needed. A quick search of the NCA4 vol 2 draft reveal only 8 instances of the cross-references to SOCCR-2: Pages: 410 Page: 429 Page: 468 Page: 1533 Page: 1150</td>
<td></td>
</tr>
<tr>
<td>Syomi</td>
<td>Shrestha</td>
<td>14454</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The Traceable Accounts are an indispensable component of NCA4 Vol II as they provide the reader with greater transparency of the deliberative process taken by the authors to come to the conclusions they did. As a result, although many decisions will take the time for 1500 pages of information. Some suggestions: 1) The traceable accounts sections should be pulled from the text and published as a second report or an appendix. The chapter-by-chapter sections on uncertainties are my favorite addition to the assessment, but the overall traceable account section naturally contains some redundancies with the core report, and the text is too cumbersome at its current length, so splitting out the traceable accounts and shortening the core report makes sense. 2) I realize the authors were trying not to tell the research community what to study, but hints at critical gaps in data or understanding occur throughout the report (e.g page 356, lines 12-17; p 430, lines 35-36; p 550, lines 26-31; and Chapter 29) has a unique format with a section on &quot;Directions for Future Research&quot;. The chapter authors must currently have a strong sense of what the critical gaps are in data and understanding that, if corrected, would significantly improve uncertainties in NCA-5. It is a shame not to capture that knowledge in a form that allows us to improve and/or defend both our research and our long-term monitoring over the next 4 years. That said, a synthesis of the Traceable accounts sections, with a set of overall recommendations for critical new or existing research, essential studies or monitoring under threat of termination, and recommendations for core measurements to track change in whole systems, and notify detected of resilience changes across landscapes and waters is a gap in the current report. The knowledge just gathered by the NCA-4 authors provides a short-term opportunity to generate that synthesis and 2) More detailed cross-check between the draft SOCCR-2 report and the draft NCA4 was conducted to determine where one report’s findings are relevant to the other. Authors were provided with this information to facilitate conversation between relevant authors and ensure accuracy and consistency in how scientific findings are presented.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144575</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A couple of editorial suggestions: Always capitalize “Earth” when referring to the planet. There are no correct places to put degrees of “certainty” and degrees of certain “confidence” and degrees of certain “conformance” or “concomitantness” when referring to the 48 states. I’d also encourage use of “that” for phrases that must be there (with no comma in front), and “which” for phrases that are optional (usually always preceded by a comma). Be the capitalization of “Earth”, we agree with this comment and the change will be made as part of the regular copy editing process. Re the degrees of certainty, we understand the concern, and where appropriate, the language will be changed to be consistent with Volume I of the NCA, which uses the phrase, &quot;extent of uncertainty&quot;. Re “conformal” vs “concomitant”, we agree with this comment and the change will be made as part of the regular copy editing process. Re use of “that”, we agree with this comment and the change will be made as part of the regular copy editing process.</td>
<td></td>
</tr>
<tr>
<td>Syomi</td>
<td>Shrestha</td>
<td>14460</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Among the 421 instances of the term carbon used across NCA4 Vol I, I found several instances where SOCCR-2 has not cross-references and/or should have been should be cross-referenced more appropriately. E.g. pages 20-40, pages 48-75, pages 83-102, pages 193-207, pages 222-246, pages 300-326, pages 351-395 pages 524-581, pages 821-941 pages 1089-1125 pages 1137-1325 Please ensure adequate and consistent cross-referencing with SOCCR-2 across NCA4 Vol II.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144575</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Among the 421 instances of the term carbon used across NCA4 Vol I, I found several instances where SOCCR-2 has not cross-references and/or should have been should be cross-referenced more appropriately. E.g. pages 20-40, pages 48-75, pages 83-102, pages 193-207, pages 222-246, pages 300-326, pages 351-395 pages 524-581, pages 821-941 pages 1089-1125 pages 1137-1325 Please ensure adequate and consistent cross-referencing with SOCCR-2 across NCA4 Vol II.</td>
<td></td>
</tr>
<tr>
<td>Michael</td>
<td>MacCracken</td>
<td>144575</td>
<td>Whole Document</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Among the 421 instances of the term carbon used across NCA4 Vol I, I found several instances where SOCCR-2 has not cross-references and/or should have been should be cross-referenced more appropriately. E.g. pages 20-40, pages 48-75, pages 83-102, pages 193-207, pages 222-246, pages 300-326, pages 351-395 pages 524-581, pages 821-941 pages 1089-1125 pages 1137-1325 Please ensure adequate and consistent cross-referencing with SOCCR-2 across NCA4 Vol II.</td>
<td></td>
</tr>
</tbody>
</table>
Michael MacCracken 14-026 Whole Document

Front of Information: I thought it very helpful to have the "Traceable Account" sections, but due to time constraints, I had to focus my comments on the main text of the chapters, hopeful that comments made on those sections might be carried on back to the "Traceable Account" section.

We developed additional writing guidance for the authors in light of this (and related comments) providing examples of how to avoid the use of "future conditionals" such as "may" or "could." The revised draft, therefore, has far fewer instances where these euphemistic and vague phrases are used. We also took care to ensure the calibrated uncertainty language (e.g., "likely," "very likely," etc.) were not used in the text unless it was specifically in the context of the calibrated uncertainty language as presented in the Front Matter.

Michael MacCracken 14-026 Whole Document

With respect to the word "drought," it usually refers to a reduction in water availability for some time, more than a few years, and not as a temporary drought. It is not dry, for example, that the Sahara Desert is experiencing a drought just because it was vegetated several thousand years ago, etc. It is a drought. The long term trend toward drying in southwestern North America due to the poleward shift of the northern boundary of the subtropics is also a drought—this is a gradual alteration of the region and not referred to as a drought. Now, one may have some wet and dry years after the decreasing precipitation trend, so one can have what one might call a drought—but the general drying trend, the shift from having a good number of rainy years in a decade and an occasional dry year to having mostly dry years and an occasional wet year is not drought—this trend is aridification. I make this point because how one responds really depends. I'm going to have a few dry years and a return to mostly wet years, then longer reservoirs is a plausible response; however, if there will be that return to extended patterns of wet years and most years will be dry (no aridification), then longer reservoirs is not a useful step—what is needed are actions to reduce per capita demand, efficiency, anti-landscaping, shifts away from water-demanding crops, etc. I would urge inclusion of a box somewhere explaining this and encouraging authors to be using the appropriate terms, because right now, drought is the word being used to explain both the trend and short term variations, and declarers and resource managers really need to be provided clear information on this.

We agree and made sure that changes to the text got reflected in the traceable accounts.

Michael MacCracken 14-4408 Whole Document

Another point that needs to be made is that after this assessment looks out across the 21st century, changes will continue thereafter. For sea level, for example, it's going to keep rising well past 2020 and focus on sea level rise in 2100 in the report is nearly mandatory by section that sea level rise will continue thereafter. Yes, useful to be aware of what the worst case might be for 2100, but in presenting such information, it needs to be mentioned that the indicated level is likely at or below the middle level expected (or that could plausibly occur) by 2100, so generation or centuries. I encourage some early discussion on this point and then a way for the chapter authors to refer to it in a statement that was made earlier still go on beyond 2100. Similarly, though to some extent dependent on policy actions during the 21st century, there will be ongoing climate changes after 2020 if the current pace of emissions decreases is not very greatly speeded up. So I'd like to see some attention to the issue of beyond 2100, perhaps in a box somewhere—references made from the chapters to that box.

We agree, thank you for this helpful comment. A detailed cross-check between the draft SOCOR report and the draft NCA4 was conducted to determine where one report's findings are relevant to the other. Authors were provided with this information to facilitate communication between relevant authors and ensure accuracy and consistency in how scientific findings are presented.
In addition to updating the current cross-references to SOCCR-2 in NCA4, please conduct a thorough assessment of all carbon and SOCCR-2 pertinent sections of NCA4 Vol 2 to ensure proper cross-referencing and consistency of information between both reports. As a resource to help you with this process of cross-referencing, please see the Preface in the SOCCR-2 Public Draft, specifically the SOCCR-2-NCA4 cross-walks figure which was developed in response to the Committee of the SGCR Principals’ request in year 2016 and presented to them accordingly. Please also refer to the SOCCR-2 Preface Venn Diagram, developed based on an earlier iteration conducted by NCA-4 staff, encompassing overlapping topics among the concurrently developed/soon to be released 2017-2018 release date USGCRP Assessments (CSSR-NCA4-SOCCR2).

We agree; thank you for this helpful comment. We agree; thank you for this helpful comment. A detailed cross-check between the draft SOCCR-2 report and the draft NCA4 was conducted to determine where one report’s findings are relevant to the other. Authors were provided with this information to facilitate conversations between relevant authors and ensure accuracy and consistency in how scientific findings are presented.