

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Corell	Gen			Part 1: The drafting team has done a remarkable job of assessing the state of climate change scientific understandings and the attendant impacts and consequences as it relates to a broad spectrum of U.S. interests. The outline is “on target” for a unified synthesis from a global and national perspective and then the sectoral and regional assessments. The concluding sections bring needed perspectives to the complexities of the climate system on to adaptation and pathways to improved understanding. The science and related assessment materials in the report are competently and expertly addressed, which is to be expected given the experience, talents, and insights of the authoring team. This is a first class effort and accomplishment. Given this background, there are several thoughts offered the hopes that the final Product will receive broad readership and action, they include: Corell	General	Thank you for your comment.
BR	Corell	Gen			Part 2: Two-Volume Strategy: The draft is 199 pages, which enabled the team to cover the needed issues and aspects. However, it presents a challenge to the audiences, some of whom most needed to read it, often only have time to read a short set of key findings and a synthesis of the major issues. Therefore, it is strongly recommended that the report be seen as a “foundation” document that covers the full range of key issues and perspectives in needed detail which is then keyed to an “Overview Document” that is written for a broad non-scientific audience. This “Overview Document” should not be seen as a Summary, Abstract or Executive Summary of the “Foundation Document” but a stand-alone document that covers the Key Findings and major messages essential to those faced with decisions either in government or across the nations public and private sectors. . This “Overview Document” should not be over 18-20 pages, maximum. Corell	General	Thank you for your interesting suggestion. While the USP must remain as one document, your point that a 199 page USP is too long for some potential readers is recognized and the report will be shortened somewhat.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Corell	Gen			<p>Part 3: New Title: This document has been prepared for a broad readership; hence the title should reflect that approach. The current title, "Global Climate Change Impacts in the United States" is too much like an AGU talk. I'd re-name it something like: "Climate Change: America's Future" or "Climate Change: Our Country's Future". I'm sure there are other ideas, but name it with a catchy yet honest projection about the future.</p> <p>Graphics Need to be Re-Sized: Many of the graphics are too small, text font size too small, and some are too complex with more than needed information in one graphic. Keep them simple. Corell</p>	General	<p>While some authors agree that your title suggestion is an excellent one, the USP title will remain as it is.</p> <p>Graphics have been re-sized and in some cases simplified throughout the report.</p>
BR	Corell	Gen			<p>Part 4: Need a Roadmap for the Reader: The report is so dense that the Two Volume Strategy would be part of a Roadmap for the reader, where the "Overview Document" provides the essentials and the Unified Synthesis Project provides the foundational materials and more depth for those readers who want it. The "Overview Document" will, by necessity, need to be keyed to the Unified Synthesis Project as the Unified Synthesis Project is now keyed to other reports, synthesis products, etc. Corell</p>	General	<p>The revised report now starts out with a section "About this Report" and has been simplified, so some aspects of what a roadmap would provide have not been addressed.</p>
BR	Duce	Gen			<p>Overall I believe that the authors have done an excellent job of synthesizing a tremendous amount of material, organizing it in an intelligent way, and presenting it, for the most part, in a way that will be understandable to the average reader. This average person, as indicated in the background material, would be "the lay community leader (high-school graduates) and policy makers". There are a few places where this type of individual would have problems understanding the points being made, and I have tried to identify a few of those. Duce</p>	General	<p>Thank you for your comment.</p>

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BR	Duce	Gen			The background material also indicates that the report should “identify important gaps in science”. One really has to look for that information, as there is no section that specifically addresses that issue. Perhaps the closest the report comes in a synthetic way is some of the discussion on pages 162 to 165, under “Pathways to Improve Decision Making”. If there were to be any new section added to this report (and I understand that time likely makes that very unlikely), then a section specifically on the major gaps in our scientific understanding would be most useful. Duce	General	Thank you for the comment. A new section entitled “Reducing Gaps in Understanding” has been added as suggested.
BR	Duce	Gen			Are the goals, objectives and intended audience of the product clearly described in the document? I believe that this is adequately done on pages 14 and 15. One has to look long and hard to finally find to whom the report is intended, at the end of the text on page 15. This could perhaps be placed earlier in the report. Duce	General	This has been addressed in a revised “About this Report Section” which is part of the USP introductory material.
BR	Duce	Gen			Are any findings and/or recommendations adequately supported by evidence or analysis? In cases where assessments or recommendations are based on the expert judgment of the authors, is this acknowledged and supported by sound reasoning? Yes, I believe in general that this has been done well. There are a few places where this might be improved, and I comment on them in my specific comments below. Duce	General	Thank you for your comment.
BR	Duce	Gen			Are the data and analyses handled in a competent manner? Where appropriate, are statistical methods applied appropriately? Are uncertainties and likelihood statements evaluated and communicated appropriately? Again, in general this has been done well. There are a few places where I believe this could be improved (in particular where regression curves through scattered points are presented), and I comment on them in my specific comments below. Duce	General	Thank you for your comment.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	Gen			Is the document’s presentation, level of technicality, and organization effective? Is the material discussed communicated in a manner that is appropriate and accessible for the intended audience (e.g., lay audiences, policy makers, high school graduates)? In most places the presentation and level of technicality is fine, but there are certainly some figures especially which will be hard to understand by the lay reader. I identify some of these in my specific comments below. Duce	General	Thank you for your comment.
BR	Duce	Gen			Is the document scientifically objective? Is it consistent with the scientific literature? Yes, in general it is. My main concern here (which I comment on in my specific comments below as well) is that in not all places is it made clear that statements about the future are based on projections or models - they are not statements of known fact. This is something we must be very careful about throughout the report. I’m sure that I have only mentioned a few specific cases below, but this needs to be looked at carefully in the entire document. Duce	General	Agreed. The report has been edited accordingly.
BR	Duce	Gen			Is there a synopsis and summary that effectively, concisely, and accurately describes the key findings and recommendations? Is it consistent with other sections of the document? As I mention below, the synopsis and summary is rather sterile, I feel, but certainly covers the key points well. It appears to me to be consistent with the rest of the report. Duce	General	Yes, the Executive Summary, including a shorter, better-focused Key Findings list, has undergone major revision.
BR	Duce	Gen			Are there significant improvements that might be made in the document without adding to its length? In general, no, although I do suggest in my specific comments below a few places where additional things might be added (short text, new figure, etc.), but I only do that where there is clearly space available for it to be done, or if something else is removed in that area. Duce	General	Thank you for your comment.
BR	Ebi	Gen			An issue of concern throughout the UPS is that equal weight was given to results from assessments and to single publications. This gives the impression that publications were chosen to demonstrate particular impacts. For example, I did not see, but could have missed, citations of publications suggesting that the size/severity of an impact might be smaller than the consensus statements from assessments. Ebi	General	The report has now been more thoroughly cited.

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BR	Ebi	Gen			An issue of concern throughout the USP is that uncertainties are not well communicated; nor does the USP differentiate between uncertainties associated with the conclusions of assessments and with individual studies. It should be made clear there are uncertainties in terms of the projections and in terms of underlying vulnerabilities. Ebi	General	Uncertainties have been addressed more explicitly in the revised version both in the “About this Report” Section and in the wider use of specifically defined likelihood statements.
BR	Ebi	Gen			The USP does not make clear that many projections of impacts do not take into consideration the extent to which timely and effective adaptation could reduce the size/severity of the impact. Ebi	General	This is true but for a very good reason: the peer-reviewed literature on adaptation is inadequate to the task. This is now clearly stated in the Pathways section.
BR	Ebi	Gen			The USP makes reference to the climate change commitment, but does not include this information consistently throughout the document. The extent of the climate change commitment should be a key finding. Ebi	General	The Core Group discussed this issue and they agreed that the climate change commitment concept is adequately addressed in the general section.
BR	Ebi	Gen			Health is included in the discussions for the first few regions, and then is not mentioned in the regions that follow. Ebi	General	Each region describes the most important impacts in the region, and this varies region by region. For some regions, health issues were not part of this group.
BR	Ebi	Gen			Are the goals, objectives and intended audience of the product clearly described in the document? 1. The goals and objectives are clear. Ebi	General	Thank you for your comment.
BR	Ebi	Gen			Are the data and analyses handled in a competent manner? Where appropriate, are statistical methods applied appropriately? Are uncertainties and likelihood statements evaluated and communicated appropriately? 3. The USP should clarify the differences in uncertainty between the results of assessments and individual studies. Ebi	General	Uncertainty has been addressed more precisely in the revised draft.

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BR	Ebi	Gen			Is there a synopsis and summary that effectively, concisely, and accurately describes the key findings and recommendations? Is it consistent with other sections of the document? 6. The fact that there is a climate change commitment should be highlighted. Ebi	General	Yes, the revised Executive Summary contains a concise list of Key Findings and a new section on “Reducing Gaps in Understanding” identifies areas in which inadequate scientific understanding hampers our ability to estimate likely future climate change impacts.
BR	Field	Gen			I missed seeing a section, somewhere in the report, explaining the importance for the US, of climate changes elsewhere in the world. While the report is about the US, it is likely that some of the largest impacts of global climate change in the US will come from changes that occur in other places. The viability of avocado farms in California will be at least as sensitive to the development of avocado markets in Mexico as to snow in the Sierras. Similarly, the stresses on the public health system in Atlanta will likely be more influenced by the influx of new African immigrants than by heat wave conditions in the Southeast. While there is not much science on this, it strikes me as irresponsible to omit the topic altogether. The AR4 IPCC chapter on North America had such a section, so there is precedent, plus material to cite. Even a single paragraph pointing out that climate changes in other places may be critical drivers of global climate change impacts on the US could be very important. Field	General	Thank you. This point is alluded to in the Global Climate Change section and in some of the sector sections as well.
BR	Field	Gen			The report places an appropriate and balanced emphasis on adaptation, but it does little to make the point that much of the adaptation that will be helpful in a changing climate will also be helpful for dealing with climate variability. In general, the report misses many of the opportunities to talk about strategies with win-win potential. Adaptation is the clearest example. Other examples come in topics like generating a decrease in congestion with a transportation project designed to reduce transportation emissions or decreasing SO2 emissions by replacing cola with wind or solar. Field	General	Thank you. A new concluding thoughts section alludes to your point. The transportation section also includes new wording on congestion.

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BR	Field	Gen			Overall, the report is excellent. The science is solid; the writing is clear, and the graphics are appropriate. The report does an excellent job of distilling the key points in a wide range of earlier assessment products. Congratulations to the author team. Field	General	Thank you for your comment.
BR	Field	Gen			The report mentions the idea of confidence language, and then it basically ignores the quantitatively defined terms. In general, the concept of uncertainty is not treated very carefully, and many readers will likely miss much of the important nuance. For example, the top figure on page 28 shows the uncertainty around the central tendencies as +/- 1 standard deviation. This same figure in the IPCC SPM also shows the full range of model results. I would argue that it is simply not correct to characterize the +/- 1 SD as the “possible ranges”. In particular, this characterization leaves out the highest end of the warming, perhaps lulling readers into a false sense of security that the extreme warming in some of the IPCC runs is too unlikely to be worth considering. Field	General	Thank you for your comment. Uncertainty is now dealt with much more explicitly and accurately throughout the report.
CC	Henson	Gen			Is there a synopsis and summary that effectively, concisely, and accurately describes the key findings and recommendations? There’s an Executive Summary but not a synopsis per se. A one-page synopsis/introduction—perhaps just ahead of the Executive Summary—might be a good addition. I would also suggest putting “About this Report” ahead of the Executive Summary. Henson	General	Agreed. The recommended order of the ‘About this Report’ has been adopted. Key findings are now on one page.
CC	Henson	Gen			Is the document’s presentation, level of technicality, and organization effective? Overall, yes. See comments below for more details. Henson	General	Thank you for your comment.
CC	Henson	Gen			Is the material discussed communicated in a manner that is appropriate and accessible for the intended audience (e.g., lay audiences, policy makers, high school graduates)? This is a very broad set of targets: I suspect a typical policy maker will be able to handle some sections much more easily than a high school graduate with no science background. Overall, given the difficult task, I think this report hits the mark fairly well. Henson	General	Thank you for your comment.

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CC	Henson	Gen			Is it consistent with other sections of the document? In overall content, yes. However, there are some inconsistencies in tone and approach among the items in the Key Findings section (see my detailed comments). Henson	General	Thank you for your comment. The key findings have been revised.
CC	Henson	Gen			Are the figures and tables readily understood? The graphical styles used in the document vary greatly (fonts and font size, amount of information conveyed, etc.) This gives a “pasted-in” effect to many of the graphics. Some graphics look crowded on the page, while others appear spacious. Some graphics are quite technical; others are very lay-oriented. And some pages have fairly dark photographs ghosted behind the text, while other pages have a much more clean appearance. As a result of these factors, many pages of the report feel somewhat chaotic, even though the overall design is appealing. If time and resources permit, the report would benefit greatly from making the graphics more consistent in look and feel. An excellent model is “Impacts of a Warming Arctic” (ACIA). When there are two or more graphics on a page, making one considerably smaller or larger than the other(s) will help direct the reader’s attention and can make both graphics easier to comprehend.] I would strongly suggest dropping all or most of the ghosted-back images (except for the top-of-the-page banners, which work quite well). Through experience, I’ve found that ghosted-back images often elicit a negative response from readers who find the text hard to separate from the image. Henson	General	Agreed. Major format improvements have been made throughout the report.
CC	Henson	Gen			Are there significant improvements that might be made in the document without adding to its length? Overall, the report contains a wealth of information, and I found it to be a useful and instructive read. My main suggestion for improving the text as a whole would be to work toward unifying the writing style. Right now some sections have a fair bit of jargon, while others are much cleaner and less wordy. I’m offering a number of specific suggestions below to tackle this issue, but perhaps a specific editing pass could help enhance the unity of the writing. Henson	General	Agreed. The whole report has been edited with these (and other) comments in mind.

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BR	Hooke	Gen			This CCSP Unified Synthesis Product is really a quite remarkable document. It is well organized, thorough, complete, and quite readable. It provides a comprehensive review of a broad range of subject matter in a way that has much to offer both readers new to these matters and experts who have been working on these problems for decades. Every contributor should be congratulated – the scientists who have carried out the original research, the authors of the 21 SAP’s that laid the foundation for this volume, the authors of the Unified Synthesis Product per se, the editors, who have managed to bring unity to the language and the format. What a monumental effort! Although this is a draft that has not yet seen inter-agency review, it is in generally quite polished form. The document provides lots of factual material, breaks this into bite-sized, digestible, bits, and is visually appealing. In some respects, it’s difficult to imagine that responding to a diverse set of reviewer comments will improve the work. You all face a very real danger – losing some of the crispness and balance in the present version. Hooke	General	Thank you for your comment.
BR	Hooke	Gen			Again, I know you requested specific edits versus global reactions, and I’m not in any way recommending that at this late point you can (or even <i>should</i> ...there’s an issue of what’s possible here, and what will get through inter-agency review) do anything to address these last two points. But I do think some slight edits, hinting at some of these issues, would be useful in both the Complex Interactions and Pathways to Improved Decision Making sections, and that you all are best positioned to determine what, if any, response you should make to these suggestions. Hooke	General	Thank you for your comments.

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BR	Hooke	Gen			There's a fair amount of repetition. In many ways this is a strength. Many important points are made in the executive summary, again in the sections on Global Climate Change and National Climate Change, and then again, in different forms, in either or both of the National Level Climate Impacts or Regional Climate Impacts sections. This organization of the document encourages revisiting of key points, and this repetition drives some of these points home. However, some readers may notice that passages like "in the U.S., the amount of precipitation falling in the heaviest 1 percent of rain events increased by 20 percent in the past century, while total precipitation increased by 7 percent" keep turning up. Hooke	General	Thank you for your comment. The report is being revised with these comments in mind.
BR	Hooke	Gen			There are a lot of truly extraordinary graphics throughout, but some of these are complex and yield their information only grudgingly. For example, the graphic on U.S. population and growth trends on page 44 contains an enormous amount of content, but sorting it all out requires a lot of thought. The same could be said for the graphic on page 102 showing the potential limits to vegetation productivity. These may be accessible to high-school graduates, but really look like SAT exam material. There are other examples throughout the text. Hooke	General	Thank you for your comments. Graphics throughout the report are being simplified to make them easier to understand.
BR	Hooke	Gen			Breaking up the material into bite-sized, self-contained chunks sometimes inhibits the flow, forcing the reader to slow down. Again, a strength in that it allows readers to put the document down, pick it up again some time later, and proceed. Hooke	General	Thank you for your comment. The new organization and format should help the document flow more smoothly.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Hooke	Gen			<p>The break-up of the impacts into regions is necessary, but it's also necessarily somewhat arbitrary. This creates problems for readers living on, or interested in, locations at the boundaries. I discovered this because my own life history makes me especially interested in DC (Northeast? Southeast?) And the Boulder-Denver areas (Great Plains? Southwest?). Because they're on the edges of the regional maps, it's hard to get a feeling for the issues, particularly as these can be different in the discussions/material for the two adjacent regions. A little of both? To the extent that national policymakers are a big part of the intended audience, some subset of this group, looking at DC, may find this a challenge. In DC's case, this is exacerbated by the fact that the area sometimes seems to be a hinge, with lots of variability in the outlook for points north and south, and a lot of uncertainty, mixed signals, in the outlook for DC itself. Again, I am not suggesting a change here, but encouraging awareness. Hooke</p>	General	<p>Thank you for expressing this clear concern. It has been addressed during the document revision process.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Hooke	Gen			<p>In the executive summary, on page 12, the first sentence of the second paragraph, the authors make the brave statement that <i>“Throughout this report, the impacts of climate change will be viewed through the lens of our possible responses.”</i> Perhaps of all the goals of the document, this has remained most elusive. The document really describes only some arenas (e.g., conservation, land use, building codes) for possible action, versus the actions themselves. At a fundamental level, this is because the document as a whole is formed more along the lines of “what does science tell us about current trends, and where we’re headed in the absence of [changed] action?” rather than along the lines of “what were the individual and societal decisions and actions, made daily over centuries, both globally and locally, that led to our current situation (predicament)?” Because we say so little about past and present actions, we haven’t set the stage for saying what changes in our decisions and actions might be more effective for coping in the future.</p> <p>Many of these topics, certainly the most interesting and relevant, are highly emotionally charged, politically sensitive, and rooted deeply in cultural values, and least amenable to discussion in a document like this or any kind of inter-agency, executive-branch clearance process. So, for example, more is said about climate impacts on renewable energy sources than on renewable energy per se. Nothing is said about the true environmental costs or end-to-end costs of solar power, or corn ethanol, etc. (with the exception of brief mention under unintended consequences on page 165). And although poverty and environmental justice are mentioned as impacting resilience to natural hazards, nothing is said about how they might be addressed. Again, I’m not suggesting a change here. That awaits another report. And it may be a report that government is ill-constituted to develop and write. Hooke</p>	General	<p>Thank you for your comments. We have kept them in mind during the document revision process.</p>

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BR	Hooke	Gen			Along this same theme, the document says much more about findings of physical and natural science than it does about the findings of social science, which have advanced our understanding about how and why individuals and social groups, including states and nations, behave the way they do. Again, the path forward needs to be guided as much by findings from sociology, psychology, economics, political science, and policy research as by physics, chemistry, and ecology. Hooke	General	We appreciate the comment, but are limited in what can be addressed in this report. The scope of the USP is limited to the science of climate change, its impacts on the United States, now and in the future, and some discussion of things society is already doing or can do to respond to the climate challenge.
BR	Hooke	Gen			Are the goals, objectives, and intended audience of the product clearly described in the document? YES Hooke	General	Thank you for your comment.
BR	Hooke	Gen			Are any findings and/or recommendations adequately supported by evidence or analysis? YES In cases where assessments or recommendations are based on the expert judgment of the authors, is this acknowledged and supported by sound reasoning? YES Hooke	General	Thank you for your comments.
BR	Hooke	Gen			Are the data and analyses handled in a competent manner? YES Where appropriate, are statistical methods applied appropriately? YES Are uncertainties and likelihood statements evaluated and communicated appropriately? YES Hooke	General	Thank you for your comments.
BR	Hooke	Gen			Is the document's level of presentation, level of technicality, and organization effective? YES Is the material discussed communicated in a manner that is appropriate and accessible for the intended audience (e.g., lay audiences, policy makers, high school graduates)? YES Hooke	General	Thank you for your comments.
BR	Hooke	Gen			Is the document scientifically objective? YES Is it consistent with the scientific literature? YES. IN FACT, THE RENDERING IS SO FAITHFUL IN MANY CASES THAT THE ORIGINAL SOURCES ARE IMMEDIATELY IDENTIFIABLE, EVEN WITHOUT THE REFERENCES. Hooke	General	Thank you for your comment.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Hooke	Gen			Is there a synopsis and a summary that effectively, concisely, and accurately describes the key findings and recommendations? YES Is it consistent with other sections of the document? YES Hooke	General	Thank you for your comment.
	BR	Hooke	Gen			Are there significant improvements that might be made in the document without adding to its length? NO Hooke	General	Thank you for your comment.


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	BR	MacCracken	Gen			<p>Part 1: Emissions Scenarios: It is not made clear that the “low” and “high” emissions scenarios that are cited are drawn from the IPCC/SRES “no policy” scenario framework (or they seem to be taken from there). The impression (e.g., by the divided road imagery and later contrasting of the two results) is given in the report that these are the only two possibilities when this is not at all the case. In fact, the misimpression (perhaps implicitly) is given that what all the policy debate about is a choice between these two scenarios, when this is not at all the case. Given Senate legislation and the clamor internationally for an agreement, it is hopefully becoming likely that the world will commit to a much lower emissions scenario than the “low” emissions scenario. I view this as a very, very serious problem with this draft that simply has to be corrected, probably by adding a page or two on emissions scenarios and explaining not just the “no-policy” scenarios, but the potential policy scenarios.</p> <p>Doing that, what then needs to be done is to have material in here about what a 450 ppm stabilization (CO2 equivalent concentration) might look like, and one might even be mentioning that some scientists (e.g., Hansen and Wigley—and I agree with them) are suggesting that if we really do want to avoid the dangerous anthropogenic interference with the climate system that the UNFCCC commits the world to achieve, we likely need to go back to a CO2-equivalent concentration that is lower than today’s level. I realize really addressing this point will require a substantial reworking of the report, but as it is, what the report talks about are the expectations for the US if the world does nothing to address the problem, and that point needs to, at the very least be made very, very prominently. MacCracken</p>	General	<p>The discussion of emission scenarios in the “About this Report,” “Global Climate Change,” and “National Climate Change” sections have been revised in response to this and other reviewer comments.</p> <p>Noted.</p>

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	BR	MacCracken	Gen			<p>Part 2a: Climate Change versus Changes in the Weather: I really think it is important to make it clear that what changes is the weather, and it is the average/integral of these changes that makes up the climate change that is being discussed. For some of the impacts, what will really matter is how the weather changes—including especially extremes, etc. Make clear it is not every day that changes by the same amount, but that the timing and frequency of weather types change, and even the nature of them changes. So, one gets changes in when and where fronts occur, where air masses interact, types of heavy rains that occur, and more. There was a recent op-ed by a reporter in the Washington Post that tried to suggest that the climate and weather were different and so put impacts off well into the future. Well, it depends where one lives—if near where there are shifting boundaries of air masses, the changes will be felt early on (at least during the months when this is the case).</p> <p>On unifying the Discussion of Impacts and Adaptation: It is helpful that adaptation is covered, but I found the separation of the two topics did not work very well and think that the notion of adaptation has to be worked into the text about the impacts (keeping the separate boxes is fine—what I want is some change in the text). For example, in the transportation section, there is mention of how many roads and rail lines will be flooded by sea level rise. Well, that just is not going to happen, for facilities will have to be relocated before they are inundated. So, rephrase to say that so many miles of roads and rails will have to be relocated or protected by levees as a result of sea level rise. MacCracken</p>	General	<p>Agreed. The recommended change has been made.</p> <p>Adaptation is now primarily discussed as examples of what has taken place. As far as the example the reviewer gives, CCSP SAP 4.7 indicates that this will happen. The flooding will not occur all of a sudden but rather the frequency of flooding will increase. Some roads will not be raised or relocated because they lead to places where people no longer are located due to increasingly frequent flooding. Each of the adaptation examples will be reviewed and better tied to the problems associated. The adaptations mentioned are examples of early adopters taking action so they prove the point that the country will not let the problems get as bad as they possibly could. Our report does not have access to any of the likely costs associated with any examples of adaptations.</p>

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	BR	MacCracken	Gen			<p>Part 2b: It is fine to say that higher storm surges will flood so many miles of roads, etc. because that happens quickly—but sea level rise is so slow that it just is not going to happen that society will just keep waiting and waiting to move them—so the text should indicate what is going to have to be moved. Similarly for air pollution—the country is just not going to let the air get that bad without tightening the standards—so say that: To keep air quality from deteriorating to unhealthy levels, much stronger and more expensive emission controls will be needed, or there will have to be a switch away from traditional combustion engines to electric powered vehicles (e.g., fuel cell cars). To limit heat-related deaths, there will be more cooling centers or more widely available air-conditioning (likely requiring societal assistance to pay the electric bills).</p> <p>Give the country some credit (the present draft is sort of the ‘dumb farmer’ approach, but applied to society); measures are going to be taken to make sure quite a number of these impacts are not taken, so mention what the changeover is going to have to be and give a sense of the level of effort and/or cost—at the least, make sure it is clear that adaptation is going to cost a good deal, possibly require relocation, etc. Otherwise, I think the report is going to get discounted as just being alarmist, not accounting for actions that society can and will take. MacCracken</p>	General	<p>Agreed and the report has been edited with these comments in mind. But note the new approach to adaptation is to primarily provide adaptation examples.</p> <p>Adaptation is now primarily addressed through examples.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	Gen			<p>Part 3: CO2 versus Other Gases: There really needs to be more focus on the non-CO2 gases. It is pure coincidence that at present, and using the 100-year Global Warming Potentials, that the cooling by sulfate aerosols offsets the warming influence of the non-CO2 greenhouse gases, allowing for, in many papers, a focus on CO2 only as it is equivalent to the present CO2-equivalent concentration (when one includes both GHGs and aerosols). First, the equality of the offset is very likely to fail as the methane concentration rises (e.g., from thawing tundra, etc.) or falls (hopefully, if enough pressure can be put on for control of methane—as Jim Hansen has suggested, and work I am doing makes even clearer) and, assuming emissions from coal-fired plants are reduced, as SO2 emissions and so sulfate loading drop. In addition, using the 100-year GWP is arbitrary and misleading for methane, which has its strong impacts over about 20 years.</p> <p>This few decade period is what we are very interested in and the 20-year GWP for methane is about three times the 100-year value. So, this being the case, the CO2 equivalent calculation would be altered—indeed, effectively, as the SO2 emissions drop and considering the strong short-term influence of methane, the climate is going to be warming at a rate that is equivalent to having a CO2 concentration of 500 ppm or more---at least that is the level from which policymakers need to take their bearings and get us on a path to a much lower equivalent CO2 concentration. In any case, there needs to be more focus in the report on discussing the key role methane emissions and other short-lived species are playing—roles that get washed out when one uses the 100-year GWPs. MacCracken</p>	General	<p>The discussion of forcing gases is now included in the Global and National sections.</p> <p>Noted.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
						<p>Part 4: Climate Modeling: While the report uses a lot of results from climate models, it does not really explain them or describe their greatly improving performance. It also does not really seem to explain the issue of chaotic variation and the needs for ensemble simulations, or get at the issue of changes in weather and changes in climate. I realize that this is not the main purpose of the report, but it is the main criticism of the critics (and recall there was a lawsuit filed about the models after the first assessment), and so the issue simply must be addressed. It just will not work having the report present climate model results without saying what a model is.</p> <p>Reliance on Climate Model Results: Climate models are tools—not something magic. Models are intended to train our thinking and help improve understanding. It is important to be explaining why the climate models are getting the results, not just keep giving their long-term results without explaining what is meant by the changes in climate and what changes in the operation of the weather system are causing the indicated changes. Text should try to explain what is happening—more or fewer storms, shift in storm tracks, etc., and not just say that models project precipitation changes.</p> <p>International Coupling: One of the recognized shortcomings of the US National Assessment (NAST, 2000) was that it was able to only barely mention what the effects of change elsewhere in the world would mean for the US and its people. Four types of coupling were identified in that report: economic and market couplings; shared resources like fisheries, water, and migrating species; health consequences; and environmental refugees and security (each of these broadly conceived). The impacts could occur here in the US (e.g., through diseases coming in) or when Americans go outside the US or invest their money there. While there are a few mentions of such connections, it seems to me this general topic deserves a 2-page spread, probably under the Impacts on Society section. MacCracken</p>	General	<p>The discussion of modeling is now included in the Global and National sections.</p> <p>Noted.</p> <p>Agreed. The report has been edited accordingly.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	Gen			<p>Part 5a: Give the Sign of the Change Where Possible: This report needs a scrub of words like “alter” and “affect” and “change” that give no sense of the direction or magnitude of the change. Everywhere possible, the sign of the change should be indicated (I’ll make specific comments as well, but there are far too many sentences where it is hard to figure out what the direction of the change is.</p> <p>Sector section bullets: While I realize that the bullets on the opening page of the sector sections are really intended to just give a highlight of what is to come, many people may just browse and this set of bullets is important. There is plenty of space available (especially if one takes out some of the distracting pictures) and so I’d like to see each of the bullets expanded just a bit to make sure that the key messages of the subsequent spread are presented right up front. And use a bit bigger font, lay them out so they are easy to read (and photocopy, so get rid of the background color) and have an adequate explanation—so maybe two or three sentences instead of one terse sentence.</p> <p>Order of the Sectors sections: I was not clear why the order was chosen. What was a bit disconcerting was having the “Society” one first, for two reasons: (1) A number of the impacts mentioned are not explained but said to be presented in later sections—so it would seem to make sense to cover the other sections first; (2) The set of societal impacts, absent the other impacts, seemed a bit trivial—having impacts on “tourism” be the first impact bullet (and it was down third in the list) really seemed to trivialize the whole section. Society depends on all the other sectors, so put those first and use the Society section as a wrap-up section.</p> <p>MacCracken</p>	General	<p>Noted.</p> <p>The sector bullet section has undergone significant change.</p> <p>The sectors have been reordered.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	Gen			<p>Part 5b: “Would” versus “will”: It seems to me that one has to think this through (and having a page on scenarios and on no-policy versus policy-based scenarios will be where this all can be set up)? Given the no-policy approach, a lot of what is described will happen (at least, our best estimate is that what is described is what will happen). The report should not make this conditional. Some of the changes sound so dramatic that it seems reasonable to expect that actions will be taken, so then there might be some sentences of the form “If policies lead to sharp emissions reductions, it is likely that such and such can be avoided, etc.” Basically, I think the report should try to avoid the use of the word “would” and I’ll be suggesting some alternatives.</p> <p>Certainty versus Confidence: A scrub is needed to make sure the report is not saying things like we have a “high degree of certainty.” This is simply wrong—certainty is like pregnancy, one either has it or not. What can vary is the degrees or levels of confidence (IPCC is pretty careful on this). MacCracken</p>	General	<p>The report has been edited to make the use of would or will more precisely accurate.</p> <p>We have taken great care in the adjectives used with the word confidence.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	Gen			<p>Part 6: “Climate change impacts” vs. “impacts of climate change”: I think it would be better to use the latter phrase (to the extent possible. The first gives me the impression that there are a set number of impacts (and these are the ones identified in the text), whereas with the latter provides a better sense that there is a very large set of possible consequences. This may seem a nit, but try the substitution in various places in the text. I think it is also a more understandable phrasing for the reader.</p> <p>CO2 concentration versus CO2 concentrations: For all practical purposes, the text should be referring to the “atmospheric CO2 concentration” (singular and not plural)—I think it is confusing to the reader to use the plural (and this is done in quite a few places). I think one should also say “the CO2 concentration is increasing” (or similar) and not say “CO2 is increasing”; I realize it is wordy, but let’s do be correct and try to educate the public instead of not be precise for them.</p> <p>“As” versus “because”: I think there is far too much use of “as” where “because” should be used—especially when “as” is being used close by in the text with other meanings. I know it saves space, but I do not think the saved space is worth the problems that get created in clearly getting a sense that a reason is being given.</p> <p>Pictures: While pictures of closely connected impacts and damages is very useful and nice to have, adding in pictures that are there mainly for emotional appeal (children holding hands, etc.) I think takes away from the scientific credibility that the report is trying to build and maintain. Basically, I think such pictures make the report look more like a report from an advocacy group than from a panel of scientists—they try to create implicit messages, and gives the misimpression that the science cannot stand on its own. Let the science and the damages, etc. be the message, and don’t get into emotional pictures. And I would add that taking such pictures out will give the space needed to make a number of the statements more precise (e.g., giving the sign of the impact). MacCracken</p>	General	<p>Noted.</p> <p>Noted.</p> <p>Noted.</p> <p>The number of pictures has been drastically reduced as per this recommendation.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	Gen			<p>Part 7: Personalizing the Report: It seemed to me the report bounced between being scientific with results presented in the third person, and getting personal by having first-person phrases like “improve our understanding.” When done, it can get confusing whether the first person is referring to the authors, those in the US, or everyone in the world. I would urge sticking to the third person and taking out all (or most) of the “our” usages. The research is hopefully improving scientific understanding for everyone, not just the authors. Using “our” might be fine when an individual scientist is giving a talk to a public audience, but I do not think it is appropriate for a panel of scientists—this report needs to make clear that these findings are independent of who is on the panel of authors.</p> <p>English or Metric Units: There needs to be a scrub (once a decision is made) about the units. There were switches back and forth between Celsius and Fahrenheit, etc. Consistency is needed.</p> <p>Page Coloring: I found the page coloring that was done through much of the Executive Summary to make the document harder to read (and its purpose was just not very clear). I also think that such coloring might well make this section hard to photocopy, and yet it is the key material that should be copied and distributed around. I would urge keeping such measures for when it is needed for a scientific purpose. (I can recall the days when we fought to be allowed to use color in reports, and this was allowed only when there was a clear scientific need for it—like some of the maps with many contours—and gratuitous color was frowned upon or not allowed. Well, the background color on these pages is just not necessary, and even seems to me to counter-productive—spend any excess money on getting the report out and around more extensively and less expensively. MacCracken</p>	General	<p>Agreed. The report has been edited accordingly.</p> <p>Noted.</p> <p>The use of background color has been removed as recommended.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	Gen			<p>Part 8. Use of IPCC Figures: From experience, I would just note that the IPCC figures are copyrighted, and the free use provision does not allow changing them and does encourage use of full figure and their caption.</p> <p>Author Review of the Report: From reading the report (e.g., pages 162-165 which are an integral statement about the whole report, but that I think are very poorly expressed, as commented on in the specific comments), it is not clear that every member of the author team has read, commented on, and approved every page of the report. This needs to happen—as happened for the US National Assessment, each author should have to sign off on the entire report, not just on their section. It will be a large investment in time, but needs to happen. MacCracken</p>	General	Noted.
BR	MacCracken	Gen			<p>Is there a synopsis and summary that effectively, concisely, and accurately describes the key findings and recommendations? Is it consistent with other sections of the document?</p> <p>The need materials are included, but a couple of problems exist. I did not feel that the opening two-page spread of the Executive Summary, as laid out and presented, really provided an adequate summary of the key messages, and the background diagram was misleading (both scenarios considered are no-policy scenarios—if a point is to be made that our decisions can make a difference, then either there should be a scenario that is based on deliberate policy action or make the point that the difference between the impacts of the two no-policy scenarios provides a demonstration that the level of emissions does make a difference—and then say that cutbacks in emissions to below the lower value would make an additional difference). With respect to presentation, I think the Executive Summary had so much color (especially as background) that it distracted from the import of the messages and its credibility. A more straightforward presentation format is needed. MacCracken</p>	General	Agreed. This portion of the report has been reworked. Key findings are now on one page.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	Gen			Are the goals, objectives and intended audience of the product clearly described in the document? Generally, yes, although it is not made clear if this is now the official national assessment is intended to be serving as the official US National Assessment under Section 106 of the Global Change Research Act, and if so, how this relates to the document that was presented in response to the lawsuit calling for an official report to be filed. MacCracken	General	Thank you. The revised “About This Report” Section in the USP front matter explains what the USP is and why it was produced. It is not the official national assessment and was not prepared in response to the lawsuit referred to in the comment; that document is the Scientific Assessment.
BR	MacCracken	Gen			Are any (sic) findings and/or recommendations adequately supported by evidence or analysis? In cases where assessments or recommendations are based on the expert judgment of the authors, is this acknowledged and supported by sound reasoning? Except as mentioned in my general and specific comments (included below), the findings and recommendations are well supported by the evidence and the analysis. There are a couple of aspects that do merit more discussion in order to aid the reader, and these include: (a) adding a spread on emission scenarios and their likelihood and making clear that the emissions scenarios considered here are all no-policy scenarios and not the result of policy decisions on future emissions (as is sometimes implied); (b) adding a spread on models results to indicate the level of confidence that can be placed in their results, to explain natural variability and the chaotic nature of the climate, to help the reader understand why there is a difference between observations and the band of model results, and, very importantly, to help the reader understand how to interpret the changes in climate as actually being changes in the weather, etc.; and (c) there is a real need to improve the section on Pathways to Improved Decision-Making, which I think is not effective in identifying what steps are needed in the future. Without the two new spreads and a revision of the Decision-Making spread, a number of the findings and justifications will be unnecessarily hard to understand. MacCracken	General	Thank you for your comment. (a) The emission scenarios are now described more explicitly, (b) the models are also described more explicitly and (c) the pathways section has been modified.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	Gen			Are the data and analyses handled in a competent matter? Where appropriate are statistical methods applied appropriately? Are uncertainties and likelihood statements evaluated and communicated appropriately? Generally yes, although the specific comments point to a number of issues with diagrams, etc. Including a box with a bit more discussion than in the first paragraph on page 15 would be useful as a way of making even more clearly how confidence and likelihood are being expressed. There are a few locations in the report where rather vague words like “may” and “affected” are used that do not adequately give a sense of the likely outcomes, and a scrub for such phrases should be done (and my comments identify many of these occasions). MacCracken	General	Thank you for your comment. The report has been edited accordingly.
	BR	MacCracken	Gen			Is the document’s presentation, level of technicality and organization, effective? Is the material discussed communicated in a manner that is appropriate and accessible for the intended audience (e.g., lay audiences, policy makers, high school graduates)? Generally yes, although my comments offer many places where improvements would be helpful. In general, it would help to have a bit more explanation and less terseness in the text, gaining the space by dropping many of the photos that are trying to evoke and impression rather than conveying useful information. MacCracken	General	Thank you for your comments. Many photos have been dropped in favor of text.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	Gen			Is the document scientifically objective? Is it consistent with the scientific literature? Generally, yes, the document is consistent with the IPCC findings, the SAP reports of the CCSP, and newer literature. My specific comments offer a number of suggestions for tightening up the language so it is more objective. The main general problem is that the analysis generally focuses on future impacts on present activities without allowing for adaptation that will surely occur. What this report needs to do is to be indicating the adaptation effort and cost that will be required to ensure that a number of the suggested impacts do not occur (e.g., current law mandates that air quality standards be met, so rather than saying that climate change will cause more air pollution, the report should be indicating the actions that will be needed to meet the law—so much stiffer controls or a conversion to electric vehicles might be needed, etc.—and then give a sense of the costs that will be involved. MacCracken	General	Thank you for your comment. While your suggested changes make sense, the data and peer reviewed literature to support such discussions in the USP do not exist yet. So adaptation will be limited primarily to citing examples of adaptation efforts with little or no data available on the benefits of such efforts.
BR	MacCracken	Gen			Are there significant improvements that might be made in the document without adding to its length? The general and specific comments that I have provided offer a number of ways to improve the report, most without adding to its length (presuming some of the photos that are not providing information are deleted). There are a couple of additional spreads that simply have to be added to ensure the report provides the information needed—one on emissions scenarios and one on climate models (and their meaning and verification). Given there are some blank pages at the end of the report, adding these two spreads could be accomplished by dropping the blank pages. MacCracken	General	Thank you for your comment. Models and scenarios are now dealt with explicitly.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Mearns	Gen			This is an impressive document created by an impressive list of authors. Its overall level is appropriate for policy makers and a lay audience. It presents a wealth of information that would be valuable for anyone interested in climate change. I have not been able to read the entire document, but read certain parts in detail and skimmed others. My detailed comments follow. One obvious gap is that the economic effects of the impacts described are not discussed. I assume this was considered and rejected, but it leaves one with an incomplete picture. It seems to me that there have been enough IAM analyses so that one could say something about the economics of climate change. But perhaps this was viewed as too uncertain. Mearns	General	Thank you for the comment, but it is correct that discussion of economics is outside the scope of this document.
BR	Mearns	Gen			In the USP product in general, there is an uneven presentation of information on climate change. In some circumstances a high and low emissions result is given (such as with heat index, p. 54) and others only one. It would be preferable if possible to be more uniform in the presentation of this material (i.e. regarding uncertainties in the emissions scenarios). Mearns	General	Thank you for your comment. The new version has a greater emphasis on uniformity of presentation. However, some changes just require different presentations (e.g., temperature versus precipitation).
BR	Reilly	Gen			Part 2: The problems crop up in the Executive Summary itself, where the structure mirrors that of the document. The Key Findings (page 6-7) seems to be fairly effective short executive summary. But then I don't know how or why we have the signposts and road graphic (page 4-5) that puts the summary into a completely different framework—it seems to demand a lot of knowledge of the reader and so it seems to be a particularly poor thing to open the document with. Then the sector and regional impacts sections are two additional ways to structure the problem. Still another is the Response Strategies. So there are 5 different ways in which you try to organize the material. Any one (or two) could work but these multiple takes on how to present the material seems to reflect several competing ideas of how to summarize the results, where any one might be okay, but not all at once. It leads to a structure that in my view overwhelms the reader—even one who knows the area. Simple language and a sober approach to the document would be far more compelling than the current structure. Reilly	General	Thank you. The Executive Summary has undergone major revision and reorganization.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Reilly	Gen			<p>Part 18: There are uncertainties about the feedbacks.</p> <p>The earth-atmosphere-ocean is a complex system subject to chaotic behavior that makes it not fully predictable and leading to natural variability and possible abrupt changes.</p> <p>Our observing system is still incomplete and our record of observation is relatively short and so it is difficult to check our models and forecasts against real data.</p> <p>Different activities affect climate in different ways and on different time scales—e.g. long lived greenhouse gases, short-lived aerosols that can have an offsetting cooling effect and have different consequences for precipitation patterns, land cover change and urbanization that can change hydrological balance, albedo, and temperature at the local and regional level—e.g. urban heat island effect.</p> <p>Projections of emissions—and what actions will be taken to limit them—are uncertain and global emissions and concentrations are not fully under our control.</p> <p>Reilly</p>	General	<p>Thank you for you comments. Many of these points have been incorporated in a significantly revised section on global climate change.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	Gen			<p>Part 19: And, in understanding possible impacts of climate change one must recognize that activities likely to be affected by climate change will themselves change possibly increasing or reducing vulnerability.</p> <p>We thus approach the task of describing potential future impacts by referring where possible to two scenarios of future climate change—one a relatively high warming scenario that might occur if the world is not very successful in reducing emissions and the climate system responds to these increasing emissions as we now understand it, and a second low warming scenario that might occur if the world successfully reduces emissions and stabilizes concentrations so that the increase is about that we have seen over the last century (or twice that—or whatever the approximate level is). (I think the reference to what was seen over the past century is a way to give the reader some sense without going into ppms or something that don't have much meaning unless you are an expert.) Reilly</p>	General	Thank you for you comments. Many of these points have been incorporated in a significantly revised section on global climate change.
BR	Reilly	Gen			<p>Part 20: These two scenarios cannot completely describe just how climate might change, nor do they necessarily bound the possible changes. Where possible we provide a more general indication of the potential changes where the direction of change seems likely regardless of the particular future scenario of emissions and warming. And, over the next 20 to 30 years much of the warming we are likely to observe is already built into the system, albeit there is considerable uncertainty as to just how much. Thus, given the significant uncertainties precise statements are not possible. Experts often speak of “robust” adaptation strategies hoping to identify those changes that will make sense across the range of possible changes. For example, since sea level rise seems inevitable continuing to build in areas that will be subject to flooding and storm surges appears unwise. Reilly</p>	General	Thank you for you comments. Many of these points have been incorporated in a significantly revised section on global climate change.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	Gen			Part 29: Then—I think the whole flow of this diagram is unclear. Is this suppose to be how things happen over time..climate changes, I am impacted, I adapt, climate changes some more, I’m impacted some more, and adapt some more. Can it go both ways? Climate changes, I adapt, I then have some impacts. Or is this supposed to describe the process of assessment...I first analyze climate change, then evaluate potential impacts, then potential adaptation measures, then evaluate climate change again. Does this go on forever? Do decisions get made at some point? And then revised later? Or is this just one loop in the process. The words in the arrows make no sense either. You have the climate delivering information—the climate is physical system, it delivers rain, snow, and sunshine—not information. I guess these ovals suppose to be communities who study climate, impacts and adaptation? Reilly	General	Thank you for your comment. The report has indeed undergone major revisions, including removal of the figure in pathways and modification of other figures.
BR	Reilly	Gen			Part 30: Then I have no idea what the “Cross-area partnerships” is suppose to mean. Again, I don’t think a blueprint for a better national assessment belongs in this report if this is really directed toward helping the country adapt to climate change. It seems a completely separate document that the CCSP and maybe Congress might get. Or if you want to include it—perhaps as an appendix, again more appropriately titled so that we know from the title that this is a set of recommendations for improving a next assessment.] Reilly	General	Thank you for your comment. The report has indeed undergone major revisions.
BR	Reilly	Gen			Part 31: If the primer is able to get across these points that will serve to educate the reader about the general difficulty of adapting to something we cannot fully describe. At present the text seems to lack an appreciation of these difficulties and thus I’m afraid the advice and forecasts it offers, while consistent with the literature and “accurate” in that sense, are not very useful for decision makers, or if people took the stuff literally and acted on it they might make very bad decisions. Reilly	General	Thank you for your comment. The report has indeed undergone major revisions.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	Gen			Are the goals, objectives, and intended audience of the product clearly described in the document? No. This is a major problem with the document. There appears to be an overriding implicit goal but the specific scope of the document is not well-defined. Not only is not clearly described in the document but the authors seem not to have a clear fix and so some sections go well beyond what I believe to be the scope of this report. I make many specific suggestions on how to more precisely identify the scope and parts of the report that need to be cut back and refocused to relate more closely to the overall objective and scope of this report and the intended audience. Reilly	General	The goal and scope of the report is now more clearly described in the About this Report section.
BR	Reilly	Gen			Are any finding/recommendations adequately supported by evidence or analysis? Expert judgment acknowledged? In general yes. I have called out a few places where I think there is too much speculation or where a broad generalization over interprets a narrow study. Reilly	General	Noted.
BR	Reilly	Gen			Part 1: Are data and analysis handled in a competent manner? Statistical methods applied appropriately? Uncertainty and likelihood statements evaluated and communicated appropriately? In general no. I realize this is a very difficult task given the material, and I don't think it is reasonable to expect precise uncertainty and likelihood statements. However, at its broadest level I believe the report fails to adequately communicate the limits of the scenario analysis that is the core of the report. This may be the result of trying to make the language "accessible", particularly some of the chapter headings. I think this can be fixed without too much effort—by wording things more carefully and explaining more directly the limits of the scenario approach. Its not that there is not language describing some of these limits somewhere in the document but that other language undermines these warnings. Reilly	General	The report has been edited to make it more specifically accurate, especially with how it deals with uncertainty. The scenarios and their limitations are now more fully described.


Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	Gen			Part 2: It is quite important that a better job is done in this regard. It doesn't require new analysis just careful attention to how things are stated. I call out specific examples and have suggestions for things to include. There is also a lack of appreciation for the related problem of decision making under uncertainty and conventional tools applicable to decision making such as real option analysis. This needs to be an essential part of the introduction. Reilly	General	Thank you for the comment. During the extensive revision of the first draft, we have emphasized the need for attention to detail.
BR	Reilly	Gen			Is the document's presentation, level of technicality, and organization effective? Is the material communicated in a manner appropriate and accessible for the intended (lay, policy maker, high school) audiences? No. No. The biggest problem is the organization—I spend considerable time below suggesting improvements in the organization. Some of the material should be shunted out of this document or to an appendix. While the other problems of the document can be easily fixed, I think the problems with organization will require considerable effort. The language itself is not overly technical but it is not presented in a way that is accessible. Reilly	General	Thank you for your comment. The report has undergone some reorganization and some removal of material.
BR	Reilly	Gen			Is there a synopsis and summary that effectively, concisely, and accurately describes the key findings and recommendations? Is it consistent with the rest of the document? No the E.S is awful in its complexity and lack of focus. In this regard it is consistent with the rest of document that suffers from an organization that makes it highly redundant and impenetrable. I provide a nearly complete rewrite to guide you in reorganizing the Summary. Reilly	General	Thank you. The Executive Summary has undergone major revisions that address the issues raised in this comment.
BR	Reilly	Gen			Are there significant improvements that might be made in the document without adding to its length? Yes. As I describe below, the highly redundant organization needs to be fixed. This should allow the document to be substantially shortened. I identify material that should be cut from this document. The basic material reported in the document is generally okay and can be the basis for a good report but it lacks organization. A shorter document, more carefully focused, and with less redundant material will make the report much more accessible and useful to the intended audience. Reilly	General	The document has now been shortened and some redundant material removed. However, not all redundant material has been removed as many readers will not read the report cover to cover so some redundancy is required in order to make sections be able to stand on their own.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Reilly	Gen			<p>Part 1: The overall document is a reasonable compendium of impact and adaptation studies. The structure of the document is very complex, visually the text is dense (small print, lots of words on a page), there are a relentless number of examples (conditioned on specific scenarios or studies), and all of this results in redundancy and unevenness. The stated goal is to write this in such way that it is accessible to an average person rather than an expert, and implicitly the non-expert would be interested because they would want to know what to do to adapt to climate change. The language itself avoids highly technical terms but the structure of the document makes it very hard for a reader to penetrate it and then use the material in a sensible way to inform their decision making. My main concerns are thus, not the technical material which seems to accurately portray studies and analyses that have been done, but the organization of the document. Some attention to the organization and addition of a few paragraphs that will give the non-expert reader a better idea of how to use the information would be a big help.</p> <p>Reilly</p>	General	<p>Thank you for the comment. The report has been revised to make it less visually dense, better organized, and easier to “penetrate” to use the reviewer’s term.</p>
	BR	Reilly	Gen			<p>Part 3: The signpost opening in particular seems more like a modern era advertising campaign where the goal is to blitz the viewer into an emotional response rather than to get them to think. Because of the uncertainties and regional variation in how climate will change there is no simple message here—its not a campaign to get people to stop smoking or “just say no” where hitting the reader/viewer with that message combined with attention getting graphics that have emotional appeal will work. The message on climate change is that all of us who might be affected must understand at a fairly deep level what climate change is, the uncertainties, etc. and then take that information back and work it into day-to-day planning, and search out additional information on how climate will change where each of us resides and in ways relevant to the decisions we need to make.</p> <p>Reilly</p>	General	<p>The signpost opening has been removed and the Executive Summary has undergone major revision.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	Gen				<p>Part 4: As noted the Executive Summary takes off into this material without much guidance. The reader is bombarded with lots of stuff but if they really don't know much about this issue it does not seem to give them the basics to help them to know what to make of it all. It would seem to be more effective to start the E.S. with a more traditional easing of the reader into the issue. E.g. There is now widespread scientific consensus that human activity is responsible for much of the observed global warming over the past century. The direct cause is emissions of greenhouse gases and related substances that affect the balance of energy arriving as sunlight and reradiating into space. Much of the contribution is from combustion of fossil fuels but other activities such as land clearing waste management, and other industrial processes contribute as well. Left unchecked it is extremely likely that these substances will continue to accumulate in the atmosphere and that warming of the earth will continue and accelerate. Broad scale changes in the climate will accompany the general rising global temperatures. Reilly</p>	General	<p>Thank you for your comment. The Executive Summary has undergone major revision.</p>
BR	Reilly	Gen				<p>Part 5: For example, it is expected that drought as well as heavy rain events will increase, there will be more intense hurricanes, and sea levels will rise in part due to warming of the ocean and in part due to the melting of glaciers and ice sheets. These changes will have consequences for agriculture, water supply, natural ecosystems, forests, human health, coastal areas, and many other human activities. This report seeks to summarize what we know about the possible consequences of climate change for the United States under the assumption that if we are better informed about them we can be better prepared, taking steps that make us less vulnerable to a changing climate. This is not an easy task because, while there is now little doubt about the broad direction of climate change, the fine details remain uncertain. And it is often the fine details of how weather might change that will determine whether there are serious consequences for human activities or whether the impacts will be mild or even beneficial. Reilly</p>	General	<p>Thank you for your comment.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	Gen			Part 6: [I think the above paragraph gives the basics of what one needs to know about what causes climate change, and what in general we expect of it, then, importantly, lays down in a clear sentence the objective of the report, and finally, forthrightly tells the reader not to expect too much because of the high level of uncertainty in any projection.] Reilly	General	Thank you for your comment.
BR	Reilly	Gen			Part 7: Is more climate change inevitable? Unfortunately the answer to this is almost certainly yes. The nature of the climate change problem is such that emissions anywhere in the world affect the atmospheric levels of greenhouse gases and therefore, climate everywhere. There is broad scale agreement among nations under an international treaty known as the Framework Convention on Climate Change to stabilize atmospheric concentrations of greenhouse gases. However, to stabilize concentrations at today's levels would take an enormous effort to switch away from fossil fuels overnight and few believe that is practical. Even to limit the increase to about that we have seen over the past century would require enormous effort and cooperation. Thus, even as negotiations among nations continue on specific measures to reduce emissions it is prudent to be prepared for climate change. Reilly	General	Thank you for your comment.
BR	Reilly	Gen			Part 8: [I think the above acknowledges that we should not forget about mitigation but places the job of describing that choice mostly outside the scope of this report. This hopefully will help focus this report on impacts/adaptation and prevent it from wandering into territories that these authors are not expert in. Together the above two paragraphs identify what this document is trying to do (get people to understand what they might do to prepare for climate change), and what it will not focus on (i.e. mitigation). The current document seems to not be carefully focused and wanders too far into the mitigation story and the science of climate change—more on that below.] Reilly	General	Thank you for your suggestions. The Executive Summary has undergone major revisions with your suggestions in mind.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	Gen			<p>Part 9: With that, and recognizing that our projections are uncertain at best, the types of changes and likely consequences for the nation resulting from climate change include:</p> <p>....[This is where I would add in the key findings. I would scrap the separate summaries of Impacts by Sectors and Impact by Regions. Already in the Key Findings are unavoidable references to sectors and regions. E.g. in point 6 water in the West is called out. In point 8, cities on the Atlantic and Gulf Coasts are identified as are arid areas in the West, etc. So it just seems awkwardly redundant to talk about these sectors/regions in the general summary and then talk about sectors and regions separately. Are the sectors and regions called out in the general findings more important than the ones in Sector/Region section? I think not or at least that is not the intent, but this structure raises such questions in the reader's mind. It should be possible to bring together key findings related to Sectors and Regions into a single Key Findings Section. Perhaps you want to break this up with a couple of chapeau headings.] Reilly</p>	General	Thank you for your suggestions. The Executive Summary has undergone major revisions with your suggestions in mind.
BR	Reilly	Gen			<p>Part 10: Climate has changed and more change is unavoidable...</p> <ul style="list-style-type: none"> • .. • .. <p>[Using this as a way to introduce the statements about historical climate change and a few points about what is expected in the way of physical climate change in the future...temp, precip, floods, droughts, sea level, etc.] Reilly</p>	General	Thank you for your suggestions. The Executive Summary has undergone major revisions with your suggestions in mind.
BR	Reilly	Gen			<p>Part 11: Then a second chapeau...</p> <p>These climate changes will have consequences for many sectors of the US economy, for society and natural systems that will vary regionally...</p> <ul style="list-style-type: none"> • .. • .. <p>Reilly</p>	General	Thank you for your suggestions. The Executive Summary has undergone major revisions with your suggestions in mind.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Reilly	Gen			<p>Part 12: [Here I would try to collapse the sector/region thing. Something like the following...</p> <ul style="list-style-type: none"> • Agriculture will be broadly affected, growing seasons in the North may lengthen, severe heat may affect crops in the South, and the arid West and Plains states are particularly prone to drought. The possibility of more extreme rainfall events punctuated by drought may have negative consequences for much of the US—even for areas where warming would nominally extend growing seasons and improve productivity—however the ability to predict changes in precipitation patterns in detail is one of the current weaknesses in our understanding of climate change. • Coastal areas in general are subject to damage from sea level rise, increased storm surge, and increases in hurricane intensity. Particularly at risk are low lying areas—areas along the Gulf and Atlantic Coast. • Permafrost...obviously something that mostly affects Alaska. • Etc...Combining things at risk (sectors) and those regions particularly vulnerable or how vulnerability differs in different parts of the country. Reilly 	General	<p>Thank you for your suggestions. The Executive Summary has undergone major revisions with your suggestions in mind.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Reilly	Gen			<p>Part 13: [Then]</p> <p>What can we do to be prepared? Scientists and analysts who have studied the consequences of climate change for human activities have attempted to indicate changes that would better prepare the nation for climate change. These include:</p> <ul style="list-style-type: none"> • ... • ... • Most importantly considerations of changing climate need to become an integral part of decision making processes where the outcomes are sensitive to climate, including for example, coastal zone and water resource planning, infrastructure design, agriculture and drought/flood planning, emergency response, building design, etc. <p>[Here draw from your Response Strategies in the summary or other material.]</p> <p>Reilly</p>	General	<p>Thank you for your suggestions. The Executive Summary has undergone major revisions with your suggestions in mind.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
█	BR	Reilly	Gen			Part 14: Then you might give the reader a paragraph that provides some guidance on the structure of the report—especially if the complex structure you have is maintained—although I would suggest simplifying the structure. The triple redundancy—National, Sectoral, Regional—is too much. You might go with Sectoral and Regional. Sectors are at the “National” level and if you needed to then have a final section bringing sectoral impacts together—you might be reasonably worried about interaction among them and possible macroeconomic consequences that would flow better after you have the individual sector discussions. Best would be have a single section that summarizes the impacts for the Nation which will then necessarily refer to sectors/activities and regions that are affected or as vulnerabilities differ—that would mirror the lay out I have proposed for the executive summary. If you then want to keep material separately by region and/or sector that might go into an appendix—although I really don’t see the reason for it as you can hopefully merge all the information in these sections into a single section. Reilly	General	Thank you for your suggestions. The triple redundancy has been diminished as climate change in the US is now largely addressed in the Climate Change Primer section with sectors and regions referring to that section rather than repeating the information.
█	BR	Reilly	Gen			Part 15: I guess I am proposing to deal with different sectors one by one, describing within each the regional implications. Reilly	General	Thank you for your suggestion. We have, however, decided to retain the regional focus as well as people often want to see what the big concerns in their areas are.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	Gen			Part 16: Additional observations on the current structure: The opening primer on climate change seems to excessively describe the science of climate change and fail to include other material that would be useful. My understanding is that this report is on the likely consequences of climate change for the United States and what we can do to reduce vulnerability to climate. There are many places where people can get various introductions to the science of climate change. A brief summary is useful but perhaps a couple of pages. To the extent detail is included it ought to be more clearly connected to the overall purpose of the report. Rather than the naïve “we have choice to mitigate or adapt” with the silly road signs, I would suggest that for this audience you briefly review the idea that mitigation is being attempted but in fact we (individually or together as the US) don’t fully control that decision—contrary to the document it is NOT fully “our” choice. Reilly	General	Thank you for your comment. The report has been reorganized so that the global and national sections are now part of a smaller Climate Change Primer section more along the lines of your recommendation.
BR	Reilly	Gen			Part 17: This document can direct readers to other reports and papers that better address mitigation. I.e. stick to a slight elaboration of what the second paragraph of the E.S. as I propose above. Other things that the primer section should address are aspects of the problem that make it difficult to precisely project future climate change. Reilly	General	Thank you for your comments. The Executive Summary has been revised with your comments in mind.
BR	Reilly	Gen			Part 21: [NOTE: In general the report says you are going to use the two scenarios. However, in one place at least (page 35) the report uses a different scenario. This is irritating and potentially perplexing to the reader—what should I make of this. Also, while you say you are going to rely on two scenarios the report often makes unconditional statements about what is going to happen. In the language I have added above I have tried to give an explanation as to why there are statements both about the scenarios and then unconditional statements. In general, I think you need to go through the report and smooth this out and be more careful about where you are making unconditional statements, where relying on the two scenarios and then what this all means for the general reader who, supposedly, wants to adapt to climate change. Reilly	General	Agreed. Additional explanation has been added. Where the USP team has synthesized model projections directly, they used the two scenarios described in more detail. However, occasionally additional material is brought into the report from existing peer-reviewed assessments or papers that use a different scenario. This is now explained better.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
█	BR	Reilly	Gen			Part 22: The other thing that would be useful in an introductory/primer chapter would be an intelligent discussion of the problems of planning for adaptation—this might help with the above. Something akin to: While experts often speak of robust adaptation strategies and some examples come to mind—such as coastal planning—identifying such strategies is easier said than done. This is because many of the investment decisions we make as individuals or in business have implications only for a few years or a decade and within that period of time much of the signal of climate change we expect to see is swamped by the noise of natural variability. That is, while we expect continued warming for the world, natural variability or other events—significant volcanic activity—could lead to some years and some regions that for a time are cooler than normal. Getting too far ahead—reading an unusually warm year as indicative of a permanently changed climate—might catch you with an adaptation that is premature. For example, a farmer planting a warmer season crop may find it is subject to frost damage when natural variability brings along a cooler year. Reilly	General	A discussion of the problems with planning for adaptation has now been added to the About this Report section.
█	BR	Reilly	Gen			Part 23: To see a clear signal much of the work on climate impacts looks ahead 30, 50 or 100 years but only a few of the investment decisions we make today will have much consequence that far in the future, and so those projections help us to think about where the world is heading but may not be directly relevant for decisions today that involve adaptation. Reilly	General	Thank you for the comment. It has been considered in the course of revising the report.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	Gen			Part 24: Also, as already noted the fine details of climate change are difficult to project in any case, and the climate is possibly subject to abrupt changes. To identify a robust response we must have some idea of the full range of possible climate change—is it possible that we might have either more rain and more flooding or less rain and more drought or even both at the same time? In such a circumstance a farmer might consider adding irrigation. Is that a “robust” strategy? Quite possibly no because, even if the farmer can grow a crop under drought conditions, the strategy may fail a test of economic robustness. If the farmer relies on depletable groundwater or surface water that is itself vulnerable to climate change, a lack of water could render the irrigation equipment useless. Or it is possible that crop price changes simply will not support the extra cost of irrigation for that farmer, leading to production to shift to other regions that fare better under a changed climate. A robust strategy will depend on the circumstances of the individual and so one size does not fit all. Reilly	General	Thank you for the comment. It has been considered in the course of revising the report.
BR	Reilly	Gen			Part 25: In thinking about adaptation to climate change one must think carefully about the range of possible climate outcomes, the time frame of the decision, and the economics of the investment. In technical terms such economic decision making in the face of uncertainty is referred to as real option analysis—making a formal calculation as to whether to invest (or invest extra) to preserve or create the ability to exercise an option in the future should things turn out so that it made sense to do so. Reilly	General	Thank you for the comment. It has been considered in the course of revising the report.


Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	Gen			Part 26: You might bring some form of the section “Pathways to Improved Decision Making” into the opening chapter—what I am calling the primer. I’m not sure I like everything about orange figure on page 162 but I think the broader message of this section—that what this document can give the reader is some direction on how to integrate adaptation into the Nation’s (Gov.s at all levels, individuals, businesses, etc.) planning and decision-making. Getting that message into first chapter will then give the reader the right message—that the rest of the document is more an example than a projection or a list of things that will happen or things to check off on one’s adaptation list. Reilly	General	Thank you for your suggestion. However, the Pathways section has been revised to make sure all parts of it arise from shortcomings in the rest of the USP. To put parts of the Pathways section up front would lose some of its logic, so this recommendation has not been incorporated.
BR	Reilly	Gen			Part 27: [Now—what I don’t like about the orange diagram. I actually misinterpreted what this whole thing was about at first. Eventually I realized this is suppose to be something like a description of how the National Assessment worked and how it could be improved. That seems like a “navel contemplation” exercise—useful for the CCSP to do but not part of the something aimed for the general public. I took the Improved Decision Making in the heading to be the point. That title is particularly misleading—an assessment activity doesn’t make any decisions—it provides information. If this section is suppose to be about how to improve a next assessment, it should be retitled “Towards Improved Assessments of Climate Impacts and Adaptation. That said, the diagram still is confusing and I think not well thought out. Reilly	General	The USP now discusses the opportunities and difficulties with adaptation. The adaptation parts of the report are now primarily limited to examples.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
█	BR	Reilly	Gen			Part 28: One of the top points..“Determine best models” is I think way to model-centric. It is not clear that any of the models are really good enough alone and what one wants is a probabilistic range. So this should be something more general. “Develop estimate of the range of future climate conditions.” I don’t mind the “Sharpen regional projections” and “monitor and project extremes” as those make some sense—while that may well mean use a regional model to downscale the statements are open to things other than models. However, if you generalize the first statement then I don’t think you need “broaden emissions scenarios” or “understand feedbacks from the climate system” as these will be naturally part of the process of developing a probabilistic range of climate scenarios. Reilly	General	Thank you for your comment. The report has indeed undergone major revisions.
█	BR	Reilly	Gen			Remainder of the document. I ran out of time to go through every page carefully. However, I would like to see a significant restructuring of the document, and so I don’t think it really pays to line edit further at this point. The above specific comments call out a general need to be more careful about how things are stated. Reilly	General	Thank you for your comment. The report has indeed undergone major revisions.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Solomon	Gen			<p>Part 1. Pages 4-199. I appreciate that the authors have worked hard, and on a limited timetable. There is much in the document that is useful and appropriate, and I thank the authors for their contributions. But there is also a great deal that is problematic in my opinion. I feel that this document requires major revision and a nearly complete rewrite to make it a credible and appropriate product. This would also require a re-review. It will be better to take the time required to produce a strong document than to move ahead with a cursory revision and release. Among the major problems I see are:</p> <ol style="list-style-type: none"> 1. Advocacy. The report contains a great deal of policy-prescriptive or advocacy language. This should be carefully removed throughout. I will give a number of specific cases below where I list my specific comments on particular pages up to page 42, but this problem is widespread throughout the document and requires high level editing to remove these occurrences throughout. I suggest the report be edited from start to finish by a subgroup of authors with this need carefully in mind. Solomon 	General	<p>Thank you for your comment. The report has undergone a major revision and will be going out for additional review as suggested.</p> <p>The report has been scrubbed for advocacy statements. A small group of authors carefully reviewing the report will keep this comment in mind.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Solomon	Gen			<p>Part 2.</p> <p>2. Referencing. The report’s referencing needs major improvements and a thorough revamping. At present, there is a great deal of material whose origin is not clear. The style of asserting that a great deal of the material is an unspecified mix of a long list of potential sources including SAPs, ACIA, and IPCC is not appropriate in my opinion. This degrades the credibility of the work substantially. Each paragraph needs to have a specific list of what its sources are. This represents significant work but I do not think the document will be credible without doing it – it is essential in any document that purports to be a synthesis across carefully reviewed material.</p> <p>3. The need for CCSP synthesis. The document states that its intent is to be a synthesis across SAPs but it is not, since much relevant material that is available in many published SAPs is not presented here. A greater effort needs to be made to ensure that the relevant findings of available SAPs are appropriately included. I note a few major omissions below. As a matter of practice, I suggest that this document should be reviewed by the leaders of all the contributing SAPs to ensure that appropriate information is included. I feel that the report will suffer greatly in properly representing CCSP’s products if this step is not undertaken. Solomon</p>	General	<p>The citation of sources is now much more prevalent throughout the document.</p> <p>The report is now much clearer in its synthesis of SAP material.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Solomon	Gen			<p>Part 3.</p> <p>4. Lack of balance and clarity on uncertainties. Many statements are unbalanced, or fail to adequately express uncertainties and limitations of present knowledge. These all need to be carefully scrubbed and corrected. Evidence should not be presented selectively; every statement needs to be a balanced of current state of understanding including not only the knowns but also the relevant unknowns. An example is sea ice, where it is not appropriate to ignore the contrast between the Arctic and the Antarctic – that is cherry-picking. I believe my comment above will help this to some degree: clarity on the origins of all statements should help to reduce lack of balance. But the authors also need to re-examine the document in its entirety. Further, a specific problem is that page 15 indicates that all statements without uncertainty language are deemed virtually certain. I find many examples in the document of statements without uncertainty language (implying that the reader is to interpret these as virtually certain) where I do not feel that a judgment of virtually certain can be viewed as substantiated or appropriate. I will identify some of these in my specific comments, but there are so many of them that I feel a revamp throughout the document is required in the way uncertainties are dealt with. The assertion that unqualified statements are all virtually certain is not likely to succeed, and I suggest that the authors need to take a more careful approach that includes clear and appropriate uncertainty statements on every paragraph. Solomon</p>	General	<p>The use of likelihood or certainty qualifiers has been enhanced throughout the text to help make all the statements more precisely accurate as to their uncertainties.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Solomon	Gen			<p>Part 4. 5. Goal of the report and undue emphasis on adaptation. There is a heavy emphasis on adaptation, but very little on mitigation. This is fundamental, and it is extremely unbalanced. It creates an impression that the message of this report is that adaptation is the solution, which is not clear based on current information. There is much that can be done to mitigate, across the full range of greenhouse gases and aerosols but this has been neglected here. The undue emphasis on adaptation is a misrepresentation of current understanding and existing SAPs. I don't think this is necessary nor is it appropriate, and it also compounds the difficulties of the report by extending its mandate. The material on adaptation should therefore be substantially cut. Particularly important would be to remove anything that doesn't trace to published SAPs (I found many examples in the report of material that seemed to come from newspapers and the like – these are the first to remove, followed by others that provide an undue emphasis). I suggest sticking strictly to the report mandate and avoiding this problem entirely: the report is supposed to be on 'Global Climate Change Impacts in the United States'. Solomon</p>	General	<p>Adaptation is now limited primarily to examples and mitigation is explicitly, though briefly, discussed.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Solomon	Gen			<p>Part 5.</p> <p>6. Repetition. The document is extremely repetitive due to how it has been structured, with issues such as heavy precipitation being repeated in many of the sectoral statements, the regions, etc. While I realize that it is always difficult to structure impacts statements, I think this has to be addressed. Some sections can be cut, combined, or trimmed down substantially to help address this, and I make a few specific comments below.</p> <p>7. Major Omissions. There are major omissions in the report that should be corrected by substantive additions. Most evident is the lack of substantive material on forcings of the climate system. I comment on this in detail below.</p> <p>8. Oversimplification of text and figures. There are many instances of oversimplification. While I can appreciate a desire for readability by a broad audience, the document goes too far and as a result loses credibility and authority. The authors will benefit by a careful look at the document that seeks to ensure that no oversimplified statements, or oversimplified figures, detract from the credibility of the work. I give examples below.</p> <p>9. Vagueness. Many statements are excessively vague. The report will be stronger if the statements are as specific as possible. Many statements are also ‘truisms’ that are not particularly useful. I provide some specific examples of these. However, I feel that the authors should go over the report and reduce most of the statements that are truisms in favor of more quantitative statements. The report is of little value if it provides undue emphasis on information that cannot be quantified.</p> <p>10. Closing comment. I regret that I had to offer a large number of major and negative comments but I feel that the above major issues are essential to a successful and appropriate report. I spent a great deal of time on the report and I hope my comments are helpful but due to the large number of issues I ran out of time to provide as many detailed comments beyond page 42. Solomon</p>	General	<p>The amount of repetition has been substantially reduced. However, some repetition remains as the authors deem it unlikely that most readers will read the entire document so some parts need to be able to stand on their own at the expense of involving some repetition.</p> <p>Noted. This will be commented on in detail below in response to your more detailed comment.</p> <p>Thank you for your comment. Details responses will be provided below in response to your more detailed comments.</p> <p>The report has been edited to be more precisely accurate.</p> <p>Thank you for your comments. The report is better having been edited with your comments in mind.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	CC	Williams	Gen			<p>In general, I found the report very well written. While reading it I wasn't brought up short by jargon, passive-voice sentences, and other examples of bad writing that get in the way of conveying information.</p> <p>On content, I like the stress on adaption strategies and the examples used to illustrate them. I've been reporting and writing about climate and climate change for 25 years and I found many things in the report that I had not thought about before. I think the report could do much to enhance the national discussion about climate change. I think the report does a good job of addressing points made by climate change "skeptics," such as on Page 19 by making it clear that while water vapor is the most abundant greenhouse gas, warming caused by anthropogenic carbon dioxide increases water vapor in the air. It is also clear that the authors were thinking of ordinary readers by making the point, also on Page 19, that the "aerosols" that climate scientists talk about are not those from "aerosol cans."</p> <p>Should the argument by "skeptics" that "scientists said in the 1970s that global cooling would kill us all"? Maybe a brief discussion could be included saying that while global cooling received a lot of news media play in the 1970s, the idea had relatively little scientific support. Many of the charts and maps are too small for their text to be easily readable. An example is on page 69 - The two maps of Florida on the bottom right. These maps and chart have useful, and interesting information. But, you are faced with the choice of using fewer of them in larger size, making the report longer in order to have room or larger maps and charts, or finding a way to make the small maps and charts more accessible to readers by reducing the amount of text, thus leaving room to make the text larger. I think that some of the graphs are too complex for general readers or policy makers who are not scientists. A specific example is the graph of Precipitation Tends by Intensity Level on Page 36.</p> <p>Williams</p>	General	<p>Thank you for your comment.</p> <p>Thank you for your comment.</p> <p>While this is easily done by citing a paper by a USP co-chair, The 1970s global cooling myth is addressed in Peterson, Thomas C., William M. Connolley and John Fleck, 2008: The myth of the 1970s global cooling scientific consensus. <i>Bulletin of the American Meteorological Society</i>, in press (September 2008), the USP goal is to state the facts rather than address all arguments by skeptics so it is probably not necessary to bring up in the USP.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	CC	Williams	Gen			<p>As with many graphic displays by and for scientists, it has more than one level of abstraction. We could consider the total amount of precipitation in a time period as a first-level abstraction that is easy to relate to common experiences. Classifying the intensity of precipitation events in relation to other events is another level of abstraction. The changes in the distribution of precipitation amounts is a third abstraction. While scientists are comfortable with these levels of abstraction, many non-scientists aren't comfortable with complex quantification and would quickly give up trying to understand it. Some of the pages seem to be cluttered by attempts to include too many illustrations or especially graphs. The authors should keep in mind that many non-scientists are as comfortable with graphs as scientists.</p> <p>Williams</p>	General	<p>The report has been revised to make the figures more readable. (e.g., the graph on page 36 has been revised).</p> <p>The reviewer makes excellent points. The graph mentioned has been simplified to make only one point.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Wofsy	Gen			<p>I was very concerned about the treatment of hurricanes and extreme weather. The description of the problem appears to use selective citations and present a distorted picture of the problem. This will lead to avoidable, distracting controversy, since the policy implications of climate change are clear for the built environment despite much uncertainty about how storms will change. Pages in the Draft: 6- point 4; 16-bullet3, 27, (58, 68), 124 (especially last PP)</p> <p>Because of the enormous potential for catastrophic damage, and the recent trauma of Katrina and Rita, the public is very concerned about the possibility that hurricane intensity and/or power will increase with global warming. The Draft gives the reader the impression that this possibility is fact. Also treated as fact is the inferred increase in hurricane power in the recent past, with attribution to climate warming. The reader could conclude that global warming caused Katrina and its huge damage, even though we have no evidence to support the causation and the damages clearly derive more from bad engineering and the placing of people at risk (it was always known that a cat-5 storm would some day hit New Orleans).</p> <p>The scientific literature, including the most recent, does not support this treatment. Given the importance and prominence of this question, a clear, accurate statement of the issue should replace what is written in the executive summary (especially) and in the section on extreme weather. It is indeed critical for this report to highlight the probability of increased damages from hurricanes and other extreme weather, but it should do so more convincingly. Wofsy</p>	General	<p>The discussion of hurricanes now uses CCSP 3.3 language very specifically to describe changes in hurricanes and extreme weather.</p> <p>The discussion of hurricanes now uses the exact language from CCSP 3.3 to very precisely convey the appropriate message.</p> <p>The discussion of hurricanes now uses the exact language from CCSP 3.3, <i>Weather and Climate Extremes in a Changing Climate</i>, to very precisely convey the appropriate message.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Wofsy	Gen			Hurricanes: The hurricane issue is best described as a probable increase in intensity with very large damages should it transpire, and some significant indications that it might--but this is one of the most difficult phenomena to model of all the climate change issues. *It is virtually certain however* that hurricane damages will increase significantly as sea level rises (a virtually certain outcome of climate warming). Hence, even if hurricane intensity did not change, it is essential for people begin now to modify the built environment. Wofsy	General	The discussion of hurricanes now uses the exact language from CCSP 3.3, <i>Weather and Climate Extremes in a Changing Climate</i> , to very precisely convey an accurate message and will make the link between hurricane damage and sea level rise.
BR	Wofsy	Gen			Steps to decrease potential damages from hurricanes are needed right away, including moving structures away from vulnerable locations, raising the elevation of infrastructure, and requiring structures in vulnerable locations to be resistant to storm surges (e.g. by raising on stilts). Some details: Hurricane intensity and power dissipation are correlated with sea surface temperature, and with other factors (depth of the ocean mixed layer, shear in the atmospheric wind structure). It is very difficult to predict how these various factors will change in the warmer world decades from now. Some (but not all) of the most sophisticated models indicate that hurricane intensities would increase significantly, but the results depend on which large-scale climate simulation is used. A recent abstract from K. Emanuel (see below) makes this point clearly, and shows conclusively that the issue is not settled. The statistical study by Saunders and Lee (prominently cited in the Draft) of the last decade does not provide a useful predictive framework (and the authors don't claim that it does.) Looking back, the deadliest hurricanes occurred in the 18th century. Datasets on global hurricanes are not sufficiently accurate to determine if recent increases are due to, or correlate with, global warming. Recent references (among many others) that tell a different story than the ones included in the Draft (see supporting documents). Wofsy	General	The discussion of hurricanes now uses the exact language from CCSP 3.3, <i>Weather and Climate Extremes in a Changing Climate</i> , to very precisely convey an accurate message.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Wofsy	Gen			There are several key areas where climate change interacts very strongly with other environmental issues. This feature is so basic, and so important, that I suggest that it receive more coherent and prominent attention. The point is that we need to take steps to improve the environment in a warming climate that we need to do anyway, just with more urgency (and these needs can be motivated by minimizing risk, they do not require perfect knowledge of climate change.) This discussion would go nicely right under "Rates of change" on page 5. Wofsy	General	Thank you for the comment. However, we are mindful that this report is intended to summarize the science of climate change and its impacts on the United States, now and in the future, and feel that the suggested additions are beyond its scope.
BR	Wofsy	Gen			Two prominent examples are: *Air pollution and health: rising temperatures make emissions more potent by increasing reaction rates; rising temperatures make vulnerable people more vulnerable; energy-related emissions release greenhouse gases and pollutants. All indicate that there is a very strong need to reduce rates of fossil fuel combustion; this would be true without climate change. *Invasive species: changing climate inevitably means that species become invasive, since ecosystem niches change with climate; invasive species are most damaging in disturbed landscapes. Both factors point to the need to preserve and enhance both natural and inhabited landscapes, for plants and animals, reserving large areas for conservation and making it possible for people to coexist with ecosystems that function resiliently. There is much to be done in this regard in urban design and in the forestry and agriculture areas. Invasive Animals: The report deals with invasive plants and somehow neglects invasive animals and micro-organisms (gypsy moth, wooly adelgid, Asian longhorn beetle, winter moth, oak death fungus, etc). In some cases these organisms are in the process of making major species functionally extinct. Wofsy	General	While some relationships are relevant even as the reviewer indicates "without climate change" the USP is focusing on the world where climate change is a reality and describing the impacts of that climate change. This topic area is addressed in the Ecosystems Section. For example, the report notes that mountain pine bark beetles have infested and killed lodge pole pines in historically unprecedented numbers and in overall area affected. Mortality of affected lodge pole pine stands has approached 90 percent of the trees.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Wofsy	Gen			<p>Ecosystems: Forest management could play a key part in responding to climate change. Almost all forest land in the US is managed. With the right incentives, forest management could promote healthy forests that adapt to climate change. Also, forests can be managed to help mitigate the changes in *surface climate* and to help with the water problems covered so well in the report. A short section on forestry would help to focus attention on the potential for forest management. Note that recent trends are for private forest lands to be broken up into small units and/or to be converted to agroforestry (high-input management with very short time horizon, monocultures of crop-like trees--not real forests). These are trends worth reversing by wise public policies.</p> <p>Forestry needs to respond to climate change by considering future drift of species niches. But the uncertainties of future climate, and the associated difficulty of forecasting future ecosystem structure, should provide an incentive for managing forests with maximum diversity and resilience. The interest in storing carbon leads to an interest in longer, not shorter, rotations. Thus the report should help the reader to understand that climate change interacts with forestry in a complex manner leading to the imperative to improve management practices to encourage more diverse, resilient forests. Wofsy</p>	General	Thank you for the comment. Forestry issues are now dealt with in considerable detail in the Ecosystems Section.
CC	Henson	8-11			<p>There is some major inconsistency in tense (future, present, past) among these paragraphs. Some refer to projections, others are phrased as future declaratives (“This will happen”), and others refer to observed change. As a reader, I wasn’t sure what to expect when I hit each paragraph. Much could be improved by reordering the statements in each paragraph to reflected a consistent past-present-future sequence. Henson</p>	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Duce	0	2		<p>Page number is wrong - it should be 6, not 4. Duce</p>	Front	The document has undergone major revisions and all page numbers have been checked.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	0			Table of Contents: Aside from there being a problem here with page numbering, it seems to me that the section entitled “National Climate Change” is a bit limiting as there is much discussion of change across the US, etc. Maybe retitle the section to be something like “Climate Change across the US.” MacCracken	Front	Thank you for the comment. The page-numbering problem has been corrected. We feel that the current section title is consistent with the material presented and does accommodate the discussion of climate change across the U.S., so the current title will not be changed in the 2 nd draft of the USP.
BR	MacCracken	0			Table of Contents: It seems to me that the section titled “National Level Climate Impacts” both need to be retitled, to something like “National Level Perspective on Climate Impacts.” Basically, the impacts vary across the US and it is not easy to add them up. What is done is to present the pattern of changes, and then the report can offer its perspective on their overall national significance. But, and this is what makes the issue so difficult, Congress can’t simply address some set of national impacts and have them moderated or adapted to—the impacts have a lot of spatial structure and character, etc. Now, this section does pick out topical areas where national level policy can be helpful and that should be considered, but these reports also have a lot of regional character, and so I think finding some way to indicate that this section is offering some national perspectives or considerations, etc. would help. MacCracken	Front	We recognize that the impacts vary across the United States and provide examples of significant U.S. impacts drawn from various regions of the country. Specific regional context is provided for each of the six sectors. There is no attempt to add these impacts up into a single, grand total as the reviewer’s comment seems to imply, and we have decided to retain the current section title.
BR	MacCracken	1			I don’t like the title “Complex Interactions,” as if this is the only place where such interactions are discussed or arise. I would suggest a title such as “Couplings and Interactions with Other Environmental Stresses” or something similar. Or maybe say “Synergistic Interactions with Other Issues” or something—but all aspects of this issue are complex and interact, so the present title seems inappropriate. MacCracken	Front	Thank you for the comment. The Complex Interactions section has been removed and the information integrated into other sections.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	1			I don't understand the term "Revisited" in the section title for response strategies. There is no indication in the Table of Contents that the topic has come up earlier, so what does "revisited" mean? I could understand saying something like revisiting the impacts from the perspective of adaptation, but not that responses strategies are being revisited. I would also think there might be a need for some subsections here, indicating both what can be done with readaptation and making the point that what cannot be adapted to must be endured or suffered through—so indicate what is irreversible (like species losses, etc.). [And the word "focus" should be capitalized.] MacCracken	Front	Thank you for the comment. The Response Strategies Revisited section has been removed and the information integrated into other sections.
BR	Corell	4			The background is not connected in direct ways to the content of the report, and it is not at all persuasive a background to such an important section. This whole spread needs to be reworked. The "pull notes" on page 5 are good, but those on page 4 don't flow. In tact, there needs to be a flow that is reinforced by the many pages that follow. One could urge that the Key Findings should be first, then a spread like this that follows and then the more detailed summaries of the sectors and regions. Most importantly, I'd add two "pull notes" that address these two issues: (i) Note the substantial increase in confidence in the findings and (ii) Note the increase in our confidence in the model and simulations projections. These are two of the most often asked questions and we have solid answers now. I'd beat this spread to death until it is so powerful that it is reproduced as the essential findings of the report. (p. 4-5) Corell	Front	The two-page spread on pages 4 and 5 has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked in light of reviewer comments.
BR	Duce	4			General layout. I realize that this page is trying to paint a highly negative impression about the impacts of climate change. However, the stark color contrasts between the black and orange/red are very jarring - if this is the intent, then it succeeds very well. I would prefer some colors that allow one to focus more on what the text says and less on the colors themselves. Duce	Front	The two-page spread on pages 4 and 5 has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Field	4			Urgency of action: The text says that delay will be costly, but this point is supported largely indirectly. The report provides some numbers on the damage side but hardly any on the costs of mitigation and adaptation, particularly with delays of different lengths. The report makes the case that important values are at risk, but it doesn't get close to doing the cost benefit analysis implied by this bullet. Field	Front	The two-page spread on pages 4 and 5 has been eliminated. The revised USP only touches briefly on mitigation as options are narrowly constrained by Sap 2.1a and SAP 2.2. The USP does provide some examples of adaptation options but endorses no particular options. We also feel that there is insufficient information to evaluate costs or benefits based on the current state of research in this area.
CC	Henson	4	3	2	settlements? communities? lay readers may not think of a small Arctic or island town as a 'civilization'. Henson	Front	The two-page spread on pages 4 and 5 has been eliminated.
BR	Hooke	4			Box 1: The Future is in Our Hands: Doesn't it make sense to have a very first box that states something even more basic, like "humans have reached such numbers, and per capita use of energy (particularly fossil fuels), water, and other resources, have grown to such an extent, that they are affecting climate?" Maybe all readers will comfortably read that into the implicit message of the first box, but somehow it doesn't seem like quite the right starting point. Hooke	Front	The two-page spread on pages 4 and 5 has been eliminated. The revised Executive Summary does not include the "Future is in Our Hands" Box.
BR	MacCracken	4			Phrasing of the points: These boxes presumably have the key messages in them. The problem is, it seems to me, is that the titles of the boxes, other than for the one "The Future is in Our Hands" are topics and not messages. All the main findings should be phrased as messages, even though this adds some words. Otherwise, getting the main messages requires actually reading the box and coming up with one's own bottom line. MacCracken	Front	The two-page spread on pages 4 and 5 has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked in light of reviewer comments.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	4			<p>Executive Summary, The Future is in Our Hands: This point really needs reworking. First, it seems to me to have too many thoughts in it. The point itself is excellent, but it seems to me that it needs a bit of simplification. More substantively, the implication that is that this report is going to explain the difference between a scenario of unlimited emissions and one where we have chosen lower emissions—and this is just not the case. Both scenarios (and actually a few more than two are discussed in the report) are “no-policy” scenarios from the SRES/IPCC set. Neither is for a case where we or the world have chosen to reduce emissions. You can certainly make the point that changing emissions can make a difference using the SRES scenarios, but the report (unfortunately, for the studies have not been done) does not show what can be done by really making an intentional choice for low emissions, either by the US or the world, and this needs to be made very clear (among other steps needed is to add a two-page spread on scenarios).</p> <p>MacCracken</p>	Front	The two-page spread on pages 4 and 5 has been eliminated. The revised Executive Summary does not include the “Future is in Our Hands” Box. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked in light of reviewer comments.
BR	MacCracken	4			<p>Background Diagram: The diagram here is really inappropriate. The two emission scenarios discussed later are for “no-policy” scenarios, yet the text here is about making a choice—between emissions going up and going down. That is indeed the choice, but the report does not focus at all--near as I can tell after reading 40 pages, and I will be reading more—on comparing what the US will be like with a no-policy scenario and a strong action scenario such as being considered in the Congress. In the diagram, the low emissions scenario takes the country to something like (using the color bar) 7-8 F warming, and that is not inevitable if we act—that is the low IPCC “no policy” scenario. And this diagram implies there are only two sort of narrow choices, and that is not the case at all. So, scrap the diagram, and clarify the scenario issue, as indicated in a general comment. MacCracken</p>	Front	The two-page spread on pages 4 and 5, including the Background Diagram, has been eliminated.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	4			Executive Summary, Beneficial and Detrimental Impacts: Just a thought that most people will think “historical” means long ago, rather than the second half of the 20th century. A key point that really needs to be made is that the real problem is that society (with its infrastructure) and plant and animal life cannot quickly adjust to the changed conditions. I get asked about how I know the present climate is optimal rather than some other climate state—and the problem is the rate of change. What to say is that good planning and proactive adaptation can help to shorten that time, but that can only work for certain aspects of the impacts, and cost can become high. MacCracken	Front	The two-page spread on pages 4 and 5, including the “Beneficial and Detrimental Impacts” Box, has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments.
BR	MacCracken	4			Executive Summary, Irreversible Losses: Good topic, and should be a subheading in the Table of Contents. I am not sure saying “civilizations on islands and coasts” is not, however, too much. We can lose “island nations” and “coastal communities”—and maybe say traditional cultures can be disrupted, but “civilization” seems a very big jump. MacCracken	Front	The two-page spread on pages 4 and 5, including the “Irreversible Losses” Box, has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments.
BR	MacCracken	4			Executive Summary, Urgency of Action: In the second sentence, I think the “would” should be changed to “will,” so making the assumption that this will happen. I also would add that “delay” is a choice—a bad one in terms of climate change, but it is a choice. So, I would change the phrasing to “and choosing to delay emissions cutbacks will magnify the amount and impacts of climate change.” So, be a bit more specific. MacCracken	Front	The two-page spread on pages 4 and 5, including the “Urgency of Action” Box, has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Mearns	4			<p>The Exec Summary is well written and covers a wide range of information generally in an orderly and concise manner. There are a few problems, though. The main one is how the assertions are made, which also relates to the tenses used in the declarative sentences.</p> <p>And this is related to the complete lack of any indication of uncertainty in the executive summary. This is surprising given that there is a CCSP product on uncertainty and the role of uncertainty in the document is discussed in ‘About this report’ section. Yet nothing on uncertainty appears in the executive summary (no explicit discussion) and the terminology provided in the section ‘About this Report’ (p. 15) is not used. While I appreciate possible concerns about how to discuss uncertainty in a general way in a document accessible to a lay audience, to not include it at all seems disingenuous and quite frankly dangerous.</p> <p>Uncertainty is a key factor in all aspects of climate change, indeed in any discussion about the future. This must be represented adequately in the summary for policy makers.</p> <p>One of the nice things about uncertainty is that everyone experiences it since we all think about and make plans about the future. While a detailed technical treatment of uncertainty would be difficult in this document, people basically know what uncertainty is and have a good deal of experience on how to manage it in decision-making (even though they may very well have not thought about it explicitly).</p> <p>Mearns</p>	Front	<p>The two-page spread on pages 4 and 5 has been eliminated. Some of the concepts now appear in the Executive Summary and Key Findings that have been reworked as well in light of reviewer comments. Uncertainties have been addressed more explicitly in the revised version, both in the About this Report section and in the wider use of specifically defined likelihood statements.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Mearns	4			This is a nice attempt to communicate the issue of choice we have regarding which ‘road’ we are going to take in the future. And it thus relates well to the first message box on ‘the future is in our hands’. However, the graphic is cluttered and it is difficult to orient oneself regarding what to look at first, next, etc. Why the boxes are ordered as they are is not clear, and this needs to be thought about more strategically in relation to the graphic. Also, the use of a detailed temperature scale at the bottom seems dissonant with a qualitatively-oriented graphic. I would remove the temperature scale completely or put a few guiding temperatures on the roads themselves. Mearns	Front	The two-page spread on pages 4 and 5, including the Background Diagram, has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments.
BR	Meehl	4	1	3	There are repeated references to warming that is “locked in” throughout the document. This is a dangerous reference since if there is a large tropical volcanic eruption next year, for example, we’ll NOT see the amount of projected warming that we’re supposedly “locked in” to. This sentence is poorly worded in any case. I’d suggest something like “We are committed to a certain amount of warming over the next few decades (barring a large volcanic eruption that would cool climate for a couple of years before we return to warming), but in any case the actions we take now will have a direct effect on the eventual amount of warming we experience later this century”. Meehl	Front	The two-page spread on pages 4 and 5 has been eliminated. Also, the concept of “locked in” warming has been eliminated from the document. The point that Volcanic eruptions or other natural variations could temporarily mask human induced Warming is included in the revised Executive Summary and Key Findings Section.
BR	Ebi	5		2nd	Tipping Points: Add “and to the affected systems” to the end of the sentence. Ebi	Front	The two-page spread on pages 4 and 5 has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments.
BR	Field	5			Tipping points: This bullet seems a little overstated. Few of the specific examples in the text are described as tipping points, and abrupt climate change is not likely in the mainstream analyses. Field	Front	The two-page spread on pages 4 and 5, including the Tipping Points bullet, has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Field	5			Limits to adaptation: I think this statement puts too much emphasis on the limits of adaptation without also mentioning its potential. Later, the report is very balanced in the concept that adaptation is both essential and limited in its potential. I think this is too important a concept to leave off the executive summary. Field	Front	The two-page spread on pages 4 and 5, including the Limits to Adaptation bullet, has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments
CC	Henson	5			The signpost on p5 is situated past the fork in the road—needs to be at the fork. Also, the “dark to the left, bright to the right” graphic feels a bit heavy-handed to me. Maybe the directions of the sign could be reversed, and a single naturalistic image (pastoral scene?) could be used in the background—one that is clear and crisp on the left, but that morphs to a fuzzier, more unsettling look on the right, reflecting uncertainty as to whether our current way of life and ecosystem(s) can continue. Henson	Front	The two-page spread on pages 4 and 5 has been eliminated.
BR	Hooke	5			Box 3: Limits to Adaptation: There are limits to mitigation too. Might have a more balanced way to describe this. Is “mitigation” a forbidden word? Why is it not introduced here? Hooke	Front	The two-page spread on pages 4 and 5 has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments. As mentioned in an earlier answer, the revised USP touches briefly on mitigation as options are narrowly constrained by Sap 2.1a and SAP 2.2, but the subject of mitigation is the subject of ongoing study by the U.S. Government’s Climate Change Technology Program, the CCSP, and others.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	5			Executive Summary, Tipping Points: This point is pretty similar to “Irreversible Losses.” To better separate the points, I would include the potential for nonlinear growth of changes. The Schellnhuber group actually has a pretty tight definition of what “tipping points” means—it is nice jargon, but there are a lot of other nonlinear consequences that merit attention. For example, hurricane strength growing is not a tipping point, even though there are tipping points as to wind levels and building loss. The official view is that changes in hurricanes may be nonlinear, but not a tipping point. So, broaden this a bit. MacCracken	Front	The two-page spread on pages 4 and 5, including the Tipping Points bullet, has been eliminated. Some of the concepts now appear in the Key Findings that have been reworked as well in light of reviewer comments. Also, the discussion of hurricanes in the USP now uses the exact language from CCSP 3.3, <i>Weather and Climate Extremes in a Changing Climate</i> , to very precisely convey an accurate message.
BR	MacCracken	5			Executive Summary, Rates of Change: Why is the focus solely on natural systems? The rate of change is very important for many social systems—like the location of cities and infrastructure. MacCracken	Front	The two-page spread on pages 4 and 5 has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments.
BR	MacCracken	5			Executive Summary, Limits to Adaptation: Make it clearer that sea level rise, once really initiated, will be going on for centuries. It also needs to be made clearer that individual humans can adapt quite well (move from Syracuse to Tucson), but that species and infrastructure—and so society and the environment—cannot. This really needs to be made clear—that small changes that individuals would consider easy to adapt to are not easily adapted to by species and human activities. The public is not at all clear on this, and needs to be. MacCracken	Front	The two-page spread on pages 4 and 5 has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	5			Executive Summary, Missing Points: I think there needs to be a point about the shifts in the weather and of precipitation systems. In the National Assessment we sort of focused on giving a shift as a shift in the climate, but what really happens, as has been made clear this year in the central US, is that the weather systems (especially the very heavy rains) shift northward as the intersection of moist tropical air and colder polar air is moved north. We had tornados in Wisconsin in January not because of a slight warming, but because moist tropical air got to Wisconsin in January, not being pushed far to the south by greater outpouring of cold arctic air. So, the weather shifts—fine to say on average it is a few degree warming, but what really matters with regard to many impacts is the weather and extremes. So, add a point on weather shifts and extremes. MacCracken	Front	The two-page spread on pages 4 and 5 has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments.
BR	Meehl	5	2	2	This is a generic statement that could actually be bolstered since we are already experiencing rapid climate change. How about something like “We have already experienced a much more rapid rate of warming over the past 40 years than that seen in the geologic record, and projections show this rapid warming will continue. Such rapid climate change makes successful adaptation much less likely...” Meehl	Front	The two-page spread on pages 4 and 5 has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments.
BR	Meehl	5	3	3	This is another phrasing that appears later in the document, namely that “climate will be continually changing”. Even an uninformed reader could respond that the climate is changing all the time (in the context of natural variability on various timescales). What needs to be conveyed here is that climate change will go beyond the natural variability of climate to which we are adapted, and that these trends are projected to continue into the future, and that we are entering uncharted territory with regards to the particularly rapid rate of climate change we are experiencing and will continue to experience. Meehl	Front	The two-page spread on pages 4 and 5 has been eliminated. Some of the concepts now appear in the revised Executive Summary and Key Findings that have been reworked as well in light of reviewer comments, and the Executive Summary includes a statement that humanity is now entering uncharted territory. The Core Group considered the reviewer’s suggested addition “...climate change will go beyond the natural variability of climate...” This is addressed in the global section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Corell	6			These are all scientifically sound, but they are too long. Reduce and give the pages more “white space” so the reader is not put off by the density of the text. Somewhere there should be reference to the increase in confidence in the scientific results, i.e., the greater than 90% idea for words like very likely – in fact why not use the IPCC lexicon as it is now a widely used strategy to convey the levels confidence in the science. As before, I’d lead with this and then follow with the spread now on pages 4-5. (p. 6-7) Corell	Front	Thank you for the comment. Major revisions have been made in the presentation of the Key Findings in the 2 nd draft of the USP. The bullet point format has been eliminated so that the Key Findings are shorter and stand out much more clearly. Each key finding is now followed by a brief explanation.
BR	Duce	6			This section on Key Findings is very sterile. This is one of the most critical parts of the entire report, but it does not grab the reader at all. The points being made are very good, but can this be improved Madison Avenue-wise? I assume that you are trying to keep these key findings to 2 pages, and thus there is no room for figures or other illustrations. Even small illustrations near the left margin for each major point, like we see in the next 2 Summary sections, would help. Or perhaps more substantial illustrations could be used for each of the 10 points, but with the entire section possibly taking 3 or even 4 pages. Duce	Front	Thank you for the comment. Major revisions have been made in the presentation of the Key Findings in the 2 nd draft of the USP. The bullet point format has been eliminated so that the Key Findings are shorter and stand out much more clearly. Each key finding is now followed by a brief explanation.
BR	Ebi	6	3		This is one place to highlight the climate change commitment. Ebi	Front	Key Finding 3 has been rephrased although the meaning of this comment is not clear and we are not sure we have addressed the full meaning of the reviewer’s comment.
BR	Field	6			many changes occurring faster than projected: This is a confusing concept. The intended reading is that we have a clearer and clearer understanding of the seriousness of the issue, but one could also read this text as indicating that the earlier projections were inaccurate to the point of being irrelevant. Would it be better to craft the text to indicate that the actual changes are at the upper limits of earlier projections or to briefly explain that the earlier projections needed to ignore some important mechanisms. Field	Front	Thank you for the comment. The conclusion containing the text referred to in this comment has been eliminated.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	6	1		This paragraph doesn't note that US emissions cuts are only part of a picture that must include global emission cuts in order to have maximum impact. I know this may undercut the goal of motivating action, but it seems like an important point to include. Henson	Front	The report has undergone major revisions. The importance of global emissions is now discussed in various sections.
BR	Hooke	6	5		Bullet 3: Atlantic hurricane intensity has increased in recent decades? There are elements of natural variability co-mingled with climate change in the attribution to this one at present. Hooke	Front	The discussion of hurricanes now uses the exact language from CCSP 3.3, <i>Weather and Climate Extremes in a Changing Climate</i> , to very precisely convey the appropriate message.
BR	MacCracken	6			I think the background coloring makes it more difficult to read the text and get a sense of the messages—and it will certainly make the pages more difficult to photocopy. MacCracken	Front	The background coloring has been removed.
BR	MacCracken	6			Style and Formatting: It seems to me a better way needs to be found to really highlight the key points (in larger font, etc.) in order to differentiate them from the bulleted points. Right now, it seems like the key statements are just a way of categorizing what must be 30 or so key findings (which is too many to remember) rather than the bulleted points being supportive examples and information, but the key points are what is really key. MacCracken	Front	Major revisions have been made in the presentation of the Key Findings in the 2 nd draft of the USP. The bullet point format has been eliminated so that the Key Findings are shorter and stand out much more clearly. Each key finding is now followed by a brief explanation.
BR	MacCracken	6			Overall set of key findings: There is nothing here that relates impacts on Americans to what is happening elsewhere in the world, even though the world is increasingly interconnected (farm prices are internationally determined, investments are global, people go to different places and visitors come here, etc.—total topic seems to be ignored. MacCracken	Front	As stated in the title, the USP is intended to focus on impacts in the United States and the Key Findings Section reflects this emphasis. Although it is not a Key Finding, the document now recognizes the linkage of U.S. vulnerability to climate change to events in other nations in the revised Executive Summary.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	6			Key finding 2: This point merits a third bullet, perhaps about how fast the fall and winter weather is changing, or about how drought and wildfire weather are increasing, or that the locations of heavy rains are shifting along with the warming as the weather patterns shift northward—so something about the weather. MacCracken	Front	The Key Findings Section of the report has undergone major revisions in response to this and other review comments. The original Key Finding 2 has been eliminated in the 2 nd draft of the USP, but weather features such as heavy downpours are mentioned in the revised version.
BR	MacCracken	6			Key finding 3: The parenthetical phrase in the first bullet needs to say over how long the warming has taken place (e.g., over the 20th century). Somewhere, it needs to be said that these changes will carry over to many future generations. The third bullet is true, but a bit misleading as there has been no discussion of scenarios where decisions have been made to lower emissions—the two IPCC scenarios are no-policy scenarios, not based on choices being made. MacCracken	Front	The Key Findings Section of the report has undergone major revisions that include removal of the parenthetical phrase that is the subject of this comment. The “About this Report” section in the 2 nd draft of the USP includes a more descriptive discussion of the scenarios.
BR	MacCracken	6			Key finding 4: The second bullet should mention personal safety as well as health. The third bullet should mention the tie to warming ocean waters. MacCracken	Front	The Key Findings Section has been reworked as in light of many reviewer comments. Revisions include elimination of Key Finding 4.
BR	MacCracken	6			Key finding 5, Bullet 1: It needs to be made clear that some regions along West coast are also very vulnerable (like Sacramento-San Joaquin delta and San Francisco Bay Area). In fact, it would likely help to be more specific here, giving examples of a few key estuaries (like Chesapeake Bay). Wetlands and their ecological services should also be mentioned explicitly. MacCracken	Front	The Key Findings Section has been reworked as in light of many reviewer comments. A Key Finding related to increasing risk to coastal areas is being retained but it has been shortened and made more general to U.S. coastal regions. References to specific locations are not included.
BR	Meehl	6			It should be explained at the outset here that the superscript numbers are footnotes that appear at the end of the document. When I first saw the first footnote number, I looked for the footnote somewhere on this page or the next, only to realize later that all the footnotes were at the end. Meehl	Front	Thank you for your comment. This is now specifically addressed in the About this Report section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Meehl	6			Bullet 2: What is the word “new” doing here? Meehl	Front	The Key Findings section of the report has undergone major revisions that include removal of the word “New.”
BR	Meehl	6			Bullet 3: See comment 1 above - beware of large tropical volcanoes. (Comment 1: There are repeated references to warming that is “locked in” throughout the document. This is a dangerous reference since if there is a large tropical volcanic eruption next year, for example, we’ll NOT see the amount of projected warming that we’re supposedly “locked in” to. This sentence is poorly worded in any case. I’d suggest something like “We are committed to a certain amount of warming over the next few decades (barring a large volcanic eruption that would cool climate for a couple of years before we return to warming), but in any case the actions we take now will have a direct effect on the eventual amount of warming we experience later this century”.) Meehl	Front	The comment is appreciated; as noted above, references to “locked in” warming have been eliminated and the potential effect of a volcanic eruption is included in the Executive Summary .
BR	Meehl	6			Almost all these key findings on pages 6 and 7 are documenting observed changes or various impacts and vulnerabilities. Pages 16-31 of the document contain a lot of summary material on projections of future climate change, but there is virtually no mention of projections on pages 6 and 7 of the “key findings”. There is one brief mention of future hurricane projections in point 4; point 8 mentions “water is projected to become increasingly scarce”, and that’s about it. What about future changes in extremes (heat waves, cold snaps, midlatitude storms, etc. etc.) and other projected climate changes? Meehl	Front	Thank you for the comment. The revised Executive Summary and a new 3 rd bullet now point to the fact that the document includes a focus on projected climate change and its impacts on the United States. The Core Group has changed Key Finding 2 to explicitly address projected climate change.
BR	Solomon	6			Please drop statement in first para, “The rapid onset of many aspects of climate change highlights the urgency of confronting the challenge without further delay.”; it is an advocacy statement and policy-prescriptive. Solomon	Front	That statement has been eliminated from the document.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	6			Point 1: The statement that global warming ‘is due primarily to human-induced emissions...’ has no likelihood qualifier and hence is intended to be read as virtually certain, in contrast to the very careful statement that ‘most of the warming of the last 50 years is very likely...’ given in IPCC (2007). Given the reference to IPCC 2007 in footnote 1, it appears that this is an attempt to simplify for the general reader (my general comment 7), and is an example of inappropriate simplification referred to in my general comments. Explain clearly why you are assigning a much higher likelihood and avoiding the restriction to the past 50 years, or change it. Solomon	Front	The Key Findings Section has undergone major revisions that include adding the qualifier “very likely” to the revised statement that discusses human-induced global warming.
BR	Solomon	6			Conclusion 1, bullet 2-3: Coming under human-induced changes and impacts, this would suggest that all of these changes and all of these impacts can be attributed to greenhouse gases. I don’t think this is the case – many of them are observed but very few are as yet attributed. Further, coming with no likelihood, they are suggested to be not just attributed, but attributed at the virtually certain level. This is clearly incorrect. I suggest instead a separate header that talks about observed changes, and move most if not all of these impacts there. As for the impacts statement about facets of society, I suggest that like bullet 3, this doesn’t belong here since these are not attributed. Also, this is too vague to be useful as it stands. Move it, and make it specific and clear or drop it. Solomon	Front	Thank you for the comment. This Key Finding has been revised and is linked only to global temperature increase; bullet 3 has been moved as suggested. Rather than adding a separate bullet, observed changes are now discussed in the revised Executive Summary.
BR	Solomon	6			Conclusion 1, bullet 2: ‘sensitive wildlife’ is a broad statement. Please be specific about what type of wildlife is changing, or drop this from the summary. Solomon	Front	“Sensitive wildlife’ has been removed.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Solomon	6			<p>Conclusion 2: This is a strong and suggestive statement but I doubt if the word ‘many’ really holds up for ‘many’ things. Regarding bullet 1 - In the case of heat-trapping gases, it may be true for CO2 if you are prepared to consider a few years rather than decadal averages (and the latter would be more meaningful for comparison to scenarios so my own view is that it is too early for such statements; note for example the reported drop in US consumption of fossil fuels as prices rise suggests that this could be quite complex). What about land use? At best this statement should be made clearer: ‘Global emissions of (fossil fuel?) carbon dioxide have (very likely?) increased more rapidly since about 2005 than the highest emissions scenarios scientists have been analyzing, (but there are large uncertainties in land use related emissions?).’</p> <p>It is necessary to be specific that you are talking only about CO2 since the statement is not true for CH4, N2O, or any other greenhouse gas that I know of so this statement is far too general and hence misleading. Regarding bullet 2 - The second bullet is OK for Arctic sea ice but I do not think it is justified for the ice sheets of Greenland or Antarctica. I don’t think referring to ‘parts of Antarctica’ is appropriate; we should be considering Antarctica as a whole because it’s impossible to say at a local level whether changes are faster than expected or how meaningful local changes are for sea level. Drop this part of the statement and say simply ‘Arctic sea ice is retreating faster than expected.’ However, it is not appropriate to ignore Antarctic sea ice if a balanced statement is to be made. Please add ‘However, Antarctic sea ice appears to have been increasing on average in recent decades.’ After making these changes, please change the header to be more accurate.</p> <p>You could say “Some climate changes” or “A few climate changes” are occurring faster than projected even a few years ago - but it is probably better to avoid making this a separate header since it is rather limited; you probably only have two or three examples and just as many counter-examples. Solomon</p>	Front	<p>Thank you for the comment. This Conclusion, including both bullets, has been eliminated from the Key Findings Section.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Solomon	6			<p>After Conclusion 2: Please add a set of conclusions here that deals more broadly with forcing issues. An emphasis nearly entirely on CO2 is unbalanced and is not an appropriate message for policy makers who are obliged to deal with a full range of forcing agents under the UNFCCC. This report needs to acknowledge the importance of aerosols, tropospheric ozone, methane, CFCs, N2O, land use, and other forcings. Material is available for this in the IPCC (2007) WG1 assessment and in several SAPs. I suggest a format that looks something like this:</p> <p>X. A range of climate forcing agents drive important global and US climate changes. Subbullets should include (but more is needed, see references above):</p> <ul style="list-style-type: none"> - Decreases in CFCs emissions under the Montreal Protocol have made important contributions to reducing climate change since 1990, and reductions in emissions of HFCs and HCFCs could make important contributions to reducing future climate change. - Changes in the stratospheric ozone layer have contributed to changes in circulation patterns and regional climates. - Methane concentrations have increased since pre-industrial times, but have leveled off in recent years, and the causes of the changes in this important greenhouse gas are not well understood. - Aerosol bullet should go here, noting the possibility of effects not just on temperature but also on precipitation. <p>Please note that a set of paragraphs along these lines needs to be added to expand upon and provide the basis for these conclusions on page 18-19. What is there now is too limited and too vague to be useful.</p> <p>Solomon</p>	Front	<p>Thank you for the suggestion. A new Key Finding “Future climate change” that deals more broadly with forcing issues has been added as suggested.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	6			Conclusion 3: Bullet 1 is oversimplified. I don't think there is a clear enough basis for the words 'locked in'. There are studies for constant concentration but that is not the same thing as past emissions. In fact, if aerosol emissions were to cease, temperatures would shoot up by about 0.8C according to one study. On the other hand, if methane emissions were to cease, its forcing and warming would decrease rapidly. Rephrase this or drop it. Solomon	Front	In response to this and other similar comments, the concept of "locked in" warming has been eliminated from the document.
BR	Solomon	6			Conclusion 4: The header statement suggests that all of these impacts have demonstrable increases in frequency or intensity. I don't believe we can say that for example droughts are having increasing impacts in the US, and perhaps not even globally when past 'megadrought' is considered. This is too strong and should be deleted. Is it clear that there has been an increase in US heat waves? Please provide a reference. Is this really a 'virtually certain' set of statements, as implied by the lack of likelihood qualifiers? If not, please use different language. The statement may be OK for heavy downpours in the US but a specific reference would be helpful and again needs a likelihood. This goes for bullet 3 on hurricane intensity as well; probably OK but please give a specific reference and likelihood. Please put heavy downpours in one place or the other, here or in conclusion 1, not both as it is at present. Solomon	Front	This conclusion has been replaced by a more general discussion of climate change impacts that eliminates the earlier, excessively strong statements. For example, it no longer includes any mention of increases in frequency or intensity of impacts. Also, heavy downpours have been moved to another Key Finding as suggested.
BR	Solomon	6			Conclusion 5: This paragraph seems a bit weak, in contrast to those occurring earlier. Alaskan coastal erosion due to sea-ice retreat is already occurring and a link to existing climate changes is already rather clear; the same goes for permafrost in Alaska, so this doesn't have to be just a vulnerability issue; it should be rephrased as an impact observed at present and projected to worsen in future. Also the statements about the East coast and Gulf could be broader: " The low-lying East coast and Gulf coast of the US are expected to experience erosion due to sea level rise. Even with small SLR, the effects of moderate storms can be expected to be more severe than at present, while the combined effects of SLR, storm surges, and hurricanes can be expected to cause substantial damage for those locations experiencing major storms". Solomon	Front	The Key Findings Section has undergone major revision. All the Findings have been rephrased and broadened and the bullets eliminated in favor of a brief, explanatory text. They are much more homogeneous now, and this Finding with no longer contrasts with earlier findings.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	7	5		This paragraph doesn't note that US emissions cuts are only part of a picture that must include global emission cuts in order to have maximum impact. I know this may undercut the goal of motivating action, but it seems like an important point to include. Henson	Front	The report has undergone major revisions. The importance of global emissions is now discussed in various sections.
BR	MacCracken	7			Key finding 6: The real key to the difference here is that rainfall tends to evaporate, so not get into the reservoirs, whereas snow melting all at once saturates the land and fills the rivers and reservoirs. Instead of snowpack, this might say "accumulated snow". Mention might also be made of the rising snowline, and that water resources are already very tight. MacCracken	Front	This Key Finding has undergone major revision and discussion of the difference between the importance precipitation and snowpack to water supply has been eliminated.
BR	MacCracken	7			Key finding 7, Bullet 1: Change "challenging" to "sometimes overwhelming". MacCracken	Front	This Key Finding has undergone major revision and the bullet containing "challenging" has been eliminated.
BR	MacCracken	7			Key finding 8: In main statement, delete the first "our" and perhaps the second one. In bullet 2, the coastal population growth is not only in cities, but also is spread out in coastal communities and vacation homes. In the third bullet, mention that people are also moving more into fire-prone areas. MacCracken	Front	This Key Finding statement, including the bullets, has been removed in the 2 nd draft of the USP.
BR	MacCracken	7			Key finding 9: In the second bullet, water and sewage might well be better examples of vulnerable infrastructure. MacCracken	Front	This Key Finding statement, including the second bullet, has been removed in the 2 nd draft of the USP.
BR	MacCracken	7			Key finding 10: In the first bullet, change "would" to "will". MacCracken	Front	This Key Finding statement has undergone major revisions in the course of preparing the USP 2 nd draft. The bullets have been eliminated and the statement broadened significantly.
BR	Mearns	7			Key Finding 7, Bullet 2: Population increase should be added to the list of multiple stressors. Mearns	Front	Thank you. We have incorporated your comment.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Mearns	7			Key Finding 10, Bullet 1: Scenarios of what? Needs to be clarified Mearns	Front	The reference to scenarios has been eliminated in the revised version of this Key Finding.
BR	Solomon	7			Conclusion 6: The header refers to future challenges but the first bullet is an observation. It is probably better to move the snowpack bullet to the observations grouping that I suggested was needed under the comment on page 6, conclusion 1. Is this really a 'virtually certain' set of statements, as implied by the lack of likelihood qualifiers? If not, please provide likelihood. Solomon	Front	This Key Finding has undergone major revision and, as noted in the earlier response, observed changes are now discussed in the revised Executive Summary. The revised bullet just notes that declines in snowpack are especially important in the Northwest, Southwest, and Alaska. The "certainty" implication is not present in the revised version of this finding.
BR	Solomon	7			Conclusion 7: Bullet 1 seems to be a truism and not useful – it is evident that simultaneous or back to back events are worse than events in isolation but what is the point here? Regarding bullet 3 – please say what regions will be subject to increasing water scarcity. Solomon	Front	Bullets 1 and 3 have been removed in the revised Key Findings Section.
BR	Solomon	7			Conclusion 8: Bullet 2 suggests that the coasts are the most vulnerable population, which I don't believe is true. The statement you may be trying to make is that US population has grown rapidly in cities on the coasts, putting a larger portion of the population into a region vulnerable to sea level rise, hurricanes and storm surge. I don't think the statement is correct for extreme heat, which is most severe in the middle of the continent, not on the coasts, so please correct that. Solomon	Front	This Conclusion has been removed in the revised Key Findings Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	7			Conclusion 9: Rephrase the statement about power plants, roads, and buildings to avoid being policy prescriptive (i.e., avoid the words ‘must be designed’). Similarly, avoid policy prescription in the next bullet ‘will have to continually incorporate’. Solomon	Front	Thank you for the comment. The infrastructure discussion has been moved to the revised Executive Summary and the policy prescriptive language has been eliminated. Policy prescriptive mention of the need to “continually incorporate” has also been eliminated.
BR	Solomon	7			Conclusion 10: Again, avoid policy prescription. Another response is to do nothing. You could say “Options to reduce damages due to climate change entail reducing emissions....and adapting.....”. Solomon	Front	The Conclusion has been rephrased and policy prescriptive language has been eliminated.
BR	Solomon	7			Conclusion 10, Bullet 2: ‘inundation and abandonment of many areas’ is too vague to be useful. Can you rephrase this to state how many miles of coastline are affected for e.g., A1FI? Solomon	Front	The Conclusion has been rephrased, made more general, and bullet 2 has been eliminated.
BR	Solomon	7			Conclusion 10, Bullet 3: This is a truism and should be deleted. Solomon	Front	As noted above, the Conclusion has been made more general and bullet 3 has been rephrased to avoid the truism.
BR	Corell	8			This is great stuff, well done. I’d add the equity idea somewhere like human health and change it to “Human Health and Well-Being” (p.8-9) Corell	Front	We agree the issue is important; however, we choose to highlight and discuss it elsewhere in the report, based on other comments that we needed to reduce up-front repetition with subsequent material.
BR	Hooke	8	1		Bullet 5: Commercial insurers reduce risk, as you point out in the sidebar on FMGlobal later on. However, the retail insurance sector primarily redistributes risk versus reduces it. Hooke	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	8			Again, the background coloring is not helpful. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	MacCracken	8			The degree of detail under the various points is unequal, with some well explained and others too terse. In that space exists, I favor saying a bit more on the most tersely phrased points, helping readers actually understand the issue. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	MacCracken	8			Society, Bullet 1: Change “more” to “an increasing number”. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	MacCracken	8			Society, Bullet 2: Almost seems to contradict the first bullet—for moving generally takes resources. There is nothing here on the cultural aspects, whether for indigenous peoples or for the sense people have of their region and lifestyles. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	MacCracken	8			Human Health, Bullet 1: Should add a phrase indicating that this is the outcome if people or cities do not prepare. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	MacCracken	8			Human Health, Bullet 2: is the result only if regulations are not tightened. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	MacCracken	8			Human Health, Bullet 3: Needs to say ‘more intense and more frequent extreme events’. There is nothing here on disease vectors surviving better through warmer winters, or on allergies from increased pollen and weeds. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	8			Energy: In bullet 1, it would be helpful to indicate that this is especially the case because the absolute humidity is also rising (it takes something like 20 times as much energy to remove the increased moisture as the increased temperature). Bullet 2 should be expanded to mention water needed for hydroelectric power and cooling systems. Bullet 3 should mention that this is because the air is less dense and temperature difference created is dripping. Bullet 4 should mention that ports and refineries are often at sea level—right now the point lacks adequate specifics. Basically, I favor such expansions because spreads such as these two pages may be all that some readers get thorough—and so giving some reasoning and specifics can help be more convincing. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	MacCracken	8			Transportation: In bullet 1, say “including an increasing frequency and intensity of”. In bullet 5, also mention the Great Lakes. There is no mention here of lower river levels, which are likely to have very severe consequences. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Mearns	8			It needs to be made clear somewhere whether these are impacts assuming no adaptation. A brief introductory paragraph would be useful for this. And of course then there is the problem that a no adaptation assumption is silly (the usual conundrum). Beneficial effects of climate change are so buried in statements that the document seems overly biased towards the negative. Its fine to say that most effects will be negative, but we need to recognize the positive effects as well. Otherwise the document may be viewed as lacking credibility. Mearns	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Mearns	8			Human Health, Bullet 4: Here is an example of a structure that could be misleading and alarming -- the reliance on the term 'projected' helps to some degree, but I don't think it sufficiently communicates uncertainties here. I single out this one, since we know that there is a strong 'dread factor' in people's minds about disease. Infectious diseases are extremely complex, and we need to be more careful than making a statement as bald as the one here. Assuming that you manage to come up with a way to more explicitly represent uncertainty in the Exec summary, then this problem may be taken care of. Minimally somewhere in an introductory paragraph to this section, you need to explain more carefully what 'projection' means, how it is different from prediction, etc. Mearns	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Mearns	8			Human Health, Bullet 4: 'climate change expected to play an increasing role in the future' -- meaning not clear, greater in the sense that it will play a greater role in everything in the future since the change will be greater? In which case this applies to almost every statement made in the Impacts section. Mearns	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Mearns	8			Energy, Bullet 2: This is a statement of fact about the relationship between water and energy. (But as a fact, it isn't clear to me that all energy sources are dependent on water.) In any event, this is not an assessment statement. If a fact needs to be inserted, it should not be its own bullet, but should be connected to an assessment bullet, such as the last one. Similar case for 3rd bullet – statement of fact, but not about climate change per se. Mearns	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Mearns	8			Transportation, Bullet 3: The benefits of decreased cold deserves its own bullet and more detail. Otherwise the document seems biased towards ignoring benefits. Mearns	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Mearns	8			It may also be useful in the introduction to the impacts and sectors section to make clear that you are going to be discussing both (current and future impacts), but that different language is used. Also, there is still the problem that attribution of current impacts to current climate change remains an area of research that is still in the state of becoming. It may also be useful in the introduction to the impacts and sectors section to make clear that you are going to be discussing both (current and future impacts), but that different language is used. Also, there is still the problem that attribution of current impacts to current climate change remains an area of research that is still in the state of becoming. Mearns	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Solomon	8			It wasn't clear to me how useful this summary is. It may be better to avoid these very general statements, many of which are truisms. Another problem is that the first set of bullets has a good focus on America, but the rest are unclear as to whether they are intended to apply to the US or globally or both. For these reasons, it may be better to avoid a separate section like this and blend much of this into the regional statements on pages 10-11, which have more meat – viz, a combined "Summary of Impacts Across Sectors and Regions" that highlights key conclusions. This would strengthen both sections. You could produce a set of key impacts that is appropriate across much or all of the US and then move to region-specific highlighted issues. This would reduce repetition and lack of clarity. I feel that a similar approach could be taken throughout pages 42-157: a more integrated approach across the US first, avoiding the breakdown by sector and then by region but rather highlighting key impacts only that are specific in particular regions at the end, would produce a stronger and less repetitious report. Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	8			Society: These are all vague and it is not clear how useful they are in the present form. Please try to clarify in the following manner: “Vulnerabilities to climate change impacts are greater for those who have fewer resources and choices, such as the poor”. “Climate change will affect the tourism and recreation industries in ways that are expected to reduce opportunities for many activities that Americans hold dear, such as skiing and (give other examples)”. “Cities, both their residents and their infrastructure have unique vulnerabilities to climate change such as....” If you can’t give examples, please delete these bullets because they are too vague to be useful. Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Solomon	8			Health: Again, please try to be as specific as possible. It is inappropriate to trade off deaths from cold versus heat because different people are affected and all life is unique. I suggest “Significant increases in illness and death related to extreme heat are projected, particularly among the elderly (?correct). While decreased deaths due to cold exposure are also projected, different persons are expected to be affected and it is therefore not appropriate to consider the two effects as canceling one another.” Second subbullet on air quality: Please clarify whether you mean that these are due to climate change or not. Third subbullet: Too vague to be useful. Please say what physical and mental health impacts are referred to, and where. Fourth subbullet: Too vague to be useful. Do you mean allergies and asthma are increasing due to climate change now? If not, make clear that you expect allergies and asthma to increase in the future but don’t try to link it to current increases, to avoid being misleading. Last subbullet: Too general. Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Solomon	8			If the elderly are most vulnerable to projected increases in heat waves, while children are most vulnerable to asthma due to air quality degradation, please say so. Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	8			Transportation: These are all strong statements. Are they true for all levels of warming? E.g., ‘major impacts, including flooding of coastal airports....’ – is this expected for the B1 scenario? If not, then all of them need to be qualified as to what level of warming you are referring to. Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Ebi	9			Water Resources, Bullet 4: This is true for more than water resources; planning in most sectors assumes the future will look pretty much like the past. Ebi	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	MacCracken	9			Water Resources: too much use of vague words like “affecting”, “alter”, etc.—give some indication of sign and magnitude, at least through appropriate adjectives and adverbs. For water resources being the number 1 issue in the US National Assessment, there are comparatively few bullets here. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	MacCracken	9			Agriculture: This analysis focuses on the food production aspects, not on what the changes will mean to the average farmer or the farmer in marginal areas (a point covered in the US National Assessment—such farmers might get better yields, but not much in comparison to those in more fertile areas, so they lose. Bullet 2 needs to mention that such events are projected to increase. Bullet 3 needs to say that the increased stress from weeds can lead to them out-competing food crops for key resources like water. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	MacCracken	9			Natural Environment and Biodiversity: Bullet 1 is an essentially useless comment—what does it mean—are impacts detrimental or beneficial, etc. Bullet 6 needs to be more specific about the Arctic and impacts on species. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Meehl	9	1	1	How will climate change continue to alter the water cycle? Meehl	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Meehl	9	1	2	How will surface and ground water be affected by a changing climate? Meehl	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Meehl	9	2	2	Can you link projections of extreme events to reduced crop yields? Meehl	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Meehl	9	3	2	How have the species shifts occurred? (e.g. moving northward or upward, I suspect, but it would help to be specific). Meehl	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Meehl	9	3	5	Please specify or give an example of how these species are sensitive to climate change. Meehl	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.
BR	Solomon	9			Water Resources: The use of the words “Climate change will continue to alter the water cycle” suggests that it is virtually certain that the water cycle has already been altered. This is too broad: what is meant by water cycle? Precipitation patterns? Streamflow? Please change to “Climate change can affect where, when, and how much water is available...” Also, this is a place where a strong US statement can and should be made please add one based on the material in the report, perhaps along the lines of “Water availability is observed to be increasing in some parts of the US but decline in others, due to changes in precipitation and snowpack, and declines are projected to worsen particularly in the western US.” Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Sectors Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Corell	10			Perfect as is, well done not too dense. (p.10-11) Corell	Front	Thank you for the comment. However, based on other suggestions to shorten up-front repetition with subsequent material, we have removed the Summary of Impacts on Regions Section from the USP 2 nd draft.
BR	Ebi	10			The color makes the text hard to read. Ebi	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Ebi	10			The tense is not consistent across the statements. Ebi	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Ebi	10			For all, the extent of impacts depends on timely and effective adaptation. Ebi	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Field	10			Alaska: It is incongruous to see the first point that summers in Alaska are becoming longer and drier and to see the precipitation projection on p 37 showing more precipitation in Alaska during all seasons. I don't think most readers will interpret "drier" as meaning something about soil moisture. Field	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	MacCracken	10			background color: Again, the background coloration is not helpful. To indicate a special section, do the coloring on the edge of the page. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	MacCracken	10			The ordering of the regions is mysterious—there needs to be some rationale used (alphabetical, group be east versus west, etc.) There is an imbalance in the level of detail by region. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	10			Northwest: There is no mention of changes in precipitation. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	MacCracken	10			Southeast: In bullet 1, change “cause” to “increase” and also mention humidity increase (or heat index increase). In bullet 2, change “impact” to “adversely impact” to give sign of change. In bullet 4, ecological thresholds is jargon—need to explain by giving examples. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	MacCracken	10			Alaska: All of the bullets are too terse. In bullet 3, change “declining” to “decreases”. There is noting here on the need to move indigenous villages—that has to be mentioned and could be done in bullet 5. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	MacCracken	10			Islands: In bullet 2, change “coastal” to “long-term, permanent” as this is the case for atolls, etc. In bullet 3, this is uselessly vague—what are the implications, what is the direction of change, impact on economics, etc. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	MacCracken	10			Midwest: I liked this level of explanation. Nice job. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Mearns	10			Some impacts are really common to all regions – I wonder if these couldn’t be grouped in a section call ‘all region effects’, e.g., increased heat waves, decreased water resources. Mearns	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Meehl	10			These regional summaries are an odd mixture of present and future tense. For example, paragraph 2 (the “Southeast”) has projections in future tense, while in paragraph 3 (“Alaska”) there are declarative sentences in present tense. Rather than go through and itemize all the instances on these two pages, I urge the author team to call out projections with future tense, and if an observed state is being referred to, then and only then should present tense be used. Meehl	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Solomon	10			Please look over all these bullets and make clearer whether you are referring to projections, or impacts already observed, and what can be attributed to human-induced climate change. Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Solomon	10			Northwest, Bullet 1: “Declining springtime snowpack has led to reduced summer streamflows since 19XX...” [make clear this is already observed – correct? Or change if you mean a projection but don’t leave ambiguous]. Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Solomon	10			Northwest: last subbullet is a truism ‘sea level rise will result in increased erosion along vulnerable coastlines’ and is better covered only once, and broadly, in the section on coasts on page 11. Similarly, it isn’t clear to me that heat waves, reduced air quality, and insect borne diseases are particularly important for the NW (and the same stuff appears in the SW and Midwest). Reorganizing this as I have suggested above would make this much better. Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Solomon	10			Southeast: Why is decreased water availability impacting the economy noted here and not for the SW or NW? Reorganizing would avoid this problem. Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Solomon	10			Alaska: Please rephrase bullet 5 to make stronger: ‘Coastal storms and erosion related to sea-ice retreat have already posed risks to villages and fishing’ Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	10			Midwest, Bullet 3: Can this be made stronger? Perhaps something along the lines of ‘The Midwest has experienced major flooding events along the Mississippi in recent years. Increased heavy downpours associated with climate changes are observed, and the Midwest is particularly vulnerable to these because of the massive flow of the Mississippi.’ Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Ebi	11			Southwest & Northwest: Add wildfires as an issue. Ebi	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Ebi	11			Northeast: Vectorborne and zoonotic diseases are an issue. Ebi	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Field	11			Southwest: it is a striking omission that the bullets here, the section on agriculture, and the text on the Southwest all ignore perennial agriculture and its special challenges, even though California, with its abundance of perennial ag, is the nation’s largest ag producer, by more than a factor of 2. Field	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	MacCracken	11			Southwest: This region is, however, covered on the northeast part of the spread—why? In bullet 1, it is not just between competing uses, but also between competing users and across states. In bullet 2, change “reduced” to “degraded.” Is there really much increase in disease when it is very dry? Perhaps mention that there will be a decrease in time outdoors. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	11			Northeast: In bullet 1, the air quality change assumes that tighter controls are not put in place—the law requires that to be done, so might say something like stronger measures will need to be taken to ensure air quality meets the current health-based standards. In bullet 2, change “affected” to “diminished” and say that as cool summer conditions shift northward or something similar to indicate that they have been a niche agricultural region. In bullet 3, change “floods” to “flooding events” or “inundation events” or something. In bullet 4, change “affect” to “diminish”. Bullet 5 is a good example of a point. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	MacCracken	11			Great Plains: In bullet 1, change “soured” to “resources” or “reserves” and make point that there will be less recharge. In general, I think it needs to be said that the weather patterns and conditions are going to be shifting northward, that the timing and character of air masses will change, that severe events will be shifting (like tornadoes to Wisconsin in January), etc. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	MacCracken	11			Coasts: In bullet 1, specifically mention wetlands and barrier islands as well. In bullet 2, change “agriculture” to “agricultural runoff”. In bullet 3, change “occur” to “are introduced.” In bullet 4, additional to what? In bullet 5, these changes will not be surprising if you tell them what they are—maybe change “surprising” to something like “intermittent”. MacCracken	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Mearns	11			Southwest, Bullets 1, 2, & 4: Is a different level of uncertainty implied when the unqualified future tense is used compared to statements where ‘are projected to’ is used? According to your discussion of uncertainty (p. 15) ‘statements that are not qualified with ‘likely’ or ‘very likely’, are assumed to be ‘virtually certain’ So is that what is meant in the first bullet? 4th bullet seems to be discussing the effects of current climate change - are these expected to continue? Its not clear in the second bullet whether current observed climate change is being referred to, future climate change or both. Mearns	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.


Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Mearns	11			Great Plains, Bullet 4: Why this is so is not clear to me – this may be my lack of expertise, but if I don't see it, then a lay person likely won't - just a brief 'because' clause could be added. Mearns	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Solomon	11			Northeast, Bullet 3: Why is the NE particularly vulnerable to severe floods due to heavy downpours? Wouldn't this be better in the general section I have suggested? Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Solomon	11			Great Plains: AZ and other parts of the SW are also dependent on ground water. Please combine. Solomon	Front	The Executive Summary Section has undergone major revisions in the USP 2 nd draft. These include elimination of the Summary of Impacts on Regions Section.
BR	Corell	12			This is too dense, need headings to give the flow and get the essential ideas across. I'm not too sure of this spread. I'd re-think this one. I don't have a suggestion, but it did not fit here and I lost the flow of the report. (p.12-13) Corell	Front	The text in question has undergone major revisions that we believe address the reviewer's concerns.
BR	Ebi	12			This section needs to mention that adaptation is needed to the climate change that has already occurred. Ebi	Front	The text in question has undergone major revisions that we believe address the reviewer's concerns.
CC	Henson	12	4	2	Recommend replace "perturbations" with "changes" [jargon] Henson	Front	Thank you for this comment. We have eliminated this term from the report.
CC	Henson	12	5	7	Recommend replace "perturbations" with "changes" [jargon] Henson	Front	Thank you for this comment. We have eliminated this term from the report.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	12	5	8	Recommend replace "drivers" with "factors" [jargon] Henson	Front	Thank you for this comment. Drivers is no longer used in the context addressed by this comment.
BR	MacCracken	12	1		Several suggestions: Rewrite first sentence to: “Most scientific research on climate change has focused on understanding its nature, causes, and impacts, and quantifying its magnitude, rate, pattern, and human contribution.” I’d then suggest a sentence that gives a sense of the societal and environmental consequences in order to provide a bit better lead in to the next sentence on responses. I would then change “Items” to “Approaches.” You could add in the last sentence that this option is still quite speculative. I would note that it should be said that those changes that cannot be adapted to will need to be suffered through—suffering is indeed one of the options. MacCracken	Front	In response to this and other comments, the Executive Summary has undergone major revisions that have resulted a shorter, better-focused presentation. The text addressed by this comment has been eliminated during this process.
BR	MacCracken	12	2		Delete “our” in the first sentence—here, based on the second sentence, this seems to be referring to “society” as a whole. This paragraph should also be very careful about narrowing the focus to CO2 only—the other gases really matter as well. In the last sentence, “energy sources” should specifically mention “renewables” and there is nothing in the sentence about simply conserving—society doing with less—which is what is actually happening now with higher gas prices. MacCracken	Front	The text in question has undergone major revisions that we believe address the reviewer’s concerns.
BR	MacCracken	12	3		This paragraph could use with mentioning suffering.	Front	The text in question has undergone major revisions; we do not believe that “suffering” should be added.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	12	4	1	When it is said that mitigation means to “reduce emission” people instantly think that means having less energy services—it would be better to say “deriving our energy services from non-GHG emitting sources”. I’d suggest changing “the less adaptation will be required” to “the more manageable adaptation will be” as we will have to adapt and the phrasing is not clear if it refers to intensity of effort or extent of effort. The phrase “significant inertia” is jargon—say something like “The full climate response to such perturbations can take many centuries because it is slowed by the time it takes to warm the oceans.” In last line, say “Consequently, the need for some degree ...” MacCracken	Front	The sentence addressed by this comment has been eliminated during the course of revising the previous draft.
BR	MacCracken	12	5		“limits of adaptive capacity” is jargon for saying that we will suffer more—be more forthright. In line 3, say “theoretically have” as this is only the case if there is significant political action to ensure a sharing and reallocating of resources and costs. Start last sentence saying “The need for future ...” The mention of “other countries” is one of the very few places where the connections of the US to the world are mentioned—this is far too brief and obscure. MacCracken	Front	The sentence addressed by this comment has been eliminated during the course of revising the previous draft.
BR	Mearns	12			One way of handling the uncertainty discussion is to include a brief discussion in this section about making decisions under uncertainty -- that we all make decisions under uncertainty, and we can come up with plans, even on local and regional plans, without knowing every detail about climate change. I think this must be communicated in the Executive summary. To ignore this really weakens the document. Also, ‘adaptive capacity’ is used in several places in the section. Will the meaning be clear to the general reader? Mearns	Front	The text in question has undergone major revisions that we believe address the reviewer’s concerns. Also, the term “adaptive capacity” has been removed.
BR	Solomon	12			This section is quite vague. I don’t find it useful as a summary. Much of it addresses research needs/pathways to better decision making. It should be moved there, near page 162-3. Solomon	Front	The text in question has undergone major revisions that we believe address the reviewer’s concerns.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Ebi	13	5		Another strategy is to improve the public health infrastructure to better and more quickly address disease outbreaks. Ebi	Front	Thank you for the comment. We feel that this idea is covered in the Human Health Sector discussion.
BR	MacCracken	13	1	3	Change “such as” to “For example, switching to renewables can improve air quality and led to reducing ...” MacCracken	Front	The sentence addressed by this comment has been eliminated during the course of revising the previous draft.
BR	MacCracken	13	2	2	Change to “and reduce their vulnerability to climate change by promoting increased resilience and adaptation.” MacCracken	Front	Thank you for the comment. The text in question has undergone major revisions in response to this and other reviewer comments and this paragraph has been eliminated during the course of revising the previous draft.
BR	MacCracken	13	3		The assumption in first sentence needs to be explained—it may well be wrong as it is based on a competent government being willing to tax and spread the costs of impacts; it is not at all clear this is the case. In last line, change to “completely successful”. MacCracken	Front	The sentence in question has been removed from the revised text.
BR	MacCracken	13	4		Somewhere it needs to be said that local level responses at some point are likely to be overwhelmed—in fact, the notion that the US is less vulnerable is based on their being a coherent national level response. In first sentence, change “adaptation” to “adaptive” and “with” to “, leading to”. MacCracken	Front	Thank you for the comment. The text has undergone major revisions, including elimination of the first sentence of paragraph 4. We think that the revised Executive Summary now addresses the reviewer’s main point through the addition of the statement: “There are also limits to how much adaptation can achieve.”

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	13	5		In bullet 1, change “updating” to “upgrading” as more than getting them up to state they were in is required. In second bullet,, add to say “jurisdictions, incentivizing actions, and”. In bullet 3, change to “Establishing ecological buffers” and rest of sentence has some jargon that might explain. In bullet 4, the phrase “Changing the location of people” sounds very autocratic (communistic?)—it should be added that actions would be taken to stop movement of people into vulnerable areas. In fifth bullet, say “Promoting different forms of communities ...” MacCracken	Front	Thank you for the comment. The major revisions of the Executive Summary text have resulted in the elimination of paragraph 5. A number of the concepts have been retained, and we feel that these are worded in ways that are consistent with the reviewer’s intent.
BR	MacCracken	13	6		A point to add might well be relocation assistance. MacCracken	Front	Thank you for the comment. It has been considered but will not be included in the revised material.
BR	Meehl	13	3	4	See comment 3 above (Comment 3: This is another phrasing that appears later in the document, namely that “climate will be continually changing”. Even an uninformed reader could respond that the climate is changing all the time (in the context of natural variability on various timescales). What needs to be conveyed here is that climate change will go beyond the natural variability of climate to which we are adapted, and that these trends are projected to continue into the future, and that we are entering uncharted territory with regards to the particularly rapid rate of climate change we are experiencing and will continue to experience.) Meehl	Front	Thank you for the comment. The revised text now includes the sentences: “Society won’t be adapting to a new steady state but rather to a moving target. Climate will be continually changing, moving outside the range to which society is adapted, at a relatively rapid rate; the precise amounts and timing of these changes will not be known with certainty. While humans have adapted to changed conditions in the past, humanity is now entering uncharted territory.”

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Solomon	13	2		<p>This statement is inappropriate. It does not provide any basis for covering adaptation strategies while ignoring mitigation and creates the appearance of bias in the report. See major comment 5 above. (Major Comment 5: Goal of the report and undue emphasis on adaptation. There is a heavy emphasis on adaptation, but very little on mitigation. This is fundamental, and it is extremely unbalanced. It creates an impression that the message of this report is that adaptation is the solution, which is not clear based on current information. There is much that can be done to mitigate, across the full range of greenhouse gases and aerosols but this has been neglected here. The undue emphasis on adaptation is a misrepresentation of current understanding and existing SAPs. I don't think this is necessary nor is it appropriate, and it also compounds the difficulties of the report by extending its mandate. The material on adaptation should therefore be substantially cut.</p> <p>Particularly important would be to remove anything that doesn't trace to published SAPs (I found many examples in the report of material that seemed to come from newspapers and the like – these are the first to remove, followed by others that provide an undue emphasis). I suggest sticking strictly to the report mandate and avoiding this problem entirely: the report is supposed to be on 'Global Climate Change Impacts in the United States'.) Solomon</p>	Front	<p>The text in question has undergone major revisions in response to this and other reviewer comments and this paragraph has been eliminated during the course of revising the previous draft. The revised version of the document notes that mitigation is a subject of ongoing study by the U.S. Government's Climate Change Technology Program¹ and CCSP, among others. The USP only touches briefly on mitigation as narrowly constrained by SAP 2.1a and 2.2. While the revised USP does address adaptation, it does not do so comprehensively.</p>

¹ Information about the Climate Change Technology Program, and U.S. efforts to mitigate climate change can be found at <http://www.climatechange.gov/index.htm>.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	13	3		The statement that adaptation is unlikely to be successful if emissions are high is not sufficiently substantiated in the report because too many statements are vague and have limited or no quantification. It is clear that adaptation to sea level rise in the long run (order 300 years) is unlikely to be successful in protecting much of Florida even in a low emissions scenario, so that is one simple example of why this statement is not justified. This statement also seems to create a very oversimplified view of adaptation versus mitigation, and the impression that the report shows that the US can adapt for low emissions but not high emissions. This is not established in the material presented. The paragraph is inappropriate and should be dropped. Solomon	Front	The paragraph has been eliminated from the revised USP.
BR	Corell	14			I'd redo this, move it upfront before any of the content and call it "About this Report" on the left and "A Roadmap to the Report" as the header on the right. Rework a bit to allow for the roadmap idea to be articulated on the right. (p.14-15) Corell	Front	The text in question has undergone major revisions that we believe address the reviewer's concerns.
BR	MacCracken	14			Picture on Left: It is not at all clear why this is here. MacCracken	Front	The document is undergoing extensive revisions that will include the removal of all pictures that are not clearly tied to the text.
BR	MacCracken	14			This might well be where the issue of scenarios needs to be addressed, making clear that this report is considering two equally likely no-policy scenarios and does not include a scenario representing aggressive policy actions. While the high and low scenarios do show that differences in emissions make a difference, they in no way represent what could be accomplished with deliberate action. MacCracken	Front	Scenarios are now addressed in the revised Executive Summary.
BR	MacCracken	14	2	3	change "by" to "authored by". The last sentence needs to be changed to make clear the supporting people were not on the Committee, so say "composed of experts in various field and was supported by a team of professional staff" or something similar. MacCracken	Front	This section, including the sentence addressed by this comment, has undergone major revision in response to many review comments.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	14	6	5	“we” is confusing. MacCracken	Front	This section has undergone major revision in response to many review comments. The word 'we' is not included in the revised version.
BR	MacCracken	14	7	5	Change to say “hampers development of capabilities for estimating the likely impacts of future changes in the climate.” MacCracken	Front	The recommended revision has been made.
BR	Solomon	14	6-7		The second to last paragraph suggests that mitigation is dealt with seriously in this document, when it is not. It is not be necessary to do so. It would be better to stick to the report mandate and avoid this entirely: the report is supposed to be on ‘Global Climate Change Impacts in the United States’. Similarly, the emphasis on adaptation is excessive and creates an unbalanced impression (see major comment number 5 above). Drop both the second to last and the last paragraph on page 14 and replace with a clear statement that this report focuses on impacts on the United States. Please avoid making statements about mitigation and adaptation that are so limited that they are not balanced or clear. Solomon	Front	This section has undergone major revision in response to this and other review comments. The revised text includes the statements “...the primary focus of the USP is on the impacts of climate change in the U.S...”, and “The USP only touches briefly on mitigation as narrowly constrained by two of the CCSP SAPs ² .”
BR	Solomon	14	1	1	‘Human induced climate change is a major and growing concern...’ Advocacy statement, please delete. Solomon	Front	This statement has been deleted.
CC	Henson	15	1	2	Recommend replace "plain language" with "plain-language" Henson	Front	Thank you for this comment. This section has been reworked.

² Mitigation options are addressed in: SAP 2.1a – Scenarios of Greenhouse Gas Emissions and Atmospheric Concentrations; and, SAP 2.2. – The First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	15	1	3	make “judgment” plural. In last line, delete “for those descriptions.” In next to last line, change “certainty” to “levels of confidence.” MacCracken	Front	The recommended change to “judgments” has been made. The sentences addressed by the other two suggestions have been eliminated in the course of revising this Section of the USP.
BR	Corell	16			I’d rename this, Climate Change: A Global Perspective . On the left, I’d add two bullets, one for modeling projections which are so much better and a second on the increased confidence in the science. Then I’d key each to the pages that follow, as when you are reading this you don’t know that there is much more detail to follow. Finally, on the left, I’d increase font size and take more of the space for this content material, still keeping enough “white space.” The material on the right is ok, but we’re now going to take all the pages from here to page 31 on this global perspective. Secondly, you have introduced this idea of “Higher and Lower Emissions” without enough of a rationale to defend the choice. This is where the skeptics will go after the material. There is also a need to defend using ice core data for what is a northern hemisphere report – just say why this is OK! Give the graphic more space – it is too small for most readers and the message will get lost. (p.16-17) Corell	Global	Thank you. We have extensively modified this section including the format. The section has also been reduced in the process. Scenarios are better explained in an earlier section.
BR	Ebi	16			The 2nd and 7th bullet communicate the same point. Ebi	Global	Thank you. The bullets have been revised.
CC	Henson	16	3		I assume that the temp and precip increases aren’t universal across the US. Maybe this needs a soft caveat, such as “in many areas” or “in most areas”? Henson	Global	Thank you. The bullets have been revised.
CC	Henson	16	9		Recommend replace "Climate can also change" with "Climate can change" Henson	Global	Thank you. The bullets have been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	16			The first and sixth bullets are very similar, or at least coupled—they should be combined. MacCracken	Global	Thank you. The bullets have been revised.
BR	MacCracken	16			Bullet 4: Just a note that some of the ice (and in fact much of the Greenland Ice Sheet) is ice that rests on the sea floor (or at least on land pushed below sea level and that is connected to the open ocean—in Greenland’s case by deep fjords). Indeed, it is this ice that is particularly vulnerable as the lapping ocean waters have much greater heat capacity than the warming air. MacCracken	Global	Thank you. The bullets have been revised.
BR	MacCracken	16			Bullet 5: Change “these” to “the”—who knows what “these” is referring to. MacCracken	Global	Thank you. The bullets have been revised.
BR	MacCracken	16			Bullet 8: I would say the “Patterns of climate can change abruptly”. There is simply no way that the whole ocean’s heat content can change as abruptly as the ice records show in Greenland. What is very likely happening is that weather patterns are changing. Now, these changes can be equally devastating—making the Sahara region arid, or the US Southwest, or wherever. But, it is climate patterns changing abruptly, not global average surface temperature. MacCracken	Global	Thank you. The bullets have been revised.
BR	Meehl	16	8	1	See Comment 1 above - Beware upcoming large tropical volcanoes! (Comment 1: There are repeated references to warming that is “locked in” throughout the document. This is a dangerous reference since if there is a large tropical volcanic eruption next year, for example, we’ll NOT see the amount of projected warming that we’re supposedly “locked in” to. This sentence is poorly worded in any case. I’d suggest something like “We are committed to a certain amount of warming over the next few decades (barring a large volcanic eruption that would cool climate for a couple of years before we return to warming), but in any case the actions we take now will have a direct effect on the eventual amount of warming we experience later this century”.) Meehl	Global	Thank you. The bullets have been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	16			Bullet 1: Correct the latter half of the bullet; this is not ‘virtually certain’, see other comments Solomon	Global	Thank you. The bullets have been revised. Certainty concerns have been dealt with.
BR	Solomon	16			Bullet 2: A ‘virtually certain’ statement on this is not consistent with IPCC. Where is this from? Correct to be consistent with assessed work. Solomon	Global	Thank you. The bullets have been revised. Certainty concerns have been dealt with.
BR	Solomon	16			All Bullets: Put in appropriate likelihood statements on all bullets; none of these are ‘virtually certain’ based on IPCC. See comments above. Solomon	Global	Thank you. The bullets have been revised. Certainty concerns have been dealt with.
BR	Solomon	16			Bullet 9: Rephrase ‘Many of the observed changes are occurring more rapidly than projected’ to ‘Some of the observed changes’ or ‘A few’; see comments made earlier on this in the key findings section. Solomon	Global	Thank you. This bullet was dropped.
BR	Solomon	16			Bullet 10: This is a truism that is misleading. Why ‘sharply’ reduced? Drop this statement; it appears to be oversimplified and the report does not provide sufficient support for a clearer statement. Solomon	Global	Thank you. This bullet was dropped.
CC	Henson	17	2		This paragraph doesn’t note that US emissions cuts are only part of a picture that must include global emission cuts in order to have maximum impact. I know this may undercut the goal of motivating action, but it seems like an important point to include. Henson	Global	Thank you. This section has been rewritten in a manner that eliminates the relevance of this concern.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	17			Figure and caption: This figure is misleading as these are two “no-policy scenarios”—they are not scenarios based on anyone making any decision to do anything. This needs to be made very clear—and the reason for the difference needs to be made clear—it is not due to deliberate human decisions. In the caption, start the first sentence by saying “The time history of the CO2 concentration determined from concentrations measured in air bubbles trapped in an Antarctic ice core. The record covers the past ...” Start the third sentence with “The carbon dioxide ...” And the math in that sentence is wrong—380 is not 30% over 300 ppmv. We are actually already at 385, in any case, and preindustrial level was about 280 ppmv. So math needs updating. And in next sentence, the Earth is not in “unchartered territory”—just humans and civilization. What needs to be said is that when the CO2 concentration was much higher in Earth history, the climate was very different—being much warmer. MacCracken	Global	Thank you. Scenarios are now discussed earlier in the report. We also include stabilization scenarios later in the section.
BR	MacCracken	17	1	2	Change “global” to “the world’s” MacCracken	Global	Thank you. We have made this change.
BR	MacCracken	17	1-2		It is not clear why the font here is larger—I would think the font of the bullets on page 16 should be as large and don’t waste so much space in meaningless graphics. MacCracken	Global	Thank you. The section has been reformatted.
BR	MacCracken	17	2	8	Change to say “impacts on society, the economy, and the” MacCracken	Global	Thank you. The paragraph has been eliminated in the rewrite.
BR	Reilly	17			Similarly, the text indicates eastern north America and southern south America as getting wetter—but again these are grey areas on the globe map. Reilly	Global	Thank you for your comment. This figure has been removed.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	17			Additional Comments on the Chapter “Global Climate Change”: Most of the figures from page 17-22 should be deleted. This is where you are going into too much detail on the science of climate change. I’d keep the one showing the basic mechanism of The Greenhouse Effect, the one showing “Change in Average Global Temperature.” The one above that seems way to much noisy stuff and this doesn’t really do justice to the large uncertainties that exist in attributing historical climate change to specific forcings. If this report were about attribution and detection that would be fine but the report is not about that—its about impacts and adaptation, and we don’t really need to know precisely why the climate has changed to be impacted or to adapt. Why do we have the Figure “global temperature” on page 22? Isn’t the basic info. In the figure on page 21. The figure showing General Changes in Precipitation Patterns on page 22 would be useful—unfortunately it does not jibe with the text right next to it. The text indicates the Mediterranean as one getting almost certainly drier but this is a grey area on the globe map indicating one where results are uncertain or mixed. Reilly	Global	Thank you for the comments. The section has been extensively revised and attribution and detection is important to many readers. Figures are important and while we do not fully agree with your comments, several figure shave been revised or eliminated.
BR	Solomon	17			Figure Caption, Bottom Para: This statement is not justified. This ice core record of temperature and CO2 does not establish this. Solomon	Global	Thank you for your comment. The caption has been revised.
BR	Solomon	17	2		Correct: ‘The amount of warming that we actually experience after about 2050 will be determined largely by the choices made now and in the near future’ Solomon	Global	Thank you for your comment. The paragraph was removed in the process of rewriting the section.
BR	Corell	18			Titles, if you could footnote the source it will increase the credibility of the report – this statement is right out of IPCC 2007. Under methane, you could add that 70% of the methane is from human-origin sources. Try to reduce and give this more white space – very dense now. (p.18-19) Corell	Global	Thank you for your comment. The titles have been changed within new editing of section. The methane section has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	18			Figure 2 Title: Delete “from 0 to 2005”. Seems odd to refer to the year 0, and it’s implicit in the graph itself. Henson	Global	Thank you. The figure title has been changed.
CC	Henson	18	1	3	Recommend replace "cooler" with "colder" Henson	Global	Thank you. The text has been revised.
CC	Henson	18	6	10	“Ozone” starts a new section, so it should begin on the next page to allow for a line of space beneath the “Halocarbon” paragraph. Henson	Global	Thank you. The text has been revised.
CC	Henson	18	6	10	Recommend replace "gas, which is" with "gas" Henson	Global	Thank you. The text has been revised.
BR	MacCracken	18			Figure 1: This is the wrong figure to use. The one in the US National Assessment has arrows proportional to the magnitude of the flux, which is helpful. MacCracken	Global	Thank you. The figure has been eliminated.
BR	MacCracken	18			Figure 2 Caption: In caption, say “increased in the concentrations of these gases” MacCracken	Global	Thank you. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	18	1		Strictly speaking, the text is wrong as it does not mention the atmosphere radiating back to the surface. I would suggest the following wording for the first two sentences: “The Earth’s climate depends on the functioning of a large natural “greenhouse effect” The greenhouse effect is the result of gases like water vapor, carbon dioxide, ozone, methane, and nitrous oxide, which absorb heat radiated from the Earth’s surface and lower atmosphere and then radiate the energy back towards the surface.” In the third sentence, I would change “gas” to “natural gas” or people will think gasoline. MacCracken	Global	Thank you. The text has been revised.
BR	MacCracken	18	2		I would rewrite the second sentence to say “The increase in the carbon dioxide concentration has been the principal factor contributing to warming over the past 50 years. Its concentration has been building up in the Earth’s atmosphere since the beginning of the industrial era due to the burning of fossil fuels, clearing of forests, and degradation of soil fertility. MacCracken	Global	Thank you. The text has been revised.
BR	MacCracken	18	3	1	Change first sentence to say “The carbon dioxide concentration has increased”—I don’t think it is right for a scientific report to shorten this to say “Carbon dioxide has increased”. In last sentence, here it says the increase is 35 per cent—on page 17, figure caption says 30 per cent. I think it is worth adding a sentence somewhere making point that there is a large natural cycle going on involving breathing of terrestrial and marine plants and animals, including humans and that this has no net effect—for people are always asking. MacCracken	Global	Thank you. The text has been revised.
BR	MacCracken	18	4	1	In first line, say “mainly as a result” MacCracken	Global	Thank you. The text has been revised.
BR	MacCracken	18	6	2	On line 2, change “manmade” to “human-created” MacCracken	Global	Thank you. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	18			I think the details of where different greenhouse gases come from is again too much on that for this document. (If you do keep it, the discussion of methane needs to be reordered—the biggest contributors are the agriculture and waste sources, but the way this is written those are made to look like minor contributors after fossil energy sources.) Reilly	Global	Thank you for your comment. The text has been revised. We think this discussion needs to be kept.
BR	Solomon	18			Ensure that policy-relevant points are made here, not just broad description. As noted above, please ensure that you cover the following points: - Decreases in CFCs emissions under the Montreal Protocol have made important contributions to reducing climate change since 1990, and reductions in emissions of HFCs and HCFCs could make important contributions to reducing future climate change. - Changes in the stratospheric ozone layer have contributed to changes in circulation patterns and regional climates. - Methane concentrations have increased since pre-industrial times, but have leveled off in recent years, and the causes of the changes in this important greenhouse gas are not well understood. Solomon	Global	Thank you. The text has been revised. Note that CH4 is increasing again.
BR	Solomon	18			Headline: Correct. It is not ‘virtually certain’ that human-caused changes are responsible for most of the warming; it is very likely. Solomon	Global	Thank you. The title has been revised.
BR	Solomon	18			Please do not use the word ‘Freon’. This was the DuPont trade name but many other companies made substantial amounts of CFCs, so this creates the misleading impression that DuPont made all of it and is not appropriate. Just say CFCs. Solomon	Global	Thank you. The text has been revised.
BR	Duce	19			Picture: It is not at all clear what this is a picture of or what it adds to the discussion. Duce	Global	Thank you. The picture has been eliminated.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	19	3	15	Recommend replace "absorb" with "absorbs" Henson	Global	Thank you. The text has been revised.
BR	MacCracken	19			Photo: Delete, not comprehensible or scientifically relevant. MacCracken	Global	Thank you. The picture has been eliminated.
BR	MacCracken	19			Figure and figure caption, lines 3-4: Change the caption to say “increases in the atmospheric carbon dioxide (CO2) concentration and global average air temperature.” Note that concentration should be singular, as should global average temperature. And why is “CO2” being defined here? Also, the figure should be updated to the present, if possible. MacCracken	Global	Thank you. The figure has been removed.
BR	MacCracken	19	1	2	On line 2, change “the part of the atmosphere closest to the surface” to “lowest 5-10 miles of the atmosphere” so give a real sense of its extent. On line 6, change “far above the Earth’s surface” to “which is the stable layer of the atmosphere above the troposphere” and say “ozone is present naturally and protects”. In last line change “have caused” to “are responsible for”. MacCracken	Global	Thank you. The text has been revised.
BR	MacCracken	19	2	6	In last line change “fueling much” to “contributing to much” MacCracken	Global	Thank you. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	19	3	2	I do not understand line 2—does it mean “human activities produce additional local and regional effects”? If so, this would be a good place to specifically mention that human activities change surface character and put out heat through their generation and use of energy—saying this helps reduce questions that arise, especially if make point these terms tend to be minor in comparison to the global changes in concentration. In middle of paragraph, many of the aerosols are not emitted directly (as is indicated here), but are created in the atmosphere as part of the natural atmospheric cleansing process. In next sentence, I would say “These aerosols also brighten clouds, causing ...” In next sentence, subject is singular, so say “absorbs incoming sunlight, causing warming.” MacCracken	Global	Thank you. The text has been revised.
BR	Solomon	19			Please avoid making the mistake of publishing a paleo record of temperature change without error bars. The confusion that has resulted from misinterpretations of the Mann record makes it clear that it is inappropriate to drop the error bars for the purpose of oversimplification. Revamp this figure to include error bars. Also, please include more than one proxy record, such as e.g. boreholes and sediments, as in the NRC report on reconstructions and in IPCC (2007). Solomon	Global	Thank you. The figure has been removed.
BR	Solomon	19	2	6	Last line is misleading. Change to: “Thus, water vapor has responded to, and amplified, human-induced warming but is not its cause.” Solomon	Global	Thank you. The line has been removed.
BR	Corell	20			Source the title, but this is too scientific, the reader will glaze over and may close the book. The major factors diagram is for an AGU audience, try to simplify as much as you can. The “Separate factors” diagram is also for an AGU audience, if there is a message for the general reader, I missed it too. Simplify as much as possible and key it to the title of the section. (p.20-21) Corell	Global	Thank you. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	20			Figure 1 caption, Line 2: Recommend replace "The top box: with "The top part of the box" Henson	Global	Thank you. The text has been revised.
CC	Henson	20			Figure 1 caption, Line 5: Recommend replace "The bottom box" with "The bottom part of the box" Henson	Global	Thank you. The text has been revised.
CC	Henson	20			Figure 1, caption, Line 3: Recommend replace "the second box" with "the second part of the box" Henson	Global	Thank you. The text has been revised.
BR	MacCracken	20			Figure: IPCC has copyrighted the figures and requires they be shown in their entirety—this one has been redrawn, it seems. In top caption, it should say since "1750" rather than "1950." If you are going to redraw the figure, then in left box, say "Increased concentration of long-lived greenhouse gases" and "Change in ozone concentration" MacCracken	Global	Thank you. The figure has been redrawn to note that it is 1750-present, in addition to other changes.
BR	MacCracken	20			The figure is in degrees Celsius whereas much of text is in degrees Fahrenheit. Figure on page 22 uses degrees Fahrenheit. MacCracken	Global	Thank you. The figure is on radiative forcing, not temperature.
BR	MacCracken	20	1		The second sentence needs simplification—has a couple of thoughts. On line 5, say "Neither of these natural factors can explain ..." and on line 6 change ", which is" to "that has been" MacCracken	Global	Thank you. The text has been revised.
BR	Mearns	20			Figure Caption: It would be useful if the unit watts/m ² could be explained in a lay-person friendly way. Also, the graphic is a tricky one to use. It can easily be misinterpreted, especially with the wide uncertainty bars on it. I'm not saying not to use, just think carefully about potential misinterpretations. Mearns	Global	Thank you. The text in the figure caption has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	20			Headline: Change header to avoid suggestion that it is virtually certain that natural factors cannot explain the warming, or provide references. This is not something you can track to IPCC. Solomon	Global	Thank you for your comment. The title has been revised.
CC	Henson	21			Figure 1, caption, Line 3: Recommend replace "shown" with "are shown" Henson	Global	Thank you. The figure has been removed.
CC	Henson	21			Figure 1, caption, Line 4: Recommend replace "combined together" with "combined" Henson	Global	Thank you. The figure has been removed.
BR	MacCracken	21	1	1	The first sentence needs a bit of refinement as it basically is not careful in separating out the lifetime in the atmosphere of a CO2 molecule (about 4-5 years, based on C-14 from nuclear tests) and the persistence time of the increased concentration (centuries). MacCracken	Global	Thank you. The E-folding time is about 100 years, not 4-5 years.
BR	MacCracken	21			Figure caption: On line 9, say "has more" and in next to last line, the color looks to be orange rather than yellow. MacCracken	Global	Thank you. The figure has been removed.
BR	MacCracken	21	2	1	In first line, say "The rate of rise of global emissions". In line 3, say "are already higher" and "developed in 2000" (you need a time reference here) and then say "for use in projecting future climate change." MacCracken	Global	Thank you. The text has been revised. The later figure also shows and discusses the point about current emissions.
BR	MacCracken	21	3		At start, say "Although" for "while" implies time. On line 4, say "that the land and ocean sinks of carbon dioxide will become less efficient". MacCracken	Global	Thank you. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Meehl	21			Bottom Figure: This supposedly shows “Change in average global temperature”, but I’m not sure how it was computed, and I’m sure an average reader won’t get it either. People are used to seeing time series of globally averaged temperature anomalies like the figure on the top half of P. 22. I assume the figure on P. 21 is some kind of derivative of temperature change and is designed to show the impacts of volcanoes, but it’s not clear that’s the case from how it’s presented. I suggest deleting this panel. Meehl	Global	Thank you. The figure has been removed.
BR	Corell	22			Source the title. Left hand side is good, but the graphic on the right is useless for the general reader. Either replace it (it is useless even if it was from the US, but Switzerland, no!) with something better to support the title of this section, how about cyclonic/hurricane intensity? (p.22-23) Corell	Global	Thank you. This graphic has been properly sourced.
BR	Duce	22			Figure 1: Recent global temperature plots, including this one, indicate that there has been essentially no average temperature increase during the past roughly 5-6 years. This has been used by a number of people who do not accept global climate change to indicate that there is really no increasing global temperature now. Some kind of a brief sentence should acknowledge this record, but indicate that short-term variability in the long terms trends are not unusual. By ignoring this and these data it gives those people a strong reason to state that this report is not considering the latest data, etc. Duce	Global	Thank you. The figure caption has been revised to account for this important point.
CC	Henson	22	2		Acknowledge the successful resolution of the apparent surface-satellite contradictions in measuring global temperature? Henson	Global	Thank you for the suggestion. However, there is no room for this in the revised document.
CC	Henson	22	3	5	Recommend replace "were" with "have been" Henson	Global	Text revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	22			Figure 2: So why show a figure with data going from 1925 to 1999? I am also not so sure the figure really is very helpful in understanding what happens—especially in that what really matters for people and the environment is P-E or something similar. MacCracken	Global	Thank you. The figure has been removed.
BR	MacCracken	22	1	6	In line 6, change “comes” to “is assembled” and in last line change “melting” to “deterioration”. MacCracken	Global	Thank you. The text has been revised, but we differ on choice of words.
BR	MacCracken	22	2		End of first sentence, change to “from satellites since 1979.” In second sentence, the troposphere has already been defined—and don’t say it this way in any case—and same goes for the stratosphere. On line 3, change “They” to “The measurements” and on line 5, change “our” to “scientific” MacCracken	Global	Thank you. The text has been extensively revised and rewritten.
BR	MacCracken	22	3		The paragraph needs to mention shifting storm tracks and the northward shift of the weather-creating intersection of cold polar and warm moist air. The report is about the US, so a bit more focus on US would be appropriate. MacCracken	Global	Thank you for the suggestion. However, there is no room for this in the revised document.
BR	Solomon	22			Headline: Provide confidence levels. It is not virtually certain that precipitation has increased over the past century. Solomon	Global	Thank you. The headline has been revised.
BR	Solomon	22	1		It is not appropriate to say that the warming trend has accelerated in recent decades. The past decade has caused substantial controversy and while it is clearly warming, it is not accelerating. Also, there are decades pre-1970 that had comparable warming rates to the fastest observed recently (see IPCC, 2007, chapter 3). This is misleading and should be dropped. Solomon	Global	Thank you. The text has been extensively revised and rewritten.
BR	Solomon	22	1	19	‘increasing melting of polar ice sheets’ is not substantiated for Antarctica and should be dropped. You may be able to make a statement for Greenland, but it should be carefully framed. Solomon	Global	Thank you. The text has been extensively revised and rewritten.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	22	2		The statement that the pattern of warming and cooling is consistent with greenhouse gases is misleading. ‘The pattern of tropospheric warming and stratospheric cooling is consistent with our understanding of how atmospheric temperatures should be changing in response to increasing greenhouse gases and depletion of stratospheric ozone.’ Solomon	Global	Thank you. The text has been extensively revised and rewritten.
BR	Duce	23	1		I believe that you should show a graph that shows increases in the intensity of tropical storms and hurricanes sine the 1970s. This is a very important point and has been rather controversial. You have the space on this page to show that figure. Duce	Global	Thank you for the suggestion. However, there is not enough space in revised document.
BR	MacCracken	23	1		Last sentence should mention that there is indication that intensification is resulting from the warming of ocean waters. MacCracken	Global	Thank you. The related subsection has been removed.
BR	MacCracken	23	2	1	In line 1, say “spatial variations”; in line 2, say “tropical climatic conditions”; in line 3 change “faster” to “more rapidly.” The phrase on lines 3-4 really opens up the question of whether climate models are any good—but the report has yet to define them, explain them, review strengths and weaknesses, etc.—adding a spread on climate models is essential. On line 4, change, “is expected to cause” to “is causing”. With respect to explanation on lines 5-6, I would suggest adding that this is happening at the same time the warmer Arctic is generating less cold air so the warmer air masses are pushing further northward. MacCracken	Global	Thank you. The related subsection has been removed.
BR	Solomon	23	1		This paragraph states that it is virtually certain that the number of heat waves has increased. I don’t think this is proven – is a better likelihood statement needed? Also, is this intended to be global or US? There are some studies that don’t support this for the US. Solomon	Global	Thank you. Analyses do show this, but only leave out the 1930s anomalous period – however all of the discussion has been removed.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	23	2		The figure shown is from the attribution study by Zhang et al., but the key conclusion of that study of an attributable effect on precipitation patterns should be noted. Please add an additional last sentence: 'Emissions of greenhouse gases and aerosols have had a significant influence on this observed broad pattern of drying in the subtropics and wetter conditions at high latitudes.' Solomon	Global	Thank you. The related subsection has been removed.
BR	Corell	24			Good stuff. Try to get a bit more white space, i.e., reduce the text where ever possible. AND be sure to update the graphs to 2008 as those data will be available about Sept. 20th. (p.24-25) Corell	Global	Thank you. The figure has been removed.
CC	Henson	24			Graphic, Para. 1, Line 3-4: Recommend replace "it rejects most of its salt to" with "most of its salt is left in" [jargon] Henson	Global	Thank you. The figure has been removed.
CC	Henson	24			Graphic, Para. 4, Line 2: Recommend replace "ice shelf" with "Ice Shelf", or you could uncapitalize all the various boldface terms in this graphic. Henson	Global	Thank you. The figure has been removed.
CC	Henson	24	3	1	Recommend replace "north pole" with "North Pole" Henson	Global	Thank you. The text has been extensively revised and rewritten.
BR	MacCracken	24			Purple Box: In last sentence say "Melting of sea ice and ice shelves does not directly cause sea level to rise, but such melting can lead to increased flow of land ice to flow into the ocean, causing sea level rise." MacCracken	Global	Thank you. The figure has been removed.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	24	3	1	On line 1, it really raises questions about the intelligence (or lack thereof) when you have to tell people that the Greenland Ice Sheet is “near the north pole”—delete that phrase as insulting. On line 3, change “levels” to “level by”. Also, the second sentence needs to make clear that IPCC AR4 projected that through the entire 21st century the sum of Greenland and Antarctic contributions to sea level would be very near zero—that both of these ice sheets are now melting is an example of how cautious (even misleading) the IPCC report was on this issue. Regarding the point on line 5-6 that the meltwater will lubricate the base, this is mainly incorrect for Greenland—much of the Greenland Ice Sheet is grounded below sea level, so the main effect is to help float the Ice Sheet—there is plenty of lubrication there. On line 7, “every large” compared to what? MacCracken	Global	Thank you. The text has been extensively revised and rewritten.
BR	Solomon	24	1		IPCC concluded that the only thing that could be said was the sea level had risen faster in the 20th century than the 19th. IPCC specifically made clear that variability and uncertainty was too large to say that sea level is currently rising at an increasing rate. My opinion is that this should be changed to be consistent with the IPCC statement, since there are not strong published studies to support a different conclusion. If this is not done, then the studies to support a stronger statement need to be given. Please don’t include the Rahmstorf study in that. Rahmstorf’s work was based on extrapolation assuming all uncertainties go in the direction of bigger values due to ice melt. The recent work published in Nature (Domingues et al., 2008) shows that this isn’t correct and that ocean heat content changes are larger than previously thought. With this correction, the Rahmstorf inference, which was shaky to begin with, disappears. If you have other evidence to cite, then cite it, or change the statement. Solomon	Global	Thank you. The text has been extensively revised and rewritten.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	24	3		It is clear that Greenland is losing mass but it is not clear that Antarctica is, and it is not clear that either is losing mass at increasing rates. Delete this sentence. Why is the recent study by Joughin et al and Das et al. (Science, 2008) not cited here? It suggests the opposite of what is claimed. A more balanced statement would be : “There are some studies suggesting that lubrication causes ice to flow more easily to the sea, speeding the loss of ice, but others (Joughin, Das) suggest that this is a small effect. Some parts of West Antarctic show large increases in mass loss in the past decade but there is also evidence for mass gain in East Antarctica suggested by other studies. Therefore, it is not clear whether Antarctica as a whole is gaining or losing mass.” Solomon	Global	Thank you. The text has been extensively revised and rewritten.
BR	Williams	24			A much better ice sheet photo could be found on the NSF U.S. Antarctic Program photo library: http://photolibrary.usap.gov/ Williams	Global	Thank you. The figure has been removed.
CC	Henson	25	2	9-10	Recommend replace "Antarctica, initial warming" with "Antarctica that initial warming" Henson	Global	Thank you. The text has been extensively revised and rewritten.
BR	MacCracken	25			Bottom box: Change first sentence to “The minimum extent of summer sea ice on the Arctic Ocean has been decreasing for the last three decades ...” In second sentence, “affecting” is not a very helpful word choice. Five lines from bottom, say “warming further.” Three lines from bottom, say “positive feedback loop”. Two lines from bottom say “sea ice also have.” In figure caption, change parenthetical phrase to say “the month with the minimum value”. MacCracken	Global	Thank you. The text has been extensively revised and rewritten.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	25	2	3	The phrase on lines 3-4 “known as the Arctic” makes it seem as if you are writing questions for “First grade geography” for the TV show “Are you smarter than a fifth grader”. Delete the phrase. With respect to the discussion on Antarctica, this does not seem to me to adequately differentiate West and East Antarctica and their vulnerabilities. With respect to changes in Antarctic sea ice cover, my impression is that they are also affected by the circulation of the Southern Ocean. MacCracken	Global	Thank you. The text has been extensively revised and rewritten.
BR	MacCracken	25	2-3		Why not update the Greenland melting figure to 2007 so it matches the Arctic sea ice figure. In fact, why not get 2008 results for both figures, given the report’s publication date. MacCracken	Global	Thank you. The text has been extensively revised and rewritten.
BR	Solomon	25			While the statement about Antarctic sea ice increase possibly being due to ozone may be true, I don’t know of any published study yet showing this. Provide a reference or change to make clear that you are raising this as a possibility but it is not established, or delete it. Solomon	Global	Thank you. The text has been extensively revised and rewritten.
BR	Solomon	25	3	12	The statement ‘Changes in sea ice have enormous environmental, economic, and societal implications’ is sweeping but unhelpful. Please give specific examples....”Changes in sea ice have important implications, such as effects on coastal erosion and native Inuit culture and lifestyle, as well as ecosystem impacts including.....’ Solomon	Global	Thank you. The text has been extensively revised and rewritten.
BR	Williams	25			The maps showing “Surface Melting on the Greenland Ice Sheet” would be misleading to those who do not know that this refers to areas where passive microwave sensors, etc. measure water in the snow during the summer. People not familiar with polar science would easily think that “Inland ice that melts in summer” refers to ice that melts down to the rocks, not areas of more melt ponds and wet snow. Williams	Global	Thank you. The text has been extensively revised and rewritten.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Corell	26			Keep the message as simple and directly related to the title at the top of the page (which should be referenced). The graphic on top is the message, enlarge and delete the graphic at the bottom of the page, it adds little for the average reader. This is good and essential stuff and relates the confidence level to this as well. The “to be developed graphic on the bottom of page 27 should further depict the title declaration. Text is a little too dense. (p.26-27) Corell	Global	Thank you. The text has been extensively revised and rewritten.
BR	Duce	26			Figure 2: This figure is very complex and either needs to be simplified or have a caption describing it better. Duce	Global	Thank you. The figure has been removed.
BR	MacCracken	26			Figure 1, Caption: The caption needs to be clarified, explaining that in comparing the results of “models” there is a smoothing of the curve, so the year-to-year variability will be smaller than for observations. Alternatively, one could include the band of model results and explain that observations are just one manifestation. But something needs to be done to make clear why observations are so jagged and models are not (one could time average the observations, but then one loses the volcanic responses). In the third sentence change “actual” to “the time history of” and “temperature” should be singular. MacCracken	Global	Thank you. The figure has been revised.
BR	MacCracken	26			Figure 2: This figure is missing a caption—which should explain that satellites do not directly measure temperature, but derive it using a radiation model. Reasons for different curves should be explained. MacCracken	Global	Thank you. The figure has been removed.
BR	MacCracken	26	1		Because “we” here refers to some select set of scientists rather than to society as a whole, change second sentence to “Climate scientists use detailed pattern analyses called fingerprint studies to determine cause and effect relations in the climate system, and to attribute ...” MacCracken	Global	Thank you. The text has been extensively revised and rewritten.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	26	2		Again, climate model results are being presented, but climate models have not been explained—if the authors have to explain that Greenland is near the North Pole, they had better explain climate models. Somewhere, it really needs to be said that models are based on fundamental physics, with some necessary parameterizations based on empirical relationships determined from the existing behavior of the atmosphere at locations around the world (so it is clear that one is not tuning to a local condition, but that parameterizations must work under a wide range of conditions). An additional point to make would be that models are not magic—and should not just be believed no matter what—scientists use them to improve understanding of the system, to rigorously apply the physics, etc. And, 3 lines from bottom, change to say “and remove the effects of particular factors to see” MacCracken	Global	Thank you. The text has been extensively revised and rewritten.
BR	MacCracken	26	3	1	On line 1, change “last” to “20th”. On line 4, say “the effects of human influence”. On next to last line, say “the observed warming over the past few decades could not” as the studies do not say this for the earlier warming. MacCracken	Global	Thank you. The text has been extensively revised and rewritten.
BR	MacCracken	26	4	1	The first sentence is not very clear. Maybe just say “Similarly, the change in temperature expected from each natural or human influence varies vertically from the surface up through the stratosphere.” In line 7, saying “just” is a bit of an understatement as the troposphere represents about 80% of atmospheric mass. In the next to last sentence, it would be useful to add that the observed pattern also disagrees with the fingerprint of other factors (or natural factors). And could change “and also show” to “showing.” MacCracken	Global	Thank you. The text has been extensively revised and rewritten.
BR	Meehl	26			Bottom Figure: Where is the caption for this figure? Meehl	Global	Thank you. The figure has been removed.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	26			On page 26-27—again too much science detail. If this report is to be focused on impacts and adaptation I don't think this is the place to go into detail about attribution—you need only report that these studies have concluded that the human contribution is there and that forms a basis for making projections. Reilly	Global	Thank you. The text has been extensively revised and rewritten.
BR	Reilly	26	2		Last line of 2nd paragraph. Is there any statistical reliability for individual locations—normal data I see is so noisy that there is no way a trend at a single location could be statistically significant. Reilly	Global	Thank you. The text has been extensively revised and rewritten.
BR	Solomon	26			Figure 1: Please do not oversimplify figures. This figure needs to include the model ranges as shown in IPCC. This is important in e.g. helping to clarify misinterpretation of the relatively flat temperature trend of the past decade, which is well within the range of ensembles. Solomon	Global	Thank you. The figure has been revised.
BR	Solomon	26	1		Please do not oversimplify. Each factor that affects climate does not produce a necessarily unique pattern – some do and some don't. CH4 and N2O are virtually identical, for example. Rephrase. Solomon	Global	Thank you. The figure has been revised.
BR	Solomon	26	3		Please do not oversimplify. The cited reference 19 does not say that observed warming is virtually certain not to have been caused by natural factors. Correct. Solomon	Global	Thank you. The text has been extensively revised and rewritten.
BR	Solomon	26	4		The profile up through the stratosphere provides evidence that both GHGs and ozone depletion are important. Rephrase and avoid the misleading impression that only GHGs matter. Solomon	Global	Thank you. The text has been extensively revised and rewritten.
BR	Williams	26			In the “Separating Human and Natural Influences on Climate” graph, you might want to use green instead of blue for the “Natural Only” line. Not only for the symbolic reason, but also because green would be in more contrast to the black, observations line. Williams	Global	Thank you. The text has been extensively revised and rewritten.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	27			Figure: If extra space is needed, for example for caption on second figure on page 26, then get rid of background picture. MacCracken	Global	Thank you. The text has been extensively revised and rewritten. A figure has been inserted.
BR	MacCracken	27	1		On line 1, change “greenhouse gases” to “an increase in greenhouse gas concentrations.” On line 3, change “can explain” to “are the dominant or sole cause of” MacCracken	Global	Thank you. The text has been extensively revised and rewritten.
BR	MacCracken	27	3		While the last sentence is making a separate point, it sounds a bit repetitive—I think it might be better to change “human influences” in the next to last sentence to the “increase in heat-trapping gases” (will people know this means greenhouse gases, of CO2 and other greenhouse gases) and not try to separate these two thoughts. MacCracken	Global	Thank you. The text has been extensively revised and rewritten.
BR	MacCracken	27	4	2	On line 2, change to say “natural factors alone cannot”. On line 3, say “are, however, consistent” and delete “our”. MacCracken	Global	Thank you. The text has been extensively revised and rewritten.
BR	Meehl	27	3		Great care must be taken with this paragraph since this conclusion was carefully negotiated in CCSP3.3. I strongly recommend deleting this entire paragraph and substituting the hurricane attribution statement verbatim from the CCSP3.3 executive summary. Meehl	Global	Thank you. The text has been extensively revised and rewritten.
BR	Solomon	27			Here and elsewhere, it is very unfortunate that this document is being sent for review without all graphics in place. This is critical and is another reason why revision and another re-review is recommended. Solomon	Global	New graphic added
BR	Solomon	27	1		Too weak. “If most of the observed surface and tropospheric warming had been caused by an increase in solar output rather than by greenhouse gases, we should have observed much larger warming in the stratosphere, particularly near the stratopause where ozone loss is less important.” Solomon	Global	Thank you. The text has been extensively revised and rewritten.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	27	2		This is an unbalanced statement. Also need to acknowledge that wind shear is important and that it is not clear how the balance between increased SSTs and wind shear has affected hurricanes in various parts of the globe. Page 29 has some good material on this. Please bring some of that forward here. Solomon	Global	Thank you. The text has been extensively revised and rewritten.
BR	Corell	28			This is good material, if you introduce the “higher and lower emissions” idea earlier, adding others here without connecting back to that concept of higher and lower emissions will simply confuse the average reader. Here you use “high and low emissions.” I don’t have a brief on what or which to use, but be consistent and if there are three, then use them everywhere. (p.28-29) Corell	Global	Thank you for your comment. The wording for emissions has been carefully reviewed and updated throughout the document.
CC	Henson	28	2	17	Recommend replace "required by the Framework on Climate Change" with "required by the United Nations’ Framework on Climate Change, which was adopted in 1992 and signed by the U.S. and most other countries." [since this is the first mention of UNFCCC] Henson	Global	Thank you for your comment. The text has been revised.
BR	MacCracken	28	1		Figure and first paragraph: I note here that temperature changes are given in degrees Fahrenheit—page 26 bottom figure is degrees C. Please do be consistent. MacCracken	Global	Thank you for your comment. The discrepancy has been addressed.
BR	MacCracken	28	1		Opening column title: I would suggest changing “Rising global temperature” to “Future increases in global average temperature”. I might add that the real point is that temperatures will be rising around the world, so maybe it should say “Rising temperatures worldwide” MacCracken	Global	Thank you for your comment. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	28	1		There is a serious problem here as the scenarios being considered are IPCC no-policy scenarios—the scenarios are basically two possibilities for the future, not what we might accomplish if we really try. This needs to be made VERY clear. I also think that giving the full range of possibilities due to scenarios and sensitivity needs to be said more thoughtfully, pointing out the significance levels, etc.—there are a few efforts (like Wigley, and Schneider) to do some probabilistic estimating. Just giving the limits of the range seems to me subject to a lot of criticism, especially given the lack of explanation about this (and the figure does not indicate how such a wide range could result). MacCracken	Global	Thank you for your comment. The text has been revised.
BR	MacCracken	28	1		In the last sentence, indicating that all models have a different sensitivity is really not a very helpful statement—and indeed seems to me to cast a sense of more uncertainty about the models than is justified. It is just essential to have a spread on modeling to put such comments into context. MacCracken	Global	Thank you for your comment. The text has been revised.
BR	MacCracken	28	2		While this paragraph does indicate that the SRES scenarios are no-policy scenarios, this is far too obscure a statement given the split road diagram and the extensive other portrayal of these being high and low emission scenarios without mentioning they are no-policy scenarios. I would imagine that the information most people want is what the benefits will be of taking policy actions—now, we don't have such runs, so it would seem to me to make sense to make the point that different scenarios can lead to different outcomes, but this needs to be done explicitly, and lumping the temperature ranges for the different scenarios as done in the first paragraph is not at all helpful in this regard. Also in this paragraph, on line 2, I would change “analyzed” to “used to explore the potential for”—indeed, we don't analyze the SRES scenarios to understand climate change, so the present sentence is imprecise. MacCracken	Global	Thank you for your comment. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	28	3		The heading for the paragraph does not describe the paragraph properly—the text is not much about “patterns”—it is mostly about “Projected changes in precipitation.” In line 1, I’d delete “future” as redundant and imprecise, and I’d revise line 4 to say “average expected over the 21st century, but with substantial ...” In the next sentence, I’d change “wetter” (which generally is referring to changes in soil moisture) to “receive more precipitation while the sub-tropics receive less.” In discussing what happens in the US West and Southwest, just saying “drier” is not really enough, as it confuses precipitation with soil moisture change. Basically, it needs to be said how precipitation changes, how evaporation changes, and what happens to P-E, etc. Use a few more words—this is a critical issue. MacCracken	Global	Thank you. Several revisions have been made; public use of ‘drier’ generally means more than just soil moisture, so we think it is okay to use as-is in some cases.
BR	Solomon	28			What model is used to put A1FI on this graph? Is CO2 feedback included in the three sets of curves? Please add to the legend to make these important points clear. Don’t oversimplify by leaving out this information. Solomon	Global	Thank you. The text and caption have been revised, and we think that the issues has been adequately addressed.
BR	Solomon	28			Figure 2: Like the curve above, the data need to appear here. I realize that the observed trend greatly exceeds the models but showing this is required for balance. Solomon	Global	Thank you. There is some ambiguity regarding what data is requested for addition.
BR	Solomon	28	3		The US west and southwest drying are rather uncertain in their extent. Please show a map of the drying, with appropriate colors/stippling to make clear how strong the agreement is across models, as in IPCC. Solomon	Global	Thank you. The detailed discussion is in the regional analysis section.
BR	Duce	29	1	1	This paragraph should begin, as the ones on the preceding page do and the other on this page does, with something like “Models project that in a warmer ...”. Some of the most vociferous criticisms of projected changes in climate are based on definitive statements like this - we must always indicate that these statements are based on our best models and projections. We need to watch for this throughout the report. An example where this is done very well is for the bullets on page 52 on Human Health. Duce	Global	Thank you for your comment. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	29	1		Headline: Recommend replace "Currently rare extreme events become more common" with "Extreme events that are currently rare will become more common" Henson	Global	Thank you for your comment. We have decided to keep this wording.
CC	Henson	29	2	4	Recommend replace "longer relatively" with "longer, relatively" Henson	Global	Thank you. This change has been made.
CC	Henson	29	5	2	Recommend replace "glacier-melt" with "glacier melt" Henson	Global	Thank you for your comment. The text has been revised.
BR	MacCracken	29	1		In opening phrase, say "In a warmer world, ..." I would also note that some of this has been covered earlier. I also did not like the phrasing "100-fold"—say it more directly, namely change from summertime conditions that have been, based on past behavior, likely to happen about once every 500 years to an conditions likely to recur every few years. Make clear it is the frequency of the weather conditions that is changing, not a projection that each of these summers will have a very high number of number of deaths, for adaptation is possible. MacCracken	Global	Thank you for your comment. The text has been revised to a limited extent.
BR	MacCracken	29	2		The second sentence should give an indication of where this has been observed (especially if it has been observed over North America). In line 3, I'd change "little precipitation" to "low precipitation." MacCracken	Global	Thank you for your comment. We have added a reference to 'observed' and are keeping the 'little' in the text.
BR	MacCracken	29	3	3	In line 3, change "the poles" to "higher latitudes" MacCracken	Global	Thank you for your comment. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	29	4		It seems to me what needs to be said is that projecting changes in number is quite hard, for some of the reasons stated, but that once formed, it is pretty clear that the warmer ocean conditions (and the greater depth of warming) are likely to lead to a greater fraction of storms developing into strong storms, and the greater spread of warm, humid conditions is likely to contribute to longer hurricane life and/or greater destructive potential over storm lifetimes. MacCracken	Global	Thank you for your comment. We have decided to keep the text as-is.
BR	MacCracken	29	5		Regarding the third sentence, indeed, IPCC really did an inadequate job on this issue. It appears that the terms they included are unable to explain the 20th century rise, and maybe can explain only about half of it. It should be mentioned that paleo evidence indicates that the global amount of ice on land has varied very sharply as a function of temperature (10 to 20 meters per degree, at equilibrium, might be reasonable), far above the IPCC estimate. MacCracken	Global	Thank you for your comment. The text has been revised.
BR	MacCracken	29	6	3	In line 3, I'd suggest changing "Various" to "Other". MacCracken	Global	Thank you. We have rewritten this section.
BR	Meehl	29	1	3	"as projected" is an unsupported statement since the various emission scenarios have all kinds of outcomes. It would be better to say something like "If greenhouse gas concentrations continue to increase because we do not do anything to reduce emissions, by the 2040s..." Meehl	Global	Thank you for your comment. The text has been revised.
BR	Solomon	29	5		Please state how much additional SLR is estimated, with error bars. The vagueness about numbers is inappropriate. Solomon	Global	Thank you for your comment. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	29	6		SLR depends not just on physical processes but also on emissions. That is why you cannot say that IPCC values were a ‘lower bound’ or that current estimates are lower bounds – it depends on emissions. You can say that the upper end was not intended as an upper bound, because for a given scenario there could be additional contributions. Please see the IPCC synthesis report for a better short statement of what IPCC said and use that here. Solomon	Global	Thank you for your comment. The text has been revised.
BR	Solomon	29	6	3	This is an extremely leading sentence. 5 feet by the end of the century is not established by any published glaciological study that I know of, let alone larger numbers. This statement is inappropriate without clear referencing as to its source, and more clarity on what is meant by ‘various methods’. If this is all based on paleo analogues, but that current glaciological understanding does not support it, then that needs to be said to be balanced. Further, please be quite careful if you are going to rely on Rohling at al (Nature, 2008), since that requires explaining not just the SLR rise in excess of a meter in a century shown in that paper but also the similar sea level falls, which seem inexplicable and raise questions about the data. Solomon	Global	Thank you for your comment. The section has been rewritten with a number of additional references.
BR	Williams	29			A brief mention at the end of the discussion on sea-level rise could point out that with the potential “even larger numbers” for the amount of sea-level rise is not likely, or is highly unlikely, to include increases from the complete, or almost complete, melting of the Greenland and West Antarctic ice sheets. Williams	Global	Thank you for your comment. The text has been revised.
BR	Corell	30			The idea is good, but the figure, even if simplified does not address the title declaration (which should be sourced). Critical message, but this does not do it. Corell	Global	Thank you for your comment. This portion of the document has been significantly reworked.
BR	Field	30			Figure – The legend is missing the traces for the 2 stabilization scenarios. Field	Global	Thank you for your comment. This portion of the document has been significantly reworked.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	30	3	6	Recommend replace "pre industrial" with "pre-industrial" Henson	Global	Thank you for your comment. The text has been revised.
CC	Henson	30	3	8	Recommend replace "long-term" with "long term" Henson	Global	Thank you for your comment. The text has been revised.
BR	Hooke	30	4	1	Isn't a phrase "due to" or some other small edit needed here? Hooke	Global	Thank you, but we feel that the text is fine as-is.
BR	MacCracken	30	1	3	On lines 3-4, I'd revise to say "if we stay on the current course, other things being equal, we're heading ..." I am also not sure that saying "current course" is the same as saying the future is evolving without policy changes—this should probably be said directly without colloquialisms. MacCracken	Global	Thank you for your comment. The text has been revised.
BR	MacCracken	30	2		While mentioning there could be other scenarios, it does not really say that there are the two being so extensively relied on are no-policy (or are policy-absent) scenarios—nor mention the really key point that the SRES scenarios do, nonetheless, assume a tremendous amount of technology improvement and reduction in carbon intensity. I think this scenario issue needs to be laid out much further to the front of the report, making clear why it is being used, what other possibilities there are, etc., and indicating the difference between the high and low scenarios shows the types of change that could result from taking policy action. MacCracken	Global	Thank you. We have added further scenario discussion elsewhere in report.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	30	4	2	On line 2, I'd change "would" to "will". With respect to the 400 ppm number, this is for CO2 equivalent, not for CO2 alone. Now, at present, and using the 100-year Global Warming Potential, the aerosol cooling influence happens to offset the warming influence of the other greenhouse gases, but this will not continue, so we really will have to get CO2 alone to below 400 ppm (probably to 350 ppm). MacCracken	Global	Thank you for your comment. The text has been revised.
BR	Meehl	30			Figure: Where is the caption for this figure? Meehl	Global	Thank you for your comment. The figure has been redrawn and a caption has been added.
BR	Solomon	30			Figure: Please do not simplify this figure. It is fine as is. Solomon	Global	Thank you. We agree. Same data included in revised figure.
BR	Solomon	30			Headline: please fix the statement about 'sharply reduced' as noted earlier. Solomon	Global	Thank you for your comment. The text has been revised.
BR	Solomon	30	1		Please fix the first paragraph regarding rate of recent CO2 increases, as noted earlier. Solomon	Global	Thank you for your comment. The text has been revised.
BR	Solomon	30	3		Delete the third paragraph, because it is based upon a limit of 3.5F. This is a political target and 'it has been suggested' is not a reason to put it here. If you have a good scientific reason to suggest a given target, that would be great, then say so and devote a good deal of space to it. Otherwise, delete. Solomon	Global	Thank you for your comment. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	30	4	5	This is an unbalanced statement. Some argue there is no danger at all now or in the future. Delete this; it is an advocacy statement and not appropriate here. Solomon	Global	Thank you, but we disagree. It is not an advocacy statement to state a fact based on existing science studies. Some people also argue that there is no climate change either, but one has to use one's own judgment as to truth and what will be of value to the public.
BR	Corell	31			Good idea, hope the graphic depicts it well. Picture is not essential. Corell	Global	Thank you for your comment. The picture has been removed.
BR	Duce	31	1		It would be very useful to give a figure that shows some specific example of abrupt climate change in the past - there are many examples that could be used. Duce	Global	Thank you for your comment. We have decided to eliminate the picture here in the interest of space.
CC	Henson	31	1		This paragraph doesn't really tell the reader how long an "abrupt" climate change takes. A year? ten years? a hundred years? A lay-oriented sentence giving an explanation and a general time frame for what experts consider to be "abrupt" would be good here. Henson	Global	Thank you for your comment. The text has been revised.
CC	Henson	31	2	3	Recommend replace "and poses" with "and that poses" Henson	Global	Thank you for your comment. The text has been revised.
CC	Henson	31	2	8-9	This sentence doesn't make grammatical sense—something's missing. Henson	Global	Thank you for your comment. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	31	1		The Greenland ice core gives results for one location. While there may be sharp variations in the patterns of climate over a couple of years and particular locations can show large change, it needs to be made clear that it is much harder to change the global average climate (the TTAPS “nuclear winter” studies did it by assuming no ocean heat capacity—a totally inadequate assumption). So, I would suggest that what is said be that the patterns and distributions of climate can change abruptly, and not be implying that the global average climate can change so abruptly, especially as we are moving to a warmer world and don’t have glacial meltwater ponds as a mechanism for causing very strong local changes in the weather. MacCracken	Global	Thank you for your comment. The text has been revised.
BR	MacCracken	31	2		The topic covered in the last sentence has already been mentioned—should tie together better. MacCracken	Global	Thank you for your comment. The text has been revised.
BR	Solomon	31	1		Please be specific about what you mean by abrupt – how fast? Are you talking of global changes or only local changes? The megadrought example is local, not global. Solomon	Global	Thank you for your comment. The text has been revised.
BR	Solomon	31	2		The comments made above require a rewrite or deletion of this paragraph: please do not provide unbalanced arguments, reference studies such as Joughin and Das that do not support a large effect of this type, avoid referencing papers that are now outdated (such as the Rahmstorf analysis which is superseded by Domingues et al.). I don’t think the claims of this paragraph can be supported in the present form and heavy editing is needed. Solomon	Global	Thank you for your comment. The revised text now supports the rewritten section on sea-level rise.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Williams	31			In the photo, the inset showing the small grains could be handled better graphically. At first glance, I thought, “what does the stack of logs have anything to do with them.” When I read the caption, I realized it’s an inset showing the small grains. The problem is too images on greatly different scales with nothing to tell the reader this is the case. Also, the big photo is too dark with most of the ice apparently in shadow. Separate images, one of an iceberg in the sun, and a separate one of the grains with some indication of scale, would work better. Williams	Global	Thank you. This figure has been eliminated.
BR	Corell	32			I’d rename this, Climate Change: A U.S. Perspective . The pull box is good; I’d add some numbers to give the general statement more substance. For example, under the Precip section, we have good data. Tom Karl’s group projected in the national assessment that while the overall precip across the U.S. has increased modestly, the amount of precipitation in an hour has increased dramatically. As I recall, it was something like a 30% increase in the amount of rain that exceeded 2 inches/hour. I could have the numbers wrong, but data like this gets the reader to think. Wherever possible, give data. Another example is that virtually all the models and the LLNL downscaling project a serious multi-decadal drought for the southwest. Data here would really enhance the power of this section. The danger of not having data to support the statement, is that it will sound like an advocacy document of the type published by some advocacy group and not a scientific document as this must remain. (p.32-33) Corell	National	Thank you. We substantially revised this section and added much more detail and data to support the overall conclusions.
BR	Duce	32	1	2	My concern here is similar to the one on page 22 concerning temperature increases. The figure on Page 33 shows that for the past 6-7 years in the US there has been essentially no increase in average temperature. Once again, this has been used by a number of people who do not accept climate change to indicate that there is really no increasing temperature now. Some kind of a brief sentence somewhere should acknowledge this record, but indicate that short-term variability in the long terms trends are not unusual. Again, by ignoring this and these data it gives those people a strong reason to state that this report is not considering the latest data, etc. Duce	National	Thank you. We added a sentence on the first page of the national section to describe the roll of natural variability in short-term fluctuations that differ from the long-term trend.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Field	32			Emissions: The text incorrectly gives the impression that forests in the US absorb US emissions. It also gives the impression that 2/3 of US emissions are stored in land and ocean sinks, when the global number is more like 55%. This text also could be interpreted as giving the impression that we don't need to worry about the fraction of the emissions already stored in sinks. It is important for people to realize that, for the oceans, the storage rate will drop as the emissions drop. Field	National	Thank you. We substantially revised the emissions section to avoid statements such as these that could be misleading.
CC	Henson	32			I found this spread to be very nicely written—crisp and easy to understand, with short sentences and little or no jargon. These two pages would be a good model if there's time for an editor to shape the other two-page intros in a similar fashion. Henson	National	Thank you for your comment. Introductions for other sections have been substantially revised.
BR	MacCracken	32			Use more of the page to present the results and don't devote so much space to sort of useless graphics. And, if you are going to continue to show lighting, then make sure to include a bulleted point about it (there are projections that could be presented). MacCracken	National	Thank you for your comment. We have revised the section to shorten its length and reduce wasted space as you noted.
BR	MacCracken	32			Temperature: I would suggest adding a point about day-night temperature, and one about the changing seasonal pattern (longer warm season, shorter and less intense winter season). MacCracken	National	Thank you. We have now pointed out the greater rise in nighttime temperatures in a new section on heat waves. We also noted changes in seasonal patterns in the section on observed and projected temperatures.
BR	MacCracken	32			Storms: Regarding the last bullet, it seems to me what is happening is that moist tropical air is able to push further north as a result of the generation of less cold Arctic air. So, the interaction occurs further north (as happened in January 2008 in Wisconsin). Calling these storms winter storms really hides what is happening—it is not that winter storms are really more severe, is it? Isn't it the energy coming from the warmer, moister air from lower latitudes that is providing this increased energy? MacCracken	National	Thank you. We revised the key message on extra-tropical storms to reflect the northward shift in cold-season storms and added text in the precipitation section to address the comment.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	32			Extreme Weather: There needs to be a point about the shifting locations of extreme events—basically, the more northerly regions are experiencing the extreme events of lower latitudes. MacCracken	National	Thank you. We added discussion on the south to north shift of storm tracks in an expanded section on extra-tropical storms.
BR	MacCracken	32			Emissions: In bullet 1, change “primary” to “primarily”. Regarding bullet 2, this is a bit self-serving in that it fails to mention that the CO2 being taken up by the biosphere is CO2 the US emitted earlier. Indeed, other countries might say that this uptake is now uptake of their CO2 molecules—not ours. The third bullet applies to the globe, making the series of bullets confusing as the first two apply to the US—so saying “remaining third” implies the US is only area taking up C in the biosphere—in fact, the second bullet’s discussion of thirds is confusing as first sentence in that bullet is about US and second sentence is about the globe. MacCracken	National	Thank you. We shifted the emphasis on emissions in this chapter, placing a shortened discussion in a text box, and removed these bullets from the key messages.
BR	Meehl	32	2	1	“but not in all areas” is a weak statement—please specify which areas or give an example. Meehl	National	Thank you. We modified the key message and now state that precipitation has increased on average over the U.S. Wet areas have generally become wetter, while dry areas have become drier.
BR	Meehl	32	4	1	Should add that cold snaps are projected to become less frequent. Meehl	National	Thank you. We now state in the body of the section on extremes that as average temperatures continue to rise throughout this century, the frequency of cold extremes will decrease and of the frequency and intensity of high temperature extremes will increase.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	32			Chapter on “National Climate Change” As titled this chapter is quite misleading. It is mostly about “two scenarios of climate change.” That needs to be much clearer as these two scenarios are just that—we don’t know their probabilistic properties and they certainly don’t bound the possibilities in any meaningful way. Some of the historical stuff—page 33, seems like it would fit better in the previous chapter where you have talked about the fact that climate has already changed. Reilly	National	Thank you. We substantially rewrote this chapter to more fully present observed and projected changes in national climate and believe the information is much more encompassing than two scenarios of climate change. In addition we feel the emissions scenario provide valuable information regarding changes that could result from two likely emission pathways. We retained the historical data from page 33 because of its importance in describing the difference between variability that occurs on a national scale compared to the global.
BR	MacCracken	33			Figures: Did spatial coverage over the US occur during the period shown—is this figure for the lower 48 states? Will “2006” be updated to be “2007”? It would help if the years for which maps are presented were marked on the maps below, just to be clear. MacCracken	National	Thanks you. 2006 is not updated to 2007. We included 2006 because it was the 3 rd warmest year on record for the US, and near to the record of 1998 and 1934. We also improved the presentation for clarity.
BR	Mearns	33			IPCC Working Group I Report should be listed as a key source. Chapter 11 in WGI is specifically on ‘Regional Projections of Climate Change’, and there is an extensive section on North America. Mearns	National	Thank you. We now use and reference chapter 11 section 5.
BR	Solomon	33			These maps are very useful as well as the line charts at bottom, nice figure. Solomon	National	Thank you for your comment.
BR	Williams	33			I really like the maps comparing the global warming of 1934, 1998, and 2006. This is a very effective way to make the point that even though the 1930s were the warmest years in the United States until the 1990s, many other parts of the globe were much cooler in the 1930s. Williams	National	Thank you for your comment.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Corell	34			Same comment as before, be consistent with the higher or lower notation. I'd add in the lower left Observed temperature that it is about 2 degrees warmer. Some readers might think this is just a colored graphic of the U.S. This is good material – great white space and the message comes across. (p.34-35) Corell	National	Thank you. We substantially revised this spread to better communicate past changes from the observational record and better link the graphic to those from model projections.
BR	Duce	34			Figure: (Lower Left Corner) The black text with white background is not consistent. Duce	National	Thank you. We standardized titles for all the figures in this section and they each better communicate what is contained within each figure.
BR	Duce	34	1	4	The text says that the first figure shows observed warming since the 1960s, but the figure to the left of the text shows change in temperature from 1970 to 2000 - an inconsistency. Duce	National	Thank you. We edited the title to reflect that it is a map of the difference between the base period 1961-1979 and the period 1993-2007.
CC	Henson	34			This is a good example of a spread where, as a reader, I'm not quite sure what to look at first or which way to go from there. Henson	National	Thank you. We significantly edited the spread to simplify the presentation and make it easier to understand.
CC	Henson	34			Graphic: The arrow for "Low Emissions" is positioned too high on the page. Maybe the graphic below it could be shrunk. Henson	National	Thank you. We edited this spread and improved the presentation of the high and low emissions projections.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	34			Top figures: Both of these figures are for uncontrolled, no policy emissions scenarios. And why now switch from A1FI to A2 scenarios as the high case? Where is Hawaii on these maps? And, as I assume these maps are not for a specific year, the labels should be 2020s, 2050s, 2090s (and for all such figures in the report!). It also needs to be made clear if these are warmings since preindustrial (to which a good bit of the discussion has been based) or from 1990, 2000, or 2007, etc.? I would also add that there is no indication here of the uncertainty range around these results, or an indication that any given year will not have this pattern—this is pattern of change averaged over something like a decade. MacCracken	National	Thank you. We made significant changes to this spread including changing the titles of the maps, and adding Hawaii as well as Puerto Rico and the Virgin Islands. We also edited the text to clarify that these are warmings compared to the base period 1961-1979 and that these are averages over 20-year periods centered on 2020, 2050, and 2090. We added a more in-depth discussion of the climate models and emissions scenarios to the Global Climate Change Section including the use of A2 and A1FI scenarios. Regarding uncertainty, we include ranges on each thermometer graphic and have moved the thermometer alongside each map to better show the connection between the increase spatially with the average projected rise in temperature.
BR	MacCracken	34			Figure at Lower Left: There is no indication of the baseline period for the bottom plot (it appears to be preindustrial), and not for the change from 1970-2000—in fact, if one is going to have these thermometers, one should perhaps have one for the 1960s. I would also note that this type of figure is used again on pages 132 and 136, but there the little box of words saying that the thermometers are showing the “change” in temperature rather than the “temperature” are missing and must be there—and even more clearly than in this figure, for using thermometers to show the change in temperature is not a normal use. MacCracken	National	Thank you. We repositioned the thermometers so that they align with each projection period and reflect that the change is compared to the period 1961-1979. The figure on pg 132 was corrected and text added to both 132 and 136 to indicate these are the degrees of projected warming.
BR	MacCracken	34	1		It is not obvious what the “first map” is, and the text says it shows the warming since the 1960s—but the figure seems to show from 1970 to 2000. I assume this is not just the difference of two specific years—the report needs to explain how the figure was derived. MacCracken	National	Thank you. We edited the title to reflect that it is a map of the difference between the base period 1961-1979 and the period 1993-2007.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Mearns	34			Showing the progression of the change in temperature across the 21st century is good, but it would also make a lot of sense to show winter and summer. The distinction in warming in those two seasons would be of interest and has reasonable certainty (at least for winter). Mearns	National	Thank you. We looked at seasonal changes and found that although different rates of warming occur on seasonal bases, the overall pattern is the same. And due to the need to manage limited space, we chose to retain projections on an annual timescale.
BR	Solomon	34			Please include Hawaii in these maps. Solomon	National	Thank you. We have added Hawaii as well as Puerto Rico and the Virgin Islands.
CC	Henson	35	5	3	Recommend replace "changes are higher" with "changes is higher" Henson	National	Thank you. We revised all the text in this section.
BR	MacCracken	35			Caption: As indicated earlier, there needs to be a discussion of models that indicates why there are sixteen models and how their results are combined here. MacCracken	National	Thank you. We added a detailed explanation of the models and reasons for selecting each set of models in an expanded reference section.
BR	MacCracken	35			Bottom Right Figure: Why is this figure here—why not have it on page 39? MacCracken	National	Thank you. We revised this layout and removed this figure.
BR	Mearns	35			Asterisked comment - are climate models explained anywhere in this report (sorry I couldn't read all of every section)? If not they should be. It is not clear why the A1FI scenario is used as the high scenario in some sections but the A2 in other parts. This is confusing and unnecessary, given what is in the IPCC chapters and available from PCMDI for plotting. Mearns	National	Thank you. We added a detailed explanation of the models and reasons for selecting each set of models in an expanded reference section. We also added a more in-depth discussion of the climate models and emissions scenarios to the Global Climate Change Section including the use of A2 and A1FI scenarios.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Meehl	35			Bottom 2 Figures: These figures are too small to see, or at least the labels are too small. Either enlarge or delete. Meehl	National	Thank you. We revised this layout and expanded the lower left figure (Emissions Scenarios) while removing the other.
BR	Reilly	35			Why oh why use this different scenario only here—why not use A1FI here as well. Reilly	National	We added text in the Global Climate Change Section to better describe the decision process for selection of scenarios.
BR	Solomon	35			Why are you using 16 of the AR4 models? Please use all 23 models Solomon	National	Thank you. We added a detailed explanation of the models and reasons for selecting each set of models in an expanded reference section.
BR	Williams	35			The graph at the lower right is probably too abstract for a non scientist. Many would not realize the smooth curves show the general trend of the year-to-year curves. I assume they are some kind of running average. Also, the graph does not fit the projected change in annual average temperatures topic of pages 34 and 35. Williams	National	Thank you. We removed this figure.
BR	Corell	36			Good material (p.36-37) Corell	National	Thank you. We retained much of this material in a revised precipitation section.
BR	Duce	36			Figure 2: This figure is rather complex and I expect could be very confusing to the majority of the kind of people you expect to read this report. I would think that the essential points in this section are given rather well by the 2 figures on page 37, and that this figure either needs to be simplified or removed. Duce	National	Thank you. We simplified this graphic and moved it to the section on heavy precipitation. The map now shows observed change in the heaviest precipitation events.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	36	6		The wording of this paragraph implies that the Great Plains, Midwest and Northeast may get more snow in the future than they do now. Have the models confirmed that? My impression was that the projection is for more precip, plus a trend toward rain vs. snow. Maybe the point can be rephrased a la: "Alaska is already experiencing such changes. Similarly, the Great Plains, upper Midwest, and Northeast are likely to experience milder and wetter winters. More of that precipitation is expected to fall as rain, and less of it as snow, compared to today's winters." (True??) Henson	National	Thank you. We modified this section and included better phrasing to indicate that more precipitation is expected to fall as rain in some higher latitude areas.
BR	Hooke	36			Figure: Difficult to decipher. Hooke	National	Thank you. We simplified this graphic and now show only the observed change in the most intense precipitation events.
BR	MacCracken	36			Precipitation spread: Precipitation is certainly important, but so is evaporation, and resulting soil moisture and runoff. While I am hopeful these additional topics will be covered later in the report, it would be very helpful to mention the connections here as it is easy to (mistakenly) conclude that an increase in precipitation will mean better growing conditions, etc. MacCracken	National	Thank you. We added discussion of the potential countering influence of increasing evaporation and runoff in the precipitation section. We also added a new section on drought and discussion of the influence of increasing temperatures.
BR	MacCracken	36	3	2	On line 2, change to "particularly" MacCracken	National	Accepted and thank you.
BR	MacCracken	36	5		Previous page had results from 16 models, this one from 15 models. This is going to seem selective. There really needs to be an explanation of models. MacCracken	National	Thank you. We added a detailed explanation of the models and reasons for selecting each set of models in an expanded reference section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	36	6		This is not really a very helpful explanation of what happens—if it were just that warmer air held more moisture, we should get more precipitation in the Southwest, so that explanation needs to be replaced—what matters is the atmospheric circulation and where the interactions of different air masses occur. Basically, for the Great Plains and upper Midwest, most of the evaporation is continuing to occur over the oceans, especially in the lower latitudes and this air is getting pushed further to the north—one does not get these very heavy rains from winter air because that air can hold a little bit more moisture—one gets the heavier snow and rains because the warm air is interacting with the colder air further to the north. Grammatically, the use of “this” three times in second and third sentences is confusing. MacCracken	National	Thank you. We rewrote this section and included phrasing that indicates the intensity of heavy rain and snow events increases as warm moist air is pushed further northward.
BR	Reilly	36	2		Last 2 Lines - Is the use of a word like “confidence” which as a clear definition in statistics appropriate here? Ditto uncertain. My understanding is that these are based on where there is more or less model agreement but a general recognition that the models may all be wrong. Reilly	National	Thank you. We believe the use of these words is appropriate in the context given as they reference the statistically significant and insignificant areas of the precipitation trend maps. We have modified the maps and text to make this clearer.
BR	Solomon	36			Why the shift now to 15 of the models, as opposed to previous page? Use all models throughout or say why you aren’t. Solomon	National	Thank you. We added a detailed explanation of the models and reasons for selecting each set of models in an expanded reference section.
BR	MacCracken	37			Figures: I think the color scheme needs to be changed as the coloring implies this relates to the status of vegetation. This is not the case, as vegetation depends on the soil moisture and seasonal patterns of P-E. So, I’d figure out a way to make clear this is precipitation only in the coloring (maybe use red and blue or something) and in the text and stop using tones showing status of changes in vegetation (which are also affected by the CO2 concentration, etc.). I would also like to see some sort of map showing where the changes in intensity of rainfall are occurring—that is likely to be more useful than the diagram shown. MacCracken	National	Thank you. We have changed the color scheme to remove any perceived connection with vegetation. We also now include a map in a section on heavy precipitation that shows changes in heavy precipitation within each region.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Mearns	37			<p>Graphics and caption of maps showing changes in North American Precipitation. There are a number of problems here. First of all, it isn't at all clear what the hatchings of uncertainty mean, and it is very unclear as to where this information comes from. It certainly doesn't come from any of the key sources listed for this part. These results displayed do not correspond in most respects with the statements present in the IPCC regional projections chapter. Minimally there is too much detail presented (why present two seasons that are completely hatched – i.e., very uncertain?). While the scenario here differs from the one presented in the IPCC (the A1B) if I'm not mistaken there are supplementary maps that portray other scenarios. In any event, since on the large region scale and seasonal temporal scale precip scales fairly well across emissions scenarios, I recommend you only present winter and summer plots, and follow more closely the certainty and uncertainty statements made in the IPCC.</p> <p>Another choice would be to just present annual plots, as you have for temperature (or as I suggested include the summer/winter temperature plots). If a different source is being used, then that should be made explicit. (There is no reference for these regional uncertainty estimates in the list of references for the chapter.) But given the detailed analysis and incredibly thorough review that the IPCC chapter went through, I would think you would want to include information from it in this section on US precipitation. Also, is it ever made clear why you select the A2 for presentation? Mearns</p>	National	<p>Thank you. We modified the graphics and text in this section. We added text to the caption of the projected precipitation maps to clarify the meaning of the hatches as those areas where the precipitation trends were significant at the 95% level. These results match closely with the projected trends in IPCC Regional Climate Projections (RCP) chapter: precipitation is projected to increase in high latitudes with winter decreasing trends in the Southwest and summer decreasing trends in the northwestern U.S. In keeping with results from IPCC RCP chapter, additional wording was added to indicate greater uncertainty in some areas and inter-model differences. We considered reducing the seasons shown but opted to retain all 4 seasons because although there is less statistical certainty, we feel it important to communicate the potentially unique character of future precipitation patterns in each season.</p>
BR	Meehl	37			<p>Top Figure Caption: Please note here that these results are from a high emissions scenario. Meehl</p>	National	<p>Thank you. We modified the caption and included text to note that the emissions scenario is A2.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	37			Explain the significance of the hatching or delete it. It's too vague to be useful as it stands. Solomon	National	Thank you. We retained the hatching but changed it so that the hatching indicates the areas where trends are statistically significant. We also added text to better explain the use of the hatching.
BR	Corell	38			On page 38, make clear that power (in the text) = intensity (in the graphic). The intermixing of higher/lower notation with the A2, A1B, etc. will confuse the reader. If at all possible, be consistent throughout the text and graphics. In the lower left on page 38, do simplify as noted. This is a great graphic, so make it tell the key message. The scatter graphic may not be required. On page 39, I'd add the dates in the title of the two graphics. (p.38-39) Corell	National	Thank you. We substantially revised this page, removing the two graphics on the left and the lower right and adding two new graphics – one depicting the rise in SSTs and the other a graphic showing the decadal and long-term change and variability in hurricane and major hurricane frequency.
BR	Duce	38			Figures: I think that there are simply too many figures here on hurricanes. I'd pick 2 or 3 and describe them in more detail. Duce	National	Thank you. We reduced the number of hurricane figures to three.
BR	Duce	38	1		Most of these points are redundant, but perhaps you intend to do that for emphasis. I do note that in many places in the report we see the same statements or issues repeated a number of times. Duce	National	Thank you. We recognize that many readers will not have the opportunity to read the entire report so some repetition is necessary. We also feel some points are of such importance that additional emphasis is warranted.
CC	Henson	38			Four complex graphics on one page feels like too much. I'd go with one or two graphics and allow for a bit more text/explanation. Henson	National	Thank you. We simplified and reduced the number of hurricane figures to three.
CC	Henson	38	2	3	Recommend replace "rain fall" with "rainfall" Henson	National	Thank you. We made this change.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	38	3		This paragraph feels thin, and it lacks a US context for its attention-getting claims. What is the upshot for particular parts of the country, such as the Great Lakes and Northeast? Henson	National	Thank you. We have increased the discussion on extratropical storms to better explain expected future changes.
BR	MacCracken	38			Hurricane intensity figure: The chart makes it look as if the future is not as bad as the present. Part of the problem is the color scheme as green does not seem appropriate color for a category 4 hurricane—maybe use purple and maybe just have a bar graph of number of storms in each category now and in the future. MacCracken	National	Thank you. We deleted this figure after determining that it was too complex and does not convey well the intended message.
BR	MacCracken	38			Non-tropical storms figure: It would help to know the baseline number of storms to understand if the changes are significant. This should be easy to do by just augmenting the numbers on the vertical axis by the baseline number. Also, having this with more emissions scenarios than 2 will likely be confusing to the reader—switching to IPCC names rather than “High” and “low” is the problem here. MacCracken	National	We also deleted this figure.
BR	MacCracken	38	2		This point has been covered before—this page now includes diagrams, which is helpful, but perhaps cover the topic in more textual detail here and make the whole page about hurricanes—then cover a bit more about storm tracks on another page (the coverage here is very sparse and not very useful at all). After all, other than sea level rise affecting all the coasts, hurricanes are likely the major issue for the southeastern US. And for figure on hurricane power, was that a plot for a 1 C change, or 2 C (the original GFDL study was for 2 C increase in Pacific Ocean conditions)? MacCracken	National	Thank you. We have substantially revised this page and have dedicated the entire page to hurricane frequency and intensity. We have closely followed conclusions reached in CCSP 3.3 and reduced the number of figures to three and allocated additional space to text discussion.
BR	Solomon	38			Ensure sources are given for all these figures. Solomon	National	Thank you. We added sources for all figures retained in this section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	39			Figure b: The color table for this graphic seems wrong. When I see red, I think “dry”, so having red as the color that denotes more frequent extreme precip. events doesn’t make sense. How about green for the high end and yellow or brown for the low end? Henson	National	Thank you. We modified the color scheme and presentation of this figure.
CC	Henson	39	2	4	Recommend replace "once every twenty year" with "once-every-20-year" Henson	National	Thank you. We have worded in keeping with editorial standards.
BR	MacCracken	39	2		These numbers are all a bit too precise—but also too little explained (e.g., is this for the US as a whole, the world, what?). The phrase “as much as 11 F” is from where—the change in annual, global average temperature for the highest scenario—if so that is simply not appropriate to use (for a lot of reasons). Same question on the precipitation numbers. I think it would be much better to stick to the type of change in frequency numbers (so going from once every 20 years to once every 10 years or something similar). MacCracken	National	Thank you. We substantially rewrote this section including separating heavy temperature from heavy precipitation events. We also modified the text to reflect the fact that the 1 in 20 year events will occur about every other year in much of the country and that a future 1 in 20 year event will be approximately 10F warmer than at present.
BR	Reilly	39	2		The second paragraph starts “The intensity of extreme events likely these will also increase in the future” referring to the previous paragraph. This is not something that will also happen it is simply a different way of looking at the same change. Intense events will happen more frequently—focusing on holding the intensity of the event constant and recording its frequency, or events that happened with a frequency of x will now be more intense—supposing to identify events that happen with a given frequency—5% and noting that they are more intense. Reilly	National	Thank you. We removed this text during the rewrite of this section.
BR	Corell	40			This does not seem like it fits here, maybe better back in the response section. (p.40-41) Corell	National	Thank you. We substantially shortened this section and placed within an inset box.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	40			Figure 2: The units for this figure are very confusing. First, one has to look hard to find them, way up in the title of the figure, not in the key box where one would expect them. Second, the average reader will have no idea what the units given actually mean, and I don't understand them either. Are the carbon emission given in grams, tons, or what per year per grid cell? And why is the attribution to Purdue given at the bottom of the figure - this is not done for most figures. Duce	National	Thank you. We agree and removed this figure when we shortened this section.
CC	Henson	40			Graphic: Might consider dropping out the non-US portions of the graph, including legends? They're not needed to get the point across. Also, is it worth mentioning that carbon emissions closely track population centers (though it's fairly obvious)? The caption mentions "human activities", but I'm assuming the graphic is showing *all* CO2 emissions, not just from human activities. And the use of green gives the impression that it's forests in the central and eastern US that are giving off CO2. Henson	National	Thank you. Other reviewers also found this graphic confusing and in need of major revisions or removal. We substantially revised this section and removed this figure.
BR	MacCracken	40			Top figure: These are presumably only the emissions of the C in the CO2 emissions, expressed as C. Were they carbon emissions, one would have to include the methane carbon, halocarbon carbon, etc. Now, as to the units to use, virtually all of the public discussion is in terms of emissions of CO2, so including the mass of the two oxygens. In that this is the unit used in all of the negotiations and public discussion, at the very least this has to be mentioned, and it might well be better to express emissions as CO2 (as EPA does in its national inventory, etc.). Or maybe show in some normalized units, etc., but showing in the units used by scientists needs to be explained. MacCracken	National	Thank you. We substantially shortened this section and removed the figure in question.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	40			Bottom figure: I'll make a wild guess and suggest that this is emissions of CO2 as CO2, not as C. I'm also baffled by the units use—namely per grid cell. For the cities and interstate highways to be listed, it must be very small, but if this is the case, how come the sort of uniform background emission rates in the western US is so high (except in the blue areas—and how come no highway shows along the route from Reno to Las Vegas, for example?). It needs to be indicated if these are only fossil fuel emissions—I would think that natural uptake by the biosphere is a natural process so not included, or is it, as the key indicates that there are regions of uptake. Figure also is not showing Alaska or Hawaii. MacCracken	National	Thank you. Other reviewers also found this graphic confusing and in need of major revisions or removal. We substantially revised this section and removed this figure.
BR	MacCracken	40	1	3	On line 3, change “those” to “these” and in referring to China, it is essential that the comparison be given also in per capita terms---it is just misleading to say this way and smacks of political influence here. In addition, it is not one year’s emissions that matter, but the integral over time of sources minus sinks, etc. (Hansen recently had such a figure)—and on that US is way ahead of China. MacCracken	National	Thank you. We agree and have added that U.S. emissions remain much higher on a per capita basis.
BR	MacCracken	40	2		The last three lines are presenting the carbon cycle in a confusing way, for it mixes US and global numbers. If you want to talk about our net emissions, fine, but you can [’t divide things into thirds in this way for if growth of trees and other plants do take up this amount, then the gradient we create to drive carbon into the ocean is less, and so, as a whole, about half of our net emissions remain airborne, just like for everyone else. MacCracken	National	Thank you. We reworded these sentences and now state that about half of U.S. carbon emissions are not taken up by nature sinks and thus accumulate in the atmosphere.
BR	Reilly	40	2		I might change the “take up the equivalent of” to “take up an amount about equal to” The use of “equivalent” could be confused with CO2-equivalents which is something else. More generally, I don’t understand what US emissions are doing in this report. It is a report on impacts and adaptation. The geographic pattern of US CO2 emissions while fascinating is irrelevant to this report. Reilly	National	Thank you. We substantially shortened this section including removal of this expression. However we retained some information because of the relevance to rising CO2 concentrations and climate change in the U.S.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	41	1	1	Saying in the first sentence that there are “significant uncertainties” needs to be put in the context of the overall issue—they have virtually no effect on the outcome of the amount of climate change. To justify using a word like “significant” there needs to be an important effect on the ultimate answer, and this is simply not the case. In any case, it would be helpful to say if this is in the magnitude or the sign of things, etc.—but, quite frankly, the uncertainties about this are quite small unless one is moving toward an emissions level far below the present (and climbing) global level. MacCracken	National	Thank you. We significantly shortened this section and removed discussion of uncertainties.
BR	MacCracken	41	2		The comparison made here is totally improper. Comparing one-year’s emissions to the amount that is stored and may take millennia to be released is just in appropriate. Sufficient warming occurs in different places over different times, and the release process takes time. Fine to make the point over a longer period—but that is not what is done. It is equally accurate, it seems, to say that US emissions over the coming century are ten times more than the carbon that would be released if all the carbon locked in frozen soils in Alaska were released, a process that would more likely take several centuries or more. MacCracken	National	Thank you. We removed this paragraph in its entirety.
BR	Solomon	41	2	5	Please change to: “Studies suggest that the thawing of permafrost could cause this peat to decompose, releasing methane and carbon dioxide, but there is substantial uncertainty as to how much warming would cause this, and it is not clear why there appears to be no significant effect currently on these trace gases given the warming of the Arctic.” Solomon	National	Thank you. We removed the paragraph containing this sentence in its entirety.
BR	Williams	41			The drawings at the bottom of page 41 appear to indicate that as permafrost thaws that ground level actually sinks. A reader could wonder whether this is a result of carbon leaving the ground. I think a more accurate drawing would have the “growing layer” layer at the same height on both sides, but expend the light “peat” color down to the level of the mineral soil. By the way, here I think the use of “growing layer” is better than “active layer” — the term commonly used. Williams	National	Thank you. Based on a number of recommendations and in revising and shortening this section we opted to remove this figure.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Corell	42			On page 42, I'd key each statement to the pages that follow where more detail is provided. Good material. (p.42-43) Corell	Society	The statements on p 42 are, in fact, the headings of subsequent material. The sources used for these broad statements (titles) are sourced with the logos of each reference used (e.g., from the SAPs or IPCC material).
CC	Henson	42			Title: Recommend replace "National Level" with "National-Level" Henson	Society	Thank you. However, the line National Level Climate Impacts has been removed.
BR	MacCracken	42			Second bullet: I would urge rewriting to say "Vulnerability to the potential impacts of climate change is greater ..." Saying "climate change impacts" makes it seem as if there is some finite set that we have to worry about rather than that climate change will have many impacts. MacCracken	Society	Thank you. The bullet has undergone substantial revision including the deletion of "climate change impacts."
BR	MacCracken	42			Ordering of the bullets: I don't think this ordering is near to reflecting the level of importance. I would move the third bullet (and so the section tied to this) to the bottom. Indeed, I think that some additional bullets are needed indicating societal vulnerability to changes in water resources (that was number one issue for all regions in National Assessment), need one on heat waves, need one on fires, need to mention hurricanes and flooding precipitation as an extreme, etc. And just maybe, this is where to make the point (and add a 2-page spread) that the US is connected to the world and what happens in the rest of the world will matter to us, as indicated in my general comment (having one sentence at the bottom of page 43 is not enough!). MacCracken	Society	The text in question has undergone major revisions that we believe address the reviewer's concerns. Specifically, a new bullet and section that is more general (about linked resources) replaces the one about tourism, and a new bullet and section is now included on climate change in the world at large.
BR	MacCracken	42			I am not at all sure why the pictures shown are relevant. MacCracken	Society	The three pictures have been replaced by a single picture that is directly linked to the text on this page.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	42			I would like to repeat my suggestion on pages 8-9, which also applies to pages 42-159: It may be better to avoid very general statements, many of which are truisms. It may be better to avoid a separate section on e.g. society and blend much of this into the regional statements where appropriate, and which have more meat. I think this entire part of the report would be stronger as a combined "Summary of Impacts Across Sectors and Regions" that highlights key conclusions. You could produce a set of key impacts that is appropriate across much or all of the US and then move to region-specific highlighted issues. This would imply you could merge the regional spotlights into the regional sections, which is where they belong. This would reduce repetition and lack of clarity. In that case you would not repeat impacts for each region but rather highlight key impacts only that are specific in particular regions at the end, which would produce a stronger and less repetitious report. Solomon	Society	The text in question has undergone major revisions that we believe address the reviewer's concerns. Specifically, this section has been moved to the end of the sectors and thus serves as a sort of synthesis.
BR	Ebi	43	2	1	It might help to explain what is meant by a stable climate. Ebi	Society	Changed wording to: "...have developed under a climate that fluctuates within a relatively confined set of conditions"
CC	Henson	43	1	4	Recommend replace "aspects of society that tend to integrate the impacts of climate change" with "aspects of society that together accentuate the impacts of climate change" Henson	Society	The language has been modified based on other review comments and the issue addressed by this comment is no longer pertinent to the text.
BR	MacCracken	43	1		Given the opening sentence talks about all these effects as affecting society, why not have the Society section come after they have been discussed so this section can summarize the issues (and not just say they'll be covered later while leaving lots of blank space on the pages to actually present the findings)? MacCracken	Society	This excellent suggestion has been adopted; thank you.
BR	MacCracken	43	2	3	On lines 3-4, be more direct and say "present challenges. As a result, adaptation will be costly and, for some impacts, not possible at all." Among those not possible might well include remaining on all coastlines and barrier islands, preserving all biodiversity and landscapes, etc. MacCracken	Society	Accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	43	3		Toward end, make the point that wealthier segments can relocate—an option not really open or easy for the poor. MacCracken	Society	We agree the issue is important; however, we choose to highlight and discuss it in the spread on vulnerability of different segments of the population
BR	MacCracken	43	4	3	On line 3, change “has to cope with” to “is strongly connected to” and then perhaps add that the connections are via economics, markets, trade, investments, shared resources, migrating species, health, travel and tourism, environmental refugees, environmental security, etc. Given how little has been mentioned to date, a 2-page spread here is needed. MacCracken	Society	The text has undergone major revision and the phrase commented on has been removed. A new half-page section is now included on this topic.
BR	Corell	44			If there is a way to source the title, do so. I’d thin down the density of the text a bit – more white space. (p.44-45) Corell	Society	Sources to statements made in the titles are provided on the first page of the section (p 42); see previous response.
CC	Henson	44			Title: Recommend replace "development choices are among the societal changes that are making" with "development choices are making" Henson	Society	Accepted and thank you.
CC	Henson	44			Figure 1: Recommend replace "United States" with "United States." Henson	Society	Accepted and thank you.
BR	MacCracken	44			Pull quote: The examples given for this pull quote are pretty weak—it just does not seem to match (tourism is, for example, indicated as a key issue). MacCracken	Society	Eliminate pull quote

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	44			Figure and figure caption: The plot does not really show the change in county population (which is what the subtitle says), but the change in population density. The first sentence needs a period. In the third sentence, say “projected percentage change.” And again, the last sentence does not seem consistent with the second paragraph’s mention of the mountainous West. And why is the figure showing projected change from 1970—if the interval 1970-2030 is going to be used, the figure should be showing the actual change from 1970-2007 and then projecting. For all we know, this figure could be way off, having been done in a much earlier time with outdated assumptions. MacCracken	Society	We have considered this comment and disagree; the figure actually does show change in population, since the area of the population is shown, the volume of the bar indicates population. Caption has been rewritten to make this clear. Unfortunately, this graphic is not available for 2000-2030.
BR	MacCracken	44	1		I don’t think saying “things” on line 3 is adequate—be more specific: say something like on homes and communities, water and land resources, transportation and urban infrastructure, landscapes and regional character that society values and depends on. MacCracken	Society	Accepted and thank you.
BR	MacCracken	44	2		Regarding terminology, here the phrase “mountainous West is used”—elsewhere it is “Mountain West;” choose a term and stick with it. It is also said that this region is the most rapidly growing, but the figure at the bottom shows this is from a very small base, and the third paragraph seems to say the most rapid population growth is in the South, West, near the coasts, and in large urban areas—so not the mountainous West. MacCracken	Society	Thank you. This has been changed to Mountain West throughout. To clarify, discussion about growth separately considers a) the fastest growing regions in the past century, b) the projected fastest-growing regions and c) the most populous regions. These are all different, and all relevant to various points. Wording changes have been made for consistency.
BR	MacCracken	44	2		In last two sentences, I would suggest saying “have less water available,” otherwise it seems to be referring to only the water that is available. Also, I would change it to read “most at risk from more intense hurricanes, sea-level rise, and higher storm surges, putting ...” MacCracken	Society	Accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	44	3		In addition to the conflict with respect to the first sentence and the earlier one on the mountainous West, none of the most populous states listed are in the mountainous West. Overall, the comparison here seems rather mixed up. MacCracken	Society	Again, this is a difference between “most populous” and “fastest growing” as well as time periods considered.
BR	Solomon	44	1	1	“Climate change is interacting with changes in the US population to affect all aspects of the human condition” seems to be an advocacy statement, please delete. ‘All aspects’ is clearly too strong – does climate change affect changes in morality, or globalization for example? The statement is not useful. Solomon	Society	The text in question has undergone major revisions that we believe address the reviewer’s concerns.
CC	Henson	45			Graphic 1, Line 5: Recommend replace "of the land in coastal" with "of U.S. land that lies in coastal" Henson	Society	Accepted and thank you.
CC	Henson	45	3		This paragraph felt a bit wordy to me, though it makes good points. Maybe breaking it into shorter sentences would help. Henson	Society	The text in question has undergone major revisions that we believe address the reviewer’s concerns.
BR	MacCracken	45			Background color: Having the text on a background makes this page seem like a special box—and one that then has a box in it. Drop the background color as this is a main page of the spread. MacCracken	Society	The layout of entire document has been changed, and the background colors have been removed.
BR	MacCracken	45			Regional highlight box: On line 6, change it to say “the land in many areas is sinking”—not all of the Atlantic and Gulf coasts are sinking. MacCracken	Society	Accepted and thank you.
BR	MacCracken	45	1	5	Change line 5 to say “is common in arid regions because of high demands for irrigating agriculture”—the key change here, and then below, is changing “dry” to “arid”—there is precipitation, but it is not spread through the year, etc. In the fourth sentence, the “these dry regions” is confusing as it refers back two sentences. MacCracken	Society	Accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Reilly	45	3		third paragraph (and elsewhere). You should avoid statements like “society wants” or society decides, etc. Individuals want things and those individual wants add up to what we get. They may be moderated by rules and regulations. Reilly	Society	Accepted and thank you.
BR	Corell	46			Good material, a bit too dense. If there is a way to source the title, do so. (p.46-47) Corell	Society	Sources to statements made in the titles are provided on the first page of the section (p 42); see previous response.
BR	Ebi	46	2		Another group at risk are Native Americans living in reservations whose geographic boundaries may reduce their flexibility to adapt. Ebi	Society	Thank you. We have added this.
CC	Henson	46			Title: Good headline! The paragraph below is also very well written. Henson	Society	Thank you.
CC	Henson	46	1	7	Replace "have the least," with "have the least" Henson	Society	Accepted and thank you.
CC	Henson	46	2	1	Replace "especially vulnerable groups" with "groups that are especially vulnerable" Henson	Society	Accepted and thank you.
CC	Henson	46	2	3	Not clear who “powerless” refers to. Henson	Society	The word has been deleted.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	46			Alaska box: In first paragraph, on line 11, change “easily eroded” to “susceptible to erosion”—it happens in storms, and they are not so easy. On last line, change the vague “are sensitive to changes in climate” to “depend on being able to cross frozen rivers and wetlands.” MacCracken	Society	The language has been modified based on other review comments and the issue addressed by this comment is no longer pertinent to the text.
BR	MacCracken	46	1	1	The first sentence says it properly—“Vulnerabilities to climate change” but the heading says “Vulnerabilities to climate change impacts.” I favor saying “Vulnerabilities to the expected impacts of climate change” or something similar. Also, on lines 7-8, I would rewrite this sentence to say “Thus, on a proportional basis, those who have the least lose the most.” Otherwise, the sentence is really not true. MacCracken	Society	We have changed bullet on p 42 to “Vulnerability is greater for those who have few resources and few choices.” because it follows directly on the prior bullet. The heading here is “Vulnerability to the expected impacts of climate change is greater for those who have few resources and few choices.”
BR	MacCracken	46	1-2		I think it would read better if one started with the first sentence of the first paragraph, and then went to the second paragraph, making the rest of the current first paragraph into the second paragraph. MacCracken	Society	Good suggestion; thank you. The paragraphs have been combined.
BR	MacCracken	46	3		This example about maple syrup really seems trivial given what is being discussed. How about talking about impacts on the poor in urban areas, who must pay more for air conditioning, everything else—all the stuff on heat waves, extremes, etc. MacCracken	Society	The language has been modified based on other review comments and the issue addressed by this comment is no longer pertinent to the text.
BR	Reilly	46			I think you need to be a little bit more precise about statements like “thus, those who have the least, often lose the most.” In purely economic terms those who have the least actually have very little to lose. Rich people whose houses are on the ocean can lose more than many people will ever see in their lifetime. I know what you are trying to say here. Reilly	Society	We have corrected the sentence to add “proportionately.”
BR	Solomon	46			Is there a separate group from the very young, very old, sick, and poor that are powerless? Seems redundant and not needed. Please delete ‘powerless’ or be more specific on what you mean. Solomon	Society	Accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Field	47			Recreation: My reading of the North American recreation literature is that the assessment on this page is more pessimistic than the literature. My sense is that most studies conclude that the longer seasons for summer activities will fully or largely compensate the loss of winter activities, at least if you are not a skier. Field	Society	The text in question has undergone major revisions that we believe address the reviewer's concerns.
CC	Henson	47			Bottom Sidebar: Why the focus only on the Southwest? There's lot of skiing in MT/WY/ID/OR/WA. Not clear why they're omitted. Maybe the headline should say "Southwest" instead of "West." Henson	Society	The language has been modified based on other review comments and the issue addressed by this comment is no longer pertinent to the text.
BR	MacCracken	47			Whole page: The effect of climate change on tourism just does not seem of sufficient import to make it the first major issue under the first major sector—the choice of tourism seems to trivialize the issue. Per my suggestion for the bullets listed on page 42, this topic should come after other ones with more heft. MacCracken	Society	The text in question has undergone major revisions that we believe address the reviewer's concerns.
BR	MacCracken	47			Lower box: Here the discussion is on the "Mountain West" and the map shows it to include all of California, etc.—I agree California has mountains, but I'd define this region as California and the Southwest. Also, the Aspen example, while true and documented, again sounds trivial when in this grander context. MacCracken	Society	The map has been eliminated and the text in question has undergone major revisions that we believe address the reviewer's concerns.
BR	MacCracken	47	1		I am at a loss to understand how these areas were chosen—what about Florida and the Everglades, which might well get inundated after being raked over by hurricanes? What about the Northeast, etc.? In the list of activities, also mention camping, and then make the point that increasing fire frequency can have very serious impacts. MacCracken	Society	The text in question has undergone major revisions that we believe address the reviewer's concerns.
BR	MacCracken	47	2		Coral reefs being destroyed is a really key issue, but here it sort of barely makes mention at the end of an example about fishing. The acidification issue (on marine life and dissolving atolls) merits its own paragraph, at least. And then the reduced water availability is said to be of importance to boaters—all while cities are thirsting for more water. These are nice examples in their place—but not at front of the parade. MacCracken	Society	We agree the issue is important; however, we choose to highlight and discuss it elsewhere in the report.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	47	3		And here we have more trivial examples—lost trips to the beach, and it adds up to \$3.9B over 75 years—what percentage is this, likely very small. Get serious about consequences. MacCracken	Society	The text in question has undergone major revisions that we believe address the reviewer’s concerns; specifically, a new section has been written on linked resources.
BR	Solomon	47			Do you mean that coral reefs are already severely compromised by climate change, or due to other influences? Please clarify. Solomon	Society	The language has been modified based on other review comments and the issue addressed by this comment is no longer pertinent to the text.
BR	Solomon	47			Please state by how much the snow season has gotten shorter. I believe there are some data suggesting 1 month shorter snow seasons since about 1970. Solomon	Society	The suggested information on season length has been incorporated into a new table.
BR	Corell	48			If there is a way to source the title, do so. This needs better graphics to support the title. It is good and essential material. Right now, it is too dense. (p.48-49) Corell	Society	Sources to statements made in the titles are provided on the first page of the section (p 42); see previous response. This text has been shortened and changed; we believe that these revisions address the reviewer’s concerns.
BR	Duce	48			Figure: It might be useful to put ± one-sigma slope lines on the figure as well, just to be as scientifically accurate as possible. There is clearly a lot of scatter in that figure, and many people might question whether the trend there is real. Duce	Society	Thank you. Instead, we have provided a r2 value on the figure, which indicates that despite the scatter there is a significant increase in the hours per day when the heat index exceeds 100. .
BR	Ebi	48	4	2	There were over 700 excess deaths during the Chicago heatwave. I suggest changing “most of the dead” to “most of those who died”. Also, it would be useful to point out that a heatwave of similar magnitude in 1999 resulted in far fewer deaths, demonstrating the effectiveness of heatwave early warning systems. Ebi	Society	We agree the issue is important; however, we choose to highlight and discuss it elsewhere in the report.
CC	Henson	48			Figure Caption: Replace "Heat Index" with "heat index" Henson	Society	Thank you. We have kept capitalization for consistency with other figure titles.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	48	2	5	Replace "their health" with "health" Henson	Society	Accepted and thank you.
BR	MacCracken	48			Photo: So, this section is about cities, and what do we have but a picture with not a building in sight. Get a more relevant picture. MacCracken	Society	Phoenix is a good example because heat is severe – at 115° it's still hot, even with very little humidity. Also, this isn't so much about how heat index differs from temp; those are just the units that were analyzed in the paper.
BR	MacCracken	48			Figure: Choosing Phoenix as the example for heat index seems a very odd choice as the humidity is so dry that temperature and heat index must be nearly identical. To see a significant increase, why not go to Dallas or Houston or somewhere in Texas that is not trying to survive in the higher temperatures and humidity. MacCracken	Society	The photo has been eliminated in the course of revising the document.
BR	MacCracken	48	4	3	On line 3, change "illness" to "illnesses" and on line 5 say "heat stress and other factors" (pollution might be an example). MacCracken	Society	Accepted and thank you.
BR	MacCracken	48	5	9	In line 9, say combined sewer and storm water systems—that is what is really affected. MacCracken	Society	Accepted and thank you.
BR	Ebi	49	1	5	Return periods will really change from 1/100 to 1/3-4? Ebi	Society	This reference comes from SAP 4.6
BR	MacCracken	49			Box on Adaptation: In first paragraph, change first word to "Urban areas"—it is not just cities. In second paragraph, I would think there should be a good bit more on the tie to the urban heat island effect. Four lines from the bottom, I would change "heat load through" to "heat load by increasing". MacCracken	Society	The text in question has undergone major revisions and the issue addressed by this comment is no longer pertinent to the text.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	49	1	1	In the first sentence, maybe say “Coastal cities are especially at risk due to sea-level rise, higher storm surges, ...” It should be mentioned, however, that cities in land near the Appalachians, for example, are also at risk from the more intense flooding rains that hurricanes bring. With respect to the second sentence, the difference between emission scenarios is mainly in the timing, with low emission scenarios coming only a bit later—so don’t say “under a high emissions scenario” unless one is very careful about dates. In last sentence, maybe rewrite to say “is based on surviving the historical one-in-100 year event, whereas cities will come to experience this same or higher flood level every 3-4 years as a result of ...” MacCracken	Society	Thank you. The text has been modified in response to the comment.
BR	MacCracken	49	2	1	Start first sentence with phrase “Especially because of the associated increases in temperature and humidity over much of the US, an increase ...” It turns out to take over 20 times as much energy to get the added moisture out of the air as to cool the air by the added amount—so the increase in absolute humidity really needs to be mentioned. With respect to the third sentence, this is not very obvious, so should be explained. In the last sentence, I would suggest changing “amplify” to “intensify”. MacCracken	Society	The language has been modified based on other review comments and the issue addressed by this comment is no longer pertinent to the text.
BR	MacCracken	49	3	5	On line 5, change to “for city health systems”. In last sentence change “crime is” to “crime has also been”. MacCracken	Society	The sentence has been deleted.
BR	Solomon	49			The ability of these cities to cope with SLR probably depends upon its rate and timing. Please clarify. [p.48 ref’d, changed to p. 49 - ed.] Solomon	Society	The text in question has undergone major revisions that we believe address the reviewer’s concerns.
BR	Corell	50			The graphic in the lower left on page 50 is the perfect way to source material. High credibility is sent to the reader. Great! This is a great section; it is a bit dense, so if possible, reduce the amount of text without loss of message. (p.50-51) Corell	Society	Thank you for the comment. A caption that allowed the removal of some text has been added to the graphic.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Ebi	50	2	2	Insurance is a lightning rod for extreme weather events? Ebi	Society	The language has been modified based on other review comments and the issue addressed by this comment is no longer pertinent to the text.
BR	MacCracken	50			Lower figure: This is a rather misleading diagram. If I added data for the Sahara desert, I'd have no lightning for high temperatures—and it certainly has not been the case for Atlanta these past two years of drought. This is a reflection for the US indicating that we get colliding air masses and this leads to lightning—while there are suggestions we would get more lightning in a warmer world, I don't think the slope is anything like this. MacCracken	Society	References have been added to articles on the anticipated increase in lightning under climate change in the refereed literature (Price & Rind and Reeve & Toumi). The slope shown in the chart is founded on observational data (not modeling), which has now been clarified in the text. Text has been clarified to state that these data are for the United States.
BR	MacCracken	50	2		Comparing the numbers in the second sentence with the figures in the fifth paragraph, it appears that the US insurance industry took in about \$1T but paid out only \$320B. That is an awfully nice profit for the insurance companies and a seeming rip off for the customer. Figures probably need to be rechecked—maybe it is because costs were average for 1980 to 2005 and inflation was not accounted for, or maybe due to increase in rates due to disasters, but the present presentation seems unduly prejudicial to the industry. Also, if one takes the \$1T for the US, this amounts to \$3K per person, which seems very high, on average—we have an expensive home and our cost is about \$750 per person. MacCracken	Society	The revenue number is given to provide a frame of reference for the size of the industry. It is problematic to isolate or otherwise weight the fraction of that revenue that is associated with weather-related risks. The text has been clarified.
BR	MacCracken	50	2		I don't really like the analog of a "lightning rod"—these save lives and prevent outages of electricity and associated damage. There must be another analogy to use—"canary in a coal mine" isn't quite right, but there must be something. MacCracken	Society	The language has been modified based on other review comments and the issue addressed by this comment is no longer pertinent to the text.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Williams	50			Does the “Lightning-Related Insurance Claims” graph really say anything about global warming? It seems to reflect the fact that thunderstorms are a warm-weather phenomenon. Something comparing the current number of plus-70 days and projected plus-70s days with a note saying lightning claims just sharply after this temperature would seem more relevant. Does the “Lightning-Related Insurance Claims” graph really say anything about global warming? It seems to reflect the fact that thunderstorms are a warm-weather phenomenon. Something comparing the current number of plus-70 days and projected plus-70s days with a note saying lightning claims just sharply after this temperature would seem more relevant. Williams	Society	The chart simply shows that the link between temperature and insurance impacts is material and that more lightning can be expected under global warming. The chart is not intended to serve as evidence of current warming.
CC	Henson	51			The word “exposure” is probably jargon to most people. Define near the top? Henson	Society	We have considered the comment but feel that the meaning of exposure as used in this Section will not be confusing.
CC	Henson	51	1	1	Replace "wildfires, account" with "wildfires account" Henson	Society	Thank you for the comment. The text has been modified and the incorrect punctuation eliminated.
BR	Henson	51	4	2	Replace "insurers"" with "insurers" Henson	Society	Accepted and thank you.
CC	Henson	51	4	2	Replace "change-related" with "change related", the symbol should be an ‘en dash’ instead of a hyphen, since it’s separating one word from a two-word phrase Henson	Society	Accepted and thank you.


Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	51	5	6	Replace "without being given" with "had they not been given" Henson	Society	Accepted and thank you.
CC	Henson	51	6	4	Replace "engaged" with "engaging" Henson	Society	Accepted and thank you.
CC	Henson	51	6	6	Replace "participated" with "participating" Henson	Society	Accepted and thank you.
BR	MacCracken	51	2		This issue of insurance penetration is, I believe, much more an international one than a national one—I just don't think that is an explanation in the US for greater losses being reported. Also, the reference needs to be cleared up (also true for line 4 on page). MacCracken	Society	The language has been modified based on other review comments and the issue addressed by this comment is no longer pertinent to the text.
BR	MacCracken	51	3		Regarding the comment on line 8, was it not mostly the nuclear power plants in France that had to be shut down due to the curtailment of cooling water? If so, this should be mentioned explicitly. MacCracken	Society	This is true. However, given space constraints, and as this is not central to the discussion, it was not mentioned explicitly.
BR	Solomon	51	3		Can you give a US example instead of just Europe? Solomon	Society	The language has been modified based on other review comments and the issue addressed by this comment is no longer pertinent to the text.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Williams	51			While the first full paragraph on the page, about weather-related cost increasing much faster than population, inflation, and insurance penetration mention that the size of the average home is growing, and homes and businesses have more valuable objects in them. Consider a 1950s and 2000s home for a “middle class” family. The same family probably has a much larger house. The 1950s house did not have multiple television sets, etc. The paragraph seems to imply that stronger storms are responsible for increasing damage. (I don’t think this is the intention.) Williams	Society	Thank you for the comment. This has been clarified.
BR	Corell	52			This is where I’d change the title to “Human Health and Well-Being”. There are equity issues buried in the text and overall, it is well done. Worry about the higher/lower emissions wordage on page 54, but overall this section is well done. A little too dense here and there, but ok. (p.52-61) Corell	Health	Thank you for the comment. We are maintaining the title as-is, because health is more than simply the absence of diseases.
BR	Ebi	52	3		Mental health impacts are expected to increase, but there are no projections that they will increase in the US. Ebi	Health	Thank you for your comment. The linkage between impacts is explained in the text on the basis of increased weather-related natural disasters.
BR	Ebi	52			The picture on the left is confusing. I couldn’t figure it out, and neither could my kids. Ebi	Health	Thank you. The picture has been removed.
BR	Ebi	52	5		Change “expected” to “likely”. Ebi	Health	Thank you. This change has been made.
BR	Ebi	52	7		A new bullet should be added, indicating that other impacts are possible. Ebi	Health	Thank you. We did not feel that possible impacts should be added in the limited space.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	52			Bullet 4: The present phrasing does not make it clear if the incidence of these diseases will go up or the number of different diseases will go up. Again, potential adaptation options should be mentioned, and, in addition, mention should be made that efforts in the US alone will not be enough due to Americans going elsewhere and those elsewhere coming here. So, perhaps say: “The number and incidence of infectious diseases by food, water, and insects are projected to increase unless significantly greater efforts are made to protect community health, tighten building standards, and ensure that foods are safe. Even with such steps in the US, infectious diseases are expected to become more of a problem for Americans traveling abroad and as more visitors come to the US from countries unable to adequately adjust their practices.” [I’ll stop here in trying to write my version of key findings—but I hope the idea is clear. Be a bit more expansive and indicate the types of adaptation required and their likely effectiveness (or not).] MacCracken	Health	Thank you for your comment. The bullet has been changed for clarification.
BR	MacCracken	52			I think the layout with pictures and different idents makes the set of points very hard to read—a simpler presentation would, in my view be easier for the reader. I also think that the texts here should be developed a bit more to not be so vague and even obscure—I’ll make specific comments—but these very brief statements only seem to represent a very limited aspect of what is presented in the subsequent two-pager. MacCracken	Health	Thank you for the comment. The layout has been changed to make it simpler.
BR	MacCracken	52			Bullet 1: This needs to mention the potential for adaptation, so perhaps insert the following on line 3: “projected if individuals and society do not take steps to protect the poor and those unable to afford or take advantage of air conditioning. Small decreases in cold-related impacts are also projected.” It is longer, but incorporates the required adaptation step into the point—the US is not going to just sit around and have tens of thousands die in heat waves. MacCracken	Health	Thank you for the comment. The longer message is incorporated in the text, but the suggested wording is too long for a simple bullet.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	52			Bullet 2: Again, incorporate the needed adaptation: “Health impacts due to reduced air quality are projected to become an increasing problem, especially in urban areas, if actions are not taken to sharply reduce emissions, either by expensive exhaust controls or by shifting to near zero-emission vehicles. With higher temperatures increasing natural emissions from vegetation, even rural areas are going to nonetheless experience poorer air quality.” MacCracken	Health	Thank you for the comment. The longer message is incorporated in the text, but the suggested wording is too long for a simple bullet.
BR	MacCracken	52			Bullet 3: I don’t think many people understand what is meant by “physical” impacts. The section uses the word “injury” which is better, so perhaps say: “Injury, deaths, mental health problems, and displacement from homes are projected to increase as a result of an increase in the intensity of hurricanes, flooding, and other extreme weather events. Enhanced evacuation capabilities and permanent relocation to less vulnerable areas (e.g., away from coastal areas and flood plains) need to be encouraged.” MacCracken	Health	Thank you. When paired with mental, the meaning of physical is fairly clear. The longer message is incorporated in the text but the suggested wording is too long for a simple bullet.
BR	Solomon	52	2		Please clarify if the health impacts due to air quality are linked to climate change, or not. Solomon	Health	Thank you for your point of clarification. The text has been modified to include climate change. In addition, we have noted that net mortality due to temperature is difficult to project and more research is needed.
BR	Ebi	53	1	1	Change “global warming” to “climate change.” It is not just increasing temperatures that are likely to adversely affect health. Ebi	Health	Thank you for your comment. This change has been made.
BR	Ebi	53	1	2	Add “potentially” before harmful exposures. Ebi	Health	Thank you for your comment. This change has been made.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Ebi	53	1	3	This sentence is obtuse. Ebi	Health	Thank you for your comment. This change has been made.
BR	Ebi	53	2	3	Delete “however” Ebi	Health	Thank you for your comment. This change has been made.
CC	Henson	53	2	12	Replace "drought, can" with "drought can" Henson	Health	Thank you. This change has been made.
BR	MacCracken	53	2	1	In first sentence, I would say specifically that Americans travel abroad and those from other nations come to the US—it is not just trade and transport (mentioned in the third sentence) that create the vulnerability. MacCracken	Health	Thank you for your comment. This change has been made to ‘trade and travel’.
BR	Ebi	54	2	2	Where don’t heatwaves occur in the US? Ebi	Health	Thank you for your comment. We have rewritten the paragraph to address this issue.
BR	Ebi	54			The writing in this section is not consistent with other sections. Also, there is a lack of references. Ebi	Health	Thank you for your comment. The text has been edited and references added in response to this and other comments.
BR	Ebi	54	1-2		The information on heatwaves is repeated. Ebi	Health	Thank you for your comment. This entire section focuses primarily on heatwaves so they get repeated mentions in different contexts.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Ebi	54	3		Are these projections consistent with other studies? Ebi	Health	Thank you for this point of clarification. The consistency has been confirmed.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	54			<p>Part 1: Top two figures: These maps have to either be wrong or are poorly or inadequately explained. Are these maps perhaps referring to 24-hour average heat index (they do not say they are for the daily maximum temperature)? What baseline temperature was augmented to do this calculation (the bottom figure gives a hint it may have been 1980), and was the absolute humidity also increased? Maybe the temperatures of urban areas are not used and just the Historical network stations are covered. Perhaps the average temperature increase was added to the average daily temperature, and as a result the number of daily occurrences is wrong, but something is surely wrong. Just take Washington DC, for example—from mid-May to mid-September, record maximum temperatures are roughly 100 F, and heat index here is typically several degrees higher, so the number of days with a potential heat index over 100 must be something like 120, and reality is likely something over 10, and yet the plots have less than 10 for the high scenario in 2090.</p> <p>I have also lived in California and the Livermore valley certainly has more than the 10-20 days indicated, and I would venture that Arizona has more as well (though it is very dry). Along the Gulf Coast, it sort of looks as if the number is kept low by the sea breeze that exists, but does this work through the whole day? And for the Northeast, the maps look inconsistent with statements on page 120 (third bullet in the middle of the page) where it says the number of days with just temperature over 100 F will be 20 to 30. Given all of this, I am sorry, but I think the maps are just not believable. I am also baffled by the very sharp spatial gradients that exist in some of the maps—weather systems are larger and move over areas. I would also note that it would help to have a present baseline map, and to say that the calculation is for being in the shade over a grass area, so these numbers really don't apply in urban areas, parking lots of malls, etc. MacCracken</p>	Health	<p>Thank you. This figure (there is now only one) has a caption that explains it better. The figure is not of the total number of days with a heat index over 100 but the projected increase in this number as clearly indicated now by the caption.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	54			Part 2: In that the increase in the nighttime minimum is especially critical for people’s health, perhaps show the increase in the minimum temperature from a baseline, etc.—so maybe number of nights with the temperature over 80 F. It might also be interesting to show the increase in percentage terms, or maybe for hours above some threshold, etc. The two plots also must say that these are for “no-policy scenarios”—not just for low and high emissions. MacCracken	Health	Thank you. This figure (there is now only one) has a caption that explains it better. The figure is not of the total number of days with a heat index over 100 but the projected increase in this number as clearly indicated now by the caption.
BR	MacCracken	54			Bottom figure: Does this figure allow for any adaptation, or is it assuming baseline 1980 housing, etc. I think there needs to be mention that as the situation worsens, increasingly aggressive adaptation and prevention measures will likely be required. MacCracken	Health	Thank you. This figure is taken from other peer-review research. The role of adaptation is clearly described in an accompanying box.
BR	MacCracken	54	3		The second sentence looks completely inconsistent with the two maps. Of the 3 cities listed, only Chicago for the high emissions scenario seems to have changed in number of occurrences (maybe from 10 to 20—for all of the cities, the present case must be less than the low case, so less than 10), so it is hard to understand why those areas would be the most seriously affected, at least as compared to areas in the center of the country that go from maybe less than 10 to several dozen or more. In the last sentence of the paragraph, again mention these are no-policy scenarios and no adaptation or additional city measures have been allowed for. MacCracken	Health	Thank you. We note that heat waves and the number of days with a heat index above 100 degrees F are very different.
BR	MacCracken	54	4		In the last sentence, perhaps mention whitening of cities as another possible adaptation measure. MacCracken	Health	Thank you for your comment. We mention urban heat-islands more generally.
BR	Solomon	54	3	11	Please say what is meant by ‘far fewer deaths’ – give numbers. Solomon	Health	Thank you. We have removed the words in question in order to fix.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Ebi	55	1		Adaptation Strategies: The health department does not issue heat alerts; it is the responsibility of the weather service. Ebi	Health	Thank you. We have clarified in the text.
BR	Ebi	55	1	4	Adaptive Strategies: Electric utilities voluntarily don't cut service to those who can't pay during a heatwave. Ebi	Health	Thank you. We have addressed this concern.
BR	Reilly	55			Effects of reduced cold. You ought to be careful about speculating about heat in homes as the cause. As I understand it, there are generally more deaths in the winter than in the summer. If all that was important was having heat in your home we should not see more deaths in winter now. What is really going on I believe is that the higher level of deaths in winter has a very complicated relationship to temperature and so the research is not able to easily identify that relationship—the cold snaps and heat snaps are picking up only a small part of the weather related deaths—particularly in the winter. Especially the way this paragraph is set up it makes the very general statement about winter and summer deaths that I think over-generalizes what one can conclude from analyzing cold and warm snaps. Reilly	Health	Thank you. We have addressed this concern.
BR	Solomon	55	2		Please add the following: "While decreased deaths due to cold exposure are also projected, different persons are expected to be affected and it is therefore not appropriate to consider the two effects as canceling one another." Please don't use words like 'will not make up for'. This suggests that trading human lives is OK. It isn't. Solomon	Health	Thank you for your comment. We do not feel that a change is called for here.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	56	5	5	It is not at all clear to me why the low emission scenario should result in the decrease in ozone, unless the low emissions scenario actually includes a decrease in some of the ozone precursors, which may well be the case. However, if so, that should be mentioned, because even the low emissions scenario is often understood by the public to simply be a smaller increase in emissions, but nevertheless an increase. Thus this could be very confusing to them. Duce	Health	Thank you for your comment. We have clarified the wording and have added the appropriate reference on this point.
BR	Ebi	56	5	3	I suggest connecting this with the need to focus on emissions reductions in the transportation sector. This paragraph also could mention possible increases in biogenic emissions due to warmer temperatures and higher CO2 concentrations. Ebi	Health	Thank you. We have incorporated the language into the figure caption.
BR	Ebi	56	3	1	This assumes (at a minimum) precursor emissions and cloud cover remain constant. Obviously, assumptions about future regulations are critical to any projections. Ebi	Health	Thank you for your comment. We have added a sentence to the caption to address your concern.
BR	Ebi	56	4	1	What assumptions underlie these projections? Ebi	Health	Thank you. This has been clarified in the extended caption of the figure showing projected changes.
BR	Ebi	56	4	2	This sentence is not clear. Ebi	Health	Thank you. This sentence has been edited for clarity.
BR	Ebi	56	6	1-2	Why include this? Projected changes in PM are highly uncertain. Ebi	Health	Thank you. In response to this comment, the paragraph referred to has been removed from the USP.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Ebi	56	6	3	This is also true for ozone and other pulmonary irritants. Ebi	Health	Thank you. In response to this comment, the paragraph referred to has been removed from the USP as the comment about ozone is made elsewhere in the text.
CC	Henson	56	2	1	Replace "conditions" with "conditions;" Henson	Health	Thank you. We have reworded this paragraph slightly.
CC	Henson	56	5	3	Why does the low-emissions scenario actually *reduce* ozone? Not obvious—would be nice to briefly explain. Henson	Health	Thank you. We have simplified the language here and incorporated into a caption for the figures, but the explanation is not expanded because the condition depends on concentration changes in NOx or VOCs (which can be counterintuitive).
BR	MacCracken	56			First several paragraphs: This all seems to be assuming that the emission control laws for vehicles, etc. will stay the same as the ozone gets worse, but the laws actually require tightening of standards to ensure (or aim to ensure) meeting the health standards, so what has to be said here is that this is what would happen without new emissions standards, and these calculations thus give an indication of how strong the controls will have to be. And it might be mentioned that going toward electric cars might well help a great deal—so another reason to do so as it would help with limiting both CO2 and air pollutant emissions. It might be added, of course, that given vegetation will likely have greater emissions, the strategy of cutting back human emissions to limit ozone will become less and less effective, so more and more difficult to make the emissions cutbacks without changing power sources. MacCracken	Health	Thank you for your comment. We have added a sentence to the map caption to address this concern.
BR	MacCracken	56			Figure: Title should say "... Concentrations versus Maximum ..." Note that figure is in degrees C whereas others are in degrees F. MacCracken	Health	Thank you for pointing this out. The figure has been revised to be in Fahrenheit.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	56			Reference 13 is too heavily relied upon here. Please broaden the discussion of possible changes in AQ linked to climate change to include other work. There are many studies available, and this important question deserves a fuller treatment. Solomon	Health	Thank you. The discussion has been broadened and additional studies have been incorporated.
BR	MacCracken	57			Figure 1 Caption: It needs to be said that these figures, I assume, keep the emissions the same and just change the climate. Or do these maps make an assumption about population growth, use full IPCC scenarios for energy technologies, etc.? The assumptions need to be made clear. Also, on page 54, the low emission scenario was on the top, but here the high one is—please be consistent. MacCracken	Health	Thank you. We have simplified the language here and in the caption for the figures. However, please note that the condition depends on concentration changes in NOx or VOCs (which can be counterintuitive).
BR	MacCracken	57			bottom box on California: I don't understand the fourth sentence: In the South Coast basin they had years with 200 days of ozone excesses, so the conditions must be conducive at least half the year already—so how can one have that total go up 75-85%? Regarding last sentence, is not the number of large wildfires already up by this amount—the Governor is saying that they now have an all-year fire season? So, where did the 55% come from [on the next page under “Wildfires” it says that large fires in the West have gone up fourfold in recent decades—something is inconsistent]? And do the calculations include the effect of CO2 fertilization—it will surely make the chaparral grow better, so increase to a burnable fireload more rapidly? MacCracken	Health	Thank you. The sentence in question has been revised and a reference has been added.
BR	MacCracken	58			Floods: I liked how this paragraph gave indications of where the changes were occurring—that should be done as much as possible. My meteorological analysis of these results would suggest it is an indication of the moist air masses moving north as the cold air masses retreat—so the intersection and active weather is further north. Also, the last sentence is also covered on the next page—maybe not necessary here. MacCracken	Health	Noted.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	58			Wildfires: Here it says that large wildfires have already gone up fourfold—this is much more than the 55% mentioned on the previous page. MacCracken	Health	Thank you for your comment. The 55% figure was a projection for California. The fourfold is observed in the entire West. So the numbers should not be the same.
BR	Solomon	58			This material repeats much of what occurs elsewhere. I think it would be stronger and clearer if it were not a separate section but rather embedded where appropriate into the regional sections. Solomon	Health	Thank you. Part of the expectation is that many readers will focus on the sections they are most interested in. Thus, some redundancy is inevitable.
BR	Ebi	59			Spotlight on West Nile Virus: References are needed. Ebi	Health	Thank you for your comment. The wording has been changed in the spotlight and text to ensure appropriate referencing.
BR	Ebi	59			Spotlight on West Nile Virus: Did the hot weather make a difference? Ebi	Health	Thank you for your comment. This is stated in the reworded text.
BR	Ebi	59			Spotlight on West Nile Virus, Paragraph 2, Line 2: How did the hot summer facilitate the spread of WNV? Ebi	Health	Thank you for your comment. This is stated in the reworded text.
BR	Ebi	59			Spotlight on West Nile Virus, Paragraph 3, Line 2: The extent of any increase will depend on the effectiveness of vector control programs. Ebi	Health	Thank you for your comment. This is stated in the reworded text.
BR	Ebi	59			Spotlight on West Nile Virus: “Insect Vector Mosquitoes” does not make any sense. Ebi	Health	Thank you for your comment. We have updated the text.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Ebi	59	1	5	References are needed. Ebi	Health	Thank you for your comment. A suitable reference will be added in advance of the public review. Patz, JA. and S. H. Olson . "Climate change and health: global to local influences on disease risk." <i>Annals of Tropical Medicine And Parasitology</i> 2006 100 (5-6): 535-549.
BR	Ebi	59			Spotlight on West Nile Virus, Paragraph 3, Line 8: Do you mean the virus or the vector responded? Ebi	Health	Thank you. This point is clarified in the revised text to indicate the virus.
BR	Ebi	59			Spotlight on West Nile Virus: Incidental is misspelled. Ebi	Health	The spelling of incidental in the West Nile figure has been corrected.
BR	Ebi	59	1	1	This sentence is repeated elsewhere and doesn't add to the flow of the text. Ebi	Health	Thank you. This sentence has been removed from the USP.
BR	Ebi	59	1		Bullet 3: Other vectorborne and zoonotic diseases also may increase. Ebi	Health	Thank you. This recommendation is accurate but too technical for the USP's target audience and translating it into lay terminology would increase the length of this short bullet too much.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	59	1	3	Replace "animals," with "animals" Henson	Health	Thank you for your comment. This paragraph has been reworded.
BR	Solomon	59			Bullet 1: Can numbers be given for salmonella increases with temperature? Can numbers be given for vibrio and temperature? These are interesting but vague as they stand. Solomon	Health	Thank you for your comment. These statements have been referenced.
BR	Duce	60	3	6	The word “of” or “in” is left out after the word “increases”. Duce	Health	Thank you. The recommended change has been made.
BR	Ebi	60	1		References are needed. Ebi	Health	Thank you for your comment. We are adding a reference from IPCC 2007.
BR	Ebi	60	2		Mention should be made that there is uncertainty as to whether the allergenic component of pollen will increase, decrease, or remain the same. Ebi	Health	Thank you for your comment. We are adding a reference from CCSP SAP 4.6.
BR	Ebi	60	3	2	This information is repeated. Ebi	Health	Thank you. The repeated information is in a slightly different context. To combine the two points would be unwieldy.
CC	Henson	60			This spread is a good example of a simple graphic with nice illustrations beside it—very easy to process. Henson	Health	Thank you. The new version has been simplified in keeping with the simpler style adopted by the revised USP.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	60	1	7	On line 7, change “mean” to “means” MacCracken	Health	Thank you. This recommended change has been made.
BR	MacCracken	60	3	7	On line 7, change “carbon” to “of carbon” MacCracken	Health	Thank you. A slight variation on this recommended change has been made.
BR	Ebi	61	3	1	Delete malaria. Ebi	Health	Thank you. Done.
BR	Ebi	61	6		Adaptation Strategies: Is this really an adaptation strategy? Ebi	Health	Thank you. This strategy has been removed.
CC	Henson	61	2	1	Replace "Children’s small body mass to surface area ratio" with "Children’s small ratio of body mass to surface area" Henson	Health	Thank you. This has been reworded.
CC	Henson	61	5	5	Replace "diabetes related" with "diabetes-related" Henson	Health	Thank you. This has been reworded.
BR	MacCracken	61	1		This paragraph needs to mention some other vulnerable groups, namely travelers to other countries, those living in river valleys where flooding rains can cause floods and landslides, and those living on coasts in the Southeast, etc. MacCracken	Health	Thank you for your comment. We have decided not to add this due to space constraints.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	61	4		It might also be worth mentioning that older people tend to stay indoors more, often have fewer family connections and community linkage, tend to keep doors locked in high crime areas, etc. [maybe even mention they stay inside more to complete reviews of documents like this]. MacCracken	Health	Thank you for your comment. We have decided not to add this due to space constraints.
BR	Corell	62			Does this belong here, maybe in the response section? It breaks the flow as you then go back to transportation impacts. I'd re-think where this belongs. (p.62-71) Corell	Energy	Thank you. The order for the sections has been changed.
BR	Duce	62			Figure: When is this figure for, i.e., is this 2008, 2000, 1990, etc.? Duce	Energy	A caption has been added to the Figure explaining that it shows current U.S. electricity production.
BR	MacCracken	62			Bullets: I like the larger font here—should do in other sections. MacCracken	Energy	Thank you.
BR	MacCracken	62			Bullet 1: I would suggest changing “Warming” to “Higher temperatures and humidity” to make clear that the higher humidity is really the key cause of increased demand for electricity for air-conditioning. MacCracken	Energy	The suggestion has been considered but not accepted since humidity is not addressed by the source literatures, and it is not necessarily a key issue for the SW.
BR	MacCracken	62			Bullet 2: I'd change this to say “Much of US energy production”—and maybe even somewhere say that solar, wind, and geothermal are not dependent on water. MacCracken	Energy	The bullet has been revised.
CC	Henson	63			Graphic: This graphic is hard to parse without some sort of intervening column between the left-hand and right-hand sides. Otherwise, it looks at first like the various bars on the left are intended to have a direct correspondence with the bars across from them on the right. Henson	Energy	Thank you. The graphic has been modified and a caption and figure title added.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	63			Figure: While the endnote does say this calculation is based on the 100-year GWP, this really ought to be added up front. For near-term climate change, using the 20-year GWP is more appropriate, and for that the methane GWP is over 3 times its 100-year value, so methane looks to be comparatively much more important. MacCracken	Energy	Thank you. The Figure has been modified and a caption and figure title added.
BR	MacCracken	63	1		I am confused here. The diagram includes the transportation sector in calculating the fraction that is included in the “energy sector” mentioned in the last line of the paragraph. But then, transportation has its own section. Usually sectors are divided into buildings, commercial, transportation and electricity, but this statement seems to have all of this in the “energy sector”—maybe this should be changed to say “from combustion of fossil fuels” or something similar. MacCracken	Energy	Energy use by transportation is an essential part of the picture. The legend has been modified.
BR	MacCracken	63	2		I am a bit confused here—California (which is by far the largest component of the “West” has per capita electric usage that is half that in the rest of the country and the state’s per capita carbon release is also about half the national average. How does people moving to the West then lead to greater overall emissions? MacCracken	Energy	The text has been modified to address this comment.
BR	MacCracken	63	3	1	The first sentence needs modification to make it clear that the statement mainly applies to what will happen in the second half of the 21st century. Unless there is a really aggressive effort to limit methane emissions (and emission of other short-lived species), temperature changes out to near 2050 are pretty well set, unpleasant a comment as that is to make. MacCracken	Energy	Thank you for the comment. The text has been modified to capture this point.
BR	Duce	64			Figure: (Bottom Right) As for the page 48 figure, it might be useful to put ± one-sigma slope lines on this figure as well, just to be as scientifically accurate as possible. There is clearly a lot of scatter in those plots, and many people might question whether the trend there is real, particularly for the warmest 2.5% and perhaps 5%. Duce	Energy	The Figure has been deleted.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	64			Figure 1, Caption: What are the units of population increase? There must be some unit area—e.g., # of people per square mile. Seems OK for the bottom graphic to be dimensionless, since it's percentages. Henson	Energy	The top Figure has been deleted.
CC	Henson	64			Text on this page could be tightened/made a bit punchier—maybe shorter sentences. Henson	Energy	Thank you. Substantial changes have been made in the text.
CC	Henson	64	2	12	Replace "highest carbon" with "highest-carbon" Henson	Energy	This paragraph has been deleted.
BR	MacCracken	64			Map figures: In the caption for the top figure, clarification is needed about the numbers—is this number per square mile or something (actually, it must be larger than that as the northern Great Plains looks to have several hundred people in each pixel)? And why are the results shown starting from 1970? I'd also like to see a bit better resolution of the highest category. MacCracken	Energy	The top Figure has been deleted.
BR	MacCracken	64			Figure on daily high temperature: It would be useful to point out that the 1997-98 spike was a very large El Nino event, maybe also in about 1981, etc. I would also sort of change away from percentages and say average of warmest 9 days, warmest 18 days, warmest 36 days of the year. MacCracken	Energy	The Figure has been deleted.
BR	MacCracken	64	1		This discussion seems to fail to note the potential for efficiency and how the American Institute of Architects has a proposal to get to zero emissions for all buildings in 30 years to so. MacCracken	Energy	Thank you for the comment. Substantial changes have been made in the text.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	64	2		With respect to first sentence, the increase is due largely to the increase in absolute humidity that will be occurring. Seven lines from the bottom, say “from the exhaust streams of coal-burning.” And on this issue of migration in the last sentence, it might well switch back over time—one people get feel for how hot it will be and the power costs, they well might not move to the South and West to retire. MacCracken	Energy	This paragraph has been deleted.
BR	MacCracken	65			On this page (and a number of subsequent pages): I would have thought every opportunity would have been taken to have a message in the top green box. MacCracken	Energy	These are second pages in the spread format used in the first draft of the document. Major format revisions made in the second draft including elimination of the top green boxes.
BR	MacCracken	65			Upper left figure: As far as the increase in electricity required for air-conditioning, the situation is likely much worse than indicated because of the increase in absolute humidity. “Cooling degree days” is not enough to be considering (unless, perhaps, one is doing it using the heat index, which adds in the humidity term). MacCracken	Energy	The Figure has been deleted.
BR	MacCracken	65	1		I think it looks silly to do this as a rate per 1.8 F—this is an embarrassingly obvious and overly simple way to go from metric to English units—it should be per degree. On line 3, say “electricity demand”. MacCracken	Energy	The text has been revised in response to this comment.
BR	MacCracken	65	2	1	In line 1, say “use of electricity” and in line 4 change “kinds of areas” to “situations”. MacCracken	Energy	The text has been revised in response to this comment.
BR	MacCracken	65	3		It might well be worth mentioning that the efficient of the average fossil fuel powerplant can be improved by almost a factor of 2 by using the waste heat—Denmark ahs done it and so can we, if we’d just change the out-dated utility laws in a number of the states. MacCracken	Energy	Thank you for the suggestion, but our discussion here is limited to the published literature.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	66	1		Given that this is referring to the Water section, why not have the order of sectors so that Water comes before Energy? MacCracken	Energy	Thank you. The order of the Sections has been changed so that Water precedes Energy.
BR	MacCracken	66	3	5	On line 5, “In addition” just does not seem the right words here—why not make this the second sentence and start with “For example”? MacCracken	Energy	This paragraph has been deleted so the comment is no longer pertinent to the text.
BR	MacCracken	66	4	1	The first sentence seems grammatically problematic—just not very clear. MacCracken	Energy	The sentence has been revised.
BR	Solomon	66	4		This is a very important point but it’s very vague as it stands. Can you quantify how water shortages are projected to affect power production? Solomon	Energy	Unfortunately, the published literature does not address this issue with specific quantitative projections.
BR	Duce	67			Big empty spot here! Duce	Energy	The page has been revised and the empty spot occupied.
BR	MacCracken	67			Missing points: I would think more should be said about the rising nighttime temperature, which will really be critical (in reducing efficiency of combustion, in upping load due to inability of cities to cool off naturally, etc.). Another key issue is wildfires and their effects on transmission lines. Also, the transport of coal by rail will also be a problem. MacCracken	Energy	Thank you for the comment, but the discussion here has been limited to content in SAP 4.5 and other published literature.
BR	MacCracken	67			Alaska box: In the second paragraph, line 3, say “improve warm-season shipping” and in last line say “movement during the cold season”. MacCracken	Energy	The text has been modified in response to this comment.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	67			Spotlight AK: Please provide specifics of the ‘serious impacts on oil and natural gas’. Solomon	Energy	Thank you for your comment. An example has been added.
BR	Solomon	67	1		Another interesting point but too vague to be useful at present. How much of a climate change is referred to here? Solomon	Energy	The reference materials are not specific to any particular projection.
CC	Henson	68	3	4	Replace "over reliability" with "redundancy" (??) [jargon] Henson	Energy	This paragraph has been deleted.
BR	Duce	69			Figure 2: The text in the two panels is very hard to read. Duce	Energy	Thank you. The figure has been enlarged.
BR	MacCracken	69			Bottom maps: The text here is too small to read. MacCracken	Energy	Thank you. The maps have been removed.
BR	MacCracken	69	2		It should be mentioned that fire is likely to become more important and can cause a number of problems—for transmission lines, for renewables, etc. MacCracken	Energy	The discussion here is limited to the information in the published reference materials.
BR	MacCracken	70	3-4		It should be noted that evaporative losses get larger the more warming there is. I understand, incidentally, that putting surfactants on top of water in irrigation canals has not been allowed as would contaminate the soils. In paragraph 4, last line, change to say “water resources”. MacCracken	Energy	Space limitations did not permit the addition of such additional detail.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Solomon	70			Please provide specifics on how earlier peak runoff is beginning to affect hydropower. Solomon	Energy	The published reference materials do not provide these specifics.
BR	Duce	71	1	1	The text on this topic is way too short (2 lines). The impact of biofuel production on food resources is not mentioned. There is plenty of space available to upgrade this paragraph. Duce	Energy	Thank you for the comment. The page has been entirely rewritten.
CC	Henson	71	2		Seems odd that the percentage of current U.S. energy derived from wind and solar power isn't mentioned in this paragraph, since similar percentages are given for hydropower and biomass. Henson	Energy	Thank you for the comment. The page has been entirely rewritten.
CC	Henson	71	2	10	Replace "seasons" with "seasons," Henson	Energy	Thank you for the comment. The page has been entirely rewritten.
BR	MacCracken	71			Missing item: I would think there needs to be some discussion about the shifting boundaries of climatic zones and how the tuning of powerplants and grids to particular regions will thus be disrupted. MacCracken	Energy	There is a lack published reference material to support this.
BR	Corell	72			Good material, A little too dense here and there, but ok. I'd fix the Alaska graphic on page 83 – not too readable as is, increase the line width on the outline of the state. (p.72-83) Corell	Transport	Thank you. The text has been revised to make it more accessible and the Alaska graphic, has been deleted.
CC	Henson	72	3	3	Replace "will confer" with "will provide" [jargon] Henson	Transport	Accepted and thank you

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	72			Bullet 1: I think the effects of sea-level rise and storm surge need to be differentiated a bit: sea level rise is slow and permanent, whereas storm surge is fast and brief, so different types of issues and adaptation arise. Treating them together causes problems, it seems to me as one can think about levees and relocation to avoid sea level rise, but storm surges are much harder to deal with. I'd basically say sea level rise leads to inundation (permanent), and storm surge leads to flooding (temporary). So, I'd suggest unbundling the first bullet. MacCracken	Transport	Thank you. We have decided to keep these together in the Key Messages, but they have been separated in the text.
BR	MacCracken	72			Bullet 2: I think this needs to mention the potential for road destruction by landslides, etc. MacCracken	Transport	Thank you. We have made this addition.
BR	MacCracken	72			Bullet 6: I think a bullet is needed covering transportation on rivers and the Great Lakes—or add the point in another bullet. MacCracken	Transport	We disagree regarding the emphasis given to Great Lakes transport. The subject matter, however, is included in the text.
CC	Henson	73	2	7	Replace "from moving coal to power plants to bringing chlorine to water treatment systems." with "such as those bringing coal to power plants and chlorine to water treatment systems." Henson	Transport	Accepted and thank you
BR	MacCracken	73			I think this will be a hard page to photocopy—try to reduce all the background shading. MacCracken	Transport	Accepted and thank you
BR	MacCracken	73	1		The numbers sound overly precise—no need to give tenths of a percent. MacCracken	Transport	Accepted and thank you

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	74	1	3	Replace "average4). The potential." with "average4), the potential" Henson	Transport	Accepted and thank you
BR	MacCracken	74	1		Again, I'd urge differentiating between inundation by sea level rise and flooding by storm surge (the heights of which will be growing due to more intense storms, mainly, and sea level rise) and will have greater effect as the coast is eroded (especially once the presently hardened—by about 8000 years of steady sea level--coast is overtopped). The second and third sentences here are really supposed to be a single one. MacCracken	Transport	Accepted and thank you. Changes have been made to distinguish the effects of sea level rise from storm surge.
BR	MacCracken	74	2	4	On line 4, "that" should be "which". And in last sentence, growth alone may increase difficulty of evacuation, but this does not have to be the case as normally more infrastructure is created in response to growth. MacCracken	Transport	The language has been modified and the issue is no longer pertinent to the text.
BR	MacCracken	74	3	1	I like the opening sentence. MacCracken	Transport	Thank you
BR	MacCracken	74	4		These numbers all pertain to situation of doing nothing, but we will be relocating them. So, I favor rewording here to indicate the degree of adaptation/relocation that will be needed, not just giving a sort of no change or adaptation result. MacCracken	Transport	Accepted and thank you. A variety of changes have been made to the text to indicate the adaptive responses taken by transportation planners or otherwise recast the issue as a "risk" to infrastructure.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	75			New York box: With respect to estimated sea level rise, the reference is hardly a primary one. I would think the report would need to mention the IPCC numbers and then indicate the potential for an additional amount of rise (the SAP for the Mid-Atlantic Coast makes the argument for a number this large). You could also indicate that if it does not come by 2100, this large a rise might come a few decades later. In last sentence, or somewhere here, text should mention the huge cost of restoration (for example, of flooded NYC subways). I would also add, however, that a category 3 hurricane at high time would cause a storm surge of over 20 feet, so NYC is vulnerable now to a much greater effect than sea level rise, so even one such storm would wipe much of the city out for a very long time unless much more protection is done (e.g., the storm surge barrier scheme that SUNY Stony Brook researchers are proposing—see their articles and might be mentioned as type of thing needed to protect at least part of the city). MacCracken	Transport	Changes have been made to the text to fit within the Advisory Committee’s need for brevity. It may not necessarily be the case that the costs of adaptation in NYC would be huge. Many of these costs will be necessary over time, and thus amortized, and likely to be coincident with planned infrastructure refurbishment. While the adaptation costs are still likely to be substantial, their true magnitude is still in question. Finally, without greater confidence in future hurricane tracks and better information on costs and benefits, it seems somewhat speculative to address hurricane impacts in NYC.
BR	MacCracken	75	1-2		Land and Water paragraphs: I think text should also be mentioning adaptation requirements. MacCracken	Transport	We agree. Text has been added in to place the discussion of impacts within the context of adaptation.
CC	Henson	76	1	3	Replace "1993" with "1993," Henson	Transport	Accepted and thank you
CC	Henson	76	2	1	Replace "past 15 years." with "past 15 years for some areas." [Seems as if this caveat is needed since XX-year floods are defined locally.] Henson	Transport	The language has been modified and the issue is no longer pertinent to the text.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	76	2	6	Replace "suggests" with "suggest" Henson	Transport	The text in question has been modified. The change is no longer relevant.
BR	MacCracken	76			Adaptation box, second paragraph: This is said very well. I really think the whole section, even the whole report, needs to incorporate adaptation right into the discussion of impacts, indicating what will have to be done to avoid the impacts as there is just no way that some of these impacts are going to be permitted to happen—we are going to (have to) pay the relocation or other costs. MacCracken	Transport	Thank you for the comment.
BR	MacCracken	76	2	6	On line 6, “suggests” to “suggest” MacCracken	Transport	The text in question has been modified. The change is no longer relevant.
BR	Solomon	76			The statement that the June 2008 flood was the second 500 year event in the past 15 years is eye-catching but to be useful the report needs to clarify how accurate the estimates of what is a 500 year flood actually are. Solomon	Transport	The text in question has undergone revisions that make the comment no longer pertinent to the text. We recognize the benefit in providing context to 500-year floods but feel this to be beyond the scope of the report.
BR	Duce	77	2		It appears that the first 2 sentences under “Water” are basically the same as the first lines under “Air” below “Water”. There is apparently some misplaced text here. Duce	Transport	Thank you. The section has been rewritten.
BR	MacCracken	77	1	1	First sentence is example of how adaptive action should be incorporated into the text. The following sentences need to differentiate what will be happening from storm surges (extensive and rapid, but short term flooding) versus what sea level rise will do (promote long-term inundation and erosion). Lumping these together seems to me to muddle the message. MacCracken	Transport	Text has been added in numerous locations to place the discussion of impacts within the context of adaptation. Clarifying language has been added to the text that appeared on pp 74-75 to better distinguish the effects of SLR from surge.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	77	2		Water: It seems to me that, given that the effects on air transport are covered in the next section, another example is needed here—perhaps about road transport, mudslides, bridge washouts, whatever, but say something different. MacCracken	Transport	Thank you. The section has been rewritten.
CC	Henson	78			Headline: Replace "confer" with "bring" [jargon] Henson	Transport	The Headline has been removed, but the suggested change has been adopted in the text.
CC	Henson	78			Figure, caption: The caption says "currently," but the graphic refers to 1961-1979. Also, is it worth mentioning that local heat-island effects could add to the projected changes? Henson	Transport	The Figure has been removed and the issue is no longer pertinent to the text.
BR	MacCracken	78			Maps: Why is the baseline 1961-79? That seems quite out of date for what people are experiencing now. I favor updating, especially as the caption says the maps are for what is happening "currently." And are these maps for maximum 1-hour temperature or daily average temperature, for the baseline map seems rather cool for the Northeast, and even in mountain areas. I would also make sure to say that these observations are for measurements in a shaded shelter over irrigated grass, making this temperature a good deal cooler than what most people experience in urbanized areas, shopping mall parking lots, along bus routes, etc. And, more to the point with respect to the softening of asphalt (as mentioned in the first sentence of the top paragraph), these temperatures are near-surface instead of the surface temperature for the asphalt. MacCracken	Transport	The Figure has been removed and the issue is no longer pertinent to the text.
BR	MacCracken	78	2		In the last sentence, the whole eastern seaboard has high humidity in summer. The cities mentioned cover too small an area. MacCracken	Transport	While your point is well taken, we feel that the lay reader may be better able to relate to the specific cities.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	78	3		It would help to say where the wildfires are projected to increase. We had maps from Ron Neilsen in the National Assessment indicating that twice as much biomass would burn over much of the West. MacCracken	Transport	Accepted and thank you
BR	MacCracken	78	5		Water section: Why is this section included under the heading on extremes—it just does not seem to make sense? MacCracken	Transport	The bullet has been expanded to include warming and drought-related impacts.
BR	Solomon	78			Why not plot the difference? This would be clearer. Solomon	Transport	The Figure has been removed and the issue is no longer pertinent to the text.
CC	Henson	79	5	8	Replace "in freight-carrying" with "in average freight-carrying" (???) Henson	Transport	The suggestion has been considered, but not accepted because it changes the meaning.
BR	MacCracken	79			Figure 1: Navigable waters map: Why are the Great Lakes not colored in? MacCracken	Transport	Thank you for your comment. The legend now notes that this figure is taken from CCSP SAP 4.7.
BR	MacCracken	79	4		It seems a bit silly to give data for a B-747 for the year 2030—the plane’s use is currently decreasing and it won’t even be around. Make the point by talking about what happens with a variation in the weather—so on a day as hot as the average will be in 2030, etc. MacCracken	Transport	Text has been added to indicate that this example is illustrative.
CC	Henson	80	5	2	Replace "deterministic" with "single-value" [jargon] Henson	Transport	The suggestion has been considered, but not accepted because it changes the meaning

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	80			Adaptation box (and apply elsewhere in this section): As a general comment, something needs to be said that while relocation and reconstruction are viable approaches, the take time and money and can cause significant disruption, the need to condemn occupied private lands for public purposes, etc. MacCracken	Transport	The Adaptation Strategies box has been removed and the issue is no longer pertinent to the text.
BR	MacCracken	80			Adaptation box, second paragraph: On line 1, change “variations” to “extremes” and on line 3 change “accurate” to “reliable” and “rapid to “accelerating”. MacCracken	Transport	The Adaptation Strategies box has been removed and the issue is no longer pertinent to the text.
BR	MacCracken	80			Adaptation paragraph, third paragraph: I am confused here by the word “deterministic”—given the weather variability mentioned above and calculations like 1 in a 100 year event, how is the present approach deterministic rather than probabilistic? MacCracken	Transport	The Adaptation Strategies box has been removed and the issue is no longer pertinent to the text.
BR	MacCracken	80	1	3	On line 3, damage increases as the cube of the wind speed, not linearly as implied here. MacCracken	Transport	Thank you. The term, “exponentially” has been added to the sentence in question.
CC	Henson	81			Sidebar: Replace "Katrina:" with "Katrina" Henson	Transport	Accepted and thank you.
CC	Henson	81	3	4	Replace "flood plains but these" with "flood plains; these 100-year" Henson	Transport	Accepted and thank you
CC	Henson	81	4	2	Replace "costliest" with "expensive" Henson	Transport	Accepted and thank you

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	81	4	14	Replace "to cost" with "at" Henson	Transport	Accepted and thank you
BR	MacCracken	81			Box on Katrina: In next to last sentence of first paragraph, identify the pipeline network—what does this really refer to? And in last line of that paragraph, change “were” to “has been.” The last sentence of the second paragraph is also awkwardly worded. MacCracken	Transport	Accepted and thank you
BR	MacCracken	81	1		Based on last two lines, is this suggesting that an 18-foot storm surge is “modest”—some rewording is needed here to give some information on a change in return period for some various heights storm surges or something—but saying “modest” doesn’t work. MacCracken	Transport	Thank you. The text has been corrected.
BR	MacCracken	81	2	2	On line 2, change “would be” to “are generally” and on line 3, change “be expected” to “occur”. In general, I’d add something here indicating that the recovery time can be years—and it can be very costly to do. MacCracken	Transport	Accepted and thank you Regarding pipeline damage and recovery, however, a change of this type does not appear to fully supported at this time. SAP 4.7 concluded, “Further study is necessary before firm conclusions can be drawn regarding the vulnerability of onshore and offshore pipelines.”
BR	MacCracken	81	3		To indicate the vulnerability that exists, it would be appropriate to mention that there are already levees around LaGuardia airport, which were put in after flooding in the early 1950s. On line 4, change “but these” to” which could create serious problems because flooding” MacCracken	Transport	Accepted and thank you
BR	MacCracken	82			Figure 1: It would be nice to have the plot for a couple of seasons to give sense of length of season. Also, as was discovered in the ACIA study, the report needs to indicate what the ice edge means (what extent of coverage). In ACIA, we found that the phrase “open water” meant less than 50% ice and open for icebreakers. The report needs to indicate what is meant here. MacCracken	Transport	The graphic has been improved, but we respectfully disagree that more scientific detail would be useful for this audience in this document.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	82			Background picture: As for the other pages, I think they should be taken out as they make the report less readable. MacCracken	Transport	Thank you. The background pictures have been removed.
BR	MacCracken	82	1		It would help in the first sentence to indicate why—that is, albedo feedback and more of the energy going into warming than evaporation. At end of paragraph, this should also mention the ice roads created by frozen rivers. MacCracken	Transport	Explanations of climate effects are being addressed elsewhere in the document. The comment on ice roads is accepted. Thank you.
BR	MacCracken	82	2		In second sentence, clarify if more means additional ports or longer season. The last sentence seems redundant given text in the third paragraph. MacCracken	Transport	Accepted and thank you. The last sentence in the 2 nd paragraph has been deleted.
BR	MacCracken	82	4		Thawing Ground, first paragraph: On line 2, change “performance” to “the integrity of the road structure”. MacCracken	Transport	Accepted and thank you
CC	Henson	83	3	1	Replace "10t o20" with "10 to 20" Henson	Transport	Accepted and thank you
CC	Henson	83	4	8	Replace "1950 to 1970" with "1950-to-1970" Henson	Transport	Accepted and thank you
BR	MacCracken	83			Figure 1: This needs to be larger—is quite hard to read. Dispense with the pictures if need be. MacCracken	Transport	The Figure and the pictures have been removed.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	83	1	1	The text needs to say that the shortening is significant, cutting number of days about in half. MacCracken	Transport	Thank you, but recent information has raised concerns about the accuracy of the proposed change
BR	MacCracken	83	2	1	On line 1, delete the second and third use of “the” MacCracken	Transport	Accepted and thank you
BR	MacCracken	83	3	1	On line 1, change “10t” to “10” MacCracken	Transport	Accepted and thank you
BR	Corell	84			Good section, I’d move it up in the list of impacts, it is arguably one of the most important. I’d add, maybe page 86, the LLNL downscaling graphic to depict the potential drought for the southwest. This is a good section. The graphic on the lower right on page 90 is hard to read and follow. (p.84-93) Corell	WAT	Thank you. The order for the sections has been changed.
BR	MacCracken	84			Bullets: It is not clear why there are so few bullets. This was the most important issue in the National Assessment for all regions—it merits a fuller set of bullet points (or at least more text on those it has as right now most of the space on this page is wasted. There is nothing here on the declining snowpack, nothing on drought, higher water temperatures, etc.—this set o MacCracken (Yes, this is how MacCracken's comment ended)	WAT	Thank you. The water section has been significantly changed, and additional bullets have been added. Snowpack, drought, higher water temperatures are now covered.
BR	MacCracken	84			Pictures: These pictures seem far too optimistic—show a stressed crop, a depleted reservoir, rising snowline, inadequate river flow, lowered lake levels, etc. MacCracken	WAT	The pictures have been removed.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	85			Figure: One of the headings says “wetter” and this word seems not to be accurately used throughout. I think most people would think this means lush conditions, but one can have more precipitation and not have lush conditions if rainfall is intermittent, comes in wrong season, evaporation increase is more than precipitation increase, etc. From experience this summer, we have had more precipitation, but in intense thunderstorms, and the soils are quite dry as there is just no time for the water to seep in—plus what does seep in evaporates with the higher temperatures. You might say conditions would be more humid (absolute humidity is up) or that precipitation went up, but “wetter” has a lot more aspects to it. MacCracken	WAT	“Wetter” is now used in only 3 places in this sector: in the diagram, in the introductory paragraphs and in a reference to paleo conditions.
BR	Duce	86			Figure 1: This is perhaps a minor point, but there are two shades of both brown and green, but only one shade of each is defined. People can likely figure out that lighter green is less wet than darker green, but could you perhaps put a color key for all 4 shades and use the terms wetter, wettest, dryer, driest, or something similar? Duce	WAT	This graphic has been replaced.
CC	Henson	86			Figure 2, caption: This is a helpful explanation. Is it possible that the other captions that refer to “hatching being less certain” could include something like this instead? Henson	WAT	Hatching has been standardized to mean more model agreement across the entire document.
CC	Henson	86	1	16	This sentence doesn’t explain to the reader why you should get longer/more severe droughts due to more moisture in the air. A short connecting explanation would help—something like “Despite more moisture in the global atmosphere, the increased evaporation of water from land areas helps lead to longer and more severe droughts...” Henson	WAT	Additional text has been added.
CC	Henson	86	1	24	Replace "lake effect snowfalls" with "snowfalls along favored coastlines of the Great Lakes" [jargon] Henson	WAT	Thank you. The suggestion has been implemented.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	86	1	25	Replace "heavy snow events" with "heavy snow" [jargon] Henson	WAT	Accepted and thank you.
CC	Henson	86	2	6	Replace "light events" with "light rains or snows" [jargon] Henson	WAT	We have considered this suggestion but believe the term is understandable as it stands.
BR	MacCracken	86	1		(this is a long paragraph): The statement that every rise in temperature by a degree increases the water holding capacity of the atmosphere by 4% is only true locally, not globally [just imagine that all the temperature increase was in mid to high latitudes where the water content is relatively low—it would not average to 4% over the globe], so cross off “global”. In the next sentence, I don’t think “this” is clear. In next to last sentence, change to read “reduced ice cover due to warming lengthens the period of open water, allowing strong evaporation when temperatures are ...” MacCracken	WAT	Thank you. We have revised the language in this section of the report.
BR	MacCracken	86	2	3	On line 3, this should say “global precipitation.” I think it might help somewhere to indicate why more moisture comes in heavier events; basically, increased CO2’s radiative effect is to cause the atmosphere to be a bit more stable, and so the atmosphere, having available more moisture, condenses more water to generate the added energy needed to overcome the slight increase in stability. MacCracken	WAT	Thank you. We have revised the language in this section of the report.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	86			Figure 1: Sorry, but the contents of the map look problematic—somehow the rain clouds seem to know about state and county/water region borders. I also suspect that going back to 1900 leads to a lot of problems in calculating a slope because of the Dust Bowl years skewing the slopes so much of the Great Plains looks as if it is getting wetter now when that might not be the recent trend. What I think would be more effective might be a bar chart for various megaregions of the country (maybe for the regions the report uses) that give something like number of dry years per decade (so compared to their local average—and maybe do count after a significance test so small variations are counted as normal. Or maybe show a bar plot that indicates tercile boundaries for each decade. But this plot does not seem to me to be very helpful. [And “Dryer” should be “Drier”.] MacCracken	WAT	This graphic has been replaced.
BR	MacCracken	86			Figure 2: Why is the baseline what it is. It would also help, if at all possible, to figure out a way to show during which season the changes are occurring. I would note also that the spatial pattern does seem to suggest that the moist subtropical/tropical air is making it up into the upper Midwest more frequently. And the caption needs to explain what white means, especially if it might mean greater variability. MacCracken	WAT	This figure is derived from the Milly et al, 2005 Nature study which has been widely used by IPCC Working Groups 1 & 2. The figure has been enhanced.
CC	Henson	87	1	4	Replace "windspeed" with "wind speed" Henson	WAT	Thank you. We have revised the language in this section of the report.
CC	Henson	87			Figure 2, How about using colors to make it easier for the reader to quickly spot the upward and downward changes—e.g., red for upward-pointing arrows and blue for downward-pointing arrows? Henson	WAT	The Figure has been modified, although not as suggested here.
CC	Henson	87	1	15	Replace "moving westward, there" with "there" Henson	WAT	This section has been re-written.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	87			Figure 2: The snow cover point needs to be in title case if the other ones are. MacCracken	WAT	Thank you for your comment. The figure has been revised for consistency.
BR	MacCracken	87			Figure 1: All the points but the one on Energy Production and Use give the phenomenon causing the change in the first sentence. Also, the point about fires under Agriculture should also be (or instead be) under Natural Environment as it is seldom the crop areas (or even the heavily managed forests) that burn. MacCracken	WAT	Energy Production impact has been modified. The Fire impact is under Agriculture and Land Resources because this reflects the organization of the USP.
BR	Ebi	88	1	8	Fishe is misspelled. Ebi	WAT	Thank you. This has been corrected.
BR	Ebi	88	2		The extent to which exposures will increase will depend on the effectiveness of control measures. Ebi	WAT	The paragraph has been revised and additional text added.
CC	Henson	88	1	8	Replace "fishe" with "fish" Henson	WAT	Thank you. This has been corrected.
BR	MacCracken	88			Photo: This is not really very informative—show a drier area or polluted stream or something. Or perhaps show, given the fourth paragraph, an example of crops or trees dying due to encroaching salt water. MacCracken	WAT	The photo has been replaced.
BR	MacCracken	88			Figure: Why is this for 1995? More than a decade ago seems terribly out of date to be of real use, especially given how drought is now playing a wider role. MacCracken	WAT	This figure has been removed. (For the record, it is the most recent figure issued by the USGS.)

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	89			This section should also refer to the Health section on diseases. MacCracken	WAT	This section has been removed.
BR	MacCracken	89			Figure: The figure includes no indication that spring runoff can lead to flooding—not all snow is caught by reservoirs—at least indicate that there can be high and even damaging discharges to limit even greater flooding. There is also no indication of evaporation and losses in summer or of demand for water for agriculture, cities, etc. Basically, this is a pretty limited diagram when there is space to do a much better one. MacCracken	WAT	This figure has been removed.
BR	Duce	90			Figure: This figure is quite confusing. I believe that it needs more discussion in the text. Also, is attribution needed? Duce	WAT	The figure now has a more detailed caption and is referred to in the text.
BR	MacCracken	90			Figure 1: The key is too small to be read. MacCracken	WAT	We have obtained a higher resolution version of this image.
BR	MacCracken	90	1	2	On line 2, I'd move recreation to the end of the list and I would add in something about migrating fish and ducks or something similar. MacCracken	WAT	Thank you. Recreation has been moved to the next to last place in the list and the other suggestion considered but not implemented.
BR	MacCracken	90	2	3	On line 3, the "419" is too precise. MacCracken	WAT	Thank you. This has been corrected to 420m.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	91	1	4	On line 4, change “lakes” to “reservoirs”—let’s be honest about this. MacCracken	WAT	While Powell and Mead are in fact reservoirs, their official names are ‘Lake Mead’ and ‘Lake Powell’. We prefer to use their recognized names.
BR	MacCracken	92			Figure 1: The map shows potential changes over next 10 years. This is not the climate change scale. Basically, what is shown is current stresses on the water system, and that is fine to show, but it should be labeled properly and an indication given that this is not related to climate change, but to the fact that virtually every region is fully using (or overusing) its water resources. That is a fine point to make—the US does not have much flexibility here. What would be interesting to know about this is what is creating the pressure—increasing population, need for irrigation, requirements for environmental preservation, what? MacCracken	WAT	This Figure has been removed.
BR	MacCracken	92	3		The first bullet needs to be expanded to mention the allocation of waters with Mexico and Canada, as these are as legally complex as other allocations. There should also be mention of agreements with tribes as these too are quite complex and are coming into play. In the third bullet, explain to whom one is suggesting rights be transferred. MacCracken	WAT	Thank you. These suggestions have been incorporated into the text.
BR	Duce	93			Figure: This figure is very hard to read. The text needs to be larger. Duce	WAT	We have obtained a higher quality version of this image.
BR	Corell	94			Good section, the graphic on page 102 (lower one) is un-decipherable to the average reader. I could not follow the message well either. (p.94-105) Corell	Ag	Thank you for your comment. The graphic in question has been removed, and the section has been reworked.
CC	Henson	94			The lengthening of growing seasons isn’t mentioned here. Seems like a conspicuous absence, esp. since it’s discussed in the text and it’s something readers will intuitively recognize and wonder about. Henson	Ag	This is discussed in the expanded text on the impacts of temperature on plants.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	94			<p>(a) This whole section seems to be based on the old, lame “dumb farmer” approach, giving impacts on the system assuming that in the future no adaptation and reaction is done. I found this whole section therefore not very useful and it will surely generate responses. What needs to be done is to indicate the changes that will be needed to accommodate the changes—farmers will adopt planting schedules, change what they grow, etc., and that is why in the National Assessment a second message was that the challenge for farmers as people will be varied and could well be significant, so be educated and willing to adapt and change;</p> <p>(b) The first conclusion needs to say, as it did in the National Assessment, that the agriculture sector is very likely to find the ways needed to ensure that enough food is produced. There will certainly have to be changes and modifications and this may well not be easy, but the system has proven very adaptable and we have lots of different land areas and so food will be provided, especially given that technology is improving (though that may mainly make up for population growth); (c) It seems to me there is far too little here regarding the effects of CO2 fertilization—this needs to be acknowledged as experienced farmers will likely be able to take advantage of it (and all will face the problematic aspects). MacCracken</p>	Ag	This section has been reorganized and the messages more clearly stated.
	BR	MacCracken	94			<p>Set of bullets: I think the third bullet on weeds, etc. should be moved up (or maybe just move the second one down). The weeds and diseases are challenges that will occur throughout the whole area, whereas the extreme weather problems tend to be quite localized. Regarding the fourth bullet, is this really the case even with CO2 fertilization? And why is the last bullet/topic in this section instead of in the Natural Resources section? Again, I think the points need to be rephrased to indicate what degree of adaptation a smart farmer would be taking—this sector has been exceptionally productive and the litany of impacts is just not something that farmers will sit around and have hit them year after year after year. MacCracken</p>	Ag	This section has been reorganized and tries not to overstep the knowledge base.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Mearns	94			<p>The overarching picture of the effect of climate change on crop yields contradicts in many ways the IPCC WGII assessments for North America and Agriculture. I realize a great deal of this section is taken from CCSP SAP 4.3, which I haven't read in detail, but I know that volume has more up-to-date information than the IPCC chapters and of course has gone through rigorous review. But I feel I would be remiss in not pointing out the rather different perspective given in the IPCC. I assume, however, since C. Field (the co-lead on the IPCC chapter) is also a reviewer for the USP, that he will also comment further on this. Neither of the IPCC chapters are referenced for this section.</p> <p>Secondly there is the issue of uncertainty again. There are no likelihood statements in any part of this section. Does this imply that everything stated in this chapter fits into the 'virtually certain' category as explained on p. 15? While there has been a lot of progress in agricultural assessments, everything described in this section just isn't as certain as the language suggests.</p> <p>I also have some concerns about the references. It of course makes sense to rely heavily on SAP 4.3, but there are also some selective references that probably already appear in SAP 4.3 or in the IPCC chapters. I'm bringing this up as a reminder to avoid 'cherry picking' of references or the appearance of cherry picking. There is of course a mountain of literature on ag and forestry impacts at this point. Mearns</p>	Ag	<p>Since the reviewer hasn't read the information base for this report, I would offer the comment that the SAP is much more thorough in the treatment of the impacts on crop growth and yield than IPCC. The references to SAP4.3 provide all of the available references on this topic.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	95			Figure 2: First note that the background color is so dark that one cannot really see the page number—get rid of most of these background figures, they are just distracting from the overall credibility of the discussion. On this map, it really needs to be redone, perhaps with bigger dots, as right now it is not very helpful—what is the reader supposed to use this for or derive from it? Value of products sold depends a lot on the crop and its value to a community then depends on how many people are there and it takes to manufacture. So, all the plot really shows is a lot is going on in a lot of places—it tells us nothing that some regions are vital for niche crops or whether there are other areas where a crop could be grown, etc. It might be much more useful to have some contours for areas where various crops or types of crops dominate—so the primary area for corn, soybeans, wheat, vegetables, fruits, whatever. But this diagram just does not seem to say much. [Also, Alaska is too small]. MacCracken	Ag	Thank you for the comment. This will be clarified in the final version.
BR	Duce	96			Figures: I'm not sure the average reader will understand these figures. It may need additional explanation in the text. Duce	Ag	Thank you for the comment. This figure has been redrawn.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	96	1	2	<p>On line 2, change to “the increasing carbon dioxide concentration.” The second sentence seems quite one-sided—basically there is a sort of parabolic curve for each species so in some places warming can help, in some not. But the most important point is that this whole section lists damages assuming that farmers will not respond. Sure, it lists some adaptation steps later, but they will be going on continuously as farmers respond to the markets, technology changes, incentives, competitors, and everything else. Farmers will grow what is right where it is right to grow it—there is a strong market incentive to do this. The question is about how much change they might have to make to grow their crop differently or to grow a different crop.</p> <p>The main opening message needs to be more like it is in the US National Assessment (or explain why that is not the case)—so the first page of the spread should focus on how farmers can grow lots of crops, we have lots of capabilities, there have been lots of past shifts that prove change is possible—and the US food supply should be secure. As the text is, I just found this whole section not very satisfactory. MacCracken</p>	Ag	The whole section has been rewritten to clarify the points related to the impacts of climate on agriculture.
	BR	MacCracken	96	1	2	Part 2: MacCracken	Ag	The comment appears to be missing.
	BR	MacCracken	96	2	3	On line 3, is it really just “some plants” or is it “most”? MacCracken	Ag	This has been rephrased in the revised text.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	96	3		Are most vegetables really cool season crops? Visiting my local farmers’ market, the vegetables are mostly there during the summer. Three lines from end of paragraph, is “will” justified? Should it not be “could” or some less confident word from the IPCC lexicon? In the next to last line is a good indication of why it is important to indicate that “climate change” is the “weather—and all its variability and fluctuation—saying “climate change is just too vague. MacCracken	Ag	The wording has been revised to reflect the proper expression of uncertainty.
BR	MacCracken	96	5		Again, farmers will grow what grows where they can based on economic return, soils, markets, etc. So, the second sentence needs to say that these are the effects if the places where these crops are now grown are not shifted. Fine to mention the problems of doing this—capabilities, soils, knowledge, etc.—but don’t assume things will just be grown where they are. MacCracken	Ag	There have been shifts in production that will continue in the future. We didn’t make any statements that agriculture would not change but point out where the awareness needs to be placed.
BR	MacCracken	96	6		Tomatoes is another example to use of the effect of a higher nighttime temperature. MacCracken	Ag	Again, the evidence in the literature supports this original statement.
BR	Mearns	96	5		Modeling studies do not indicate that increased temperatures would decrease cotton yields. Cotton is one of the crops that would actually fair pretty well under increased temperature (not considering moisture stress). It is a distinctly heat loving crop. Mearns	Ag	This is incorrect; there are studies cited in SAP4.3 that indicate the response.
CC	Henson	97			Figure 1, caption: Need to define “very warm nights” here (the top 10% of all nights, correct?). Henson	Ag	Thank you for the comment. This has been changed in the text.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	97			Figure 1: Another point to explain in a 2-page modeling spread is why the model results are smooth and the observations are variable. This type of graph, without explanation, just feeds the misimpression that models do not represent variability—the graph is a comparison of apples and oranges (just to note that this issue is just the mistake that was made in the Douglass et al. paper on tropospheric temperature trends and that Santer et al. have spent a lot of time responding to). One solution is to show a smoothed set of observations, another is to create and explain why a band is there (the weather is chaotic)—but something has to be done. MacCracken	Ag	It is obvious to me that observations will have variation compared to model results. Models do not handle variability very well.
BR	MacCracken	97	1		In the last sentence, is it not the case that, as at the global scale, the temperature response is not very different among scenarios out to mid-century, and the significant divergence is only later. MacCracken	Ag	An additional reference will be provided for this statement in the next draft.
CC	Henson	98			Figure 1: Is it appropriate for the area under the curve to turn red near the top? At first it made me think there was some meaning to the redness, but it appears to be arbitrary. Henson	Ag	The purpose of the figure is to show the yield impacts and the color is not indicative of any problem.
CC	Henson	98	2	5	Replace "Storm events" with "Storms" [jargon] Henson	Ag	Accepted and thank you.
BR	MacCracken	98	1	6	On line 6, change it to say “low levels of oxygen in the soil” so people don’t think the atmospheric oxygen is endangered. Further down, I don’t understand why it will take years to recover from the recent flood—doesn’t the deposition of new mud tend to enrich the soils? If this refers to the farm infrastructure, say so. MacCracken	Ag	The point is that increasing wet periods affect the oxygen content of soils which has a negative impact on plant growth.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	99			Figures: It is not clear if this figure actually illustrates that the greater amount of vegetation indicated in the right panel is a result of lower herbicide efficiency at higher CO2 or higher productivity due to the higher CO2. This could be a confusing figure. Duce	Ag	The point of the figure is that there is less efficacy of herbicides with increasing CO2
BR	Duce	99			Figure 2: The scale needs to be larger so it can be read. Duce	Ag	The Figure and the scale have been expanded.
BR	Ebi	99	3	9	Obviously, human health impacts also are possible. Ebi	Ag	The comment is noted.
BR	Ebi	99	4		Human health impacts are possible if pesticides are used inappropriately. Ebi	Ag	The comment is noted.
BR	Ebi	99	5		The research base is small, increasing the uncertainties surrounding the conclusions. Ebi	Ag	The comment is noted, but we feel that the research base is adequate to support the conclusions as stated.
BR	MacCracken	99			Upper figure: I don't understand the levels indicated—is the 300 ppm added to the future CO2 concentration, or the present one? MacCracken	Ag	It is added to the present concentration.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	99			Figure 1: First, get rid of the gratuitous caterpillar or whatever it is—or show some of them eating plants. With respect to the map, it might be more interesting to show the increase in the coldest decile of temperatures or the change in the number of days with minimum temperatures below freezing or some other key level. Or perhaps to indicate that this is occurring as the cold season is getting shorter more than as a result of every day increasing in temperature by an equal amount. MacCracken	Ag	This Figure has been removed.
BR	MacCracken	99	1	6	With respect to line 6, just as the weeds will move north as it warms, so will the agricultural zones ahead of them—this analysis needs to consider the challenges of their relative movements. MacCracken	Ag	Thank you, but this analysis is beyond the scope of this report.
BR	MacCracken	99	5		This matter of poison ivy was covered elsewhere, no need to repeat it here. MacCracken	Ag	Thank you for the comment. However, although poison ivy was mentioned briefly in the Human Health section, we feel that the material commented on presents a somewhat different context.
BR	MacCracken	100			Figure: I am not sure what the figure is supposed to be telling me. Is not most of the reddish color in the upper Great Plains cropland instead of pasture? Are the cow counts based on cows on pastureland or does it include cows in feedlots (e.g., based on the corn grown on cropland)? It sure seems from the two black concentrated areas in Texas and Okalahoma-Kansas that this includes cows in feedlots—and other places might be contained dairy herds. If so, then what is the use of having the cattle shown on it? MacCracken	Ag	A caption that explains the meaning of the Figure has been added.
BR	MacCracken	100	1	4	On line 4, change “which have” to “receive” and on lines 5 and 7, I think “these” is not very clear. MacCracken	Ag	Thank you. The suggested change has been made and the text clarified.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	100	2		Change opening to “The rising atmospheric CO2 level impacts” as there is only one to be considering, and on line 2 change to “concentration.” MacCracken	Ag	Thank you. The text has been edited in response to this comment.
BR	MacCracken	100	3		(and it is a long one): Two and 4 lines from the bottom change to “an increasing CO2 concentration” MacCracken	Ag	Thank you. The text has been edited in response to this comment.
BR	Duce	101			Picture: (Lower Right Corner) This picture is too dark to see clearly what is happening. Duce	Ag	The picture has been deleted.
BR	MacCracken	101			Photo on lower right: This is a hard to figure out photo—just delete it. MacCracken	Ag	Accepted and thank you.
BR	MacCracken	101	1		Now, this heat stress issue is a good one to bring up as these facilities are harder to move (though if grain crowing areas move, the meat growing facilities may well too). This using of 9-11 F needs to indicate that this is for the end of the century, and I’d also like to know if this is how much the hot days got hotter or if this increase is mainly a result of the cold season becoming shorter—so this statement should give an indication of time of year—is this what happens in the hottest summers, or based on a general global rise? Also, the “For example” sentence is quite long. MacCracken	Ag	The comment was considered during the revision of this section. We feel that the primary climate related issue to be considered here is heat stress caused by summer temperature and humidity extremes and we have tried to make sure this was addressed.
BR	MacCracken	101	2	2	On line 2, the number is too precise—it would really help, in fact, to give a percentage change to know if this is at all a meaningful number (including account for growth of economy, etc.). MacCracken	Ag	The number has been removed and the text revised in response to this comment.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	101	2	3	On lines 3-4, what does “increased maintenance energy requirements” mean? MacCracken	Ag	The text has been revised in response to this comment.
BR	Duce	102			Figure 1: There are simply too many colors that look exactly the same in the key. Duce	Ag	The Figure has been deleted.
BR	Duce	102			Figure 2: I believe that this figure may be very difficult for the average reader to understand. Duce	Ag	The Figure has been deleted.
BR	Hooke	102			Figure: Bottom figure is difficult to decipher. Hooke	Ag	The Figure has been deleted.
BR	MacCracken	102			Bottom map: I think the figure is a bit hard to understand and make sense of: It appears that both Central America and the Canadian north are limited by sunlight (if so, quite differently). Indicating that most of the western US is limited by water rather skips over the fact that water management and irrigation in the west has made it extremely productive. The value of crops (and their needs for water) also vary greatly, so the San Joaquin Valley produces a lot of high value crops whereas areas that are not limited such as in the Northeast have not much value added. And I don’t understand when this is supposed to apply—now, or in the future—and how it is changing. MacCracken	Ag	The Figure (map) has been deleted.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	102	1		If this whole spread is to be in this section rather than the natural areas section, then it needs to discuss the value and products we get from the forests. So, where is the information on timber forests, the discussion of how forests will get cut and replanted with different species, etc. This deserves much more mention than a couple of words in a long list. Otherwise, this all should go in the next section. Also, the last phrase of the paragraph (i.e., “most of these changes are likely to be detrimental”) should be deleted—in part because it seems to conflict with the next paragraph that explains the issues. In the next to last sentence, it should say something like “air quality improvement” and why did semicolons change to commas in the list? MacCracken	Ag	Thank you for the comment. The spread has been removed from the Agriculture and included with revisions in the Ecosystems section as suggested.
BR	MacCracken	102	3		The last sentence seems to duplicate what has been said elsewhere. MacCracken	Ag	The paragraph has been deleted.
CC	Henson	103	2	6	Replace "trees ability" "trees' ability" Henson	Ag	Accepted and thank you.
BR	MacCracken	103			Upper photo: It is not clear what the message is here—why not a chart on area burned or something informative. MacCracken	Ag	The photo has been removed.
BR	MacCracken	103	1	4	On line 4, say “higher spring”. On line 9, add a comma after “burned” MacCracken	Ag	Line 9 has been shortened and “burned” eliminated but, after consideration, we prefer to retain “high” on line 4.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	103	2	2	On line 2, change “which” to “that, in turn,” MacCracken	Ag	The paragraph has been removed; hence the comment is no longer relevant.
	BR	MacCracken	103	3	6	On line 6, change to “reduces the capability of trees” so it is not necessary to figure out where to put the apostrophe and to explain how trees have talents. MacCracken	Ag	The text has been revised.
	BR	MacCracken	104	1	5	On line 5, “the atmospheric CO2 concentration”—doing it for one is hard enough. MacCracken	Ag	Thank you for the comment, but we prefer “concentrations.”
	CC	Henson	105	2	8	Replace "and also" with "and that also" Henson	Ag	The Adaptation Strategies Box has been removed; hence the comment is no longer relevant.
	BR	MacCracken	105			Adaptation Strategies box: I think it would be much more effective and reasonable to include these ideas right n the text—not save them to the end. My reaction was, oh, there were terrible things happening, but now I can resolve most of them I think impacts and possible adaptation has to be treated together. MacCracken	Ag	The Adaptation Strategies Box has been removed; hence the comment is no longer relevant.
	BR	MacCracken	105			Adaptation Strategies box: Regarding the second point, this seems far too pessimistic. Such changes have been going on constantly—see the Agriculture sector report for the changing areas where various grains were grown. We might have to build up our capabilities so that we can advisers=helping everyone constantly rather than having a fewer number of agents helping optimize with a steady climate and pattern of growing crops, but changes can be made (especially if farmers get prepared, etc.). And when it is said that stress-tolerant varieties can be expensive—compared to what? Give a percentage or something. MacCracken	Ag	The Adaptation Strategies Box has been removed; hence the comment is no longer relevant.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	105			Adaptation Strategies box: Regarding the third point, this too has happened all the time, especially for the advanced farming that is underway now with most livestock grown inside, etc. Sure changes will be needed, but why be so pessimistic? Basically farmers need to be better educated and be provided needed information, but they have proven to be very adaptable. MacCracken	Ag	The Adaptation Strategies Box has been removed; hence the comment is no longer relevant.
BR	MacCracken	105	1		Is this right, that grazing is down 70%? Given the increased demand, this does not seem very plausible. Or is this the ability of land to support cattle, so much larger areas are now needed per steer? MacCracken	Ag	The photo caption that accompanies the text has been expanded to clarify the text.
BR	Corell	106			Great section, well done. (p.106-117) Corell	Ecosystems	Thank you for your comment.
BR	Field	106			Biodiversity: This section says almost nothing about biodiversity, about the number of species and the number of extinctions. It should at least summarize the literature on this. Field	Ecosystems	The chapter has been extensively revised and re-organized to focus on ecosystems and processes that affect the viability of populations.
CC	Henson	106			Acknowledge the aesthetic/cultural value of the natural environment? This page seems to focus almost completely on utilitarian aspects—“services” and “goods” rather than the inherent value of the living world around us. A sentence noting the latter would be good. Henson	Ecosystems	This is acknowledged in the chapter as revised. The concept of ecosystem services does explicitly include aesthetic and cultural values.
CC	Henson	106	1		This point could be deleted, since it’s implicit in the ones that follow. Henson	Ecosystems	This section has been completely re-drafted.
BR	MacCracken	106			Bullet 1: This is far too technical a point to have as the first one here—or if it is kept, then give some examples of the types of processes that matter to real people. MacCracken	Ecosystems	This section has been completely redrafted.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	106			Bullet 2: The phrase “the timing of the seasons” seems very odd in this list—that is a climatic result that is causing the other changes and it might well help to rewrite the point to say something like “The changes in the length of the seasons has caused ...” and this would fit well with a first point that started something like “The changes in temperature and precipitation have caused ...” MacCracken	Ecosystems	This section has been completely redrafted.
BR	MacCracken	106			Bullet 3: Now this is a useful point that should probably be the first point MacCracken	Ecosystems	This section has been completely redrafted.
BR	MacCracken	106			Bullet 4: Change “climate change” to “climate change, sea level rise, and ocean acidification.” The phrase climate change, for most people, is not broadly enough conceived, so help them along. MacCracken	Ecosystems	This section has been completely redrafted.
BR	MacCracken	106			Bullets 4-6: It sometimes seems as if everything is a priority, being “especially vulnerable” or “particularly sensitive” or “extremely vulnerable”—yet the first bullet only says “been affected”. Somehow, you need to find a way to make the point at the start about the whole natural system is particularly vulnerable, as indicated by how it has changed in the past when climate has been different, and then give examples. But right now, it seems as if the adjectives are just being inserted everywhere possible without having a coherent framing of priorities. MacCracken	Ecosystems	This section has been completely redrafted.
BR	MacCracken	106			Bottom two paragraphs: I assume this was supposed to be the text at the top of page 107, and the text on 107 was supposed to be part of the spread on 108-109. If not, there is a real conflict in styles of the various sector sections. MacCracken	Ecosystems	This section has been completely redrafted.
BR	MacCracken	106			Last paragraph: I think it is important to list some of the “services upon which we depend”—this is just too vague for those you are writing for. MacCracken	Ecosystems	This section has been completely redrafted.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	107	1	2	Replace "how fast" with "how quickly" Henson	Ecosystems	Noted. This section has been completely redrafted in part to improve the writing.
CC	Henson	107	1	4	Replace "exceeds or is lower" with "is more or less" Henson	Ecosystems	Noted. This section has been completely redrafted in part to improve the writing.
CC	Henson	107	1	8	Replace "forest growth has risen" with "forests have grown" Henson	Ecosystems	Noted. This section has been completely redrafted in part to improve the writing.
CC	Henson	107	2	4	Replace "There have also been episodes of extensive death of trees" with "Also, many trees have died" Henson	Ecosystems	Noted. This section has been completely redrafted in part to improve the writing.
BR	MacCracken	107	1		The last line of paragraph needs to be moved up to after "factors" and then put the examples in a separate sentence. Right now the last sentence is 7 lines long. MacCracken	Ecosystems	Noted. This section has been completely redrafted in part to improve the writing.
BR	MacCracken	107	4		The persistent attempt to be terse can really make things harder than needed to read. I'd suggest redoing the first sentence to say: "Thus, in the future, as the atmospheric CO2 concentration continues to rise and as climate continues to change, growth of relatively young forests growing in fertile soils is projected to increase" [and, I would suggest that this statement needs a reference]. The phrase "some forest growth is projected to increase" is just too confusing. MacCracken	Ecosystems	Noted. This section has been completely redrafted in part to improve the writing.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	108			Figure 2: Again, too many colors that are too similar to distinguish. The color code needs to be changed or simplified. Duce	Ecosystems	Noted. All figures have been re-done.
CC	Henson	108	2	6	Replace "Checkerspot Butterfly" with "checkerspot butterfly" Henson	Ecosystems	Noted.
CC	Henson	108	2	8	Replace "Checkerspot" with "checkerspot" Henson	Ecosystems	Noted.
CC	Henson	108	3	1	Would be good to give an example of a mismatch here, since the concept may not be obvious to the novice. Henson	Ecosystems	This section has been redrafted, and examples given.
CC	Henson	108	4	4	Replace "In the United States, some" with "Some" [U.S. context is implicit from last sentence.] Henson	Ecosystems	Noted.
CC	Henson	108	4	7	Does this apply to the whole U.S. or just to some parts, such as the lower 48? I didn't think Alaska was at risk of losing spruce and fir, but maybe that's the case. Henson	Ecosystems	Lower 48, more specifically the northeast. This has been clarified in the re-write.
BR	MacCracken	108	1		Regarding third sentence, it would help to know if the change over the past 20 years was going on before this. Note that the last sentence of the paragraph goes back to the first half of the century, so what is to be made of this. It would help to have consistent time periods. MacCracken	Ecosystems	This has been clarified.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	108	3	4-5	On lines 4-5, I'd rewrite to say "shopping mall occupying their new favored locations" and on line 6 say "they need have led to". But then, that last sentence also needs a rewrite for it seems to say that extinctions only occur during those times and not at other times—as biologists keep telling me, "extinction" means all are dead (in the wild and in zoos, etc.)—what appears to be happening in the example mentioned here is loss of subpopulations, so is extirpation, not extinction. MacCracken	Ecosystems	This wording has been clarified in the revised draft. However, it is worth noting that many ecologists also use the term "local extinction" to refer to what the reviewer calls extirpations, which is not a term in general use by biologists.
BR	MacCracken	108	4		in last sentence, is this talking about all 50 states, or the contiguous 48? I think the latter, so make mention of that. MacCracken	Ecosystems	Noted.
BR	Duce	109			Figure: Not at all clear what this figure is or is supposed to portray. Duce	Ecosystems	All figures have been re-done.
BR	MacCracken	109			On the "Point to add": This will need some careful explanation—it is easy to explain that trees move slowly as they have to grow to reproductive stage to prompt next step, but this is not at all so clear for animals. MacCracken	Ecosystems	The section on changing geographic ranges has been re-drafted. There is not much space to explain the details of the interactions of life histories and biogeography.
BR	MacCracken	109			Figure: The figure needs a caption—and place it with the paragraph on the butterflies. MacCracken	Ecosystems	All figures have been re-done.
BR	MacCracken	109	1		On lines 1-2, change to read "note that the communities of species making up functioning ecosystems do not"—I don't know what is meant by "entire communities of species"—is that all species of a given type or what? On lines 2-3, change to say "to its particular sensitivity". On lines 4-5, say "and the ranges of large migratory animals can shift more easily and rapidly than small species." MacCracken	Ecosystems	This has been redrafted to improve clarity. The previous wording was perhaps too technical for non-specialists, for whom the phrasing would not have been ambiguous.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	110	1	4	Replace "ignitions can occur" with "fires can start" Henson	Ecosystems	Noted.
CC	Henson	110	1		Should this paragraph mention the increase in fuel due to fire suppression efforts since the 1800s? Henson	Ecosystems	We have not chosen to emphasize this because it is not immediately relevant to ignitions.
CC	Henson	110	3	1	Use synonym for “pathogens”? Henson	Ecosystems	The section has been redrafted.
CC	Henson	110	3		[“Insect pests” feels jargony. Are there other kinds of pests? Is “insects” alone not OK? Maybe define it in the first sentence? “Insect pests” reads like plain English, but I suspect it has a specific meaning that isn’t obvious to laypeople. Henson	Ecosystems	Although the section has been re-drafted and completely re-organized, the words insect pests are to be taken literally – they are insects that are ecologically or economically damaging.
BR	MacCracken	110			Figure: First the title is incorrect—the figure is about area burned per fire and not intensity. Second, I think there needs to be a caption explaining that there was a change in policy about fighting fires so that may well be a contributor to the upward jump in the 1980s. The figure should also explain what area this is for—does it include Alaska? It would also be helpful to have some suggestion of why there is such high variability. MacCracken	Ecosystems	Noted and fixed.
BR	MacCracken	110	1		I think this paragraph needs to also make the point that CO2 fertilization promotes growth during the wet season and so biomass builds up faster, leading to there being an adequate biomass to sustain fire in a fewer number of years. This is particularly the case for chaparral—which is a fire-based ecosystem and what is happening is a faster cycling—and so more danger. MacCracken	Ecosystems	The speculation about CO2 effects is just that, and we have chosen not to rely on speculation.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	110	3		In the second sentence, there needs to be some comparison given as to whether this is a large amount, for example, compared to forest productivity--remember, a billion dollars is a penny a day per citizen for a year—as investment in a global change research program it is large, as a loss out of total forest harvest, is it large or small? On line 6, give a sense if this area is large or small by giving it as a percentage of, for example, the forest cover in British Columbia. Similarly, on line 7, are 620,000 acres large or small—give as a percentage of state forest or something. MacCracken	Ecosystems	We have been clear in the re-write about context. These are large changes that are occurring – far larger than have been observed in the past.
BR	Ebi	111	2		Increasing temperatures also will decrease the geographic range of some pests and pathogens. Ebi	Ecosystems	True, but this has not historically been the case for many economically and ecologically important pests and pathogens.
CC	Henson	111			Photo 1, Caption: Replace "Toad" with "toad" Henson	Ecosystems	Noted.
CC	Henson	111	2	6	Replace "biting," with "biting" Henson	Ecosystems	Noted
BR	MacCracken	111	2	2	On line 2, change “as climate heats up” to “as temperatures rise.” On line 7, change to say “The development rates and infectivity of some parasites also increase ...”—and it would help to give a sense of whether some is a few or a high percentage. MacCracken	Ecosystems	Noted. This section has been revised for clarity.
BR	Duce	112			Figure 2: There needs to be a caption explaining what one is seeing - this is a good picture about coral bleaching, but it needs to be explained. Duce	Ecosystems	The picture has been removed.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	112	2	8	Replace "to some regions" with "in some regions" Henson	Ecosystems	Noted
CC	Henson	112	3	2	Replace "bleaching with some" with "bleaching, with some" Henson	Ecosystems	Noted. This section has been shortened.
BR	MacCracken	112			Bottom photo: It appears to be upside down. MacCracken	Ecosystems	Noted. The photo has been removed.
BR	MacCracken	112			Photos: I'd reduce the size of the photos or eliminate one and get the whole coral reefs section on one page. MacCracken	Ecosystems	Photos have been removed.
BR	MacCracken	112	3		I think a bit more diplomatic phrasing of the first sentence is needed, something like "There are extensive coral reef systems in the Caribbean, Atlantic, and Pacific Oceans, including many on islands under US trusteeship and governance" (or something similar). For second sentence, say "In 2005, unprecedentedly high water temperatures led to significant coral bleaching in the Caribbean basin, with some sites in the U.S. Virgin Islands experiencing 90 percent ..." (save "dramatic" for hope people act). MacCracken	Ecosystems	This section has been edited for clarity.
BR	MacCracken	112	4		Change the third and fourth sentences to "As the atmospheric carbon dioxide concentration increases, more carbon dioxide is absorbed by the oceans, leading to increasing acidification. The changes in chemistry make less calcium..." And why is "CO2" not being used for "carbon dioxide" throughout the report? MacCracken	Ecosystems	Noted.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	113			Figure 1, caption, line 2: Replace "Basin" with "Basin," Henson	Ecosystems	Noted.
CC	Henson	113			Figure 1, caption, line 3: Replace "recorded" with "recorded in this area" Henson	Ecosystems	Noted.
BR	MacCracken	113			Bottom figure, caption: Reword line 2 to say “for 12 weeks from August 5 to October 28” if that is what the period was—giving just the end date is not very helpful to the reader. MacCracken	Ecosystems	Noted.
BR	MacCracken	113	1	1-4	On lines 1-2, say “the carbon dioxide concentration continues to rise” (singular). On line 3, I would expand the discussion to say that this effect becomes most serious first in colder waters, which is just where major fisheries are migrating—so this could become quite serious quite quickly. In line 4, it gives the misimpression that the effect on coral reefs happens everywhere around the globe at the same time—it needs to be clarified that there is not one threshold that applies to all systems, but a whole series of ones. MacCracken	Ecosystems	This section has been clarified, but note that the near-synchronous responses of many coral systems to increases in SST is part of what implicates global warming, even though different coral species do have different thresholds of response.
BR	MacCracken	113	2	1	In the first sentence, it is written to seem like the species living in US waters (alone) somehow decided they would move in contrast to others—all species are responding and this needs to be made clearer. It seems to me the last sentence in the paragraph is too pessimistic—despite variability, ocean species are moving poleward and the acidification is building globally. There may be problems being precise on timing, but there is a quite clear sense of what is happening overall. Or does this sentence apply just to what is happening in US waters—and if so, that should be said. MacCracken	Ecosystems	The writing has been clarified.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	114	1	2	Replace "Major changes have already been observed in the pika as previously reported populations have disappeared entirely" with "Pika have completely disappeared from some locations" Henson	Ecosystems	Noted.
CC	Henson	114	2	6	Replace "climate but" with "climate, but" Henson	Ecosystems	Noted.
CC	Henson	114	2		This paragraph could use a transitional lead sentence, since we've been discussing fauna and now we're on to flora. Henson	Ecosystems	Noted.
CC	Henson	114	2	2	Replace "Larkspur, Aspen Fleabane, and Aspen Sunflower" with "Larkspur, aspen fleabane, and aspen sunflower" Henson	Ecosystems	Noted.
CC	Henson	114	3	4	Replace "were" with "are" Henson	Ecosystems	Noted.
CC	Henson	114	3	7	Replace "increase" with "increased" Henson	Ecosystems	Noted.
CC	Henson	114	3	7	Replace "18 percent" with "18 percent of the total tree population," Henson	Ecosystems	Noted.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	114	3		This paragraph left me thinking that trees might be more adaptable than I realized. Not sure if that's the intent... Henson	Ecosystems	This has been redrafted.
BR	MacCracken	114	3		In the second sentence, it should be explained if it is our understanding of the speed of relocation or of the speed of climate change that is causing the problem. On line 7, change to "increased" to match "declined" on line 6. On line 9, the phrase "surprisingly rapid rate" seems to indicate redundancy with the second sentence. MacCracken	Ecosystems	It is the speed of climate change that is the concern. This has been redrafted for clarity.
BR	MacCracken	115	1		Regarding fourth sentence, I am a bit confused. In many locations, dams are put in place and operated to prevent/limit such floods. Is not the real flood potential from rain onto snowpack—that is the design runoff situation for many dams in the western US. Normally, in the west, it is snowmelt that causes floods, not rain (which often sinks into unfrozen ground and runs off over time). MacCracken	Ecosystems	This has been redrafted for clarity.
BR	MacCracken	115	2		Regarding third and fourth sentences, need to say a reason why fish die off is that the multiple streams they are in are isolated and disconnected, so once lost during some extreme, they do not become reestablished from other streams. In the fifth sentence, you might comment that the trout streams in Pennsylvania are world-renowned. MacCracken	Ecosystems	This has been redrafted. But note that the disconnect of stream networks is not why fish die – however, it is why their populations have trouble becoming re-established.
BR	MacCracken	116	1	6	On line 6, it might be appropriate to say "Native people" (or peoples). In last sentence, it might alternatively be said that there is no ice to rest on near where the food is. MacCracken	Ecosystems	This has been redrafted for more clarity.
BR	MacCracken	117	1	12-15	On line 12, change to "openings"; on line 14 change to say "hunting by polar bears". On line 15, rewrite sentence to say "Except when rummaging through villages, polar bears on shore feed very little" to give this a human connection. MacCracken	Ecosystems	This has been redrafted for clarity.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	117	2		Make sure you really mean “extinct” versus no in that region or in a zoo—biologists I have met are pretty strict on this. On line 5, change to “may be able to adapt”—though the idea is to avoid the word “may” so consider changing that as well. On line 7, change to “underway is likely to depend critically on ...” In last sentence, for clarity change to “the life spans of seals, walruses, polar bears, and other wildlife, and ...” MacCracken	Ecosystems	This has been clarified for the bears.
BR	Corell	118			Good section, this is where the reader comes to see things close to home. Good and well done section. Congrats. (p.118-155) Corell	Ecosystems	Thanks for comment.
CC	Henson	118	1		This paragraph seems short and anticlimatic, given the grand sweep of the sections that followed and the room that’s allowed for it. Expand? Henson	Ecosystems	This has been redrafted.
CC	Henson	118	1	4	Replace "even if they" with "even if two or more regions" Henson	Ecosystems	Noted.
BR	Hooke	118			Graphic: Depiction of Alaska is nowhere near to scale. Considering the importance of the Alaskan resources, climate impacts on the state, this should be addressed. Hooke	Ecosystems	Noted. All figures have been redone.
BR	MacCracken	118			I’d get rid or tone down the background color. Also, the state of Alaska needs to be scaled to size to make the point about how large it is. Regarding the text here, its is fine, but there needs to be more—perhaps some indication of key points, or at least of the categories of points, namely effects on the environment, effects on the economy, and effects on people (e.g., health, etc.). This might well be a page that is pulled out as a highlight, and so it needs to have some highlights—if not for each region, at least indicating the key categories of impacts. MacCracken	Ecosystems	Space is too limited to add more detail. All figures have been redone.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	120			Top set of bullets: I think the second bullet needs some expansion, as the longer growing season actually is leading to a loss of the cool nighttime summer temperatures that are the basis of agriculture in much of the region. The phrase “increased snow density” might be translated to “less skiable snow” MacCracken	NE	After consideration of the comment, the “cool nights” issue will not be dealt with here as we feel that it is implied in the section on agricultural production. We agree that the phrase “increased snow density” may be confusing and it has been removed from the text.
BR	MacCracken	120			Second set of bullets: This focus of just giving the change in temperature without describing the changes in the weather I find very unsatisfactory. It seems to me that the second bullet makes clear why the changes are occurring—winter is becoming shorter—so say that so people do not get the impression that every day, or even the average for each winter day, will be 8-12 F warmer—that is not what is happening; instead what is happening during the cold half of the year is mainly a change in the lengths of the cold and warm seasons. In the second bullet, I would change the “reduced to a week or two” to “will become very intermittent year-to-year, averaging a week or two.” The fifth bullet is also very helpful in explaining what is happening. With respect to the third bullet, it does not seem consistent with the low numbers shown for the region on the maps on page 54. MacCracken	NE	Thank you for the comments, and the set of bullets has been re-examined. As suggested, the mention of an 8-12 F winter warming and 6-14 F summer warming has been eliminated.
BR	MacCracken	120			Bottom paragraph: It needs to be said that this would be the consequence for ozone if there are no further controls, and it would be better to say that sharp reductions in emission will be needed to keep ozone within existing standards. MacCracken	NE	Accepted and thank you. The text has been changed to reflect these comments.
BR	MacCracken	120	1		The second sentence should include mention of the strong vegetation cycle and of warm summers (after all, it is a major vacation area and the first subsection is about the extreme heat). MacCracken	NE	The suggested change has been considered, but not accepted. The meaning of a strong vegetation cycle can be ambiguous and the sentence already mentions heat waves so we feel that the addition of warm summers is unnecessary.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	120	2		I would think it better if the first sentence said “Each of these observed changes is consistent with the changes expected in this region from global warming.” MacCracken	NE	Accepted and thank you. The suggested change has been made.
BR	MacCracken	120	3		The second sentence, while true, is misleading as this report does not talk about scenarios where choices have been made—these scenarios are no-policy scenarios. Rephrasing is necessary to indicate that while true, much lower emissions would mean even smaller impacts. MacCracken	NE	Accepted and thank you. The text has been modified to reflect these comments.
BR	Ebi	121	1	9	This will change by the end of the century. Ebi	NE	We understand the comment to refer to the availability of air conditioning in the Northeast. The text has been changed and now reflects the reviewer’s comment.
CC	Henson	121			Figure 1: Maybe print the intervals in red and orange, to match the icons and to make it easier to connect the years with the states? Henson	NE	The Figure has been deleted from the document, so the comment is no longer relevant.
CC	Henson	121	3	8	Replace "ten to 20 percent" with "10 to 20 percent" Henson	NE	Thank you for the comment. The text in question has changed and the point made in the comment is now addressed.
BR	MacCracken	121	1		As conditions change, more air-conditioning will be installed—that is adaptation. And houses in northern regions (well, with the exception of our summer home in NW Connecticut) are typically tight enough and well-enough insulated that they will be relatively easy and inexpensive to air condition. The place where the real problem will be in more to the south, where the houses are not so tight (and an indication of this is that the state with the most dependence on electric blankets is Florida—or at least it used to be), for there one must structurally improve the homes for air conditioning to be cost effective—and many people in this region are poor or on very limited budgets. MacCracken	NE	The text has been changed to reflect these comments.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	121	2		The problem for agriculture in the Northeast as the region is that they will not be able to compete in growing warm season crops with areas of the region with better soils (of course, if the cost of transporting food grows along with the movement for locally grown foods, they might do well). MacCracken	NE	Thank you for the comment. We agree that the point is interesting and it is dealt with in the cited reference.
BR	MacCracken	121	3		This analysis of milk production seems overly precise and based on average changes rather than the situation with variability included. Not considering farmer responses, as is indicated, is basically saying this is a “dumb farmer” analysis—which has been a discredited approach for quite some time. MacCracken	NE	Thank you for the comment. The text has been changed to reflect these comments.
BR	MacCracken	121	4		The opening sentence is a general point that should not be repeated here. The paragraph and heading should mention the storm surge issue, not just sea level rise and heavy downpours. MacCracken	NE	Thank you for the comment. The opening sentence has been deleted as suggested The text has been changed to reflect the comment regarding storm surge, although we have decided to retain the paragraph heading with its emphasis on sea-level rise and heavy downpours.
BR	MacCracken	122			Figure caption: Is sea level rise really so different for the two scenarios? In any case, the real issue will be storm surges, and for these, I rather doubt that the amount of sea level rise makes such a big difference. Also, given the there is a published study looking at the potential for storm surge barriers for New York harbor, that possibility should be mentioned (after all, it is an approach already being used in a number of New England coastal communities—see Bowman, M., D. Hill, F. Buonaiuto, B. Colle, R. Flood, R. Wilson, R. Hunter, and J. Wang, 2008: Threats and responses associated with rapid climate change in metropolitan New York, pp. 119-142 in Sudden and Disruptive Climate Change: Exploring the Real Risks and How We Can Avoid Them, M. C. MacCracken, F. Moore, and J. C. Topping, Jr., eds., Earthscan, London, UK, 326 pp. MacCracken	NE	Thank you for the comment. The caption has been revised and a sentence addressing storm surge barriers has been added as suggested.
BR	MacCracken	122	1	1	In first sentence, say “The rising sea level is ...” The text at the end of the paragraph basically duplicates what is in the caption. MacCracken	NE	Thank you for the comment, However, we think this is an instance in which repetition is not a bad thing so no change.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	122	2		It would help to indicate the percentage of the economy represented by \$7.6B—is this a large number or small one? MacCracken	NE	The region GDP in 2007 dollars is about 1.6 trillion, so the number is small for the region, but not to those who make their living from winter recreation. Therefore, we feel that to express it as an absolute ratio would obscure the point being made.
CC	Henson	123	1	5	Replace "declined" with "has declined" Henson	NE	Thank you for the comment. The text has been changed as suggested.
CC	Henson	123	2	5	Replace "The commercial potential of lobster harvest appears limited in its southern extent, today, by this temperature-sensitive shell disease and in the coming decades, by rising nearshore water temperatures." with "This temperature-sensitive shell disease appears to be limiting the southern extent of commercially viable lobster. In the coming decades, rising nearshore water temperatures will also limit the lobster's southern extent." Henson	NE	The suggestion has been considered but not accepted because we feel that it introduces some changes in the meaning of this sentence.
CC	Henson	123	3	4	Replace "the sea floor" with "on the sea floor" (OK??) Henson	NE	Thank you for the suggestion. In response to another comment, the meaning of this sentence has been clarified through the addition of missing word "near" in front of "sea floor."
CC	Henson	123	3	4	sentence may not be needed; the 54F threshold is implicit in the previous sentence Henson	NE	Thank you for the suggestion but after consideration, we have decided to keep the original wording.
CC	Henson	123	3	12	What's "recruitment"? Makes me think of fish that encourage other species to become cod. =) Henson	NE	Thank you for the comment. The word "recruitment" has been removed.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	123	3	1	The first sentence does not make sense—something is fouled up. MacCracken	NE	Thank you for the comment. The missing word “near” has been added in front of “sea floor.”
CC	Henson	124	1	6	Replace "increased" with "has increased" Henson	SE	Accepted and thank you.
CC	Henson	124	2	10	This sentence made me wonder how the projection relates to the present. Does the upper tier of states currently receive *less* rainfall than the Gulf Coast? If the projections denote a switch, it would be good to cast it in those terms. Henson	SE	Accepted and thank you. The phrase about the upper tier of states has been modified.
CC	Henson	124	3	17	Replace "2030" with "2030." Henson	SE	2030 is correct. We are not sure what is meant by this comment. No change has been made.
CC	Henson	124	3		Perhaps acknowledge that many factors will play into how and when hurricanes change, but “all else being equal,” warmer oceans will lead to stronger hurricanes? Henson	SE	Accepted and thank you. A sentence has been added in response to this comment.
BR	MacCracken	124			Not having discussion of the likely impacts of sea level rise mentioned on the first two pages of the spread seems to me to be missing a very key issue. MacCracken	SE	Accepted and thank you. A sentence has been added mentioning sea level rise.
BR	MacCracken	124			Bottom figure: If the shading represents the range of model results, this needs to be said. Also, showing the observations and comparing them to time averaged model simulations is comparing apples and oranges—the nature of chaos needs to be explained (probably again and again), certainly, at least, in a spread on models. MacCracken	SE	That figure has been removed and the comment is no longer relevant.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	124	1		Third sentence, it would help to say 4-7 days out of how many. Regarding second half of the paragraph, it would really help to have an analysis of the changes in weather types and features that are causing this change. For trends in precipitation, great care must be taken to avoid being misled by an occasional very high number from a hurricane year, etc.—what one really wants is some trend in beneficial/useful precipitation. It would also help to know if the increase in drought is from a reduction in tropical storms, or perhaps a reduction in cold fronts getting to the region to trigger the thunderstorms, etc. Give a sense of the changes in weather causing the change. MacCracken	SE	Accepted; “per year” has been inserted.
BR	MacCracken	124	2	3	On line 3, change “greatest” to “largest” but, more importantly, explain if the greater warming is due to the region drying out, so losing the ability of moisture to cool the surface, maybe causing the loss of vegetation, etc—give an explanation of what is going on. The third sentence does not make sense—comparing things with quite different metrics. Regarding the suggested “much higher heat index”—this is not really evident in the figure on page 54. MacCracken	SE	Accepted and thank you. The sentence has been revised for clarification.
BR	MacCracken	124	3	4	On line 4, the Kerry Emanuel finding is that there is an increase in the hurricane destructive power (or effect)—due to higher winds and or storms lasting longer. Last sentence needs a period. MacCracken	SE	Accepted and thank you.
BR	Ebi	125	1		Bullet 1: Assuming no change in acclimatization and adaptation. Ebi	SE	Accepted and thank you. A phrase about adaptation has been added.
CC	Henson	125	1		Replace "deaths is generally" with "deaths in this region is generally" OK?? [Also, this sentence contrasts a number with a percentage. Perhaps restate?] Henson	SE	Thank you for your comment. This part of the section has been slightly reworded.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	125	3	3	Replace "climate change," with "climate change" Henson	SE	Accepted and thank you.
CC	Henson	125	3	8	Replace "diversity can" with "diversity may" Henson	SE	Accepted and thank you.
BR	MacCracken	125			Figure on number of days over 90 F: Title needs to say this is per year. Also, using 1961-79 seems an out-dated baseline given what people today have adapted to and expect. MacCracken	SE	Accepted and thank you. The Figure title now indicates "per year."
BR	MacCracken	125	1	1	In first sentence, say "heat-related stresses"—and are trees the only type of vegetation that will suffer? Regarding the first bullet, this seems to be assuming no adaptive response (sort of a "dumb citizen" approach). Regarding the third bullet, it would be better to say that macadam roads will have to be converted to cement to prevent extensive buckling—and indicate cost. In fifth bullet, perhaps indicate that it is outdoor production that will decline—indoor production will basically cost more. MacCracken	SE	Accepted all 3 points, thank you. The first bullet was revised to include the phrase "less adaptation measures are implemented". The CCSP has no product that supports the second recommendation on roads. "Poultry" was deleted at the end of this bullet and a new sentence added about poultry and swine in housed operations.
BR	MacCracken	125	2	9	On line 9, it is more probably 'Loss' than "elimination" which sounds more intentional. MacCracken	SE	Accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	125	3	1	In first sentence, mention less rainfall as a cause (or maybe it is less frequent, but more intense rainfall). The second sentence needs to be rewritten to be clearer—and to indicate the timing of the increase in the storage capacity (so compared to when). In line 5, the word “conflicts” needs to be changed to “disagreements about priorities” to be clearer about what the issue is and so as not to imply we will have a breakout of violence. The fourth sentence needs to be reversed in order to say “As humans seek to adapt to climate change by manipulating water resources, streamflow and biological diversity are likely to be reduced.” In fifth sentence, can eliminate “as projected.” In sixth sentence, rewrite to say “Responding by increasing groundwater pumping will further stress or even deplete aquifers and place increasing strains on surface water resources. In last sentence, change to say “and are likely to lead to saltwater” MacCracken	SE	Thank you. All suggestions accepted, with exception of eliminating the word “conflicts,” which we prefer to retain.
CC	Henson	126			Headline: Replace "tropical storm" with "tropical cyclone" OK?? Henson	SE	Thank you. “Tropical storm” has been replaced with “hurricane.”
CC	Henson	126	1	1	Replace "sea-level rise" with "sea-level rise" [remove extra space before ‘rise’] Henson	SE	Thank you. The sentence has been revised and the extra space eliminated.
BR	Hooke	126			The title at the top of the page says “will” while the text beginning midway down the page beginning “An increase in hurricane intensity” says “would:” Some way should be found to make these a bit more obviously consistent. Hooke	SE	Accepted and thank you. We have changed “would” to “will” in the text.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	126	1		In first sentence, change to say “intensity are likely to be among the most costly consequences of climate change for this region.” And regarding this point, if this is the case (and I agree it is), then should this point not be addressed earlier in this regional write-up? In the second sentence, rewrite to say “will be inundated more frequently by storm surges, and then later permanently lost due to sea level rise.” In third sentence, explain what is meant by “altered”. In fourth sentence, change to say “coastal zone, leading to a restructuring of coastal ecosystems and displacement of them inland from their present locations.” In fifth sentence, change to say “is likely in low lying areas where extensive leveeing would not be able to protect against sea level rise and higher storm surges.” And on last sentence’s conclusion, in my view, IPCC even underplays the uncertainty. MacCracken	SE	Accepted, the first sentence was revised as suggested and a mention of sea level rise was added. Mention of levees as an adaptation measure has been added in a new adaptation discussion at the end of this Section.
BR	MacCracken	126	2	1	Rewrite first sentence to say “Compared to the present coastal situation, for which vulnerability is quite high, an increase in hurricane intensity would further affect ...” In the second sentence, it would help to explain what “implications” means—that is uselessly vague. In third sentence, would be clearer if said “ecosystems throughout the Southeast. In the fifth sentence, delete “our” or say what “our” refers to. Finally, I think that it would be important to mention the significant potential for increased inland flooding given the projected trend toward more rain and more destructive power from hurricanes. MacCracken	SE	Thank you. The paragraph has been revised in response to these suggestions.
CC	Henson	127			Headline 2: Replace "scarcity, and" with "scarcity and" Henson	SE	Thank you. This message has been reworded.
CC	Henson	127	1		Drop periods after each bulleted item? Henson	SE	Thank you, but we prefer to keep the periods.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	127	1	12	Replace "fresh water" with "freshwater" Henson	SE	Accepted and thank you.
CC	Henson	127	1	14	Replace "that lead" with "leading" Henson	SE	Accepted and thank you.
CC	Henson	127	1	20	Replace "a initial" with "an initial" Henson	SE	Thank you. The sentence has been revised.
CC	Henson	127	2	4	Replace "percent" with "percent," Henson	SE	Thank you. The sentence has been rewritten.
BR	MacCracken	127			Top photo of forest fire: The text mentions "intense wildfires"—the photo does not really look like an intense fire—it is a ground fire not even consuming the trees. MacCracken	SE	The photo has been removed.
BR	MacCracken	127			Bottom pictures: I would recommend taking these pictures out as basically uninformative and use the extra space for better explanations. MacCracken	SE	Accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	127	1		In headline statement, say ‘to be crossed throughout the region, causing’. It would help if the first sentence gave a few examples of the ecological system services being referred to. With respect to the first bullet, it is not just the loss of land, but also the loss of homelands for the people living there—it is important to mention the impacts on people as well. The third bullet is too complex—make the points more user friendly. The fourth bullet also needs a bit of explanation as well—is climate change already causing “precipitous decline of wetland-dependent coastal fish and shellfish populations”? And the phrasing here is just overly complex. MacCracken	SE	Accepted and thank you.
BR	MacCracken	127	2		In the second sentence, delete “in size”—while it may be true, this is not the place to suggest that the average size of women’s dresses has gone from 10 to 20 or something. On line 4, say “percent and were concentrated”. On line 6, say “are likely to be affected” as I assume it is meant that both population and quality of life are being altered. MacCracken	SE	Accepted and thank you.
BR	Ebi	128	2	3	The extent to which this is an analog for future events will depend on assumptions about acclimatization and adaptation. Ebi	Midwest	Agreed. Text added to address this point.
BR	Ebi	128	4	1	Please check this statement. I believe the IPCC concluded that nighttime temperatures are not longer increasing faster than daytime temperatures. Ebi	Midwest	Thank you. The text has been revised to correct for more recent data.
CC	Henson	128			Figure 1: Too many states and arrows in this graphic? I found it confusing, even though I understood the message. Maybe you could use a different solid color for each “current” state and a pastel of that shade for the “future” state. Henson	Midwest	Thank you for the comment. The Figure has been modified in response.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	128	2	7	Need a time frame for this projection; it doesn't appear till end of paragraph Henson	Midwest	Thank you for the comment. The text has been revised to include the time frame.
CC	Henson	128	3	3	Replace "brown-outs" with "brownouts" and "black-outs" with "blackouts" Henson	Midwest	Thank you. The text has been revised.
BR	MacCracken	128			Figure 1, caption: A better way to say what is happening is that the weather of the southern regions is shifting up to the North, so, for example, Illinois will be experiencing the weather now typical of the Gulf Coast—including the heavy precipitation events, etc. It is not just how people will “feel”—it is about the type of weather that will be affecting the landscape. MacCracken	Midwest	Thank you for your comment. The figure has been revised and the caption expanded.
BR	MacCracken	128			Lower figure on heat waves: A caption is needed that explains the number of days in a heat wave. MacCracken	Midwest	Thank you for the comment. A caption has been added as suggested.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	128	1		<p>Compared to the other regional write-ups, this one paragraph introduction is pretty short. I would urge in this paragraph to also give a sense of the changes in the weather (recall that Peter Sousounis did this for the Great Lakes regional assessment)—basically we’ll be having fewer intense cold fronts coming out of the much warmer Arctic, and the weather in the region will be more like what it is to the south of the region now. With respect to the record-breaking floods, the moisture for these is moist air from the Gulf getting further north than normal. With respect to the levels of the Great Lakes, it is not so much that less ice is leading to more evaporation, but that warmer summer temperatures are—and the Great Lakes have a very small drainage basin so that changes in rainfall make a very large difference. Also, regarding last sentence, clarify why there are more heat waves—presumably less active frontal activity coming out of Canada and the Arctic.</p> <p>MacCracken</p>	Midwest	Thank you for the comment. However, the space is too limited to add such text. Weather related information would be good but we think less necessary for the public audience this document is intended for.
BR	MacCracken	128	2		<p>Regarding the heading, it is quite possible that adaptive measures will be taken to ensure that public health is not negatively affected—but it seems quite clear that these measures will adversely affect the quality of life in the region (less outdoor time, etc.)—so perhaps some rephrasing would be appropriate. Regarding the third sentence, it is not clear this is a defensible statement given that adaptation will occur (in people and in buildings)—were this true, we would constantly be having a lot of heat-related deaths in Dallas and Atlanta, etc.—and we don’t. I think it actually turns out that one gets more deaths when events are rare than when they are common (e.g., we get more traffic accidents from ice and snow in Washington DC, where such conditions are rare, than in more northern areas where such conditions are common). On line 8, say “in Chicago by 2100” and really what the lower emissions scenarios does is to just delay the indicated condition by a couple of decades—so say this—reach beyond 2100. Regarding last sentence, same comment as for second sentence—the more things happen, the less the impact will be—that is what adaptation is all about. MacCracken</p>	Midwest	Thank you for the comment. A sentence has been added noting that some health impacts can be reduced through better preparation.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	128	3		Again, this sentence is assuming that there will be no response—sort of the “dumb utility” response. The paragraph should be rewritten to say that the system will have to be upgraded to ensure that such electricity disruptions will not become much more common. On line 5, change “oil and gas demand” to “the need for energy”. MacCracken	Midwest	Thank you. The text has been revised.
BR	MacCracken	128	4	1	On line 1, delete “even”. With respect to the urban heat island effect, a contributing cause is the heat from energy dissipation. And in last sentence, again, this is the case until the region adapts. MacCracken	Midwest	Thank you. The text has been revised.
BR	Ebi	129	2	2	I am not sure the concern over WNV is growing – it is already quite high. Ebi	Midwest	Thank you. The text has been revised.
CC	Henson	129	1	1	Replace "ozone or urban" with "ozone and urban" [or is ozone considered synonymous with smog?] Henson	Midwest	Thank you. The text has been revised.
CC	Henson	129	3	9	Need a time frame Henson	Midwest	Thank you. The time frame has been added.
BR	Hooke	129			“Declining air quality is a concern,” then in the next paragraph “...virus is thus a growing concern.” Are we suggesting these are comparable? If not, which is greater? There are a number of places in the regional impacts section that talk about impacts but don’t guide the reader as to the relative importance, manageability, etc. of these issues. Again, my guess is that instead of doing too much to try to fix this, might best be left as a task for future studies. Hooke	Midwest	Thank you. The text has been revised to address this comment.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	129			Lower graphic: The title of figure or caption needs to say whether these estimates from GCMs or detailed lake hydrology models with GCM results imposed? The lines and figure as a whole gives no indication of the degree of uncertainty in the result—is the graph from one model study or many? I thought there was even the potential for Lake Superior to be cut off from the other lakes (except by canal). Also, the first sentence of the caption needs a rewrite saying something like “Average levels of the Great Lakes depend on the balance between, on the one hand, precipitation and incoming runoff from its small watershed and evaporation and outflow on the other hand.” The second sentence of the caption is basically wrong—at least incomplete—and in conflict with the text—the main increase in evaporation is in the summer due to warmer temperatures. MacCracken	Midwest	Thank you. A reference and explanatory text added.
BR	MacCracken	129	1		I would change first sentence to read “ozone (urban smog) that can cause respiratory problems for people who do not take precautions, especially.” The phrasing of the last sentence is just right—this is the way to make the needed points. MacCracken	Midwest	Thank you. The text has been revised.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	129	3		<p>In second sentence, it might be added that the drainage basin is small, so there is little runoff into the lakes. With respect to the word “likely” on lake levels dropping, the Great Lakes regional assessment found the result in something like 11 out of 12 models (see Midwest section of the National Assessment), so the likelihood was given as “very likely.” Indeed, I had a discussion on this point with Phil Cooney, so going back to just “likely” seems to be a retreat from what had been reasonably established, In the third sentence, I’d change it to read “Reduced lake ice also allows increased evaporation in winter, contributing to an increase in lake effects snow storms and a lower lake level.” Regarding the fourth sentence, the results cited in the National Assessment suggested a larger drop in lake levels, up to a potential of 5 feet—so what new results give this reduced decline (there are no references cited for all of this discussion)?</p> <p>In middle of paragraph, change “can result” to “would be likely to result”. In the second to last sentence change to say “which limits the weight of freight the ship can carry” as the present phrasing seems to apply more to a weightlifter than a ship. In last sentence, change to “Such impacts will put a drag on the regional economy by increasing costs for shipping, fuel, and maintenance and repair and reducing income from recreation and tourism.”: MacCracken</p>	Midwest	The text has been revised in response to the comment. However, not all suggestions used because of lack of space.
BR	Ebi	130	5		<p>These impacts also will affect human health. Ebi</p>	Midwest	These effects are mentioned earlier, but new emphasis has now been added in first paragraph.
CC	Henson	130	2	7	<p>Replace "during this century" with "by the end of this century" Henson</p>	Midwest	Accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	130	1		It would really help here to indicate the changes in weather going on. The precipitation increase is coming from the average northward shift in the boundary of moist tropical air from the Gulf of Mexico interacting with the cold air out of the Arctic—so, indeed, more and heavier precipitation (and even tornadoes in Wisconsin in January, as this year). In third sentence, say “Such heavy downpours can overload ...” With respect to the last sentence, it needs to be made clear what will have to be done to make sure this will not become routine, because whatever is need to do this will be done. This is a “dumb community health” analysis. MacCracken	Midwest	The text has been revised in response to the comment, but weather information has not added because of space limitations.
BR	MacCracken	130	2		This is well said, but it would help to say how often it happens now. MacCracken	Midwest	Thank you. The text has been revised to address this point.
BR	MacCracken	130	3		In second sentence, indicate that what is presumably meant is there was an effect on one-quarter of the US freight at that time and over that period—not over the whole year. And again, it would help to explain the types of change in the weather that are causing these changes. MacCracken	Midwest	We have re-examined the text in response to this comment, but don’t feel that changes need to be made in this paragraph.
BR	MacCracken	130	4	2	In line 2, I think it should be “drought” and in line 3 “are likely”. In last sentence, say that as streams dry up, native fish die off. MacCracken	Midwest	Thank you. The text has been revised to address these suggestions.
BR	MacCracken	130	5		This headline is well said. In first sentence, change to say “would be likely to delay planting.” In second sentence, say “effects on the yields of some crops, but this can be counter-balanced ...”—“crop” as possessive seems awkward. Rest of paragraph is well said. MacCracken	Midwest	Thank you for the comment. The text has been revised but “crop yields” is a common term in the Midwest and is left unchanged.
BR	MacCracken	130	6		Last line of page, change second line to say “Southeast are likely to become established throughout the Midwest” MacCracken	Midwest	Accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	131			Figure 1: There needs to be some description of the zones - what they are or refer to. Duce	Midwest	Thank you. An explanatory caption has been added to the Figure.
BR	Ebi	131	2		Will there be decreases in some species due to higher temperatures or changes in the hydrologic cycle? Ebi	Midwest	Yes, this is discussed in the following two paragraphs.
CC	Henson	131	1	2	Sentence needs a verb—"can be expected", maybe? Henson	Midwest	Thank you. The text has been revised.
BR	MacCracken	131			Box on adaptation: The first paragraph should mention white pavements and roofs as an additional option. In the second paragraph, simplify wording to say "use by changing to reflective roofing materials." [Otherwise, incidentally, it reads as if some disciplinarian is going to force the roofs to change their ways.] In second sentence say "image that shows that the radiating temperature of City ..."—and somehow make clear that this is not the air temperature being 77 F different. MacCracken	Midwest	The adaptation box has been removed and the issue addressed by this comment is no longer pertinent to the text.
BR	MacCracken	131	1	1-2	On lines 1-2, it is not clear how higher CO2 and nitrogen levels decrease air quality—maybe say, I presume, that CO2 enhances warming and plant growth, and this leads to more ozone formation—but mechanism needs to be stated here. MacCracken	Midwest	Thank you. The text has been revised.
BR	MacCracken	131	2	9	On line 9, change to "mobilize" and in next to last line to "hazard of all species" MacCracken	Midwest	Thank you. The first suggestion has been accepted and the text has been revised to address the second.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	131	4		I would suggest rewriting to say” will be affected by the effects of climate change, local extirpation, and by changes in competition as other species move into the Midwest region.” One cannot really have local extinctions—biologists I know do not like the term. In last line, change to “major metropolitan areas” as the suburban components matter as well. MacCracken	Midwest	Thank you. The text has been revised.
BR	Duce	132			Figure: (Bottom Right Corner) Other figures that use these thermometers (e.g., in Southwest and Alaska) only have the “mercury” going up to the top of the high emission estimate. This one has all the thermometers with the “mercury” at a constant value of about 16 degrees. These kinds of figures should be consistent. Duce	GrtPlns	Thank you for the comment. The Figure has been revised.
BR	Ebi	132			Thermometer Figure: This figure makes no sense. The one on page 136 is much clearer. Ebi	GrtPlns	Thank you for the comment. The Figure has been revised.
CC	Henson	132			Figure 1: Needs a caption explaining what’s being shown Henson	GrtPlns	Thank you for the comment. The Figure has been revised.
BR	MacCracken	132	3		Need to explain the weather changes occurring—basically, the coldest period of winter is becoming shorter, so a less intense cold season, but it is not that the lowest minimum temperature is that much warmer. Do more explanation of changes in the weather (which is what people live and experience). MacCracken	GrtPlns	Thank you for your comment. The text has been revised.
BR	MacCracken	132			Maps on precipitation: Is the baseline map at the top of the page inches per year of precipitation—give period of time. I think it would then help to have the maps of precipitation change (in percent) located nearby. MacCracken	GrtPlns	Thank you for the comment. The maps have been revised, placed next to each other, and had captions added.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	132			Maps of temperature change: Is this annual value? It would really help to give seasonal changes. Also, the color bars are upside down—one needs to have the maximum change at the top, not the bottom as the temperature is going up, like a thermometer. MacCracken	GrIPins	The color bars have been revised as suggested, and the revised temperature Figure clearly labeled as showing summer temperature changes.
BR	MacCracken	132			Thermometer diagrams: These are not done the same way as those on other pages as they have the red bars all at the same height. It needs to be said that these are supposed to be indicators of the change in temperature and not the actual temperature itself. It is also not clear why this diagram is needed as well as the maps of temperature change over the region. Reduce the number of figures and add to the explanations. MacCracken	GrIPins	Thank you for the comment. The thermometer Figure has been revised and a caption added.
BR	MacCracken	132	1	1	In first sentence say “by strong seasonal variations in climate”—the variability of seasonal change is far larger than of anything else. And, with respect to the drier and wetter variations, so this is a variation in the likelihood of moist Gulf air reaching the region and interacting with polar fronts—and this is an effect of changes in the global circulation apparently caused by changes in sea surface temperature—do a bit of explaining of what is happening. MacCracken	GrIPins	Unfortunately there is insufficient space to adequately describe the changes in air masses that contribute to climate over the Great Plains. However, the first sentence has been modified to be more precise in its language.
BR	MacCracken	132	2		Need to make clear that North Dakota can get quite warm in the summer—the way it is phrased now does not make clear that the whole region can get very warm. Also, in indicating the average temperature, it would be more useful to know the number of days below or above some temperature than the average. MacCracken	GrIPins	The comparison indicators have been made symmetrical (i.e., both average winter temperatures and number of days over 90°F are now given for both ND and TX).
BR	MacCracken	132	4	1-2	The first two sentences are repeated so often it gets very frustrating—talk about the models and results up front and then say very briefly and provide new information, not the same old stuff. And make clear it is not mainly our emissions decisions that will make the difference. Also, best to say “Over the 21st century” or this could mean the 22nd century. MacCracken	GrIPins	Text has been modified accordingly.
BR	MacCracken	132	5		An important point to make is that as the intersection of the cold and moist air shifts northward, so will the likelihood of tornadoes and related severe weather. MacCracken	GrIPins	Although this concept makes intuitive sense, as yet there are no peer-reviewed, published studies to support this hypothesis.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	133	3	4	The words “Figure 4” are used, but there are no figure numbers on the figures. Duce	GrIPins	Figure references have been removed from the text.
CC	Henson	133			Dust Bowl Headline: Replace "combined affects" with "combined effects" Henson	GrIPins	Accepted and thank you.
CC	Henson	133			Photo 1: This looks like a Dust Bowl photo that’s been colorized. If true, is that OK? Generally I’d avoid using colorized photography in a scientific report, although I know satellite images are often colorized. Henson	GrIPins	The photo has been replaced with an official NOAA photo.
CC	Henson	133			Sidebar, Paragraph 2, Line 1: Replace "dust bowl" with "Dust Bowl" [as on page 132] Henson	GrIPins	Accepted and thank you.
CC	Henson	133			Sidebar, Paragraph 2, Line 6: Replace "dust bowl" with "Dust Bowl" [as on page 132] Henson	GrIPins	Accepted and thank you.
BR	Hooke	133			Figure: Figure on the aquifer shows the drawdown. How many years’ worth of water remain? Under what assumptions? Readers will be interested. Hooke	GrIPins	Unfortunately the answer to that question is unknown. Although total drops in aquifer level can be measured, the initial amount of water contained in the aquifer is unknown.
BR	MacCracken	133			Box on Dust Bowl, first paragraph: In title of box, correct to say ““Combined effects”. In first sentence say “During the 20th century, large-scale” and delete “has” on line 2. The second sentence also does not seem to connect to the first, or even the box as a whole. MacCracken	GrIPins	Thank your for your comment. We have changed the title.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	133			Box on Dust Bowl, second paragraph: On line 3, change to “plowed”. In third sentence, I would argue that we do not know that “Natural variations in the ocean then caused ...”—there were human influences then as well, so this is really a statement that we have not figured it all out. Again, on line 7, we do not know that the Dust Bowl all resulted from “natural climate changes”—we just have not proven anything at all, so it is assumed to be natural, but this was a time of human influences on the climate, whether greenhouse gases, increased sulfate aerosols, land cover changes, etc. (and strictly speaking, if anything, it should say from natural climate fluctuations—not changes, as they did not persist long enough). In last sentence, “similar” to what? MacCracken	GrIPIns	The text appearing here is based on the consensus in the scientific literature, namely that unsustainable agricultural practices could not withstand a short-term variation in climate that mostly likely was primarily natural. No published literature exists that can identify a global-scale anthropogenic influence on the Dust Bowl.
BR	MacCracken	133			First paragraph (of main text): Is the second sentence correct—with all the dams on rivers is this really the case. With respect to the third sentence, the aquifer also holds some recharged water, so it is not all “ancient” water—a point made at the bottom of the page but this also needs to be clarified here. Also, what is “Figure 4”? MacCracken	GrIPIns	Yes it is correct. The text has been changed to clarify that aquifer also is recharged currently. Reference to Figure 4 removed.
BR	MacCracken	133			Figure: The figure is too detailed to be so small. MacCracken	GrIPIns	Thank you. The Figure has been enlarged.
BR	MacCracken	133	2		Second paragraph (of main text): What period is being referred to? When was the aquifer seen as only a last resort? MacCracken	GrIPIns	This refers to the time period being when the region was first cultivated, before widespread irrigation. The text has been clarified to make this point.
BR	MacCracken	133	4	1	Fourth paragraph (of main text): In first sentence, reword to say “only increase the stress on already overdrawn water sources.” Don’t use the word “tax” unless that is meant. MacCracken	GrIPIns	We prefer to keep the text as is and have added a number of references to this sentence.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	134			Adaptation Box: I note that there are no “Adaptation Strategies” examples in most of the other state regions. Why not? Duce	GrtPlns	Although the USP does address adaptation, it is not intended to do so comprehensively.
CC	Henson	134	5	2	Replace "fisherman" with "fishers" Henson	GrtPlns	Thank you, but we prefer the term “fishermen.”
CC	Henson	134	5	3	Replace "duck," with "duck;" Henson	GrtPlns	Accepted and thank you.
CC	Henson	134	6	1	Replace "climate driven" with "climate-driven" Henson	GrtPlns	Accepted and thank you.
BR	MacCracken	134			Third through sixth paragraphs and Adaptation Strategy box: Very good—this is just the type of analysis that should be done throughout the report, allowing for adaptation. MacCracken	GrtPlns	Thank you for the comment.
BR	MacCracken	134	1		Regarding “agricultural heartland” claim, I think California might object—maybe refer to region’s leadership in grain growing. On line 3, I’d take out “floods” as these typically have more local effects and do not “wither crops.” MacCracken	GrtPlns	Thank you. The text has been modified as suggested.
BR	MacCracken	134	2		Hooray—recognition that optimal zones for crops will shift, and should mention that therefore so will the actual growing zones. On line 3, change to “but will also lead to faster growth of some types of weeds.” MacCracken	GrtPlns	Thank you. The paragraph has been reworded.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	134	7		Change to “threatened the distinctive wetlands of the Great Plains.” The possessive Great Plains should be avoided—and it is certainly not “Plain’s”. MacCracken	GrIPIns	Thank you for your comment. We have corrected the apostrophe.
BR	MacCracken	134	8		The paragraph is fine except for the first sentence, which is incomplete and so quite misleading as it implies only Native Americans live outside urban areas. MacCracken	GrIPIns	Thank you. The sentence has been clarified.
BR	Duce	135			Figure: The text in the figure is almost impossible to read. Duce	GrIPIns	Thank you. The Figure and text have been enlarged.
CC	Henson	135	1-3		Put the subheads in bold face? Henson	GrIPIns	Thank you. Done.
BR	MacCracken	135	2		Change to say “than those in urban communities” or it seems that it is the infrastructure rather than the people suffering poor health. MacCracken	GrIPIns	Thank you for your comment. We have decided to keep the text as-is.
BR	MacCracken	135	3	2-4	On line 2, it would help to say out of how many cities considered—so maybe out of the top 100? On line 3, change “challenged” to “being overused” or similar. On line 4, change “may also” to “are likely to” and at end of sentence indicate whom the comparison is being referenced to. MacCracken	GrIPIns	Thank you for your comment. This point has been referenced.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	135			Box on playa lakes: This box is nicely done. However, in second paragraph, there seems to be some overlap in first and second sentences—maybe say in first sentence to “feed and to rear their chicks”. Somehow, I am not sure birds ever rest. In third paragraph, start fourth sentence with “In many areas, agricultural” In fifth sentence, say “expected to become an increasingly important additional stress, with ...” And the figure is too small—needs to be larger. MacCracken	GrtPlns	Thank you. The Figure has been enlarged and the text modified in the second paragraph. The other changes are not accepted because we feel that they change the meaning.
BR	MacCracken	135	1		You might also mention the social challenges of unemployment, poverty, etc. and also the very significant windpower resource. MacCracken	GrtPlns	Those points for which we could find references are now included.
BR	MacCracken	135	4		All but the first sentence is about mitigation and not impacts. MacCracken	GrtPlns	Thank you. A subhead has been added and the text revised to address this comment.
BR	Duce	136			I realize that space is very limited, but I was somewhat surprised when reading the southwest section to see that there is no comment about the impact of climate change on the southwest monsoon, which has such a dramatic impact on the precipitation patterns in much of the Arizona, New Mexico, far west Texas and parts of southern California. Duce	SW	Thank you. Text noting the lack of scientific and modeling consensus on the summer monsoon has been added.
BR	Field	136			Southwest: I am surprised that there is no mention of first nations (indigenous peoples) in this section. Even the section on Alaska barely gets into first nations issues. Throughout the report, there are lots of general statements about vulnerable people and activities, but little effort to make this explicit. Field	SW	Thank you. We have added new text, although peer-review literature is limited in this area, and thus our coverage is also limited.
CC	Henson	136			Figure 1: Should the label read °C instead of °F? The adjacent text refers to 18°F, but that seems to correspond to 10°F in the image. Henson	SW	Thank you. The text referred to summertime temperature changes while the figure is for annual averages. The former has been reworded.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	136	1	6	Replace "experienced the" with "experienced its" Henson	SW	Thank you. The suggested change was made.
BR	MacCracken	136			On the four page spread: With California having more people than all of the other states combined, this section seems quite unbalanced in that it seems to mention California issues in only one four line paragraph and in a couple of phrases in sentences about the region. This imbalance has to be corrected. MacCracken	SW	Accepted, imbalance corrected with more material relating to California.
BR	MacCracken	136			Thermometer graphic: This is better done than the one on page 132, but it still does not say that this is a graphic of temperature increase instead of temperature. MacCracken	SW	All figures in the new version will include a caption to indicate that these are increases from a specified base period.
BR	MacCracken	136	1	1	In first sentence, I think most people would say the Southwest stretches from the southern Rocky Mountains to the Pacific Coast, thus at least moving in a westerly rather than an easterly direction. In the third sentence, well, one might say the Sahara Desert is undergoing the longest megadrought on Earth (and thank you for capitalizing Earth). With respect to the “most rapid population” statement, I note across these sections claims of being the largest—say compared to what. In last sentence say “prospect for future droughts becoming more severe as a result ...” MacCracken	SW	Thank you. The first and last sentences have been edited as suggested. The reviewer is correct that drought cannot be normal. The third sentence has been edited to reflect this point.
BR	MacCracken	136	2		Using the phrase “up to 18 F” is really alarmist—what is it, worst scenario and worst place in the region and this is probably a location that went from being moist to dry. A much more nuanced statement is needed. With respect to the “declining air quality” comment, need to say “unless more stringent control measures are taken” to show that this can be dealt with—and US law provides for this happening. MacCracken	SW	Noted. The text has been changed to emphasize less the possible magnitude, but rather the likelihood that regional and seasonal extremes could change more than reflected in the thermometer figure that relates to annual average changes only. Also, included is relevant reference to the urban heat island effect.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	136	3	2	On line 2, reword to say “projected that, combined” MacCracken	SW	Thank you. This paragraph has been reworded.
BR	MacCracken	136	3		third paragraph (and extending to page 137, second paragraph): Given the history of the matter, please do not use the word “conflicts” (or “conflict”) to describe what lies ahead-it sounds like a prediction of water wars—not just in the court, but literally. How about saying “discord” or “contention” rather than using the word conflict at least six times on these two pages? MacCracken	SW	Thank you. We have made some modifications based on this comment, but reserve the use of ‘conflict’ as appropriate. Conflict is the term most commonly used in the scientific literature and by stakeholders in the region. The term has no connection, in reality, to physical fighting.
BR	MacCracken	136	3	1	Rewrite line 1 to say “Water is needed to meet the demands of the region’s increasing population as well as for agriculture, hydroelectric power, and healthy ecosystems.” I would actually move the last sentence of the paragraph up to be in front of this sentence. On line 2 of the present version, say “including for some” and on line 5 change “explosive” to “large” and again get away from the “war” images. MacCracken	SW	Thank you. The suggested edits have been made.
BR	MacCracken	136	3		Third sentence, and lower figure: While Phoenix and Las Vegas may have the highest percentage growth rates, California has the largest increase in the number of people—and it is the number that counts for requiring water. Indeed, the map shows very high growth in California, but it is not even mentioned. This all seems to have come from a report that did not consider California. The figure caption also needs some tuning up. MacCracken	SW	<p>California is mentioned in the sentence above and two example cities were mentioned, one in Arizona, one in Nevada. We feel that adding another example city from California is unnecessary.</p> <p>Actual increases in population is directly related to water use but when it comes to changing the relationship between water supply and use, it is the percentage population change that matters most.</p> <p>The figure caption has been tuned.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	136	4	2	On line 2, delete “more” (more than what?). Delete “all-important” and add at end of sentence: “months, when it is especially needed to fill reservoirs to meet summer demand.” MacCracken	SW	Thank you. The suggested edits were made.
BR	Duce	137			Figure 2: What does the red signify on the far right of the figure? Duce	SW	This has now been clarified in the figure caption.
CC	Henson	137	2	2	“Bi-national” seems jargony here when the only two countries involved are U.S. and Mexico. Henson	SW	This term has been removed, although the terminology is in common use in many communities.
CC	Henson	137	4	2	Replace "made more" with "with its effects made more" Henson	SW	Thank you; “made more” has been removed.
CC	Henson	137	4	8	Replace "longer — many decades long — droughts" with "longer droughts — many decades long —" Henson	SW	Thank you. The paragraph has been reworded.
BR	MacCracken	137			Upper figure: This map should be deleted. It looks to be from a GCM that does not adequately represent the orography and so is just plain wrong. Also, the base period is rather old (and odd). Find some better way to convey the results—change in number of storms, etc. MacCracken	SW	Thank you. This figure has been reworked.
BR	MacCracken	137			Box on the Southwest, first paragraph: On second sentence, “climate projections” are still quite limited for the region—models don’t do well on ENSO or have fine enough orography. Also, delete the word “ever” as model runs typically only go to 2100. MacCracken	SW	Thank you. The suggested edit has been made.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	137			Box on the Southwest, second paragraph: Change wording starting in second sentence to say “medieval times, multiple droughts gripped parts of the Southwest. These droughts sharply reduced the flow of the Colorado River and runoff from the Sierra Nevada as well as drying out the region as a whole.” On last line, say “a devastating “one-two punch” for the region.” MacCracken	SW	Thank you. The suggested edits have been made.
BR	MacCracken	137			Box on the Southwest, figure: What does the “red” curve indicate? MacCracken	SW	This is now explained in the figure caption.
BR	MacCracken	137	1	6	In line 6, say “to meet the agreed-upon allocations.” On line 7 say “At the cost of food production, water used in agriculture ...” and say “during especially dry periods” as the region is always dry. In last sentence, change “disappearing” to “being depleted” MacCracken	SW	The suggested edits have been made.
BR	MacCracken	137	2		The word “conflict” is used five times in this paragraph—get rid of them all and talk about contention or discord or some not violence-related word. Also, the first two sentences can likely be combined. The sentence dealing with “lost” water needs a bit of elaboration to be understandable—I assume what is meant is that the allocations could be cut, but others might not get it. MacCracken	SW	Thank you. Please see the response to previous comment on the use of “conflict.” The text has been modified to elaborate as suggested on “lost” water.
CC	Henson	138	1	9	I’ve heard that up to 90% of some piñon populations are gone. Would be nice to give a dramatic statistic here if one is available. Henson	SW	Thank you. The comment has been noted. It is true for some locales, but not others.
CC	Henson	138	2	2	Replace "have the potential" with "has the potential" Henson	SW	Thank you. This portion of the text has been reworded.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	138	2	4	Replace "fire, and" with "fire and" Henson	SW	Thank you. This portion of the text has been reworded.
CC	Henson	138	3	2	is "riparian" familiar enough to laypeople? Maybe use "river-based" or "river-adjointing"? Henson	SW	Thank you. This portion of the text has been reworded.
BR	MacCracken	138	2	3	On line 3, change "these" to "those" and on line 4 change it so say "fire and that have". In fourth sentence, say "The warming climate will also impact" and later say "in other ways, leading to, for example, more woody species spreading northward" MacCracken	SW	Thank you. This portion of the text has been reworded.
BR	MacCracken	138	3		Last word should be "supplies". MacCracken	SW	Thank you. This portion of the text has been reworded.
BR	MacCracken	138	4		The phrase "there are undoubtedly" sounds like unscientific reaching. As to the rest of the paragraph, what is needed is to give some indications of the adaptations that are necessary. MacCracken	SW	Thank you. This portion of the text has been reworded.
BR	Ebi	139	4-5		Adaptation Strategies: Prognostications? Ebi	SW	Thank you. We are still considering this comment.
BR	Ebi	139			Figure 1: This figure is not related to the adjacent text. Ebi	SW	Thank you. This figure has been removed from this section.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	139	3	2	Replace "seeing the affects" with "seeing the effects" Henson	SW	Thank you. This portion of the text has been reworded.
BR	MacCracken	139			Adaptation box, first paragraph: In the second sentence, ‘Sealing attic vents” needs to be mentioned—it is sparks getting drawn in that causes a lot of fires and some developers are already, for about 1% of the price of a new home, getting rid of the vents—and it works. Also, it should be mentioned that a challenge of selecting ignition-resistant building materials is that they also have to be earthquake safe (and not crack, so very costly to repair)—earthquake safety is why the houses are build of wood instead of bricks. MacCracken	SW	Thank you. We are still considering this comment.
BR	MacCracken	139			Adaptation box, second paragraph: I’d change the first word from “Additional” to “Community-based”. In the second sentence, what is needed is information on regrowth rates of plants (they need fast growing ones to stabilize soils after fires or winter mudslides are the result), but fast growing can also lead to rapid reaccumulation of burnable biomass—so indicate the conflict that exists. The phrase “improving prognostications for regeneration” is far too complex. In last line, say “another, although more controversial, strategy for adaptation.” MacCracken	SW	Thank you. We are still considering this comment.
BR	MacCracken	139			Top figure: It needs to say that what is meant is that, for example “40% of baseline snowpack is remaining” and maybe make case that the baseline value was the standard for designing all the significant water infrastructure in California. MacCracken	SW	Thank you. This figure has been removed from this section.
BR	MacCracken	139			Adaptation box, figure: It seems to me a bit jarring to have a box on fire have a figure that is primarily green in color and that has deciduous trees very uncharacteristic of the region. In addition, the house looks like a shack instead of the expensive structures being built at the fire-suburban interface. MacCracken	SW	We appreciate the comment. We have removed the figure and altered the color scheme.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	139	1		The lead in headline talks about flooding, but the region is said to be drying out. Some explanation is needed—presumably that these are flash floods—and it would be helpful to make this point on line 7 of the paragraph. In line 1, say “further climate change”. MacCracken	SW	Thank you. The text has been changed.
BR	MacCracken	139	2		In last line, say “flooding from more rapid springtime snowmelt, coupled” MacCracken	SW	Thank you. This portion of the text has been reworded.
BR	MacCracken	139	3	2	On line 2 say “is already experiencing the adverse effects of warming.” On line 3, change “climate change” to “warming”. The paragraph also needs to say there will be an increased likelihood of fires will limit warm-season use of forests and campgrounds. MacCracken	SW	Thank you. This portion of the text has been reworded.
BR	Duce	140			I note that this section appears to be very heavily Washington-state oriented. Duce	NW	We are sensitive to this issue, and agree that sea level rise, where Washington has far and away the biggest cities at sea level, and the adaptation discussion are two clearly Washington centric. However, we feel that much of the material in this chapter is general for the NW or generalized (e.g., Quinault River example could be any river).
BR	Ebi	140			Northwest: There is no mention of human health issues. Ebi	NW	A review of the peer-reviewed literature on climate change related health concerns turned up very little that goes beyond the Human Health Sector discussion and is specific to the Pacific Northwest.
BR	MacCracken	140			Left figure: It would help to give an explanation for the greater snowpack at the southern end of the Sierras—is it more storms or what? MacCracken	NW	No change is required because of modifications that have been made to the figure removing California from the area covered.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	140			Figure in lower right: Change title to “Trends in Timing of Peak Streamflow.” It would also help to give readers some geographic markers as it is not immediately obvious and is a different area than the other figure on the page. MacCracken	NW	This figure is one of many photos and figures that have been eliminated from the document in response to comments calling for a shorter, more focused report.
BR	MacCracken	140	1		The first sentence here says this region is “rapidly growing”—it seems everywhere is. On line 6, change to “4 F). The region’s temperatures are projected ...” and give what season as well. In last sentence, change “in this century’ to “over coming decades” and change “much more” to just “more” MacCracken	NW	Thank you for the comment. The text in the sentence dealing with temperature change has been revised and the suggested changes to the last sentence made.
BR	MacCracken	140	2		In the third sentence from the end, change it to say “Further declines in Northwest snowpack are projected to result from additional warming over the 21st century” so the meaning is clearer and independent of other sentences. MacCracken	NW	Accepted and thank you.
BR	MacCracken	141			Top figure: The actual graph shows “Changes in the annual cycle of streamflow”—the present title is about the conclusion that one might draw (like a heading on a slide), but this should be explained in a caption or in the text. For example, the caption could also say “Note the significant shift to wintertime peak flows over time, an effect due to warming.” MacCracken	NW	The caption has been changed as suggested in the reviewer’s example text.
BR	MacCracken	141	2	1	In line 1, change “around” to “based on” and on line 3 is the phrase “west of the Cascades” again. MacCracken	NW	The suggested change in line 1 has been made and the word “side” has been added after “west” in line 3.
BR	MacCracken	141	3		On line 11 (and line 3 of the next paragraph) it says “west of the Cascades”—I would think most of the readers might, like me, think west of the Cascades is in the Pacific Ocean—maybe say on the west side of the Cascades? Five lines from end, say “vegetation” instead of “plants” and in last two lines maybe say “increased flood risk in winter and increased drought risk in summer.” MacCracken	NW	The suggestions are accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	141	3	4	On line 4, say “hydropower, a far larger rate than” and on line 8 say “will lead to reduced hydropower” MacCracken	NW	Accepted and thank you.
BR	MacCracken	142			In the headline, I don’t understand why this is referring to “unique” ecosystems—are not even the dominant ecosystems being affected” On line 6, it would help to also express 33 million acres as a fraction of the size of British Columbia or its forests. MacCracken	NW	“Unique” has been removed from the headline and text has been added to clarify the relative magnitude of the area of tree destruction.
BR	MacCracken	142			Figure: Here the color bar is actual temperature instead of change in temperature—hopefully readers will catch this. MacCracken	NW	Thank you for the comment. We have reviewed the figure and feel that the magnitude of the temperature values shown, the readers will understand that these are actual temperatures and not change values.
BR	MacCracken	142	2-3		What about effect of CO2 fertilization? Should it not be mentioned? MacCracken	NW	CO2 fertilization is not unique to the NW and therefore should be covered elsewhere in the USP.
BR	MacCracken	142	4		In the headline, change to say “species will experience” a d “stresses as a result of rising”. On line 8, change to “in addition, diseases” MacCracken	NW	Accepted and thank you.
BR	MacCracken	142	5		It is improper to say “mostly extinct”—say “populations are sharply down” or something similar. On line 11, say, “end of the 21st century” and on last line change “recover” to “restore” MacCracken	NW	The suggestions are accepted and thank you.
BR	Duce	143			Figure: In the key, does “High Water” refer to the current level of high water (i.e., high tide)? This is a bit confusing. Duce	NW	Yes, “High Water” represents the water level at high tide.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	143			Figure: Figure needs caption and change title to say “Cities of the Northwest at Risk due to Sea-level Rise” MacCracken	NW	A figure caption has been added as suggested and the title has been changed.
BR	MacCracken	143			Adaptation box, first paragraph: On line 1, change to “develop strategies to adapt to”. Also make color of box lighter so it can be photocopied. MacCracken	NW	Thank you for the comment. The suggested change in line 1 has been made. Also, the background color has been removed from the box.
BR	MacCracken	143	1		On last line say “all along the Pacific Coast”. MacCracken	NW	Accepted and thank you.
BR	MacCracken	143	2	2	On line 2 say “with local vertical movement of the land:”. On line 3, where does “medium” come from—IPCC was pretty low. On last line, “in recent years” can be deleted. MacCracken	NW	The changes suggested to line 2 and the last line is accepted with thanks. Regarding the line 3 comment, this estimate comes from Mote, et al. 2008 (ref #12) – this reference has been added to the text.
BR	MacCracken	143	2	5	On line 5, change to “increasing as climate changes.” On line 6, say “model that other local governments can use to organize adaptation actions within their municipal” MacCracken	NW	Accepted and thank you.
BR	MacCracken	143	3	4-5	On lines 4-5, say “soils and, therefore, an increased number of landslides” MacCracken	NW	Accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Ebi	144			What about health and cultural issues? Ebi	Alaska	Health issues associated with smoke were mentioned in the previous draft. We have added a sentence about the link between subsistence food security and health issues citing Berner and Furgal ACIA human health chapter. Cultural issues related to subsistence are touched upon in several parts of the Alaska Section.
BR	MacCracken	144	3	5	On line 5, I would change “under” to “with” in both spots. MacCracken	Alaska	Accepted and thank you.
BR	MacCracken	144	4	5	I would suggest changing “as” to “however, for example” MacCracken	Alaska	Thank you. The text has been edited, although slightly differently from the suggestion.
BR	MacCracken	145	2	3	On line 3, add “however” after “summers” MacCracken	Alaska	Accepted and thank you.
BR	MacCracken	145	2	5	On line 5, change “largest” to “most severe” and on line 7, change “changing climate” to “projected climatic”. On line 10, can drop “in Alaska” (so trying not, on a net basis, to add words). In last sentence, change it to “communities because of the reduced availability of the fish and game that sustain these communities.” MacCracken	Alaska	This is actually paragraph 3. Changed “largest” to “most severe”. Dropped “in Alaska” on line 10. Changed end of last sentence as suggested
BR	MacCracken	145	3	4-5	On lines 4-5, say “that is resulting from ongoing warming.” I also think it would be helpful to give the area as a percent of the area of Alaska. MacCracken	Alaska	Changed “that result from warming” to “that is resulting from ongoing warming”. Added “(21% of Alaska)” after “77 million acres”.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	146			Top figure: The vertical axis mixes metric and English units. MacCracken	Alaska	Thank you. The vertical axis has been revised and now uses English units.
BR	MacCracken	146			Bottom figure: I think this figure needs a caption if what is presented is to be seen as important and significant. MacCracken	Alaska	Thank you. A caption has been added.
BR	MacCracken	146	1	6	On line 6, change “it” to “its temperature” MacCracken	Alaska	This comment was considered but not implemented because we prefer the wording “it is more vulnerable to thawing” than “its temperature is more vulnerable to thawing”.
BR	MacCracken	146	2		Are the costs of moving all the Native villages in these numbers—many are on frozen barrier islands? Also, the numbers seem very precise, and not really all that big a number over that next 70 years. Is the problem really so small? MacCracken	Alaska	The numbers clearly refer to costs of permafrost thaw on public infrastructure and not to the costs of moving villages because of coastal erosion. The percents cited in the paragraph provide a sense of the degree to which costs of publicly owned infrastructure are increased.
BR	MacCracken	146	3		Text needs to be added to indicate what happens after permafrost melts—namely loss of carbon, sinking, flooding, fire, whatever. MacCracken		Thank you. “The thawing of permafrost” has been changed to “Subsidence associated with the thawing of permafrost”.
BR	Williams	146			A matter of style. The paragraph at the top of the page uses “AK” for Alaska while the one at the bottom uses “Alaska.” Many of us involved in writing believe that the two-letter, upper case state abbreviations belong only in text that will be read by the U.S. Postal Service’s address scanners. Careful writers don’t use them except on things they are mailing. This might sound trivial, but it’s one of the small things that indicates careful writing. Williams	Alaska	Thank you. Both captions now use “Alaska.”

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	147	2		While ocean acidification has been described as a threat to coral systems, it might be useful to give an additional sentence here to describe what the impact is on cold-water ecosystems. Duce	Alaska	Thank you for your comment. This may be done in the next draft if a suitable reference can be found.
BR	MacCracken	147	2		On line 2, change “enhanced” to “increased” (this is a special correct for the attention of Susan Hassol). MacCracken	Alaska	Accepted and thank you.
BR	MacCracken	148			Figures: Titles should be rewritten to put the region name last (so say “Change in Surface Air Temperature for the Pacific Islands Region,” and similarly for the Caribbean. And I think there needs to be an explanation of the single line for observations versus the band for models, basically explaining how the band was calculated and the chaotic nature of the annual perturbation—and either do it everywhere such plots come up or have a spread on model results up front that does this and refer to it. MacCracken	Islands	The Figure Titles have been modified to address the point made by the reviewer. We believe that there is an adequate discussion on models earlier in the report.
BR	MacCracken	148	2		Isn’t the phrase “often concentrated in coastal areas” obvious for islands, or does this refer to right at the water’s edge? Given that the Coastal sector section (page 152, first paragraph) apparently treats being near the coast as many, many miles (if half of all Americans live there), if something else is meant here it needs to be mentioned. MacCracken	Islands	Thank you for your comment. We have reviewed the text and believe that the meaning of coastal areas here is clear and does not refer to the water’s edge.
BR	MacCracken	148	1		In last line simplify to “and the size of its freshwater aquifer.” MacCracken	Islands	Accepted and thank you.
BR	MacCracken	148	4		Bullet 3: In the third bullet, say “an increased frequency of heavy downpours” and then let the second part of sentence talk about amount. MacCracken	Islands	Accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	149			Adaptation Strategies, third paragraph: I'd suggest a rewrite on first two lines, saying "latest science. This effort started during the 1997/98 El Nino, when managers began using seasonal ..." MacCracken	Islands	The text has been rewritten as suggested.
BR	MacCracken	149	1	6	On line 6, change "use" to "rely on". The next to last sentence in paragraph is also awkwardly phrased. MacCracken	Islands	Thank you for the comment; "use" has been replaced with "rely on" and the next to last sentence has been revised as suggested.
BR	MacCracken	149	2		The first sentence sounds as if what might be a positive is being made into a negative. On line 6, change to "due to high storm tides. Finally, a rapidly rising populations is putting an increasing strain on the limited water resources, as would ..." MacCracken	Islands	The first sentence of the paragraph has been revised and the text on line 6 changed as recommended.
BR	MacCracken	150	1	1	On line 1, I would think it more significant to say "on many island nations". MacCracken	Islands	Accepted and thank you.
BR	MacCracken	150	1	2	On line 2, I would suggest saying "higher storm tides". MacCracken	Islands	Accepted and thank you.
BR	MacCracken	150	1	4	On line 4, I would say "Loss of land will reduce". MacCracken	Islands	Accepted and thank you.
BR	MacCracken	150	1	7	On line 7, change to "level" MacCracken	Islands	Accepted and thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	150	1	9	on line 9 change “can” to “is expected to” MacCracken	Islands	Accepted and thank you.
BR	MacCracken	150	2	2	On line 2, change it to “from a combination” and on lines 4-5 to “2003, as a result of the combination” MacCracken	Islands	Accepted and thank you.
BR	MacCracken	151	1	4	On line 4, change “which” to “that as phrase is key component of sentence and not optional.” MacCracken	Islands	Accepted and thank you.
BR	MacCracken	151	3	2-3	On lines 2-3 change to “ecosystems that attract tourists” MacCracken	Islands	Accepted and thank you.
BR	MacCracken	151	4	1	First sentence is awkwardly phrased—maybe start with “Coral reefs are important as hosts for fisheries, attractions for tourists, sustaining biodiversity, ...”—but some sort of rewrite is needed. On line 5, change “reef” to “reefs” MacCracken	Islands	Thank you for the comment. The first sentence has been revised and the recommended change made to line 5.
BR	MacCracken	151	6		In next to last line, change “extinctions” to “extirpations” or some other word—extinction means loss of all species on Earth (including in zoos). MacCracken	Islands	The comment has been considered but not accepted because we feel that qualifying “extinction” with the word “local” makes the meaning clear, and we think that many lay readers would not understand the use of the word “extirpations.”

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	152	1		Over what time period have these changes taken place? Since the turn of the century? Since 1950? Duce	Coasts	The time period has been defined as the past 50 years.
BR	MacCracken	152			Lower photo: The caption needs reworking to say “Louisiana that has been lost due to saltwater intrusion” or something similar. MacCracken	Coasts	Thank you. The caption has been revised.
BR	MacCracken	152			Box on multiple stresses: On line 2, change it to “For example, relative rise in sea level is expected to be at least two feet in”—and actually, likely a good bit more. At end of this sentence, it is important to indicate that there are a number of cities, including Annapolis, Washington DC, and Baltimore, and many communities that will have to take action to protect themselves or relocate. In last sentence, change to “due to the rising carbon dioxide concentration”. MacCracken	Coasts	The suggested change has been made and threats to cities added.
BR	MacCracken	152	1		The first sentence seems overstated—what is meant here by “narrow” if it includes half of all Americans—is not narrow a hundred miles or so? On line 5, delete “us”. The last sentence needs to be broken in two and simplified. MacCracken	Coasts	We feel that the meaning of narrow is clear in context—it is a narrow zone relative to the area of the U.S. Edits have been made to address the other concerns.
BR	MacCracken	152	2		On line 1, change “poses” to “imposes” and at end of line change “levels are” to “level is”. On line 4, change “warming” to “rising” and lines 6-7 change to “and the geographic distributions of many marine species have shifted”—otherwise it sounds like a preplanned maneuver. MacCracken	Coasts	Thank you. These helpful edits have been made.
BR	MacCracken	152	3		In second line of headline, change to “being most vulnerable”. In line 1, change “rise” to “increase”. In next to last sentence indicate that this loss has changed since some initial year (1950? Or what?). MacCracken	Coasts	Edits and additions have been made to address reviewer’s comments.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	153			Figure 1: The scenarios B1, A2, A1F1 on the horizontal axis will have no meaning to the average reader. Give something that they can understand, or just use high and low and leave out the other. Duce	Coasts	Thank you for the comment. The caption has been revised.
BR	MacCracken	153			Upper figure: In the caption, line 2, change “increase” to “add to”. In the figure, I think it is important to say “IPCC projection without accounting for ice dynamics” and the top description should be “Potential rise when including ice dynamics” as it is not really from greater melting, but greater calving of ice. I also think the upper limits of the added amounts should somehow be indicated as uncertain. MacCracken	Coasts	Thank you for the comment. The caption has been expanded to provide a better explanation of the meaning of the figure.
BR	MacCracken	153	1		I’d suggest rephrasing the first sentence to say “these estimates do not include the accelerated loss of ice from the Greenland and West Antarctic ice sheets that, although now underway, has been difficult to estimate.” The phrase “many scientists think is likely to occur” is really not the key point—both Greenland and Antarctica are now, by observation, losing mass whereas IPCC estimated that their net effect over the 21st century would be about zero. This is a huge understatement by IPCC. MacCracken	Coasts	Thank you for the suggestion. However, this section has undergone a major revision that includes removing the reference to Greenland and West Antarctic ice sheets, hence the comment is no longer pertinent to the text.
BR	MacCracken	153	1		The last sentence seems to me to be very inadequate coverage of the threat to cities from sea level rise. Much more discussion of this point, coupled with the potential for storm surge damage, is needed. MacCracken	Coasts	We agree that the issue is important; however, we have chosen to include more discussion of effects this issue in the Northeast and Northwest sectors.
BR	MacCracken	154	1		I was surprised that acidification did not get some mention here. On line 3, I would change the start of the second sentence to read: “To the extent that species can migrate, those that cannot tolerate ...” and then start the next sentence saying “Such shifts open the door to” MacCracken	Coasts	We feel that acidification is dealt with adequately in the next paragraph. The language in the remainder of the paragraph has been clarified in response to the comment.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	154	2		In headline, line 3, change to “will present”. I would then change the third and fourth sentences to say “Much of the carbon dioxide emitted by human activities is absorbed by the ocean, reducing the increase in global average temperature, but decreasing the pH of the ocean. MacCracken	Coasts	Thank you. These are helpful edits and have been incorporated into the revised text.
BR	MacCracken	155			Box on Adaptation strategies: In second paragraph, line 3, change “use” to “are using” MacCracken	Coasts	Accepted and thank you.
BR	MacCracken	155	1	1	I think a range needs to be given instead of saying “considerably”. In last line of the opening set of lines, can delete “rising”. MacCracken	Coasts	Thank you for the comment. The word has been changed to “demonstrably” to avoid having to go into a complex issue.
BR	MacCracken	155	2	2	On line 2, change to say “along the nation’s coast” MacCracken	Coasts	Accepted and thank you.
BR	Corell	156			This is a difficult idea to get across. While the material here is well done, it is too short for the concept to stand alone. I’d take this material and somehow integrate it into the section that begins on page 32. It stands alone here and gets lost. (p.156-159) Corell	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.
BR	Duce	156	2	4	This is describing an event that took place over 20 years ago. Does this make sense? As an illustration of the impact of a major drought it is a good example, but because it was so long ago, many people may say that this shows this problem is not a current one. Duce	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.
BR	Ebi	156			Figure: Additional information, such as the time period, is needed to interpret the figure. Ebi	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Ebi	156	2	22	“City” should be “cities”. Ebi	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.
CC	Henson	156	2	11	I don’t think there could have been “5,994 all-time high-temperature records” that summer. Generally, an all-time high denotes the highest reading ever measured at a given station. I suspect these are *daily* temperature records. Henson	Complex	You are correct. These were daily high temperature records. We would have corrected, but after reviewing all comments we decided to remove this section from the report.
CC	Henson	156	3-4		This section would benefit from a brief explanation of how the large zones of subsiding air that produce heat waves also lead to stagnant conditions that allow pollutants to build up. Also could mention how dry conditions allow heat to go directly into warming the atmosphere instead of evaporating water, thus encouraging heat waves. Henson	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.
BR	Hooke	156			In many respects, this is the weakest section of the Unified Synthesis Product. There’s a reason for this – it’s also the most challenging, and represents the issues that will be the substance of hundreds of reports and studies in future years. But the question here is: why select these two? Suggest a band-aid rather than a major fix. The lead-in paragraph needs to state a little more emphatically that these issues represent the main challenge of climate change, that many complex interactions have already been mentioned in the report, e.g., between climate change and alternative energy sources, etc., and that two examples hint at the challenge. Hooke	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.
BR	MacCracken	156			Footnote: It is not clear what “all days” means—it should presumably say “all summer days.” Is the percentile based on each single year, or 30 years of data, or what? MacCracken	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	156	2		Should the third sentence say “7,000 premature deaths”? In last sentence, change “city” to “cities”. MacCracken	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.
CC	Henson	157	1-2		This section would benefit from a brief explanation of how the large zones of subsiding air that produce heat waves also lead to stagnant conditions that allow pollutants to build up. Also could mention how dry conditions allow heat to go directly into warming the atmosphere instead of evaporating water, thus encouraging heat waves. Henson	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.
CC	Henson	157	3	7	Replace "during drought when cooling water is at its lowest is often the time when" with "cooling water is at its lowest during a drought, which is often the same time as" Henson	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.
BR	MacCracken	157			Footnote: This footnote repeats the one on the previous page—if kept, the same types of changes are needed in the wording. MacCracken	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.
BR	MacCracken	157	3		Regarding the second sentence, a real (and perhaps unrecognized problem) is that most of the electricity for air conditioning over the humid part of the nation goes to reducing absolute humidity (pulling the dew point of the air down to, for example, 55 F), so given the Clausius-Clapeyron relationship is exponential, it is the rise in absolute humidity that will really push up the air-conditioning electric load. MacCracken	Complex	Thank you. While this is an important point that should have been made in this section, after reviewing all comments we decided to remove this discussion from the report.
BR	Williams	157			The discussion of air-conditioning demand could also include that during times of high power demand, cooling water is not only likely to be at its lowest levels, but also warmer, which means the cold sink of a thermal power plant is not as cold; thus decreasing the plant’s efficiency. Williams	Complex	Thank you. After reviewing all comments we decided to remove this section from the report.


Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	158			Headline: Replace "Bark Beetle Infestations" with "Bark beetle infestations" Henson	Complex	Thank you. We moved this section to the Ecosystems chapter while changing the title to Interacting Stresses: Lessons Learned from Bark Beetle Infestations.
CC	Henson	158	6	12	Does the reference to -40F mean that temperatures must *stay* below that level for several days, or that you need several days with *lows* that dip below -40F? I'm guessing the latter . . . would be helpful to clarify. Henson	Complex	Thank you. This refers to the need for temperatures to remain below -40F for several days. We have edited the text and moved this discussion to the Ecosystems chapter.
CC	Henson	158	7	3	Replace "in Colorado in the U.S." with "in Colorado." Henson	Complex	Thank you. We moved this discussion to the Ecosystems chapter and edited. This text was removed.
CC	Henson	158	7	5	Replace "continental divide" with "Continental Divide" Henson	Complex	Accepted and thank you.
CC	Henson	158	7	8	Replace "to the Atlantic Ocean" with "east to the Atlantic Ocean" Henson	Complex	Thank you. We edited as suggested.
CC	Henson	158	7	8	Mention that regrowth can take decades, and that the dead trees will release large amount of carbon to the atmosphere as they decay? Henson	Complex	Thank you. We edited appropriately.
BR	MacCracken	158			Nicely stated. MacCracken	Complex	Thank you.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Duce	159			Photo 2: A caption on this excellent picture would be helpful. Duce	Complex	Thank you. We added as suggested.
BR	Corell	160			This stands all alone. I'd redesign this section to be a short primer on Response Strategies: Adaptation, Mitigation and Decision Support . Many of the readers are still not up to speed on these concepts. I think that there is adequate information from the 21 Assessment Products and the IPCCWG III to do a nice job here, including moving the Energy Section here as well. This could be a really nice set of material that would be used over and over again. Right now, as is, I'd drop it, but the potential for a short primer on Response Strategies: Adaptation, Mitigation and Decision Support is both needed and would enhance the report substantially. (p.160-165) Corell	Complex	This recommendation to drop this section has been accepted. Adaptation and mitigation will be mentioned elsewhere in the USP.
CC	Henson	160			Headline: Replace "focus" with "Focus" Henson	Complex	Comment accepted. This section has been deleted.
CC	Henson	160			Sidebar: I didn't come away from this sidebar convinced that adaptation measures would necessarily save money for a company when applied *everywhere*. In other words, it sounds as if adaptation will save you large amounts where and when a hurricane does strike, but I wanted to know how the cost/benefit ratio works when aggregated across a whole region or a long time period. Could such a statistic or two be added? Henson	Complex	Comment accepted. This section has been deleted.
BR	Solomon	160			Should be deleted if there is not a comparable chart of mitigation. Solomon	Complex	Comment accepted. This section has been deleted.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Ebi	161			This table should either include all sectors discussed in the document, or should be deleted. Otherwise, the impression is that the sectors not mentioned are unimportant. Ebi	Complex	This recommendation to delete the section has been accepted.
BR	MacCracken	161			Table of Examples: The text regarding the table needs to indicate that the sample actions can be costly and unpopular, so it may well be hard to get them approved beforehand, and as a result, expensive steps will be needed in reaction. I also do not understand why the table does not have a set of examples for Health, Society (e.g., urban areas, communities, etc.), etc.—these are only a few of the possible areas to be covering. MacCracken	Complex	This section of the USP has been removed. In the new draft of the USP adaptation will be addressed through the various examples in different sections of the report and mitigation and adaptation will be briefly discussed in an early section of the document.
BR	MacCracken	161			Table of Examples, Water Supply: With respect to supply, desalination plants should be listed as a possibility. With respect to reducing demand, steps to increase home efficiency should be mentioned (low flow toilets, etc.), and maybe even indicate they could be subsidized. MacCracken	Complex	This section of the USP has been removed. In the new draft of the USP adaptation will be addressed through the various examples in different sections of the report and mitigation and adaptation will be briefly discussed in an early section of the document.
BR	MacCracken	161			Table of Example, Coasts: To reduce property damage, the use of tidal, storm surge, and floodgates should be listed (and is already done on some New England rivers). MacCracken	Complex	This section of the USP has been removed. In the new draft of the USP adaptation will be addressed through the various examples in different sections of the report and mitigation and adaptation will be briefly discussed in an early section of the document.
BR	MacCracken	161			Table of Example, Agriculture: On improving supply and use, limiting evaporation and other losses from water ditches and canals should be listed. MacCracken	Complex	This section of the USP has been removed. In the new draft of the USP adaptation will be addressed through the various examples in different sections of the report and mitigation and adaptation will be briefly discussed in an early section of the document.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	162			Figure 1: Very hard to read the text in this graphic. Henson	Pathways	Thank you for your comment. This content of this section has been moved into new sections on recommendations and concluding thoughts. This figure has been removed.
CC	Henson	162	3	6	Replace "variables." with "variables?" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	162	3	16	Replace "observation information" with "data" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	162	3	17	Replace "(e.g., by natural changes or by human-induced changes)" with "(e.g., natural or human-induced factors)" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	162	3	18	Replace "the United Nations' Framework Convention on Climate Change Global Climate Monitoring Principles" with "the Global Climate Monitoring Principles of the United Nations' Framework Convention on Climate Change" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	162	4	1	Could skip the first sentence. Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	162-165			I think this section would read just fine without the subheads that are now in yellow. Henson	Pathways	The subheads have been removed.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	Hooke	162			<p>I have the same reaction to this section as to the Complex Interactions Section. It's a great portal to "next steps," responses, etc., but it falls too much into the trap that says the reasons people and institutions are making the decisions and taking the actions they do is they don't have all the climate science. The reality is, people and institutions are optimizing their circumstances based on the political and social context they're in. As an alternative to this approach, the authors of the Unified Synthesis Product might revisit a ten-year old book, Human Choice and Climate Change, edited by Steve Rayner and Elizabeth Malone (Battelle Press, 1998; out of print, but Elizabeth Malone still has copies). The four volumes are extraordinary, but they're neatly summarized in a short piece, "Ten Suggestions for Policymakers". Here are the ten suggestions:</p> <p>1. View the issue of climate change holistically, not just as the problem of emissions reductions. 2. Recognize that, for climate policymaking, institutional limits of global sustainability are at least as important as environmental limits. 3. Prepare for the likelihood that social, economic, and technological change will be more rapid and have greater direct impacts on human populations than climate change. 4. Recognize the limits of rational planning. 5. Employ the full range of analytical perspectives and decision aids from natural and social sciences and the humanities in climate change policymaking. 6. Design policy instruments for real world conditions rather than try to make the world conform to a particular policy model. 7. Incorporate climate change into other more immediate issues, such as employment, defense, economic development, and public health. 8. Take a regional and local approach to climate policymaking and implementation. 9. Direct resources into identifying vulnerability and promoting resilience, especially where the impacts will be largest. 10. Use pluralistic approach to decision-making. Intrigued? (I hope you are.) Here's a link to fuller text. http://www.globalchange.umd.edu/data/users/24/files/Ten_Suggestions.pdf</p> <p>Hooke</p>	Pathways	<p>Thank you for your comment and suggestion. This section will now avoid dealing directly with improved decisions and rather focus on the gaps in understanding.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	162			Figure: With all the colors in red, no priorities are apparent and figure has print so small it is hard to read (and would be very hard to photocopy). As to the listed items, a key missing aspect of climate studies is translating the calculated changes in weather into projected changes in the weather (i.e., changing frequency of different weather situations, etc.). In the adaptation points, it should say “Improve understanding of” and “Identify unintended consequences”—there is no way to “determine” them all. MacCracken	Pathways	Thank you for your comment. This content of this section has been moved into new sections on recommendations and concluding thoughts. This figure has been removed.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	162			<p>This section was by far the least well done. It really reflects little understanding of how decisions are made—decision makers work with uncertainties all the time and they are making decisions all the time. It is not for the scientific community to set the level of confidence before a decision is made—that is up to the decision makers based on a clear explanation of the situation by the scientific and expert community. Half of this section is devoted to improvements in projecting climate change, suggesting this is the highest priority when there is no real indication that this is the key to helping the decision-making community. Certainly more information is needed, but the phrasing of the climates section is really poor—the whole idea of a “best model” for example—there is no indication that if all models agreed that this would lead to any other action, and in fact that would lead to a lot more concern that models were not accounting for the chaotic nature of the climate and for variability.</p> <p>Suggesting that society has not paid much attention to climate change in the past seem totally at odds with the report’s findings of how attuned various activities are to the climate. Reading this over, I find it hard to believe that all of the authors agreed to this section and I think it needs a total reworking—or should even be dropped from the report as this is being prepared in too cursory a manner given the broader effort that should underpin designing the needed research program for the nation. As a general stylistic comment, I did not like there being an opening indication of the challenge (what was in the bronze color type), then having a set of questions (in the italic type) and then having the text description—I would favor skipping the questions. MacCracken</p>	Pathways	<p>Thank you for your comment. This section will now avoid dealing directly with improved decisions and rather focus on the gaps in understanding.</p> <p>The concept of the best model was poorly put and has been revised to the worst models. It may be impossible to determine the best model but quite possible to determine some models that are just not as good as many of the others.</p> <p>Thank you for your comment. Listening to the Mayor of Galveston on Capitol Hill asking for money to rebuild Galveston again seems to imply inadequate attention being paid to climate.</p> <p>The bronze color has been removed. The use of questions, however, has been found to be effective in explaining this material orally. So the edits will try to build on this feature rather than replace it.</p>

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	162			<p>The first climate point about the observing system: First, get rid of the questions and the first person. Perhaps start by saying “The surface and satellite network of systems that is necessary for providing the comprehensive, high quality observations needed to document and project climate change and its impacts must be extended and improved.” This would keep the focus on what is needed. The second sentence switches the focus away from impacts to attribution when that issue has been, to all extents and purpose, resolved, so it need not be mentioned. The third sentence is fine (but delete “our”—maybe change to “ability of the US”). The fourth sentence needs to be rewritten to make it clear that the US should be working internationally for a comprehensive monitoring system and not focusing things just on what is in the CCSP strategic plan. We need a global network to help all nations move toward a more sustainable future and for several other purposes as well as for understanding climate. MacCracken</p>	Pathways	<p>Thank you for your suggestions. The question format will remain but parts of the other suggestions were incorporated.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	162			<p>Bottom point on Determine best models: This objective needs to be restated—what we need are the most informative and useful projections—not a best model. The US needs to have a broad-based modeling effort that links with the world—as we are affected by impacts around the world, taking a North America focus is inappropriate and not scientifically sound—what happens elsewhere will affect the climate in North America. There are ways for evaluating relative strengths of models—and interestingly the “best” results are from the combination of multiple model results. It is not at all clear that better model results would lead to better decisions—it is fine to have a series of hoops (tests) that are used to qualify models whose results are used, but to claim a single best model makes no sense.</p> <p>The report actually lacked a spread on how models work and what we need from them that considered natural variability (the chaotic nature of the climate), ensemble estimates, etc. that would indicate that there will inherently be an uncertainty about future projections that cannot be reduced. This whole phrasing, it seems to me, raises the wrong aspects of the issue and needs to be redone.</p> <p>MacCracken</p>	Pathways	<p>The objective has been restated. The models are now described better elsewhere. The phrasing has also been revised.</p>
BR	MacCracken	162			<p>Part 2: MacCracken</p>	Pathways	<p>Noted.</p>
BR	MacCracken	162	1		<p>Minor editorial changes: on line 1, say “change, impacts, and adaptation, as illustrated”. On line 3, say “of the increasingly changing climate”. MacCracken</p>	Pathways	<p>This section has now been revised taking this comment and others into consideration.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Meehl	162	1		This paragraph is already out of date. There are currently plans for 50km class global coupled models from at least five climate modeling groups to perform decadal climate change predictions out to 2035 to be assessed in the IPCC AR5 (see general description in Hibbard et al., EOS, 2007). Also, it is simply wrong to state that El Nino is a function of resolution. Even the current generation of global coupled climate models with roughly 150km resolution can simulate most aspects of El Nino events. Therefore, reference to El Nino and resolution should be deleted. Meehl	Pathways	This paragraph has been deleted.
BR	Meehl	162	2		Once again, this statement is already out of date and should be changed to reflect the current activities in climate change modeling. As noted in the Hibbard et al. 2007 EOS article mentioned in comment 27 above, the new generation of earth system models using the new RCP mitigation scenarios are including carbon cycle as a standard part of the models. Therefore, this issue is being addressed right now and this statement should be updated to reflect the current state of modeling or risk being immediately out of date. Meehl	Pathways	The section has been removed from the USP.
BR	Meehl	162	3		This paragraph is already out of date and should be updated. Four new mitigation scenarios (RCPs) will be run with the new generation earth system models, and these scenarios will include changes in land use. Meehl	Pathways	This part has been deleted from the USP in response to reviewer comments and insights as the comment is with respect to a different section than identified in the columns.
BR	Meehl	162	4	4	This is promoting a false impression of models. There have been several recent studies (e.g., Reichler article in BAMS) that show that the multi-model average ALWAYS outperforms any individual model. Therefore, we should not agonize over the “best model” syndrome, and to promote it here is a disservice to the large number of analyses studies that have used multi-model ensembles to learn about how the climate system responds. I suggest deleting this entire paragraph, or totally re-writing it to convey the information in this comment. Meehl	Pathways	This part of the section has been reworked to avoid the question of best model and to emphasize the benefits of ensembles. It does, however, now raise the question of whether there are some models that just do not provide as reliable projections as others.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Williams	162			Does the diagram on this page really communicate anything? Williams	Pathways	Thank you for your comment. This content of this section has been moved into new sections on recommendations and concluding thoughts. This figure has been removed.
CC	Henson	163	1	1	Replace "information particularly" with "information is particularly" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	163	1	7	Replace "finer scale" with "finer-scale" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	163	3	2	Replace "by the highest" with "in the 1990s by the highest" OK??? Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	163	3	6	Replace "future emissions nor do" with "future emissions, nor do" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	163	1		<p>Part 1: The first sentence in italics is fine (though there needs to be some definition of “region”—note that IPCC considers a continent a region) and then let the text be the answer to the question without stating it. The opening statement is just wrong (especially if we were not limiting the time provided for the fine scale modeling that we are capable of)—but it is wrong nonetheless in that models do calculate (and so are making projections) for on a grid-by grid basis. Now, there can be problems with the large-scale patterns and so with local estimates, but the first order projection across the continent is the large-scale for the regional change (so, over North America, all models give larger changes over land than ocean, at higher versus lower latitudes, etc.). And the models do show some variation across continents—what might be said to be lacking is how the local changes will depart from the larger scale changes.</p> <p>For changes in temperature, this is likely not as important as for changes in precipitation. So, we have some plausible estimates (given emissions scenarios) of the likely changes in climate (remembering that climate is defined as the average over, for example, three decades).</p>	Pathways	This part has been deleted from the USP in response to reviewer comments and insights.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	163	1		<p>Part 2: The bigger problem is not even mentioned here, and that is that what we want is the change in the weather—or at least the relative frequency of different weather types and changes in their character. Here the problem is not so much a lack of computer resources as a lack of people to look at the computer results we have and analyze them for what people really need. For example, saying the average winter temperature is going to go up by a few degrees is nowhere nearly as useful as would be an indication of how this is happening—so, for example, fewer and less intense Arctic outbreaks and a greater frequency of time with moist Gulf of Mexico air moving into the heart of North America, and a northward shift in where the polar and moist air masses are colliding, so a northward shift in the intense convective frontal passages, yielding, for example, an increase likelihood of tornado-producing storms across the upper Great Plains in winter.</p> <p>Or whatever—but we need to be providing information that people need, and not just averages over many decades. And model results can be analyzed to provide such information (including comparing their capabilities for representing present weather)—this is the huge gap in our efforts as far as projecting information on impacts is concerned.</p> <p>I have been an advocate of refining model resolution for several decades—in fact a number of what were thought to be physics-related problems with models have been cleared up by just going to finer resolution, and we need to be doing this. There are some aspects of models that are limited now by understanding of atmospheric or oceanic physics, but my view is that right now the much greater problem is in not providing the computer resources to be able to run at as fine a scale as the physics justifies—and we know we are not there yet. MacCracken</p>	Pathways	<p>This part has been deleted from the USP in response to reviewer comments and insights.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	163	2		<p>The first italicized sentence is too vague—this notion of “Earth system feedbacks” needs to be better defined. If this means not including the potential for methane to be emitted as permafrost thaws and not adequately treating ice sheet dynamics, then say this, but this seeming assertion that lots of important feedbacks are being left out seems to me to be overstated, especially given how well the detection and attribution studies have performed. It seems to me that what is pretty clear is that what is being left out has, if anything, the potential to amplify the amount of change (I say this because what the results of Berger show is that additional long-acting feedbacks like isostatic rebound and depression have to be added for existing climate models to be able to simulate orbitally driven glacial cycling), so say it that way rather than give some sort of open impression that negative feedbacks exist that could limit the estimates of change from available models.</p> <p>The suggestion that we have every process in and well understood before we get useful results is just not the case—the greenhouse gas changes are the very large elephant in the room and insisting that every mouse be treated as well seems to me to be misrepresenting what policymakers are after and could use. Of course, to answer that question, what we really need is much greater participation by social scientists—a point not mentioned in this section. MacCracken</p>	Pathways	This section has been removed from the USP.
BR	MacCracken	163	3		<p>This point is not really about “Climate”—and, in any case, the CCSP did have a major scenario effort. Fine to call for an ongoing effort on emissions scenarios, but let’s not get hung up over trying to make sure that we have economic models that consider absolutely everything. Indeed, we should be exploring a good range of emissions scenarios, and climate modelers do, but let’s not make the mistake of thinking we can accurately predict the future—we can give some plausible estimates and the actual situation will likely bounce around these. Given the investment in the fossil fuel infrastructure, there is a very good chance of emissions going up, so that has to be a key scenario being considered. MacCracken</p>	Pathways	This part has been deleted from the USP in response to reviewer comments and insights.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	163	4		I don't think the problem is so much not monitoring these, but it is in not having nearly enough of the climate modeling community participating in looking at this issue and analyzing their results for changes in the weather and not just in multi-decadal averages. Going to models with five mile resolution is fine with me—but we will not be getting predictions of the future—they will still be plausible ranges, for the system is chaotic. And it should not be implied that waiting for such models will somehow make decision-making better or easier—that is just not clear. We will never be able to project if a hurricane will hit here or there more than several days in advance—so, basically, everyone on the coasts must be prepared. MacCracken	Pathways	Accepted. The paragraph has been edited with these comments in mind.
BR	Solomon	163			End of paragraph, insert the following: “While there is a mature understanding of global temperature changes, the understanding of many other aspects of climate change are just beginning. Much more work is required to provide the level of quantification needed to understand the full range of climate changes and their relationship to human emissions, such as how aerosols may be affecting precipitation, how changes in the stratosphere may affect drought in the subtropics, or how air quality is influenced by and influences climate change.” Solomon	Pathways	This section has been removed from the USP.
BR	Solomon	163	1		Please add the following sentence after ‘local-scale physical processes’: “An increasing focus on regional issues requires improved information on forcing and forcing/response relationships, to determine for example, how the mix of aerosols, ozone depletion, and greenhouse gases affect such factors as pressure gradients and movement of storm tracks.” Solomon	Pathways	This section has been removed from the USP.
BR	Ebi	164	1	1	Deleted “other” Ebi	Pathways	Thank you. The language has been updated in the context of the new sections.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Ebi	164	4		This paragraph is poorly written. The focus on vectorborne and zoonotic diseases should be decreased. SAP4.6 concluded that diarrheal diseases and air quality would likely have the largest impacts. Very few impacts are being adequately measured. Change “predicting” to “projecting”. What diseases are not of biological origin – I suspect this was supposed to be a statement about the causes of adverse health outcomes. Ebi	Pathways	Thank you. The language has been updated in the context of the new sections.
BR	Ebi	164	2		Add social, technological, and other stresses. Ebi	Pathways	The text has been edited in response to this comment, but technological stresses have not been added to it.
CC	Henson	164	3	1	Replace "environment. And so" with "environment, and so" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	164	6	1	Replace "irreversible ." with "irreversible." [remove space before period] Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	164	6	3	Replace "up slope." with "upslope." Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
BR	MacCracken	164	1		This section is missing a call for much more participation by social scientists. It also does not have a major point about sea level rise and what that means—in fact, I would think it should be mentioning major impact categories more specifically. [Also, in this section, again get rid of the “we”s.] MacCracken	Pathways	This point has now been made in the USP.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	164	4		Quantify natural benefits: This is a pretty vague and underdeveloped section. Also, get rid of all the “we” this and that—it is just not very helpful. MacCracken	Pathways	“We” has been removed for this section of the USP and made the section less vague. This section has been further developed.
BR	MacCracken	164	6		I don’t think the italicized question is very helpful—what, we’ll only take precautions when we know something is irreversible and almost to that situation? Say what is meant—that we need to be monitoring species very carefully and ensuring that all possible is being done to aid their adjustment, etc. The text here would make much more sense if the US (and world) were committed to a path to stop and then somewhat reverse climate change, for then we could figure out how to help some species survive the temperature and climatic overshoot. As long as we are on a path of no limits on climate change—this is like using a soup can to bail out the Titanic. So, give context to what is being recommended here—to help in a situation of limiting climate change, such and such would be very useful. MacCracken	Pathways	This section has been edited in response to this and other comments. Though the specific text recommended was not used.
BR	Solomon	164	2		Calculate thresholds: This is a very weak paragraph, largely speculation. I don’t think there is sufficient basis for the very broad claim that impacts will likely occur in bursts. Please delete or provide specific reference. Solomon	Pathways	Additional specific examples provided along with 4 references.
BR	Ebi	165	2		The current rate of climate change should be mentioned. Ebi	Pathways	Done.
BR	Ebi	165	3		Climate never has been constant. A different phrase than “continuously evolve” should be used. The key point is that anthropogenic emissions are causing the climate to change, in predictable and unpredictable ways. Ebi	Pathways	The report has been edited in response to the first part of this comment. The use of the phrase continuous evolution of the atmosphere does not imply that the forces changing the atmosphere are natural.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
CC	Henson	165	2	1	Replace "in the past and" with "in the past, and" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	165	2	2	Replace "short grass" with "shortgrass" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	165	3	3	Replace "end of the Century" with "end of the century" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	165	4	1	Replace "sky rocket" with "skyrocket" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
CC	Henson	165	4	1	Replace "into fuel forcing" with "into fuel, forcing" Henson	Pathways	Thank you. The language has been updated in the context of the new sections.
BR	MacCracken	165	1		I don't understand the opening statement—this is the goal of doing everything below? If so, say so. MacCracken	Pathways	The statement has been removed.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	165	2		The italicized points are just wrong. California’s whole water system has been designed to deal with the climate and its fluctuations (within some limits, of course) and our agricultural system is tuned up to the present climate all the time. The implication that the Dust Bowl could have been prevented seems a bit far-fetched—or maybe overly far-sighted as the government would have had to prevent the sod-busters from moving in. MacCracken	Pathways	<p>The opening statement has been reworded to be precisely correct.</p> <p>During the sod-buster era, a climate truth that “rain follows the plow” was a common selling point to encourage sod busters to head out into the plains. If that message hadn’t been so strongly and widely propagated, many sod busters would not have ventured out.</p>
BR	MacCracken	165	3		The opening italicized sentence was the conclusion of the Villach conference in 1985—it has been known for a long time. (Some would also point out, I might add, that the natural climate was not constant). While this report has focused on how the climate is going to be changing, it generally failed to consider that society will be changing at the same time—basically it applied the projected changes in climate to the present society—giving some rather misleading findings. The report needs to be calling for much more involvement of social science experts. With respect to the latter set of sentences, I would suggest that it is not just communication that is needed, but dialogue and an analysis and planning effort that unities across the scientific and stakeholder communities—and valuable information will flow both ways. MacCracken	Pathways	<p>The USP has been edited to incorporate most of this comment.</p>

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	MacCracken	165	4		It would be much more useful to say that what needs to be done is to be looking at climate change, impacts, adaptation, and mitigation in a more holistic way and in conjunction with evaluating other stresses on and activities of society. The National Assessment attempted this by having its first workshop question focus on aspects other than climate change. The Global Change Research Act does this by encouraging a focus on global change rather than climate change. This whole report could have been focused more broadly in order to demonstrate just what is being recommended, but it was not done very much. It really would have helped, for example, to be integrating the discussion of adaptation not in a box, but integrated in with the analysis and description of the impacts and how other stresses might be causing effects as well. With respect to the notion of “determine unintended consequences,” it is likely virtually impossible to do completely—what needs to be encouraged is at least looking for them, so at least a more thoughtful phrasing is needed. MacCracken	Pathways	This holistic point was added to this section.
BR	MacCracken	165	5		I don’t think the questioning italics helps—instead, give the answer, which is clearly no and then discussion the key challenges. It is not so much that we do not know how to do this is that doing it requires agreement on a lot of very difficult value based issues, and there will never be such agreement—this is what politics is all about, how to value various interests and to prioritize different goals and approaches. This phrasing sounds like all that is needed is some clever rational approach and all will be agreed. The situation is much more involved—even deciding what deciding widely means is up for debate. So, I think a much more nuanced discussion is needed. MacCracken	Pathways	The USP is maintaining the format of a question and then answer, but the reviewer’s point has been edited into the USP.

Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
BR	Meehl	165	2	1	See comment 3 above (Comment 3: This is another phrasing that appears later in the document, namely that “climate will be continually changing”. Even an uninformed reader could respond that the climate is changing all the time (in the context of natural variability on various timescales). What needs to be conveyed here is that climate change will go beyond the natural variability of climate to which we are adapted, and that these trends are projected to continue into the future, and that we are entering uncharted territory with regards to the particularly rapid rate of climate change we are experiencing and will continue to experience.) Meehl	Pathways	This point has been added to the USP.
BR	Meehl	165	3	1	It is my impression that corn being used for biofuels is not the only factor that has driven up world food prices as implied here. For example, drought and crop failure in Australia has played a role as well. This sentence should be re-written to reflect that corn for biofuels has “contributed” to the increase in world food prices. Meehl	Pathways	Done.
BR	Solomon	165			It is doubtful that better land practices and understanding of drought could have prevented the problems of the dust bowl. Please delete or provide specific reference. Solomon	Pathways	Reference added which documents that part of the driving force behind the rapid increase in farming in the plains was the mistaken belief that rain follows the plow. Peer-reviewed reference is: Libecap, Gary D. and Zeynep K. Hansen (2002), “Rain Follows the Plow” and Dryfarming Doctrine: The Climate Information Problem and Homestead Failure in the Upper Great Plains, 1890-1925,” <i>Journal of Economic History</i> , 62 (1): 86-120.
BR	MacCracken	168			Second column, top line: Saying “earth-atmosphere” makes we wonder what happened to the ocean—saying the “Earth system” makes much more sense, encompassing land, ocean, air, biota, etc. MacCracken	End	Thank you. We have altered the text in this section.

	Type	Reviewer	Page	Para	Line	Specific Comments	Section	Responses
	BR	MacCracken	175			Wilbanks: It should read “Dr. Thomas J. Wilbanks”—like others who have a PhD, Tom does as well. MacCracken	End	Thank you. The biographies are provided by the authors in their desired format.
	BR	MacCracken	187			Second column, reference 38: The 612 pp. version of the NAST report was published in 2001, not 2000. MacCracken	End	Thank you. The change has been made.
	BR	MacCracken	190			Second column, reference 1 and Page 191, second column, reference 1: Need to capitalize “Resources” in title of CCSP SAP 4.3 MacCracken	End	Thank you. The change has been made.