

Charge Question	Section	Page #	Paragraph, Line #, or Figure/ Table #	Reviewer Comment	Supporting Materials Provided by Reviewer	Response to Comments
1	Overall			Yes, I found the introductory chapter to do a reasonably good job of explaining the purpose of the report and to provide context for the sector chapter results. There are various opportunities for clarification and expansion of the text in a few places outlined in the specific comments below. One of the larger concerns I have about the report, however, is the exclusion of socioeconomic and demographic change, which leads to an interesting tension that is not really addressed head-on in the introductory text. The mean “years to temperature change” for the 2C and 4C scenarios are 2056 and 2097—more than 30 and 70 years into the future, respectively, in which significant demographic shifts would seem very likely to occur. And, of course, the global climate scenarios that drive the climate projections assume population growth, yet the results are presented for a constant population. I appreciate and respect the fact that sufficient demographic projections are not available for those time frames (to the best of my knowledge) but also believe the report runs the risk of misleading audiences when it reports that “X vulnerable population is projected to experience higher risk in Y sector.” I believe it would be more in line with the analytical approach to report something like “Places with higher projected impacts in the Y sector are disproportionately home to X vulnerable population today.”		We agree with the reviewer that there are likely to be substantial demographic shifts in the U.S. by the end of this century. However, without robust projections of demographic changes (with sufficient variables consistent with our approach), we are unable to consider the effects of these demographic shifts and implications for disproportionality. We have clarified the wording of key findings in the executive summary to note that the analyses assume constant demographic distributions, and added similar caveats earlier in the executive summary when describing the general approach/methodologies to the analyses. We have also added text to the ‘Sources of Uncertainty’ section further describing the implications of this assumption.
1	Introduction	5		One topic more broadly missing from the introductory chapter – or any sort of conclusion/summary/steps forward chapter at the end – is discussion of the application of these findings. Who is expected to take what types of actions with this information? On page 5, the text says that “Understanding the differential impacts...is critical for developing effective strategies.” Why? Which strategies? How would one use information about differential impacts accordingly? If there are concerns about this report being prescriptive of any particular programs or policies, maybe recent projects/initiatives around the country that use differential impact data to support effective strategies would be helpful. It would be a shame if readers of the report do not come away with a clear sense of how it could be applied to support their work.		Consistent with previous CIRA reports, this document is intentionally not prescriptive on how the report should be used. There are a number of ways in which this information could be used, including as a resource for federal and state-level climate assessments, and as scientific basis to inform public and private decision making at multiple levels. We find that the reader is capable of determining for themselves how the information can be used for their own purposes, and try to provide all of the information necessary to enable that determination. We have carefully reviewed and revised the executive summary and introduction to ensure that the objective of the report and methodologies for the overall framework are clearly stated. In addition, we’re providing the sectoral impact modeling data, social vulnerability data, and report results to support anyone’s interests in using the information for their own purposes.
1	Introduction	5	Paragraph 1	Adding “some” ahead of “extreme weather events are becoming more common” would be more consistent with the National Climate Assessment and IPCC reports. As written, some readers might interpret the text to mean that all extreme weather events are becoming more common.		Change made.
1	Introduction	5	Paragraph 3	While I am comfortable with the idea of referring readers to the appendix for additional information, I think there is room to slightly expand the introduction of the risk framework. It may be helpful to offer an explicit definition for each term in the framework; “exposure” may be the most ambiguous for the audience for this report. There might also be a benefit to the temporal application of the framework. One sentence in the text says that the framework is used to investigate the impacts of “climate change” but the figure itself refers to “climate hazards.” Perhaps the text could acknowledge (in a general sense) the methodological approach of assessing risk under different climate scenarios/temperature end points. As shown, Figure 1 seems useful for calculating risk to a particular hazard, but might be perceived to miss the temporal component for the “change” aspect of climate change.	Possible sources for a definition for exposure:  Ott WR, Steinemann AC, Wallace LA, editors. Exposure analysis. CRC Press; 2006 Oct 26.  Kuras ER, Richardson MB, Calkins MM, Ebi KL, Hess JJ, Kintziger KW, Jagger MA, Middel A, Scott AA, Spector JT, Uejio CK. Opportunities and challenges for personal heat exposure research. Environmental health perspectives. 2017 Aug 1;125(8):085001.	We substantially edited the approach chapter to clarify how impacts of climate change, and attendant hazards, are addressed; added definitions of key terms; and tightened the description of the overall framework both in the approach and individual chapters. We also consulted with experts on the project team to clarify the use of the risks and impacts terms. We believe we used those terms correctly in most instances, but in some cases we further edited the text to clarify what is meant by impacts and risks associated with climate hazards and, by extension, the consequences of unit changes in global temperature.
1	Introduction	5	Paragraph 5	Here, and elsewhere, I struggled with the term “six sectors” to capture the different types of impacts presented in the report as well as the names of the individual impact sections. They seem to suffer from a lack of parallelism. “Air Quality” and “Coastal Flooding” are environmental phenomena/hazards, whereas “Labor” and “Roads” refer to infrastructure (broadly defined). Similarly, we see “Air Quality” but “Temperature Mortality” (and not just “Temperature”). Of all of the six categories, only “Labor” and “Roads” feel like “sectors” to me. If a sector is an “area or portion” or “subdivision,” what is the whole of which these sectors are a part? “Climate change impacts”? I wonder if it might be helpful to call them something like “Impact Categories” or “Impact Types” and then re-frame each section with directional language that clarifies the outcome(s) considered. Thus, instead of Air Quality, we might have “Air Pollution Morbidity and Mortality” (in a similar manner to “Temperature Mortality.”) I appreciate the need to have relatively succinct and comprehensible section titles, but the current mix reads a bit awkwardly to me and might confuse other readers in terms of the actual outcomes that are being investigated.		We agree and have changed the names of the analyses as suggested to capture both the stressor and impact (e.g., “Air Quality and Health”). We also removed all references to “sectors.”
1	Introduction	6	Paragraph 2 in “Interpreting”	For completeness, it might be worth acknowledging that there might also be benefits to socially vulnerable populations that are not presented in this report (following from the language that it “represents only a small portion of the risks.”).		We added the term “disproportionate” ahead of “risks” to clarify this point.
1	Introduction	6	Paragraph 2 in “Interpreting”	I suggest a slight expansion of the final couple of sentences of this paragraph to recognize the complexity around vulnerability and assessment thereof. One minor change would be to replace “some” in the final sentence with “many.” A sentence could also be added acknowledging that there are many and intersecting causal pathways that connect the four chosen indicators to adverse health outcomes and that those pathways might operate differently for different people, communities, etc. Successful implementation of intervention strategies to protect the vulnerable populations considered in this report requires full consideration of the specific mechanisms that ultimately contribute to higher risk (and some of these mechanisms are nicely elaborated in tables throughout the report as the justification for including each vulnerability indicator in each section).	References related to causal pathways:  Gronlund CJ. Racial and socioeconomic disparities in heat-related health effects and their mechanisms: a review. Current epidemiology reports. 2014 Sep 1;1(3):165-73.  Chakalian PM, Kurtz L, Harlan SL, White D, Gronlund CJ, Hondula DM. Exploring the Social, Psychological, and Behavioral Mechanisms of Heat Vulnerability in the City of Phoenix, AZ. Journal of Extreme Events. 2019 Dec 2;6(03n04):2050006.	The suggested edits to this paragraph were made. The additional text provides better context for interpreting results under these four measures of social vulnerability.
1	Approach	8		It may be helpful, even for an “educated but general audience,” to mention the specific RCPs that were used in mapping out the “times to temperature changes.” I appreciate the language around “lower” and “higher” emissions scenarios but suspect that at least some readers will appreciate knowing exactly what those are (in the main text) and I recognize that ultimately only RCP8.5 is used for the analysis, which seems fine.		We have clarified in Figure 2 which RCPs are represented by the narrative names. Specifically, we have labeled ‘RCP8.5’ under Higher, ‘RCP4.5’ under Lower, and ‘RCP2.6’ under Even Lower.
1	Approach	8	Paragraph 4	Suggested replacement of “cooler” with “lower”		Replaced.

1	Approach	8	Paragraph 4	Do the benchmarks for global warming used here include land and ocean areas? If so, I wonder if a land-only benchmark would be a more appropriate point of comparison, given that most land areas are expected to warm faster than ocean areas (to my current understanding, anyway). Regardless, it would be good to clarify if the global numbers include land and ocean areas or land areas only.		Yes, changes in global mean temperature (also known as global mean surface temperature) represent areas over land and water. We have clarified this in the text box.
1	Approach	10	SLR Section	I can envision some readers not fully grasping why local estimates of sea level rise are so different from global sea level rise. There is one mention of "where land levels are falling" in the text above Table 1, but I wonder if a separate text box or diagram could help illustrate the different factors that influence local sea level rise. It might also be worth explaining why none of the cities considered have local sea level rise estimates that are below the global average. Is this a function of the physical geography of the North American plate? Ocean currents? Etc. I am not sure that it is a completely fair comparison to temperature with respect to the U.S. estimates being above global averages.		We have placed an endnote after the end of this sentence (we believe that the technical nature of this sentence is best placed as an endnote, rather than in the main text). The endnote reads: Estimated "relative" sea level rise means that the estimates incorporate both projected land and sea level changes. Relative sea level rise accounts for land uplift or subsidence, oceanographic effects, and responses of the geoid and the lithosphere to shrinking land ice. The coastal property analysis of this report covers the lower 48 states, and in more than 95% of this coastline, relative sea level change is greater than the global average. Therefore, we think it is appropriate to have the 10 cities focused on areas that are larger than the global average.
1	Approach	11	First full paragraph	As a minor grammatical consideration, the second sentence lists "four" populations but then presents a list of five factors – perhaps race and ethnicity can be combined without a comma, or with some other approach, to avoid any confusion.		Change made.
1	Approach	11-12		The year and data source for the demographic data should be presented somewhere in this section (perhaps as part of the caption for Figure 4?).		Added source to Table 2.
1	Approach	13		Comments on the analytical approach will appear elsewhere in this review. In the table, I appreciate the worked example.		No change needed.
1	Approach	14		Comments regarding uncertainty will appear elsewhere in this review. In the text that currently appears, the phrase "highly uncertain and therefore currently unavailable" in the socioeconomic and demographic change section reads awkwardly to me. If the projections are uncertain, it sounds as though they may be available? Perhaps simplifying the text to "Robust projections of socioeconomic and demographic change were not available for this report" (or similar).		The sentence has been revised to address this comment. It now reads "This report estimates climate change impacts to socially vulnerable populations based on current demographic data distributions, as long-term and robust projections for national changes in demographics are currently unavailable."
1	Approach	14		In the Geographic Coverage section, it is not clear to me why Alaska and Hawai'i and the 2+M Americans who live in those two states cannot be included in this report. I appreciate that many of the data sets used are not consistently available for U.S. territories, but is the same true for those two states? Some justification should be presented for the exclusion of those two states. If I was a taxpayer in those states, surely I would be disappointed to see my home excluded from this important report!		Yes, while there are data constraints for Alaska and Hawaii, as the reviewer notes, the primary reason why those states are omitted is because the underlying impact models are not set up to simulate impacts in those locales. Many of the datasets required to run the impact models only include data for the lower 48 states. We agree that there are likely to be important risks to socially vulnerable individuals in both states, however, we are not able to estimate those effects. We have added a brief rationale for their exclusion in the report.
2	Overall			I frequently found myself trying to anticipate who the likely readers of this report would be as I was working my way through the text. Sometimes, I found myself unsatisfied at a lack of detail presented in the main text and the need to refer to appendices, and at other times, found myself wondering if the main text itself might be too technical/jargon-filled for a more general audience. Related to my comment in response to Q1, I wonder if the report might more specifically articulate its intended audiences and acknowledge that it is first written for them, with a broader audience in mind. One of my major concerns about the report is that there are so many different analyses and data sets brought together, each of which has significant uncertainty and limitations, and readers might come away with the impression that this is a very "clean" problem to measure and that the results are much more precise than they actually are.		We agree with the reviewer that a careful balance needs to be struck between providing clear and simple narratives in the main text, while also providing sufficient description of the methods and key caveats so that the results can be properly interpreted. We have tried to strike that balance in this report so as to provide a product that is understandable by the general public, however, we acknowledge that some of the concepts and material may be challenging for some or even many. We have clarified in the introduction what the purpose of this report is and how the results should be interpreted. We do not however find it necessary, or even useful, to define who should read this report and/or how they should use it. We think this report is likely to be of interest to a wide range of stakeholders (e.g., the public, academia, federal climate science enterprise), and believe that they can make decisions for themselves as to how they can use this material. We have carefully revised the report in response to peer review to ensure that the information is carefully and appropriately described in light of the uncertainties involved in its development.
2	Overall			For improving the accessibility of the document, it may be helpful to add a glossary of key terms, and/or "definitions" boxes throughout the text. Even terms like "mitigation" and "adaptation" might be quite wildly differently interpreted by different readers.		We have added a section to the Approach chapter called "Key Terms and Concepts" that includes definitions for a number of terms, and have defined others in the text or in endnotes+H21.
2	Overall			I entered a few randomly selected paragraphs into Grammarly to assess reading level, and most of the ones I checked were scored as "Your text is likely to be understood by college graduates but may not be easy for many to read." I am not sure if this is the intended reading level; additional evaluation with reading level assessment tools may be helpful.		We appreciate that the nature of this work is somewhat technical. We have written the report to provide as simple communication of the content as possible, but we recognize that many of the concepts are still technical in nature.
2	Overall			Thinking about the entire constituency that may encounter this report, I do wonder if there is an opportunity to broaden the discussion around at least some of the hazards and impacts presented to pre-empt challenges and objections to what is presented. Most of the report adopts a "climate change will lead to negative impacts" framing, and I do not dispute or disagree with that framing or the subsequent approach. But, for example, the air quality section makes no reference to the significant improvements projected in air quality over the coming decades; climate change is presented to "increase concentrations" rather than as a "penalty" on reductions. Similarly, in the temperature mortality section, there is no attention to the multi-decade declines in heat-related mortality that have been observed in the U.S. and elsewhere. I suspect that this report will be more valuable to and appreciated by a broader audience if some of these (perhaps tangential) counter-arguments are anticipated and explained. Perhaps the most general point that could be made is that trends in all of the outcomes considered in this report are subject to a wide variety of influencing factors, of which climate change is only one—and one that may be a relatively small (or large) driver of future outcomes.	Jing P, Lu Z, Steiner AL. The ozone-climate penalty in the Midwestern US. Atmospheric Environment. 2017 Dec 1;170:130-42.  Trail M, Tsimpidi AP, Liu P, Tsigaridis K, Rudokas J, Miller P, Nenes A, Hu Y, Russel AG. Sensitivity of air quality to potential future climate change and emissions in the United States and major cities. Atmospheric environment. 2014 Sep 1;94:552-63.  Bobb JF, Peng RD, Bell ML, Dominici F. Heat-related mortality and adaptation to heat in the United States. Environmental health perspectives. 2014 Aug;122(8):811-6.	We agree that it is important to provide a balanced and complete picture when it comes to climate change impacts. While this report focuses on who is exposed to the highest impacts of climate change, we have revised the report to make note of areas of the country where climate change is projected to result in benefits to society (compared to the baseline period). For example, the Air Quality section notes that large parts of the Midwest and Northern Great Plains are projected to have decreases in premature mortality (in those >65) and childhood asthma diagnoses as a result of climate change. Similarly, we have revised the report to note changes in underlying drivers of changes that are not related to climate change. For example, the Air Quality section includes a call-out box noting that there have been improvements in U.S. air quality over the past several decades due to regulatory policies. For Temperature Mortality, we have also added baseline mortality rates to the appendix for that section which helps to provide a benchmark for evaluating the projections of future effects.
3	Overall			I found the report to adequately explain the overall analytic framework of the project, and especially appreciated the effort to make it possible to compare results across multiple "sectors" in a consistent manner. In fact, I believe the cross-comparability of results is one of the major strengths of this report. Page 75, Figure 1 (and other similar figures) should be of high interest.		No change needed.

3	Air Quality	20	<p>However, as suggested above, I do have some concerns about the analytic approach itself and presentation of results from the current approach. Here is sample text from page 20:</p> <p>“The analysis finds that Blacks and African Americans ages 65 and older are at greatest risk of experiencing premature mortality due to climate change-driven effects on fine particulate matter.”</p> <p>Although the difference is subtle, I believe that this sentence is a partial misrepresentation of what the analysis actually found. This sentence should probably have “will be” in place of “are,” but would also then require a clarifying point about the population distribution remaining identical to present day. I would recommend a modification of this sentence to:</p> <p>“The analysis finds that places with the highest projected mortality impacts from climate change-driven effects on fine particulate matter are disproportionately populated by Blacks and African Americans ages 65 and older at present.” (ALTERNATIVE A)</p> <p>The latter presentation more appropriately, in my opinion, reflects the combination of current population/demographic information with projected climate impacts. It also helps alleviate concerns that some reviewers might have regarding atomistic/ecological fallacy. In the original statement, effects are attributed to “individuals” (or groups of individuals), but the analysis was actually conducted for larger spatial units. At times in the text, the authors are more careful in articulating that “X vulnerable population is more likely to live in Y place with Z projected impacts,” which is an improvement from the excerpt above, but still misses the lack of temporal data regarding population/demographics. An alternative revision to the original excerpt could be:</p> <p>“The analysis finds that Blacks and African Americans ages 65 and older are more likely to live in places with higher projected mortality from climate change-driven effects on fine particulate matter, assuming the future population is distributed identically to present day.” (ALTERNATIVE B)</p>		<p>We have re-worded results consistent with a slightly modified version of Appendix B: “Blacks and African Americans are X% more likely to currently live in areas where X impacts are projected to be highest.”</p>
3	Overall		<p>I am not sure that it would substantively impact the overall takeaway messages, but I could see upside in re-working the analysis to focus on places instead of populations (especially given some of the study limitations). To reach a conclusion like that presented in Alternative A above, the authors could first classify all spatial units in their analysis into terciles, and then compare the relative proportion of vulnerable populations between the highest group and the other two groups. The final result would be “population ratios” (or similar) and not necessarily “risk,” although perhaps could still be framed as such. Mathematically, this would be just a slightly re-working of the current approach (information would be needed about the size of the reference populations in the high and non-high impact areas), but I think could ultimately be a more comfortable way to report the results that is consistent with the available data.</p> <p>Example: High impact census tracts = 32% African American          Low/medium impact tracts = 25% African American  <math>0.32 / 0.25 = 1.28</math> “African Americans represent a 28% greater share of the population in high impact tracts compared to low and medium impact tracts for projected air pollution mortality” (all hypothetical data)</p>		<p>We seriously considered the alternative suggested by the reviewer, but chose to maintain the original set of calculations. In both our construction and in the potential alternative suggested by the reviewer, we are looking for a way to summarize the intersection of populations and places of high climate impact, using the same data. In essence, the suggested alternative changes the order of operations (starting with population rather than impact areas - our calculation starts with impact areas and then looks at population). In this manner they are roughly equivalent. We also performed test calculations on three of the six sectors, and found that the alternative calculation method results were nearly identical (within a few percentage points). In the end, we did seek to improve the explanation of our calculation and tried to be more consistent in the use of terms, to better convey that we are focusing on places and exposure to climate hazards and impacts within those places.</p>
3	Overall		<p>A separate concern relates to the spatial scale of analysis, which appears inconsistent across the various impact sectors. What was the justification for shifting to the census block group scale for the sea level rise analysis? As the authors are likely well aware, census block group data from the American Community Survey come with considerably higher margins of error – so much so that some researchers are very reluctant to work with them. ACS margins of error do not appear to be presented anywhere in the text/appendices, and the scale of this issue at the block group scale should probably be briefly addressed somewhere. But, more generally, it is not clear why the spatial scale had to shift for parts of the analysis (although I should note that I am not an expert in coastal flooding – and do appreciate that flooding is confined to “narrow” areas along the coast that might be better assessed with smaller units). (This comment is also applicable to the inland flooding section).</p>		<p>The logic for using Census block group for the sea-level rise and inland flooding sector analyses is twofold: 1) The underlying paper for each of these sector studies estimates impacts at a finer scale than for other sectors - for sea-level rise there is a 150m x 150m grid, and for inland flooding effects are estimated at the building level. 2) In both cases, as the reviewer notes, the finer scale of the impacts calculations reflects the relatively small areas that are vulnerable to the flooding climate hazard, compared to other sector (e.g., air quality is estimated across CONUS). In response to a separate comment, we added information about the higher ACS margins of error for population data at the block group versus tract level.</p>
3	Air Quality	23	<p>Figure 5 Caption</p> <p>Same challenge in presentation of results described above. At a minimum, results need to be presented as “living in places with higher rates of childhood asthma diagnoses” rather than “experiencing higher rates of asthma diagnoses” given data/scale limitations. [Please scan the full text for other instances of this concern, if there is agreement that it needs to be addressed].</p>		<p>We now present results as a comparative likelihood that individuals from a socially vulnerable population currently live in areas that are projected to have the highest impacts.</p>
3	Coastal Flooding	54	<p>Concerns about ACS block group margins of error discussed above (also applicable for inland flooding)</p>	<p>Spielman SE, Folch D, Nagle N. Patterns and causes of uncertainty in the American Community Survey. <i>Applied Geography</i>. 2014 Jan 1;46:147-57.</p> <p>Folch DC, Arribas-Bel D, Koschinsky J, Spielman SE. Spatial variation in the quality of American Community Survey estimates. <i>Demography</i>. 2016 Oct;53(5):1535-54.</p> <p>Bazuin JT, Fraser JC. How the ACS gets it wrong: The story of the American Community Survey and a small, inner city neighborhood. <i>Applied Geography</i>. 2013 Dec 1;45:292-302.</p>	<p>The logic for using Census block group for the sea level rise and inland flooding sector analyses is twofold: 1) The underlying paper for each of these sector studies estimates impacts at a finer scale than for other sectors - for sea-level rise there is a 150m x 150m grid, and for inland flooding effects are estimated at the building level. 2) In both cases, as the reviewer notes, the finer scale of the impacts calculations reflects the relatively small areas that are vulnerable to the flooding climate hazard, compared to other sector (e.g., air quality is estimated across CONUS). In response to a separate comment, we added information about the higher ACS margins of error for population data at the block group versus tract level.</p>

				For the most part, I found the text, figures, and tables to do a good job in clearly communicating the modeling results.		
4	Air Quality	18	Table 2	To provide important context, I think that it would be helpful, where possible, to include current rates of the various outcomes that are considered. For example, on page 18, Table 2, we see that there are 1,200 additional projected premature deaths due to particulate matter pollution in the Northeast at 4C compared to 1986-2005. What I cannot determine from the information presented is the relative scale of this impact because I do not know the current annual number of premature deaths associated with particulate matter in the Northeast. Simply adding one additional column to the table would be helpful – and perhaps each of the projected absolute changes could also be expressed as a percentage from the current baseline. [This same comment is applicable to many other tables/figures throughout the report – Figure 3 could be reconsidered to present relative change versus absolute change, for example. It might also be helpful to include some of that baseline information in the text itself. An excellent counterexample is Page 67, Figure 2, where the Baseline projection is included].	Jing P, Lu Z, Steiner AL. The ozone-climate penalty in the Midwestern US. Atmospheric Environment. 2017 Dec 1;170:130-42.  Trail M, Tsimpidi AP, Liu P, Tsigaridis K, Rudokas J, Miller P, Nenes A, Hu Y, Russell AG. Sensitivity of air quality to potential f	Not all of the sectors lend themselves well to presentation of baseline information - roads, coastal, and labor, for example, measure changes from the baseline, but do not explicitly incorporate a baseline incidence or damage in the calculations. For the other three sectors, we present or have added new information to the supporting materials, with some mentions in the main report as well: 1. The example the reviewer points out, for inland flooding, provides a straightforward flooding baseline, as noted in Figure 2 of that chapter; 2. For extreme temperature, we added estimates of baseline extreme mortality rates by city to Table 2 of Technical Appendix E ; 3. For air quality, we added estimates of all-cause baseline mortality by age to Technical Appendix D, with further disaggregations by race and ethnicity, but information on mortality attributable to baseline air quality is not available from the Fann et al. study. We also added to the text information on baseline asthma prevalence by age and race from available CDC data.
4	Overall			Outlines for the regions are difficult to see on some of the maps in the draft text.		The figures have been revised to make the regional delineations more visible.
4	Overall			It may be helpful to add text/figures/tables to the main text to help readers understand the scale of differences between “high impact” and the other two terciles. Some of these maps exist in the appendices. For some of the effects, it seems that this difference includes the SIGN of the effect, whereas for others, the difference is more marginal. I completely understand and appreciate the simplification into terciles for consistency throughout the analysis but imagine that the difference between the terciles in terms of actual (absolute or relative) impact may worth including in the main text in some manner.		We have added information to the main text on the impacts associated with the high tercile areas and refer the reader to the appendices for detailed information on the parameters of each tercile.
4	Air Quality	17	Figure 2	The outlines of the regions are tough to see in these figures, and the labels could probably be larger. [same comment is applicable for some other maps]		The figures have been revised to make the regional delineations more visible.
4	Temperature Mortality	30	Figure 2	Some of the city names are lost in the region outlines; consider text outlines or background text box colors to assist (although I appreciate that this is a difficult cartographic exercise!).		We have adjusted the city name labels to improve the figure.
4	Temperature Mortality	30	Figure 2	This may be a good opportunity to present the baseline mortality rates, given that the city symbols are all a uniform color at present.		We are concerned about potentially confusing less technical report readers with too much information, but we have added the baseline mortality results, by city, to a revised Table 2 in Technical Appendix E.
4	Inland Flooding	69	Figure 3	The difference in the risks for White, non-Hispanics between the 2C and 4C temperature changes is remarkable! 32% more risk in the 2C scenario versus 1% more risk in the 4C scenario. This seems to be one of the larger contrasts between the two temperature changes anywhere in the report, but I did not see any text discussing this disparity (and apologize if I missed it). This must be related to a changing projected geography for flooding between the two temperature changes?		We have added a sentence to the results discussion describing this result: Notably, the likelihood of living in areas estimated to experience the highest inland flooding damages is projected to decrease substantially as warming increases: 32% greater likelihood under the 2°C warming scenario and 1% greater likelihood under 4°C.
4		79	Figures 1-7	It might be helpful to repeat the note about +/-10% from the main text on page 78 in each of the figure captions, to help readers understand why only certain results are presented. I also wonder if there might be a way to graphically contrast cases with higher versus lower risk (up or down arrows, different colors, etc)?		In revising the final report, we have dropped the +/- 10% metric, and now show all impact results for each region.
4	Appendix E	Appendix E	Figure 5	The census tract-scale maps for the study cities included in the temperature mortality analysis are very difficult to read and may not be necessary given the analysis limitations (see comments in final section). Unless readers will be able to interactively zoom into these figures and/or access high resolution versions, it may be possible to remove them.		As noted in reponse to the other referenced comment, we chose to report results for this sector at the Census tract level, for consistency with other sector results. In addition, the appendices will be provided in an online format - this figure in particular is high-resolution and supports the reader zooming in to see detail (though not interactively). Further, unlike counties, tracts are of roughly equal population, providing a better basis for comparing socially vulnerably population density within and across cities.
5	Overall			Yes, I believe that the determinants of social vulnerability and metrics of disproportionality considered in this report to have been clearly described. I did have some concerns about the metrics of disproportionately that are noted above in the response to Q3, and was also surprised that the authors did not present any information about margins of error for demographic estimates from the ACS (particularly at finer spatial scales, also noted in Q3).		We provide a full response to this comment where it is mentioned in more detail by this same reviewer.
5	Overall			I have no objection to the four variables the authors chose for the full analysis and appreciate that they included text acknowledging that these are just a small fraction of the total set that could be included. It may be worth noting that these variables are, to varying extents, spatially correlated with one another, and thus the results for one variable are not necessarily completely “independent” from those presented for other variables. It might be helpful to include the four-by-four correlation matrices for these four variables at all scales included in the report, and perhaps for each of the different regions as well.  To reiterate a comment from above, I very much appreciated the text in each chapter that begins to consider the causal mechanisms that relate each vulnerability indicator to the outcomes considered.		The reviewer is correct that other dimensions of social vulnerability could be explored, and also that the four measures chosen are spatially correlated and not necessarily independent - many individuals may meet the definition for inclusion in multiple categories. We added language addressing these points in Technical Appendix C, and also added a brief mention in the Approach chapter. We considered adding correlation matrices, but the key disproportionality results do not necessarily exhibit the same degree of correlation nationally or by region that we would see in the full ACS dataset, because each sector impact examines a different spatial domain based on the specific locations of the higher impact terciles.
6	Overall			Yes, I thought that the main sectoral sections were reasonable abstractions of the more detailed information presented in the appendix. A few specific suggestions related to this question appear elsewhere in this report (e.g., including information about baseline impacts more consistently for all sections in the main text, providing a brief summary of the magnitude of differences between the impact terciles), but for the most part, I appreciated the “balance” between the appendices and the main text.		Responses to the specific comments raised are provided elsewhere in this response to comments document.
6	Temperature Mortality	32		I recommend adding additional disclaimers to figures and the text here to remind readers that these results are only applicable within the 49 cities included in the temperature mortality analysis. There is currently a comment about regional results not being presented, but I would also recommend updating the caption for Figure 4, the main text at the top of this section, etc. “Within a subset of 49 large American cities” (or similar) should be sufficient. It is imperative that these results be interpreted within the context of select/urbanized counties only.		We agree that it is important to convey this caveat and have included disclaimers in the main text and figure captions to remind readers of this point.
6	Appendix E			In neither the main text or the appendix am I able to locate a list of the 49 city-specific temperature thresholds that were used for the analysis. Would it be possible to include them in the appendix, with perhaps summary statistics thereof in the main text?		We added this information to Table 2 of Appendix E

7	Executive Summary	1		<p>The executive summary does a reasonable job in providing appropriate findings and conclusions from the modeling results and sufficient context to understand those results. My concerns related to the executive summary mirror those voiced elsewhere in this report:</p> <ul style="list-style-type: none"> <li>-The executive summary does not acknowledge that population/demographics are held constant under the projection scenarios</li> <li>-The executive summary could do a better job of framing risk as “living in a location that is projected to experience higher impacts from climate change” rather than experiencing particular outcomes (which the methodological approach is unable to examine – as acknowledged elsewhere in the main text). Relatedly, “higher risk of living in areas” reads more awkwardly to me than “higher likelihood of living in areas,” although I appreciate the effort to find synonyms and avoid repetition.</li> </ul>		<p>We have revised the brief description of methods and key findings in the executive summary to clarify that the analysis assumes constant demographics. We agree that this is an important limitation to be clear about.</p> <p>The executive summary, and other sections of the report, have also been revised to frame risk as living in a location that is projected to experience higher impacts. We agree that our method is not able to quantify particular outcomes by individuals, and think that the revised wording provides this clarification. We have also used the phrasing “higher likelihood” more frequently throughout, as we agree that it is less awkward.</p>
7	Executive Summary	3		<p>As a separate point, I am not certain that the last bullet point in the executive summary is directly relevant to the analysis. The point reads “Adults ages 65 and older are projected to experience significant impacts from climate change across the sectors analyzed,” but I do not believe that there is any framework presented in the report to determine what “significant impacts” might be. As stated earlier in the executive summary, “this report, however, focuses not on measuring these specific impacts but rather on analyzing whether and to what extent socially vulnerable groups are likely to disproportionately experience the effects.”</p>		Edit made.
7	Executive Summary	2	Figure 2 Caption	<p>The text for Low Income should likely read “income that is at or below 200% of the poverty level” rather than “is 200% of the poverty level.”</p>		Change made.
8	Overall			<p>The extent to which this report engaged with the concept of uncertainty was probably my greatest source of disappointment. I do agree that the report presented some of the key limitations upfront, and that there was adequate text in the sector-specific appendices that further expanded upon some of these limitations. However, I was very surprised to see that almost every single estimate in this report is a point estimate with no quantification of uncertainty. It is certainly a large undertaking to have assembled all of the point estimates across the diverse data sets and geographic scales that the authors used. Furthermore, it would be almost impossible to gather quantitative information to fully estimate the range of uncertainty around the point estimates. But it would certainly seem to be possible – at least as a demonstration for one of the sectors – to work through a more detailed estimate of the scale of the uncertainty. For example, in the temperature mortality analysis, there is uncertainty introduced across the GCMs, from the ACS population estimates, and from the exposure-response relationships themselves. Could the authors perhaps implement something like a Monte Carlo analysis to help readers get some sense of the confidence in the point estimates provided, even if just for the data sources for which uncertainty information is available? It would be very exciting to see error bars around the bar graphs on page 32, Figure 4, for example!</p> <p>A less satisfying option, but certainly still an improvement from the present state of the report, would be to provide some qualitative assessment of the relative uncertainty associated with the various data sources included for each sector.</p>		<p>We made several changes to the revised report to improve the treatment of uncertainty in the report. First, we added additional text to the main text Approach chapter on the sources of uncertainty. Second, we added substantially to Technical Appendix C section on uncertainty, including a detailed summary table that identifies key sources of uncertainty that could affect the disproportionality metric results, and the estimated impact of each source of uncertainty on the impact results - as the reviewer suggested at the end of this comment. We considered a quantitative analysis for a single sector, such as a Monte Carlo aggregation across sources of uncertainty, but determined that for multiple reasons, including the inability to estimate uncertainty quantitatively for certain inputs or methods, as well as the need for strong assumptions about independence or correlation of uncertainty across methodological steps, that a quantitative approach was not possible. Each of the sources of uncertainty mentioned in the comment are addressed in the Technical Appendix, as well as other sources identified in our review and those mentioned by other reviewers.</p>
8	Overall			<p>As described elsewhere, I am also concerned about the manner in which uncertainty associated with population/demographic projections is communicated in the main text. There are multiple instances (a few examples of which are highlighted elsewhere in this report) where the fact that the projections are oriented around the current population distribution in the U.S. could become lost to readers. I did not see any text that begins to address whatever limited information we have about possible demographic trends in the United States over the time span of relevance to this report, but believe it would make the report more comprehensive if there was some discussion of such, even in an appendix. The current language that there is “high uncertainty” is a bit unsatisfying and may undercut the validity of the results for some readers. I strongly encourage the report authors to frame as many of their results around “places where vulnerable populations currently live” (or similar language—which may ultimately motivate them to adjust the analysis as suggested elsewhere in this review) to try to make it as clear as possible that this report examines the intersection of PROJECTED climate impacts with CURRENT population patterns.</p>		<p>We agree with the reviewer that there are likely to be substantial demographic shifts in the U.S. by the end of this century. We have added an endnote to the report summarizing recent demographic trends and themes in the U.S., with reference to where readers can go for more information. We acknowledge that without robust projections of demographic changes, we are unable to consider the effects of these demographic shifts and implications for disproportionality. We have clarified the wording of key findings in the executive summary to note that the analyses assume constant demographic distributions, and added similar caveats earlier in the executive summary when describing the general approach/methodologies to the analyses. We have also added text to the 'Sources of Uncertainty' section further describing the implications of this assumption. Finally, we have tried to frame results throughout the report as being representative of where vulnerable populations currently live.</p>
NA	Temperature Mortality	28	Paragraph 1 (and equivalent text in Appendix E)	<p>Please see a subsequent comment regarding “rising temperatures due to climate change” as a potential grammatical hiccup.</p> <p>Regarding the content of this sentence – I think this is a misrepresentation of the literature that is also present later in the paragraph (“Studies that have analyzed future temperature-related mortality...”). The reason that these studies project higher temperature-related mortality in the future is that they are based on very simple exposure-response relationships that do not account in any manner for population adaptation. Results of projections studies (which I have somewhat of a difficult time presenting as “evidence” in the health domain) are almost completely inconsistent with retrospective studies that document significant reductions in heat-related mortality in the recent past, even with ongoing warming. There is ample room for debate regarding the extent to which further reductions might be possible with continued warming, but I believe it is inappropriate to assert that there will be an increase in heat-related mortality rates. Instead, perhaps the framing could be that “higher temperatures will increase the risk of heat-related illness and death, in the absence of additional societal adaptation.” Supporting references are provided in the box to the right.</p> <p>It may also be important to acknowledge that adaptation/vulnerability is not constant over time, because lower societal adaptation/higher vulnerability could also drive temperature mortality rates higher even in the absence of warming (as appeared to be the case in our analysis of Maricopa County heat deaths in 2016, see Putnam et al. 2018).</p>	<p>Bobb JF, Peng RD, Bell ML, Dominici F. Heat-related mortality and adaptation to heat in the United States. <i>Environmental health perspectives</i>. 2014 Aug;122(8):811-6.</p> <p>Hondula DM, Balling RC, Vanos JK, Georgescu M. Rising temperatures, human health, and the role of adaptation. <i>Current climate change reports</i>. 2015 Sep;1(3):144-54.</p> <p>Sheridan SC, Dixon PG, Kalkstein AJ, Allen MJ. Recent trends in heat-related mortality in the United States: an update through 2018. <i>Weather, Climate, and Society</i>. 2021 Jan;13(1):95-106.</p> <p>Sheridan SC, Allen MJ. Temporal trends in human vulnerability to excessive heat. <i>Environmental research letters</i>. 2018 Mar 19;13(4):043001.</p> <p>Gosling SN, Hondula DM, Bunker A, Ibarreta D, Liu J, Zhang X, Sauerborn R. Adaptation to climate change: a comparative analysis of modeling methods for heat-related mortality. <i>Environmental Health Perspectives</i>. 2017 Aug 16;125(8):087008.</p> <p>Putnam H, Hondula DM, Urban A, Berisha V, Iñiguez P, Roach M. It's not the heat, it's the vulnerability: attribution of the 2016 spike in heat-associated deaths in Maricopa County, Arizona. <i>Environmental research letters</i>. 2018 Sep 19;13(9):094022.</p>	<p>We have revised the sentence to clarify the the potential effect of societal adaptation, and added some of the citations provided by the reviewer. We have also added an endnote describing relationship between adaptation effectiveness and temperature over time, with a citation to the Putnam paper.</p>

NA	Temperature Mortality	28	Social Vulnerability paragraph	Some attention to unsheltered individuals is likely warranted here given their significantly elevated exposure to high temperatures.	Longo J, Kuras E, Smith H, Hondula DM, Johnston E. Technology use, exposure to natural hazards, and being digitally invisible: Implications for policy analytics. Policy & Internet. 2017 Mar;9(1):76-108.  Maricopa County heat-related death report for 2019: <a href="https://www.maricopa.gov/ArchiveCenter/ViewFile/Item/4959">https://www.maricopa.gov/ArchiveCenter/ViewFile/Item/4959</a>	We have included the following sentence in the Social Vulnerability and Temperature Mortality section: The homeless are more exposed heat and cold extremes, while also possessing many risk factors such as social isolation, psychiatric illness, and other health issues.
NA	Temperature Mortality	29	Table 1	It may be worth acknowledging that some studies report lower rates of heat-related deaths among Hispanic and Latino populations compared to Whites (at least this has consistently been observed in heat death data from the Phoenix area).	Maricopa County heat-related death report for 2019, see page 12: <a href="https://www.maricopa.gov/ArchiveCenter/ViewFile/Item/4959">https://www.maricopa.gov/ArchiveCenter/ViewFile/Item/4959</a>	We have included an endnote describing this reported result.
NA	Temperature Mortality	29	Approach Section	Section numbering is out of sequence (1-2-3-5)		We have corrected the sequence of numbering.
NA	Labor	33	First sentence (and equivalent text in Appendices and other sections)	The American Meteorological Society defines climate change as “any systematic change in the long-term statistics of climate elements.” If this is the same definition used for this report, this sentence reads: “Systematic changes in temperature are projected to increase the frequency and intensity of high-temperature days,” which is of course a touch redundant and offers a strange cause-effect relationship. I recommend a change to something like “Global-scale climate forcing and urbanization are projected to increase the frequency...” to begin the sentence with the driver of climate change (which, itself, is an ‘effect,’ not a ‘cause,’ I would argue).	<a href="https://glossary.ametsoc.org/wiki/Climate_change">https://glossary.ametsoc.org/wiki/Climate_change</a>	We have revised the beginning of this sentence to: “A changing climate includes increases in the frequency and intensity of high-temperature days across the U.S., leading...”
NA	Labor	34	Bullet point #1	Please add a degree sign and units here.		We have added degree sign and units
NA	Appendix E	E-7		I cannot convince myself that there is any value in disaggregating results to the census tract scale for this analysis. Given that the mortality calculations are completed at the county scale only, wouldn't it be sufficient to use the county scale for demographic information as well? The text says that “displaying results at the tract level allows for better application of social vulnerability factors,” but I do not see any mathematical upside to do so. The number of people in a vulnerable group in the county must equal the sum of the number of people in a vulnerable group in all of the census tracts in the county. Over-stating the spatial scale at which analyses are completed/relevant is a broader concern of mine throughout the report, and this is one case where it seems more appropriate to present results at the coarser scale (county). I do not think that there are any “real” tract-scale results here but apologize if I am misinterpreting the work.		The reviewer is correct that the method for estimating extreme temperature climate impacts per person for this sector are uniformly estimated by county. For this reason, we initially conducted the analysis at the county level. The results were somewhat different, however the main messages were identical. In the final analysis, we chose to use tract level for consistency with other sectors, where disproportionality is assessed at the Census tract or finer resolution.
NA	Appendix E	E-9	Final paragraph	The point here about the Midwest is speculative, in my opinion. The Midwest is projected to show high mortality rates based on the combination of their current exposure-response functions and the projected climatology, and particular methodological assumptions. I would refrain from making assumptions about actual behaviors and capacity in the underlying populations.		We agree and have edited the text.
NA	Appendix E	E-10	Figure 4	Here, and in the main text, I wonder if it would be more instructive to present the number of days above a given temperature percentile for each study unit (as based on the baseline scenario). Because the number of 90F days is so variable across the United States, the scale of the differences across time periods becomes a bit hard to determine – particularly in some of the hotter and cooler parts of the country. I could envision an alternative version of this figure that shows the # of days above the present-day 90th percentile temperature, or similar.		For technical audiences, particularly those most familiar with climate change analyses, we agree that an “anomaly” type graphic based on percentiles provides more readily identified detail. We worry that the audiences we anticipate will be most interested in this report’s results, however, could find an anomaly type presentation confusing (for example, it will show larger increases in hot days in northern regions, which some may interpret as northern regions having more hot days in an absolute sense). For that reason, we used days above a common temperature threshold.
NA	Appendix E			Would it be possible for the authors to present disaggregated results for heat and cold? I am a little uncomfortable with the report presenting results that are mostly stated as being heat-related, but are actually based on a combination of changing heat and cold-related risks. Having the results disaggregated in the appendix would help some readers deepen their understanding of how these two processes are working together to produce the final results.		It is possible to present disaggregated results, but we worry it could confuse readers, including those who access the technical appendix. As we state throughout, while we find it important to present a balanced presentation to include both extreme heat and extreme cold effects, the extreme heat component dominates the analysis. We have added an additional reference to the quantitative basis for this claim in the 2017 EPA Climate Impacts and Risk Analysis framework report.

					<p>Georgescu M, Morefield PE, Bierwagen BG, Weaver CP. Urban adaptation can roll back warming of emerging megapolitan regions. Proceedings of the National Academy of Sciences. 2014 Feb 25;111(8):2909-14.</p> <p>Broadbent AM, Krayenhoff ES, Georgescu M. The motley drivers of heat and cold exposure in 21st century US cities. Proceedings of the National Academy of Sciences. 2020 Sep 1;117(35):21108-17.</p> <p>Georgescu M, Broadbent AM, Wang M, Krayenhoff ES, Moustauoi M. Precipitation response to climate change and urban development over the continental United States. Environmental Research Letters. 2021 Mar 15;16(4):044001.</p> <p>Hondula DM, Georgescu M, Balling Jr RC. Challenges associated with projecting urbanization-induced heat-related mortality. Science of the total environment. 2014 Aug 15;490:538-44.</p>	<p>As noted in response to comment in row 45 above, in the revision we added a new table to Technical Appendix C that identifies key sources of uncertainty and provides a qualitative estimate of the impact of each source of uncertainty on the disproportionality metrics. In response to this comment, we included the effect of urbanization as a possible key source of uncertainty in that table.</p>
NA	Overall			<p>The report does not, to the best of my knowledge, speak to the role of urbanization as a driver of regional climate change. Any representation of urbanization in GCMs is coarse and probably an underestimate of actual physical effects on climate; depending on particular emission and development scenarios, the urban effect on regional climate may equal or exceed the magnitude of what is effected from GHG increases. There may be an opportunity to add additional text to the uncertainty section along these lines; this is a particularly important issue for processes dependent on the urban energy balance and "heat island" effect including temperature-mortality and air quality.</p>		
1	Approach	10	Step 2	<p>The introduction is generally adequate, but here are some "bigger picture" suggestions for revisions:</p> <p>Under Step 2 (p. 10), I would describe in more detail or at least give an example of the type of underlying analysis that leads to the estimates of human health and economic impacts – especially since this part is given the most detailed treatment in the respective appendices.</p>	<p>Table 3 provides an example (for Coastal Flooding and Traffic) of the type of underlying impact analysis that generates the estimates used in Step 1 of the approach. We find that this table provides a sufficient example of the type of analysis, with more details provided in the six impact chapters (and their respective appendices).</p>	
1	Approach	13		<p>I would re-label the section following Table 3 on p. 13 as "Maintained assumptions" – since "uncertainty" refers more to the statistical properties of a given model or data shortcomings, at least in my field (applied economics) - or perhaps "Caveats for interpretation." I would add here the perhaps most important caveat – that you can't really tell which vulnerable people are actually exposed to a given risk – you can only determine the relative demographics in spatial units with generally high exposure. In essence, you are assuming uniform and equal exposure to risks by everybody living in "high" spatial units. This is stressed in virtual every appendix chapter, but not in the introduction.</p>	<p>We find that "Sources of Uncertainty" is a more appropriate title for this section, and is consistent with terminology used in other climate science and economics literature. In response to the comment on exposure, we have added the following caveat to the section: The analyses of this report are not designed to project the specific individuals actually exposed to a given risk, and are instead intended to determine the relative demographics in Census tracts with generally high exposure. As a result, the analyses assume uniform and equal exposure to risks by everybody living in these tracts.</p>	
1	Introduction	5	Figure 1	<p>I wouldn't call figure 1 a "framework" – it's an overly simplistic schematic at best. It's OK to show it, but I would drop the sentence starting with "This report uses."</p>	<p>We modified the figure to better illustrate the underlying framework, and also updated the descriptive text that accompanies it.</p>	
1	Introduction	5		<p>"monetize these risks" promises more than what is delivered – nothing is monetized (= express costs and benefits in \$'s) in this report. Again mentioned on p. 6 and other places in the report. I would drop all instances that claim that the report monetizes impacts from climate change.</p>	<p>The reviewer is correct - we use monetized impacts only as an intermediate result in the inland flooding sector, which we then standardize by property value in each spatial unit in order to generate a non-monetary ranking of climate impact. We removed references to monetizing risks in the main report, but the detailed calculation for inland flooding remains in the relevant Technical Appendix.</p>	
1	Introduction	5		<p>Not sure I would call the six areas of investigation "sectors" in the economic sense. To me they are more "avenues of impacts" or "types of adverse effects" of climate change.</p>	<p>We re-named the chapters and no longer refer to the analyses as "sectors."</p>	
1	Introduction	6		<p>Not sure the appendices make any mention of the "peer review process," and it is unclear at this point if this refers to the peer review for this report, or the peer review for the underlying source studies.</p>	<p>The text has been clarified. A "Front Matter" section has been added to the beginning of the report that acknowledges the peer review process and reviewers. Appendix A, which has now been included in the report, also contains a detailed description of the peer review process for the report, a summary of peer review comments, and how the report changed following review.</p>	
1	Introduction	6		<p>This report presents relative probabilities of exposure for vulnerable populations under a variety of relatively strong assumptions (unchanged demographics etc). Not sure it really "informs strategies to enhance resiliency, etc." as claimed.</p>	<p>The sentence has been deleted in response to this comment and others from peer review. The paragraph has been clarified to state the intention of the report and how results should be interpreted by the reader.</p>	
1	Approach	8	Figure 2 legend	<p>Legend to figure 2: I would explain the meaning of "1,2,3,4"</p>	<p>We have added unit labels to the legend of this figure.</p>	
1	Approach	7-13		<p>Steps 1-3 as described in the text are not in sync with the four steps given in table 3.</p>	<p>We have revised this section to clarify that there are four main steps. The text, figure, and table are now consistent.</p>	
1	Approach	13	Table 3	<p>Table 3: I would list the regional analysis as a fifth step rather than a table note. Something like "repeat steps 1-4 for each of the [x] NCA4 regions..." – with a corresponding example in the last column.</p>	<p>Since the fourth step is not involved with developing the calculations at the NCA4 regional level, we disagree with the suggestion to create a fifth step. No change made.</p>	
2	Overall			<p>In general, yes. I do have some editorial suggestions for some of the graphics and figures, as listed in detail under "Question 4."</p>		
2	Appendix D	D-5	Line 112	<p>I'm using the specific comments table below to list typos and editorial glitches. Should that be "deaths BY 2095?"</p>	<p>Responses to the specific comments raised are provided elsewhere in this response to comments document.</p>	
2	Appendix D	D-38	Line 575	<p>What is meant by "protective effect?"</p>	<p>The sentence is correct as written. The values provided in Fann et al. (2021) are annual premature deaths in the year 2095.</p>	
2	Appendix D	D-40	Line 592	<p>What is meant by "protective effect?"</p>	<p>We have clarified this phrase by noting that 'protective effect' signifies that climate change at a national level reduces the number of asthma ED visits per 100,000 individuals.</p>	
2	Appendix D	D-40	Line 592	<p>What is meant by "protective effect?"</p>	<p>We have clarified this phrase by noting that 'protective effect' signifies that climate change at a national level reduces the number of asthma ED visits per 100,000 individuals.</p>	

2	Appendix E	E-22	Line 362	"detath" should read "death"		Edit made.
2	Appendix F	F-12	Line 392	What is meant by "probability expansion?"		The word 'of' was missing. Revised to 'probability of expansion'
				Why is the older community survey used here instead of 2014-2018 as in the other chapters? Is this a typo? Same in line 408 – these seem very dated levels.		While the years of ACS data employed (2008-2012) are more dated, they lie within the reference period upon which the underlying econometrics study is based (2003-2016, based on available data from the American Time Use Survey). That said, substantial differences should not exist between the data used and values from more recent years.
2	Appendix F	F-12	Line 404			We have corrected the sequence of figure numbering.
2	Appendix F	F-21	Line 505	"Figure 9" should read "Figure 10"		We have corrected the sequence of figure numbering.
2	Appendix F	F-22	Line 529	"Figure 10" should read "Figure 11"		We have corrected the sequence of figure numbering.
2	Appendix F	F-23	Line 538	"Figure 11" should read "Figure 12"		We have corrected the sequence of figure numbering.
2	Appendix G	G-35	Line 699	Drop second "to be"		Edit made.
2	Appendix H	H-3	Line 77	Drop "="		Edit made.
				I found the appendices extremely useful. They clearly outline the analytical framework for each sector analysis.		
3	Overall			In general, the essential analytical steps are also given in the main report. As mentioned below under "general comments," I would give the exact thresholds for the H/M/L tiers in each sector, and – if possible – also provide an analysis based on the highest quartile of exposure.		We have added information to the main text on the impacts associated with the high tercile areas and, due to space limitations, we refer the reader to the appendices for detailed information on the parameters of each tercile.
3	Overall			In some cases (e.g. effect of ozone on premature mortality, p. 17) detailed results are omitted from the main report, but given in the appendix. This could be justified a bit better / in more detail.		In an effort to keep this report manageable in size, we do limit the amount of information that is presented in the main report. It is true that estimates for ozone are provided in the appendix but omitted in the technical report, mainly for space considerations. The main text includes a note directing the reader to the Technical Appendix for these results, and there are also several endnotes that similarly direct the reader to Appendix D for these results.
3	Overall			As mentioned below under Q.5, I would give the explicit formulas for the relative ratio of exposure from p. C-10 in the main report (introduction & sector-specific variations). Then, under the last bullet of "Approach" for each section, I would refer back to that formula and clarify that the analytical results are all "ratios of ratios." This is not 100% clear, as it stands.		We substantially edited the text describing the approach for each analysis, and we now refer the reader to the example calculation provided in the Approach chapter for detailed information.
3	Air Quality	16	Bullet 4	Please stress that this is a ratio of ratios – not fully clear		We have revised the text to clarify the calculation and how it should be interpreted (and removed the term 'relative risk').
3	Temperature Mortality	29	Bullet 5	Please stress that this is a ratio of ratios – not fully clear		We substantially edited the text describing the approach for each analysis, and we now refer the reader to the example calculation provided in the Approach chapter for detailed information.
3	Labor	34	Bullet 4	Please stress that this is a ratio of ratios – not fully clear		We substantially edited the text describing the approach for each analysis, and we now refer the reader to the example calculation provided in the Approach chapter for detailed information.
3	Roads	41	Bullet 9	Please stress that this is a ratio of ratios – not fully clear		We substantially edited the text describing the approach for each analysis, and we now refer the reader to the example calculation provided in the Approach chapter for detailed information.
3	Coastal Flooding	54	Bullet 4	Please stress that this is a ratio of ratios – not fully clear		We substantially edited the text describing the approach for each analysis, and we now refer the reader to the example calculation provided in the Approach chapter for detailed information.
3	Inland Flooding	66	Bullet 5	Please stress that this is a ratio of ratios – not fully clear		We substantially edited the text describing the approach for each analysis, and we now refer the reader to the example calculation provided in the Approach chapter for detailed information.
				Generally, yes, but please see below for some specific editorial suggestions.		We have clarified this bullet.
4	Air Quality	15	Figure 1	I also have one general suggestion regarding the "framework" graphics such as Figure 1 on p. 15 for the air quality section: It seems to me the narrative to these figures would be more consistent with moving the last block "risk outcomes" ahead of the "social vulnerability" schematic, as the latter is essentially the endpoint of each analysis.		We removed the framework graphics in the Background sections as they did not align with the steps in the approach chapter nor the steps in the methods sections.
4	Overall			For the tables that relate social vulnerability to each impact "sector," I often felt that some of these associations are pure conjectures and a bit tenuous, for example that some minorities may lack communication and language skills that makes them more likely to move into a high-risk flood zone. Please see below for details. (this also holds for the corresponding sections in the appendices where the same arguments are raised)		We have removed language about potential associations that are not backed by evidence in the scientific literature.
4	Overall			Figures that show a split-up by racial groups, such as Figure 4 on p. 21, are a bit misleading as "whites" are included in the blow-out graphic that is supposed to give further details for "minorities." It might make more sense to list the result for "white" as a separate block not connected to the "minority" bar in the main graph.		We modified the graphic to depict the individual racial and ethnic groups included in the minority category as separate from the white, non-Hispanic group.
4	Overall			All figures in the appendices that show the distribution of impact by tiers (e.g. Figure 7, p. D-16) need a label for the y-axis, and a legend for the color codes.		The graphics referred to are histograms, so the y-axis the cumulative frequency. We added the requested information to each of the relevant captions.
4	Air Quality	16	Table 1	The entry under "no HS diploma" begs the question of cause and effect – I think most of these studies find that poor air leads to sub-par educational outcomes, while the table suggests that people with lower education are more likely to move to / live in highly polluted areas. As it stands, the statement is unclear and a bit muddled.		We have revised and clarified this statement to acknowledge that there are complex cause and effect drivers of these disproportionate risks.
4	Temperature Mortality	29	Table 1	The linkage between "working in outdoor occupations" and "lacking a HS diploma" is purely speculative. Also, it is not the lack of education that causes the impact, it's the nature of the occupation – even a field worker with a PHD would suffer from high temperatures.		We have removed language about potential associations that are not backed by evidence in the scientific literature. We have also clarified vague statements and eliminated conjecture.
4	Temperature Mortality	30	Figure 2	I would add a note explaining why the Northern Plain region is void of included cities.		An endnote already exists which describes this, including "The underlying epidemiological relationships described in Mills et al. (2014) constraint the analysis to these 49 cities, therefore omitting large parts of the country and its population. "
4	Labor	34	Table 1	"Minorities under-utilizing safety precautions" – seems highly construed and speculative – I would either present a published reference on this or drop this conjecture. Same with respect to >65 "facing barriers to find safer employment."		We have dropped these statements, or in one case, added a citation to back up the statement.



4	Roads	41	Table 1	The rationale given for minorities seems speculative at best – and low income is already covered in the preceding row of the table. Similar for no HS diploma – who says they are aiming for the same total pay as others? As for the “job security” argument, that could be used for any of these groups.	We have removed the mention of effects on individuals with low income in the row for minorities. But we note that this statement is supported with a literature source, therefore we find it to be an appropriate statement. As for the comment regarding individuals with no HS diploma, we acknowledge that there may be some people who do not aim for higher pay, however, we feel that it is reasonable to assume that most individuals with low income aspire to earn more money. And yes, we agree that the job security argument can be used for some of these other socially vulnerable groups, however, the underlying study specifically made this statement for those with lower educational attainment.
4	Roads	42	Figure 2	The bars need to be color-coded with the same color as the corresponding region on the map.	We have made that change to the figure.
4	Coastal Flooding	53	Table 1	The rationale given for minorities has more to do with wealth and property values than ethnicity – seems ad-hoc. Similarly, the rationale for no HS diploma is vague and speculative.	We have clarified and simplified the statement about minorities. While we acknowledge that this finding is related to wealth, the intersection between wealth and minorities is highly relevant to this particular impact of climate change. We have added a citation to support the statement for those with no high school diploma so that it is not speculative.
4	Inland Flooding	65	Table 1	Rationale for minorities “may have limited access to information” is a bit speculative. The rest of the statement has to do with low income, not ethnicity or race. Similar for no HS diploma – I don’t see why higher education is needed to prepare for a disaster. The rest of the statement has to do with income.	The first part of this finding comes from the 2016 Climate and Health Assessment of the U.S. Global Change Research Program. We find this assessment to be a robust source of information and have kept the finding as is. However, we have moved the second sentence to the low income row, as the reviewer is correct that the finding has more to do with income.
4	Appendix B	B-3	Figure 1	Nicer than figure 1 in the Introduction – I would swap.	We have changed Figure 1 in the Introduction to make it more clear, simple, and compelling.
4	Appendix F	F-26	Table 2	I would add a legend for the colors or change the labels to vary with color	We have added a caption to the table describing that positive differences in likelihood are colored in blue showing two categories: relatively low difference (0-20 percent; lighter blue) and relatively high difference (20-40 percent; darker blue).
4	Appendix G	G-19	Figure 9	I would give the bar charts the same color as the corresponding region, for ease of exposition and consistency with other similar figures	As noted by the reviewer we do adopt this type of color-coding in other figures, in the main report especially (see response to comment 98). The main purpose of the Technical Appendix is to provide an expanded set of results across additional dimensions, which this figure accomplishes.
4	Appendix H	H-13	Figure 4	I would give the bar charts the same color as the corresponding region, for ease of exposition and consistency with other similar figures	As noted by the reviewer we do adopt this type of color-coding in other figures, in the main report especially, where information is provided for a smaller set of SLR scenarios. The main purpose of the Technical Appendix is to provide an expanded set of results across additional dimensions, which this figure accomplishes.
4	Appendix H	H-14	Figure 5	I would give the bar charts the same color as the corresponding region, for ease of exposition and consistency with other similar figures	As noted by the reviewer we do adopt this type of color-coding in other figures, in the main report especially, where information is provided for a smaller set of SLR scenarios. The main purpose of the Technical Appendix is to provide an expanded set of results across additional dimensions, which this figure accomplishes.
4	Appendix I	I-13	Figure 5	“experience the worst outcome” in the figure header is a bit vague, I would be more specific on the nature of the risk considered here.	We have revised the figure title to state “Likelihood that Those in Socially Vulnerable Groups Currently Live in Areas with the Highest Projected Inland Flooding Damages, Relative to Those in Reference Populations”
4	Appendix I	I-16	Figure 7	“experience the worst outcome” in the figure header is a bit vague, I would be more specific on the nature of the risk considered here.	We have revised the figure title to state “Likelihood that Those in Socially Vulnerable Groups Currently Live in Areas with the Highest Projected Inland Flooding Damages, Relative to Those in Reference Populations”
5	Overall			Yes, but as suggested below under “general comments,” I would really like to see a general vulnerability category that combines the four considered (i.e. either minority, or low income, or no HS degree, or >65), vs. the corresponding opposite category (none of the above). I think this would really add to the report.	We understand the comment and believe it is a good suggestion. We reviewed the underlying ACS data and found that they would not support such a calculation. While a few “cross-tabulations” are supported (e.g., age and race), most are not supported by the publicly available ACS data.
5	Overall			I do have problems with some of the rationales given in tables why a given category of social vulnerability might be susceptible to climate change-imposed risks – some of these arguments seem quite speculative and ad-hoc (please see specific comments for each of these tables under Q. 4). I don’t think it is necessary to justify for all impacts and vulnerability categories why these four segments might be vulnerable (except where there are clear proven links, like elderly more susceptible to heat, or low income residents less able to take adaptive measures to protect properties). Corresponding sections in the appendices would have to be adjusted as well.	We have removed language about potential associations that are not backed by evidence in the scientific literature.
5	Overall			In terms of “metrics of disproportionality” I would show the equations given on p. C-10 in the introduction, and specific modifications to the equation in the corresponding sector chapters. The math is simple enough to be suitable for a general audience.	We respectfully disagree that the equations are sufficiently straightforward and understandable for the general audience we target in the main report. Readers interested in the equations are more likely to read the technical appendices where this type of technical information is presented in an effort to keep the main report concise and communicable.
5	Overall Executive Summary	2	Figure 2	Low income = 200% of the poverty level OR LOWER	Corrected.
6	Overall			Generally, yes – but, as mentioned under Q3 and Q8 it would be useful to see the exact cut-off values for H/M/L impact zones in the main report. I would also give a rationale early on why tiers were chosen as opposed to, say, quartiles.	Responses to the specific comments raised are provided elsewhere in this response to comments document.
6	Overall			The main report could also provide more details on the determinants / definition of “exclusion from adaptation” in the coastal flooding chapter. Same for “exclusion from adaptation to mitigate HTF” in the roads chapter.	We have added clarifying text about the definition of “exclusion from adaptation” in these chapters.
7	Executive Summary			I think care needs to be taken upfront to distinguish what this report estimates – relative probabilities of exposure to climate change related risks – from what it does not deliver – relative risks. For the latter, individual or at least spatially explicit, vulnerable segment-specific data would be needed on mitigation and adaptation.	We agree that our approach does not estimate changes in relative risk, and have revised the language to more accurately reflect what the results represent. We no longer use the words ‘relative risk’ throughout the report, and instead use “higher likelihood” or “more likely”.

7	Executive Summary	1		So I agree with the statement on p. 1 “this report quantifies the differential exposure ...” (under maintained assumptions, such as no changes in demographics or mobility), but I don’t think the report “estimates how socially vulnerable populations may experience impacts differently.” It makes conjectures to that effect (see comments under Q. 4 and 5), but does not provide quantitative evidence given available data.	While the Air Quality and Health section (specifically premature mortality from PM2.5 in those aged 65+) does include race-stratified baseline incidence rates as part of the analysis, the reviewer is correct that most of the report does not estimate how socially vulnerable populations may experience impacts differently. As such, we have removed this statement from the executive summary and other sections of the report.
7	Executive Summary			It might be useful to be upfront under which conditions “relative differences in exposure” translate into relative risks (uniform measures of adaptation and mitigation for everybody living in a high-exposure spatial unit), and that assuming these conditions are met, the two terms are used interchangeably in the remainder of the report. I agree that in all likelihood relative risk will actually exceed relative exposure for vulnerable segments, but you don’t have the actual analysis to back it.	We agree that the term ‘relative risk’ is not an appropriate descriptor of the results that are generated from our methodology. As described in responses to similar comments, we have removed this term throughout the report, and instead use more appropriate terminology, such as “changes in the likelihood of experiencing...”. We have also clarified the executive summary text to more clearly state the methodology and how the results should be interpreted.
7	Executive Summary			I would also outline key assumptions and caveats in the executive summary, such as presumed static demographics and zero mobility for the next few decades.	We have added brief descriptions of key assumptions and caveats to the executive summary so that the reader has this knowledge when reviewing the key findings. We also include a sentence directing the reader to the ‘Sources of Uncertainty’ and impact sections where these caveats are described in more detail.
7	Executive Summary	4		As mentioned below, it would be really useful to have a comparison of “any of the 4 vulnerability criteria” vs. “none,” in addition to the segment-specific analysis. So for example in Figure 3, p. 4, one would then add a “low income and/or minority and/or no HS and/or >65” comprehensive vulnerability category, relative to the remainder of the target population that does not fall into any of the four vulnerability classes.	We understand the comment and believe it is a good suggestion. We reviewed the underlying ACS data and found that they would not support such a calculation. While a few “cross-tabulations” are supported (e.g., age and race), most are not supported by the publicly available ACS data.
7	Overall			In a nutshell, I am mainly concerned about “over-interpreting” exposure results as actual individual risks. I can’t think of anything relevant in terms of references or contributing effects that is missing from the report, at least not related to my field (applied economics).	The reviewer is correct that most of the report does not estimate how socially vulnerable individuals may experience impacts differently. We do not intend to convey that our analysis assesses actual individual risks. As such, we have removed statements from the executive summary and other sections of the report implying that the analyses evaluate how socially vulnerable individuals may experience impacts differently.
8	Approach	13	Sources of Uncertainty Section	As stated previously, I would re-label the section in the Introduction following Table 3 on p. 13 as “Maintained assumptions” – since “uncertainty” refers more to the statistical properties of a given model or data shortcomings, at least in my field (applied economics) - or perhaps “Caveats for interpretation.”	We appreciate that different disciplines use different nomenclature. We find that “Sources of Uncertainty” is the best title for this section, and is consistent with terminology used in other climate science and economics literature (including the National Climate Assessment).
8	Approach	13	Sources of Uncertainty Section	I would add here the perhaps most important caveat – that you can’t really tell which vulnerable people are actually exposed to a given risk – you can only determine the relative demographics in spatial units with generally high exposure. In essence, you are assuming uniform and equal exposure to risks by everybody living in “high” spatial units. This is stressed in virtual every appendix chapter, but not in the introduction.	In response to this comment, we have added the following caveat to the section: The analyses of this report are not designed to project the specific individuals actually exposed to a given risk, and are instead intended to determine the relative demographics in Census tracts with generally high exposure. As a result, the analyses assume uniform and equal exposure to risks by everybody living in these tracts.
8	Introduction			This report is all about (relative) exposure to risk – while conjectures are made about vulnerable populations’ ability to obtain and process relevant information, and / or take adaptive or mitigating actions, this is not captured quantitatively in your analysis. I would stress this upfront, probably in the Introduction chapter.	The report has undergone substantial editing to generally remove conjecture from the summary tables, and also to clarify the metrics of exposure to risk among different populations. In response to other comments, we have generally tried to avoid the use of the term “relative risk” as well.
NA	Overall			As mentioned above, it would be useful to add “any vulnerable category” vs. non-vulnerable analysis (white, non-poor, <65, >HS diploma), as general vulnerability along any of the four dimensions considered in this report is often of interest in policy questions and scenarios.	We understand the comment and believe it is a good suggestion. However, we reviewed the underlying ACS data and found that they would not support such a calculation. While a few “cross-tabulations” are supported (e.g., age and rate), most are not supported by the publicly available ACS data.
NA	Overall			I would encourage you to show the detailed cut-off values for H/M/L impact spatial units for each chapter. As it stands, this distinction seems a bit ad-hoc (but is clear in the appendices). I would also offer a rationale for separating impacts by tiers – is that consistent with the bulk of the relevant literature? Could one perhaps add a robustness check using quartiles instead of tiers, with focus on the highest quartile? I think it would be very interesting to see how relative exposure changes going from highest tier to highest quartile.	We chose terciles based on our analysis of the data, as presented in the Technical Appendices and in other analyses conducted for the data; we are not aware of strong precedents in the literature, although some literature cited in the Labor technical appendices makes similar use of terciles to identify high impact areas (see for example Behrer and Park, 2017, cited in Appendix F). We worried about finer cuts of the data (e.g., deciles) being overly focused on possible outlier areas, and generally were seeking to focus on a broad definition of “high impact.” Informal robustness checks on the data suggest that similar results would be obtained with quartiles. Data will be made available with the final report to allow researchers to explore other analyses.
NA	Overall			As mentioned above, I would for each “sector” state all maintained assumptions upfront, as done in the appendices.	The revised report describes assumptions and caveats in two primary ways. First, the Approach chapter contains a section describing the sources of uncertainty that broadly apply to all or most analyses of the report. Second, each impact chapter briefly describes the most important assumptions and caveats specific to that particular impact. Given the desire to keep the sections easily readable, we do not provide a comprehensive list of all caveats in the main text, and instead refer the reader to the technical appendices for each chapter where they are described in detail. We find that this helps to strike the balance between ensuring that the main report is not too technical in nature, while also providing the reader with sufficient information on how to properly interpret the results.
NA	Labor			I am not sure the “labor” chapter is as convincing as the other “sector” analyses. There are just too many unknown layers between extremely high (or low) temperature days and reduced work hours, as opposed to, say, air pollution and asthma. The labor chapter basically assumes no options for labor substitutability indoors, or from day to night, adding a second job, and no reaction of labor markets to a changing climate. The appendix does a better job raising some of these issues / assumptions, but the actual chapter in the report jumps rather quickly from high temperatures to lost work hours. Other, perhaps more interesting impacts on the labor market, such as productivity losses and health effects are beyond the scope of the chapter. In all honesty, I would drop that “sector” altogether.	Information on the response of labor to heat stress overall is robust, although we acknowledge that data limitations can limit the precision with which these effects are measured, as outlined in the Technical Appendix. The Neidell et al. 2021 paper was recently accepted for publication by Plos ONE, where some of the same questions were raised by journal reviewers and successfully addressed in the revision through further robustness checks.

				Appendix D discusses premature mortality due to ozone, this analysis is omitted from the main report – why?		We have added a brief rationale to the report as to why the ozone results are shown in Appendix D. In short, results do not show large disproportionate risks to socially vulnerable populations, therefore we have decided to use the main report to highlight AQ results for premature mortality (age 65 and older) and childhood asthma diagnoses (with childhood asthma emergency department visits also shown in Appendix D due to space constraints).
NA	Air Quality	17				
NA	Air Quality	15		The air quality chapter could benefit from a more detailed discussion of how exactly climate change leads to elevated PM 2.5 levels (sand dust? Wildfire smoke? More cars stuck in traffic? Etc.)		We have added additional text and footnotes describing the climatic drivers of air pollution changes and the precursors that are most affected.
				Childhood asthma – how about the effect of ozone? Why was the analysis on childhood asthma ED visits omitted from the main report?		The underlying study for childhood asthma did not investigate impacts associated with changes in ozone. Therefore, we are only able to cover effects from changes in PM2.5. We have added an endnote describing this. Results for childhood asthma emergency department visits generally show substantial disproportionate risks to socially vulnerable populations (especially Blacks and African Americans), however, the number of incremental visits due to climate change is proportionately small compared to the number of visits due to all causes. Given space constraints, we therefore refer the reader to Appendix D where these results are provided.
NA	Air Quality	22				
NA	Temperature Mortality	28		Social vulnerability and temperature mortality: how about access to / affordability of heating?		We have added a sentence noting this relationship between extreme cold health effects and access to/affordability of heating.
NA	Temperature Mortality	29	Table 1	How about effects of extreme cold? In general, this chapter seems to lump extreme hot and cold together (or ignores cold), but this needs to be explained / justified upfront.		We have added clarifications throughout the chapter indicating how mortality cold temperatures are included and evaluated (i.e., they are fully quantified), including the balance between heat and cold related deaths.
NA	Labor	34		Neidell et al. (in progress) needs a reference		We have added the reference.
				Similar to the extreme temperature chapter – how about extreme cold and labor hours? Extreme weather (storms, rain, etc.) and labor hours?		
NA	Labor	35				We have added a clarifying sentence to the background section stating: Global warming can also bring reductions in extreme cold temperatures, with potential benefits to labor allocation during winter months, however such benefits were not found in this analysis. We have also added a sentence clarifying that the analysis does not evaluate changes due to other weather variations (e.g., storms, rain, snow).
NA	Labor	36		I would be consistent with the other chapters and show the figure for the relative risks to specific racial and ethnic groups, in addition to discussing it in the text.		We have added the figures breaking out values for the specific racial and ethnic groups.
NA	Roads	43		I would discuss a bit more here the underlying analysis leading to the identification of “areas excluded from adaptation measures.”		We have added an endnote providing more detail about the adaptation measures modeled and how the results should be interpreted by the reader.
NA	Coastal Flooding	52		“Adaptive measures, such as seawalls...” it would be good to have a reference supporting this statement.		We have added to references supporting this statement
NA	Coastal Flooding	54		It would be good to give a few details on how “potential exclusion from protective adaptation” was determined. It’s clear in the appendix, but a bit obscured in the report. In that vein, I would also list all underlying assumptions that go with it, such as the very basic BCA (high property values driving exclusively the protection decision) that motivates this exclusion criterion.		We have added two sentences to the summary of the approach describing how these values are derived and how they should be interpreted. We have also included a reference to Appendix H where the reader can go for more information on this topic. Many of the underlying assumptions and caveats for these values are technical in nature, therefore we think it best to describe them in the Appendix where they can be properly discussed in detail.
NA	Inland Flooding	66	Bullet 5	This description is a bit unclear – it’s really a ratio of ratios, as shown on page C-10.		We have clarified this bullet.
1	"Peer Review_Layouts.pdf"			One file I received ("Peer Review_Layouts.pdf") had a cover pg w 6 photos, then 2 pages (numbered starting w 4 not the expected 2), followed by 6 pages summarizing the Labor section (numbered starting w 20 not the expected 6). So this file felt incomplete. I don't think this is the 'introductory chapter' this Question is seeking input on. That said, focusing on the 2 introductory pages of this file, I think the text is well-written and strong. Specific reactions to this particular pdf: 1.I think what is called Table 2 in the text should be called Table 1. 2.p.5: let's try to avoid calling the “four determinants of social vulnerability” determinants. We don't want to fall into the trap of implicitly or explicitly promoting the idea that people who have one or more of these characteristics are necessarily vulnerable. The word determinant makes that undesirable connection. The report in several places offers strong text in footnotes or elsewhere adding nuance to the concept of social vulnerability and to the inherent limitations in measuring it, especially when our set of measurements is limited to four. But these nuances are a bit buried. Some readers may not dive deeper than this 2-pg summary. The title of Table 1 uses a reasonably strong alternative to ‘determinants,’ namely ‘categories.’ One could also use ‘factors,’ ‘correlates,’ or other terms. I suggest doing a global search for the word ‘determinant’ and replacing it with a term that connotes a less rigid relationship. 3.Related to the above point, there are two additional nuances about the production of climate change vulnerability to communicate in the report that are not examined in the report: (a) there are (hidden) strengths in some cases within these 4 groups targeted for your analysis (e.g., sometimes the skills needed for adapting/coping with climate stresses are more prevalent among people with less formal education than among people with graduate degrees); and (b) there are vulnerabilities within groups that don't meet the thresholds of your 4 categories’ measurements (e.g., white middle- and upper-class populations in some sectors may be particularly vulnerable in certain sectors or regions). It's fine that these two dimensions aren't examined in this report; any report needs bounds for tractability. But I would call out these two additional nuances to the vulnerability discussion in this and the other few places you describe how the 4 measures you use don't cover the full range of vulnerabilities. Your report makes a valiant attempt to do a solid analysis while also recognizing its measurement limitations; I'm simply adding two important nuances to reference when you present these measurement limitations. These additional nuances highlight important scholarly and policy avenues for future research and reporting. 4.p.5: Table 1 lists 5 ‘categories’ but I don't think ‘one parent HH’ is examined in the remainder of the report so this row should be deleted in this table. Also in this table the final row is labeled ‘over 65’ but I think it should read ‘65 and over.’		As described in the charge materials provided by the EPA contractor coordinating the peer review, the "Peer Review_Layouts.pdf" file was solely intended to provide the reviewers with a brief glimpse at the intended look and feel of the final report. While the entire report was not placed in layout prior to commencement of the peer review, we wanted to provide the reviewers with a small section so that they could see how the material would come together in the final product. - We have corrected the Table numbers. - We appreciate the comment about nuances and undesirable connections with the original wording of ‘determinants’. We have replaced all uses of this wording throughout the report. - We acknowledge that there may be ‘hidden strengths’ within the four socially vulnerable populations analyzed in this report, however we are unaware of any evidence documenting these strengths. We therefore do not make this point in the report, especially since the literature consistently indicates that these four populations are likely to be more vulnerable and less capable of adapting to these adverse effects (e.g., Gamble et al. 2016). - As for additional dimensions, combinations, and measures of social vulnerability, we agree that this report only provides a limited analysis for specific populations. We have made this clear throughout the introduction and other sections of this report, and provide examples of populations that are not covered. - We have corrected Table 1 in response to these comments.

1	Introduction			The introductory portion of "Draft Report for Peer Review_040921.pdf" (pp.1-14) is a very strong section. Here are a few overarching comments, with specific matters in the table below (line #'s did not appear in the doc so it was challenging/time-consuming to identify the specific places for comment). 1.Mathematically all of the climate changes (and associated impacts) results hinge on the definition of the climate normal. Your report uses a 20-yr normal but the standard (albeit admittedly not exclusive) approach is to use a 30-yr timeframe. Why use such a short timeframe? Why is it arguably outdated (it ends in 2005 and we're in 2021)?	The climate normal used in the report corresponds to that used in previous US EPA Climate Change Impacts and Risk Analysis (CIRA) studies, including all of the underlying published literature used for each chapter's impact analyses, as found here: <a href="https://www.epa.gov/cira">https://www.epa.gov/cira</a> . While many analyses make use of a 30 year period, the CIRA framework adopts a 20 year period as sufficiently long to characterize era-level climatic changes and to avoid influence of interannual variability. The period is based in part on that used in the USGCRP's Climate Science Special Report (USGCRP, 2017: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, 470 pp., doi: 10.7930/J01964J6.), where the baseline period begins in 1986. As noted in that report, "The year 2005 was chosen as an end date because the historical period simulated by the models used in this assessment ends in that year."
1	Introduction			2.Also, what is the geography of the climate normal? If the geography is the CONUS then that feels unhelpful for all of the region-specific analyses presented in the report.	The climate normal is measured from local-scale baseline temperatures, at resolution that varies by sector from 1/2 degree to 1/16th degree latitude/longitude grid, as provided by the LOCA data used in the underlying studies. These local baselines are anchored as the zero degree global warming baseline, and changes in global temperature and then mapped to corresponding changes to local-scale temperature changes at the same spatial resolution.
1	Introduction			3.Similarly, did you tailor the geography for other variables fundamental to the analysis, such as income? For ex., whether or not a household has an income <=200% of the local poverty level is arguably what matters for the household's standard of living and consequent potential vulnerability to the effects of climate change – not of the national poverty level, since the local and national levels may differ widely. Using a national threshold will systematically include, or exclude (depending on the variable), people who arguably don't belong in the classification is viewed using a more appropriate local lens.	Unfortunately, the ACS data is not provided with local poverty levels. All data are provided with reference to the national poverty level.
1	Executive Summary	2		Figure 2 is really a Table.	We have ensured that the correct element type is used in the final report.
1	Executive Summary	2		The 'low income' definition should say 'or lower' at the end.	Corrected.
1	Executive Summary	2		Your report is well-positioned to advance using model results what is often glossed over due to a lack of empirical basis: how climate change may affect minority and low-income groups differently than the larger population. This is important because there is substantial overlap between minority and low-income communities. Your report separates the two concepts, in effect testing for c.c. vulnerabilities in the non-minority low-income population. You should highlight any quantitative differences you find along these lines as being worthy of particular notice (such as a stand-alone 'key finding' in the Executive Summary or Press Release), and for further study for explanation and policy relevance. Consider therefore elevating in visibility any findings that compare/contrast disproportionality (or lack thereof) in impacts between the low-income and minority groups.	We have attempted in all cases to differentiate results by social vulnerability metric, where applicable, though as the reviewer notes there are many cases where results for minority and low-income groups are similar. In addition, we highlight results for sub-categories of our "minority" metric, to present a much richer set of results specific to sub-populations within this metric, relative to their own "reference" population.
1	Executive Summary	4	Figure 3	Fig 3 title needs to say "or 50cm" not "and 50cm".	Corrected.
1	Executive Summary	4	Figure 3	Fig 3 needs a footnote indicating that the missing datapoint in age-air quality is not a mistake.	Inserted footnote.
1	Executive Summary	4	Figure 3	The only way to interpret the Fig is through the legend's colors; help people who are color blind (or who printed the doc in b/w) to also be able to interpret the legend.	We appreciate the need to provide information that can be easily digestible by all audiences. We have adjusted color legends throughout the report with this in mind, but also note that different types of color blindness make it difficult to select colors that will work for everyone. We have inserted alternate text for each figure to help those who are visually impaired understand the information being shown.
1	Executive Summary	4	Figure 3	More substantively, the credibility of the entire report hinges on how much the reader feels the authors have taken a scientific mindset to the analysis (i.e., if the authors are asking questions of the data and letting the cards fall where they may, or if the authors have prejudged the answers to the questions). Overall, this report passes this litmus test pretty well. But in some cases, some additional (brief) text is needed on this point. For ex., the large, negative result for minority-inland flooding sticks out like a sore thumb in this figure. It's begging for attention. Maybe this figure isn't the place for that call-out and speculation, or maybe it is. But any surprising or counter-intuitive results need to be given particular attention, even if not deep, so the reader is confident all results are being viewed objectively and given equal weight.	We appreciate the need for both transparency and full attention to counter-intuitive or complex findings. In order to further explain the inland flooding result for the minority group, we have expanded our discussion of this in the Inland Flooding and Property chapter; we found it too "in the weeds" to include as part of the Executive Summary graphic. Two additional graphics were provided in Appendix I to support the result that the high impact riverine flood locations show poor overlap with the locations with higher percentages of low income and minority populations.
1	Introduction	5	Paragraph 1	First para needs cites.	A citation to the Fourth National Climate Assessment has been added to this paragraph.
1	Introduction	5	Paragraph 2	First sentence in second para should read "may" where it now says "will" and "are."	We added text to specify that the NCA4 concludes that impacts will not be equally distributed across the U.S.
1	Introduction	5	Figure 1	Fig 1's colors are all blue; some color variety may work better.	We have modified this figure.
1	Introduction	6	Interpreting the Results' section	The 'Interpreting' section undersells the geographic analyses in the report. The national sector focus is very helpful, but so too is the geographic breakdown. This multi-scale aspect to the results is one of the report's strongest selling points.	This section has been reviewed and we believe that the caveats are important for the reader to understand while reading the report. We agree that the multi-scale aspect of the results is useful, and are revising the report to ensure that these storylines are clearly communicated.
1	Introduction	6	Last paragraph	Final para re: 'costs of GHG reductions' – add 'and benefits' wherever possible when referencing 'costs,' to remind the reader that the reason for considering to incur the costs of GHG reductions in the first place is to realize various kinds of benefits.	We agree that estimates of the benefits of GHG reductions are an important set of information. In fact, this report is intended to highlight the benefits of GHG mitigation, as levels of impacts under different levels of warming can be compared. As the original sentence is written to convey that the report does not quantify the costs of GHG mitigation, we feel that adding 'benefits' to the sentence would confuse the reader (as the report does indeed discuss mitigation benefits, even if in an indirect way).
1	Approach	8	Figure 2	Fig 2's averages appear to be weighted rather than strict arithmetic. If so then simply add this note. Otherwise it seems curious; we want to avoid any result appearing curious.	The averages are strictly arithmetic, as no weights are applied. We reviewed the caption to ensure that the information described is correct.
1	Approach	9		GCM = general circulation model.	Change made.

1	Approach	9		The 'climate hazards' referenced in the final sentence deserve their own stand-alone (simple) table. You need at least one place where the climate hazards are called out. This might be such a simple table that adding this info works better as an add-on to Fig.1 on p.5, in the 'climate hazards' bubble.		The climate hazards modeled in each impact analysis are described at the start of each impact chapter. We feel that it is most appropriate to list the hazards in that context, where related detail can be introduced (which would be difficult to do in this section providing a general overview of the approach and framework).
1	Approach	10	Table 1	The table is quite informative but the rank-ordering by city population appears inaccurate. For ex., Baltimore does not have a larger population than Miami, and Virginia Beach does not have a larger population than Tampa – unless you're using strict municipal boundaries. If that's the case, then there is a tension with any analyses in the report that may use the metropolitan (MSA) area boundaries (for ex., the Miami MSA has ~6.5M people but the municipality has ~450k residents). Often the MSA boundaries are used in climate impacts models so I'm highlighting this as a potential important detail. One simple solution is to indicate on this table what geographic boundaries are used to rank-order the city-specific impacts.		In response to this comment, we have added clarification about what geographic boundaries are used to rank-order the population values. We have also reduced the number of cities listed from 18 to 10, as the point is to generally convey the effects of relative sea level rise (therefore a longer list is not necessary).
1	Approach	11	& Figure 4 (p 12)	Crucial to add which year the data reflect. The answer may be buried in the footnotes (I tried but couldn't find it anywhere), but this is important enough to call out prominently in the text and figure. Whatever disproportional effects you find depend on the distribution of the social characteristics across the country, and that distribution changes every year. So tell the reader which year your baseline geographic distribution of social characteristics reflects.		We have added a note to Table 2 (Definitions for the Four Socially Vulnerable Populations Analyzed in the Report) stating "Data Source: U.S. Census, American Community Survey 2014-2018"
1	Approach	11		Text box: Defining 'minority' in this context is challenging. Your text on this matter is well-written. But having read the whole report and appendices, I see a tension between what you're trying to do with that category, and the fact that your 'minority' results figures include 'white' as a category. See for ex Fig 4 on p.21. Adding a sentence in this section explaining/foreshadowing this tension may be helpful, to avoid confusing the reader later in the report. Come to think of it, perhaps all the #'s in the 'minority' category in all figures throughout the document that resemble Fig 4 on p.21 need to be recalculated to reflect only non-white?		We agree that the results for white, non-Hispanics/Latinos should be shown separately so that the figures of the report do not suggest that they are 'minorities'. We have changed layout of the graphics to separate white, non-Hispanics/Latinos from the other races and ethnicities shown under the minority category. The graphics are now clear (and accurately calculated) showing changes in likelihood for the different groups relative to their respective reference populations.
1	Approach	14	Bullet 1	First bullet: nice treatment of how other social characteristics and processes may contribute to climate change vulnerabilities. I suggest a simple figure to illustrate; this figure could be v. important and helpful.		In response to other comments, we have enhanced and clarified this bullet to more comprehensively describe this important caveat. While we agree that a figure could help illustrate this point, we believe that such a figure would need to be large and we have decided not to include given space constraints.
1	Approach	14	Bullet 4	Fourth bullet: the inland flooding sector isn't listed as either directly or implicitly dealing with adaptation, but all the other 5 sectors are classified as either directly or indirectly incorporating adaptation.		In response to this and other comments on this section, we have enhanced and clarified this bullet to more explicitly describe the treatment of adaptation in all six impact analyses (including for Inland Flooding).
2	Overall			The writing is concise, comprehensive, and clear. That said, the 'grade level' required to understand the material is very high. It is way too high for conveying effectively to a newspaper reporter, for example, since they need to relay information to their audience using much simpler language and concepts. I gather your charge in writing this report was not to satisfy such an audience, but I mention this having experience with communicating these concepts to not only scholarly and policy audiences but also to the general public. It's not that the latter group is necessarily uneducated or unable to grasp the concepts and results; it's simply that they need to be introduced to the fundamentals before you can share results – especially results that are as nuanced as in this report. This entire report is about nuance. So if one goal is to communicate with the general public then a different summary report is needed. But the writing is excellent if the intended audience is, for example, graduate students or professionals in the field.		We agree that the writing of this report contains technical language and that there are lots of important nuances surrounding the results of the report. While we strived to present findings in the most clear and concise way possible, we recognize that the results are still complex and that these nuances detract from the simplest communication possible. We have revised many parts of the report to improve the language so that it most appropriately conveys the results in light of their methods, while also being as clear as possible.
3	Overall			The analytic framework is clearly presented and illustrated. On a very specific count, many people do not know the exact or even general definitions of Census Tracts, Census Block Groups, etc. A simple illustrative figure introducing this concept in the introduction would help the average reader. Census.gov has some nice images to draw from. But more importantly, the analytical approach to calculate a ratio of in-group to full-group populations in the highest-third of impacts as a reflection of 'disproportionality' is elegant and compelling.		We have added an infographic that illustrates the size of Census tracts and Census block groups in relation to counties and states.
4	Air Quality	16	Table 1	The reason for Table 1 omitting 'age' is buried in the footnote; it should be evident on the table itself.		We have clarified this point in the background section of this chapter.
4	Air Quality	16		p.16: key findings are reported first for PM, then asthma. Based on the preceding framing/discussion, I expected asthma to appear first.		We have made that change in the framework schematic.
4	Air Quality	17		Should the "Appendix D" sentence also reference PM?		There are separate references to the Appendix for other PM2.5 results. This particular reference to Appendix D is intended to point out that the ozone-specific results are not shown in the main report, but in the appendix.
4	Air Quality	18	Tables 2 and 3	I recognize that the general charge of this report is to report rather than to analyze or explain. But certain results, especially counter-intuitive ones, should be at least acknowledged. Doing so would ensure the reader feels the analysts took an even-handed approach. To this end, the negative #'s for 'disproportionality' (e.g., Tables 2 & 3 for Air Quality) should be called out, and given speculation as to the explanation.		We have tried to include additional acknowledgements of negative numbers for disproportionality, and to offer potential explanations where possible. As for the values in Tables 2 and 3, we note that the report already includes text explaining the likely driver of negative values in parts of the country. For example, the premature mortality section describes: "Most of the Midwest and parts of the other regions are projected to experience modest decreases in the annual number of new childhood asthma diagnoses due to the projected increase in the number of rainy days in these areas, which reduces PM <sub>2.5</sub> concentrations and associated health effects."
4	Air Quality	24		Starting on p.24, the regional results for asthma and PM appear mixed together and not clearly identified (I think it's unclear because the figures don't have names).		We have clarified in the title for that section that the values represent risks for childhood asthma only (not premature mortality)

4	Temperature Mortality	28		The reader wants to know the extent to which there is double-counting, for lack of a better word, with the deaths estimated in the preceding 'air quality' analysis.		Double counting is not likely an issue because the air quality and health section of the main report only quantifies effects from climate-driven changes in PM2.5. While ozone and temp are highly correlated, PM2.5 is more tied to the frequency of rain days and wind patterns. There's another factor that works in the other direction, though – with the exception of New Orleans, the highest mortality risk for extreme temp is in Midwestern cities, but that is the also the place where AQ actually improves with climate change – if fewer individuals die from AQ in Midwestern cities, the population base for deaths from extreme temp mortality is slightly higher, and we could underestimate the population and therefore the deaths from extreme temp in those places. Appendix D contains a summary of results for climate-driven changes in ozone. As the reviewer alludes to, the concern here is that extreme temperature mortality is based on an epidemiological approach that correlates all-cause mortality with temperature events. If that econometric analysis does not control for air quality, then the approach might be picking up a relationship that is the sum of a "pure" temperature effect (A), along with an effect related to air quality changes resulting from heat (B), plus any possible cross terms (e.g., increased temperature leading to increased vulnerability to air quality or vice versa) (C). The original Medina-Ramon & Schwartz study ( <a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2095353/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2095353/</a> ) said, "Adjustment for ozone reduced the effect of extreme heat and linear hot temperature on total mortality by 15% and 16%, respectively". So in the ozone results, which are not a part of the main report, there is the potential for some double-counting, but it is a small fraction of the total (and might be less than the 15% from the study, as the double counting would only come from term "B", but the 15% includes both B and C).
4	Temperature Mortality	28		Explain why extreme cold temperatures are mentioned if they're not analyzed, or remove the mention. The mention of extreme cold temperatures also gives the impression that the number of extreme cold days is expected to increase with climate change, and that this increase is meaningful for the report.		The analysis quantified premature mortality from changes in extreme heat and extreme cold. We have added clarifications throughout the chapter indicating how mortality cold temperatures are included and evaluated, including the balance between heat and cold related deaths (with the decrease in cold related mortality being largely overwhelmed by the increase in heat related mortality).
4	Temperature Mortality	28	Air conditioning paragraph	Air conditioning para – one area for future research is the excess deaths expected with prolonged power outages from storms, in a warmed world. (In other words, hurricanes may become more lethal via a delayed temperature mortality effect, if average temperatures are higher when we suddenly cannot use our air conditioners.) It's ok that your analysis does not address this factor, but mentioning it is helpful to demonstrate how the results of your 'temperature mortality' analysis are likely conservative.		We have added the following endnote to this section: Prolonged power outages from storms and other climate-driven weather events can increase the risk of temperature-related mortality, as people are not able to access air-conditioned space. This effect is not captured in the analysis of this report, likely leading to underestimated risks.
4	Temperature Mortality	30		30 (and elsewhere the findings are discussed): some context would be helpful. How do these excess mortality estimates compare to other climate (or non-climate) hazards? An additional 2 deaths per year per 100,000 residents for a given city may or may not be a major concern, given all the other public health concerns in cities.		We have added the following sentence to help provide context for the reported death rates: To place these mortality rates in context, the age-adjusted death rates for influenza and pneumonia in 2018 were 14.9 per 100,000.
4	Temperature Mortality	31		31 (and Appendix E): why do many/most of the excess mortality estimates decline at 5 deg-C compared to 4°C? Again, anywhere there's a counter-intuitive result, try to acknowledge and even possibly explain it, even if tentatively and speculatively.		On review of these estimates, we discovered an error in the aggregation of results across GCMs. The error is limited to the impacts results for 3, 4, and 5 degrees in this impact category, and so affects the 4 degree results in the main report as well. It does not, however, affect any of the disproportionality calculations or results, because the error was identical across space and did not change the sign of results or the ordering of Census tracts into terciles, it affects only the estimates of mortality impact. Correcting the error also removed the prior surprising result, and the per capita impacts increase monotonically with increases in global temperature. We corrected the relevant tables, maps, and text in both the Technical Appendix and the main report.
4	Temperature Mortality	32	Figure 4	It's interesting that the disproportionality results for low income and low education are so different in this figure (and possibly in other figures), when generally speaking low-incomes are correlated with low education. A deep analysis/interpretation of questions like this is probably beyond the scope of this report. However, when we observe results that are counter-intuitive or otherwise noteworthy, one reaction by readers is to question the validity of the results. To avoid that thought becoming planted in the reader's mind, offer at least a 1-sentence speculation on what may be driving this result. It may be as simple as a problematic modeling assumption, such as is discussed in footnote 40 on page E-12.		Generally speaking, low income and low education are correlated over space, but that is not uniformly true for all locations, as illustrated in Figure 4 of the Approach chapter. In this particular instance, they are less highly correlated. We re-examined the result and found no problematic modeling assumptions or errors.
4	Labor			This sector seems to focus much less on race than the other sectors. Why?		We have added the figures breaking out values for specific racial and ethnic groups to complement the presentation in other impact chapters.
4	Appendix F	F-26	Table 2	Table 2 on p.F-26 is a good summary table. At least it has a good structure; I don't recall more tables like it in the other sector summaries or appendices. I recommend more tables like this. However, this table could be improved, as follows: the shades of blue should be explained; the sector in question (in this case, Labor) should be identified in the title.		We have clarified the meaning of the color scheme in the caption, and added text to the title indicating that the results are for the labor sector. There already exist other tables and figures showing the distribution of impacts and risks across regions, therefore we do not propagate this table format across all impacts of this report.
4	Appendix F	F-27	Line 584	I suspect that "Northeast is projected to lose between 8 and 19 hours of worktime per year under 2°C of warming" should read instead "Northeast is projected to lose between 8 and 19 hours of worktime per worker per year under 2°C of warming."		This sentence has been deleted as part of separate revisions.
4	Appendix G	G-10	Line 282	This text says "building hard structures such as sea walls," but then Fig.3 on the next page says just "sea wall." Is sea wall the only 'direct' adaptation modeled apart from raising roads? This distinction is important. Also, the reader would like to know more about the cost and placement of the seawalls in the model.		Within the model and analysis, bulkheads are also an option for sites that do not front the open ocean. Additional details were provided in the revised Appendix to address this comment.
4	Roads	43		The text references Fig 4 but I think it should be Fig 3.		We have made that correction to the report.
4	Coastal Flooding	53	Figure 2	The bar chart called "Contiguous US" should be renamed something like "Contiguous US Coastal Counties"		We have clarified the label.

4	Coastal Flooding	55	Figure 3	Fig 3, p.55 (and associated text): these #'s for population seem much too low to me. I think the report claims these #'s are population counts. Perhaps the #'s are counts of households instead? The dollar values also appear very low. I've combed the appendix but I can't find an explanation for these apparent discrepancies. Also, for the same reason it's good to specify in the figure title the baseline year for the SLR projections, it's also important to specify in the figure title the baseline year used for measuring population by location.	We reviewed the results and found that the base year for data presented in the review draft was 2000, not 2015 which was intended. Estimates for property value in particular are approximately 60% higher in the revision, and the caption clarifies that the population and dollar values are for 2015 data. An important note about this figure, and one reason results may appear to some to be lower than other estimates, is that it reflects an estimate of the effectiveness of existing, baseline adaptation and coastal protection to reduce the vulnerability of all populations, both socially vulnerable and reference populations. Those adjustment for baseline adaptation effectiveness is described in detail in the Lorie et al. (2019) cited work, as well as in the Neumann et al. (2021 in press) work cited in the chapter and technical appendix.
4	Appendix H	H-7	Figure 2	This is a very helpful figure, but it begs the question I raised in an earlier comment: what is the exact threshold for defining 'low income'? Does it vary by region, or is there a singular national value? For example, what constitutes low income in coastal New Jersey is probably quite different from the analogous number in coastal Mississippi. This distinction is important for climate impacts research, and associated policy discussions. How you define the threshold will affect the #'s presented in this figure.	As noted above, the ACS data use a consistent national threshold poverty level (in our case, 200 percent of this level) for low-income measures across the country. Unfortunately it is not possible to make adjustments for local-scale income distributions from publicly available ACS data.
4	Inland Flooding	67	Figure 2	Are these #'s in the maps expressed as "\$ per year per geographic unit," or "\$ year per household (or person) per geographic unit"?	The reported values in these maps are expressed as dollars per year per Census block group. We have clarified this in the caption
4	Summary of National Results	74		Intro: as I noted above for another chapter, I'll repeat here for emphasis: the baseline year for the social data needs to be highlighted at the same level of visibility for charts and tables as the baseline years for the climate measures and sea level projections. This comment applies to other figure or table titles and subtitles.	We have clarified in the titles and captions for these two graphics in the National Summary section that the populations reflect current demographics.
4	Summary of National Results	74	Paragraph 2	Second para: this clause is ambiguous as to meaning and purpose: "... though their risk increases modestly with 4°C of global warming"	We have clarified this statement.
4	Summary of Regional Results	80	Figure 4	I'm struggling with the results of +13% and +14% for high tide traffic delays and SLR-induced property inundation, respectively, for the Southern Great Plains low-income group. The Texas coast certainly has exposure and vulnerability to these two roads impacts for low income. But I doubt this region's low income group so dominates the Texas coast's human landscape that its expected climate impacts on roads are that much higher than for the reference group.	Figure 4 of the main report shows that coastal Texas does not have a particularly high low income population relative to the national scale, at the Census tract level, as the reviewer suggests. The regional calculation for coastal impacts, however, is a relative measure that is based on the regional distribution of potentially vulnerable block groups. We checked the result to confirm that it is in fact accurate.
5	Overall			Yes, this piece of the report is very clearly described (although elsewhere in this document I argue against using the word 'determinants' as this Question 5 uses). This is not simple to do, so these descriptions deserve special acclaim. The term 'disproportionality' rubbed me the wrong way a number of times, however, because it hints that we know a priori that each of the four social vulnerability measures will reveal a greater (negative) climate change impact than for the greater population. In fact, even though that appears to have been the case in many cases, there remains a significant number of cases where either there is no discernible difference, or there is the opposite (a lesser) effect on the sub-group than for the full population.  This implicit presumption about the directionality of 'disproportionality' grates a bit for people who have to present these concepts or results to skeptical audiences because it appears as though the result is pre-determined by the analysts. I don't think your analysts pre-determined the results, but one wants to remove even the smallest potential that a reader could have that impression. Technically 'disproportionality' could reflect either a positive or a negative deviation from the norm, but in practice it is likely to be understood by readers as meaning 'more negatively impacted.' I don't have a better term to propose but this is something for your team to finesse.  For ex., in the Executive Summary's first para, we see this sentence "Many studies have discussed higher climate change impacts among socially vulnerable populations," followed by this sentence "... how socially vulnerable populations may experience impacts differently than the general population." The former presumes a directionality of the disproportionality, whereas the latter is agnostic on directionality. But on balance the term disproportionality in the report feels like the directionality of the deviation is known a priori: to be negative ("bad"). This is a difficult needle to thread, but it is important to pay attention to early and up-front, especially since some of the results have the opposite algebraic sign to what a negative disproportionality would predict. (Also, circling back to the sentence I reference above that speaks of 'higher climate change impacts': the word 'higher' is imprecise. 'More negative' is one alternative.)	We acknowledge this limitation of the word "disproportionality," but after careful consideration, we have opted to use it in some places throughout the report, as it is accurate and we do not have a better or more appropriate term in some cases. In other cases, we were able to change our terminology to avoid using the term.
6	Overall			The appendices are helpful and well-written. The main sections do a good job of summarizing the appendices. I have offered some specific reactions to the appendices in the comments above.	No change needed.
7	Overall			My answers to these guiding questions appear sprinkled throughout the other answers. My specific and general comments noted elsewhere in this document notwithstanding, I deem the report to be superb. Estimating differential climate change vulnerabilities is a difficult and much-discussed yet rarely-undertaken systematically for the entire country (although Alaska and Hawaii are missing from this report) task. The approach and results are clearly presented, aside from the several questions of clarity and precision that I've noted in this document. The EPA should be proud of this document once it is revised. Now, the hard part of succinctly summarizing the most important findings (subject to perhaps a few recalculations as described here) begins. This document should eventually be submitted in several pieces to scholarly peer-reviewed journals, and to the next iteration of the IPCC and NCA reports. This report has the strong potential to advance the academic/research conversations on climate change vulnerabilities in a noticeable way.	No change needed.
8	Overall			The topic of uncertainty is treated squarely and adequately. This is especially the case for Fig 2 (p.8), which effectively shows error bars. Very few if any additional error bars to my recollection are shown for the other results (of either climate changes or associated impacts). A bullet in the Uncertainty section (p.13) explaining why that is the case would be helpful.	We have substantially revised the uncertainty section of the Approach chapter of the main report, and added a table and text in Appendix C to more thoroughly outline the main sources of uncertainty and how they could affect our results.
NA	Overall			The reader would benefit if the Sections (and all underlying Figures & Tables) were numbered, and more precisely labeled. For example, the "Key Findings on Regional Impacts" section at the top of p.37 would benefit from a colon and specific topic or sector name after the word "Impacts." The report has probably 100 or more figures and tables, presented in rapid succession. Adding more detail to the titles would help the reader keep track of where he or she is in the larger document. As it currently stands, reading the full report is a bit overwhelming without more detailed titles and guideposts.	The word version submitted for peer review did not include formatting and layout enhancements that make navigation through the report clearer, including uses of chapter specific colors, icons, etc.
1	Introduction			Yes- but significant improvements are needed, as I explain in my line by line comments. I was initially very confused by the introduction, on what was meant by "risk", "vulnerability", and "impact".	We substantially edited the introduction to clarify what we mean by "risk," "vulnerability," and "impact."

2	Overall			Yes, very appropriate. But, for a general audience, it's important to add in more commentary interpreting the results; "why" are these patterns appearing? Why, for instance, are Latinos at greatest risk from coastal flooding, but whites at greatest risk from inland flooding? What's the cause? See my line by line comments for suggestions.		These are important questions, but in a general sense are beyond the scope of the report. We are also reluctant to speculate on these reasons without more time and data. Data from the report will be made available to the public to facilitate an option for more detailed "deep dives" in subsequent .
3	Overall			You did a great job at this. However, there are some inconsistencies between sections, as when you included adaptation in the methods for flooding but not elsewhere. And, there are some statements in the introduction that I feel misled me as a reader as to what you were going to be analyzing; the confusion was cleared up in the overview of the methods themselves. Overall, you need to be much more precise about the meaning of risk, vulnerability, impact, etc., right from the first page of the introduction.		We have added detail to the Approach section describing the treatment of adaptation in the sectoral modeling, including what sectors explicitly model adaptive responses and which do not. We have carefully reviewed and revised the introduction and executive summary to ensure that the descriptions of the methods are clear and accurate. For example, we are more clear about the the interpretation of the disproportionality calculations we make in this report and how they were derived.
4	Overall			Yes. However, some of the figures are "sparse" and should be condensed into combined figures to save space and improve information. I really like the figures in the summary at the end, more than the small bar charts in the chapters.		The final layout has addressed this comment.
5	Overall			No- see my comments above and in the line by line. It is helpful in each section to explain briefly after each result why a specific vulnerable group probably suffers disproportionate impacts. Do they live along the coast more than other groups? Do they live in hot places more than other groups? Do they work outdoor jobs more than other groups? It's speculation, but it's needed in my opinion.		We have added some explanations throughout the report providing potential rationale for what may be driving many of the results. However, the scope of this report is not intended to explore the underlying drivers at a detailed level. Because this report analyzes six impacts across four socially vulnerable populations at a national scale, it would require a large amount of effort to identify socioeconomic conditions of the specific locales that are potentially driving the results. And these conclusions would likely be speculative in nature, which offers somewhat minimal value.
6	Overall			Yes, in general, they do.		No change needed.
7	Executive Summary			The executive summary needs work to be clearer about what you are studying- what impact and vulnerability and risk mean.  The main missing message is the "why" behind the results, as I explain above. This is needed to make the report more interesting to a general audience, and to help inform mitigation policy and action.		The "why" is an important question, but in a general sense is beyond the scope of the report. We are also reluctant to speculate on these reasons without more time and data. Data from the report will be made available to the public to facilitate an option for more detailed "deep dives" in subsequent research
8	Overall			Yes, I believe this is adequately treated, at least for a general audience. The nuances for the experts are in the appendix for those who want to look.		No change needed.
NA	Executive Summary			The executive summary needs work to be clearer about what you are studying- what impact and vulnerability and risk mean.		We have reworked the executive summary to improve clarity on the overall approach, the impacts covered, the social vulnerability measures considered, and how changes in risk and likelihood are being calculated.
NA	Executive Summary	1		...this report, however, focuses not on measuring these specific impacts but rather on analyzing whether and to what extent socially vulnerable groups are likely to disproportionately experience the effects . This comment confused me, because the report "does" deal with impacts extensively, and because relative risk calculations require assessment of impact in order to determine relative impact. I believe this requires clarification.		We have removed that statement from the executive summary.
NA	Introduction	5	Figure 1	On page 5, you show the IPCC figure that defines risk as probable impact, and as the intersection between hazard, exposure, and vulnerability. Are you looking at risk (expected impact), or just at vulnerability? Please clarify here, on page 5, and throughout. This is a key conceptual issue that needs to be clear up-front. The language I read in the introduction implies you are looking at risk (expected impact, monetized, or per-capita), and at relative risk of socially vulnerable populations.		We modified and amended this figure and the accompanying text to clarify these points.
NA	Executive Summary	2	Figure 2	... Individuals living in households with income that is 200% of the poverty level. Less than 200%?		Corrected.
NA	Executive Summary	2	Figure 2	Perhaps identify socially vulnerable groups that were "excluded", and why- or what group they are included in. For example, people with cardiovascular disease are socially vulnerable to climate related impacts, but they are mostly over age 65.		We added information to the Introduction and Approach chapters that explains in further detail our choices of the categories of social vulnerability that we address. Limitations in the ACS data prevent us from examining sub groups in more detail, but the air quality chapter and technical appendix does include information on additional categories of sensitive subpopulations that have been identified in the literature and are within our broader categories of socially vulnerable populations.
NA	Overall			... Blacks and African Americans I'm no expert, but shouldn't you pick just one of these terms and stick with it?		We use this terminology to be consistent with the language used in the American Community Survey, which is the data we use to define the socially vulnerable populations.
NA	Executive Summary	2		Of the four socially vulnerable groups examined, minorities are projected to experience the most disproportionate risks of climate change impacts Climate change is a long term phenomenon. How will likely long-term demographic shifts in these populations' locations, etc. likely change the expected impacts? Are these groups more or less mobile to migrate away from the problem, compared with the general population? You cover this in the limitations discussed on Page 14, but it's an important issue to discuss. The report doesn't separate Male and Female categories, which is a notable group-definition limitation in my opinion. It's a big issue because we know that men tend to be far more exposed to some kinds of climate hazards due primarily to their (more outdoor) occupations. See Harlan et al., among other researchers, on this point. This should be discussed here. You touch on it on page 28, further down.		We have clarified the wording of this key finding to note that the analyses assume constant demographic distributions. We added similar caveats earlier in the executive summary when describing the general approach/methodologies to the analyses. We have also added text to the 'Sources of Uncertainty' section further describing the implications of this assumption. In the introduction, we have added gender inequality as a type of social vulnerability not evaluated in this report. We agree that evaluating climate effects on gender inequality is an important topic, but defer that analytic question to future work.



NA	Executive Summary	3		<p>Adults ages 65 and older are projected to experience significant impacts from climate change across the sectors analyzed, but the effects are not expected to be disproportionate to those experienced by younger age groups.</p> <p>... Unless they have cardiovascular disease, or live alone in isolation, in which case they are going to have serious problems. See the French and Chicago heat wave examples. Mortality was concentrated among the cardiovascularly weak isolated elderly. This is a major area of specific concern.</p>	<p>Wainwright, Sherrilyn H., et al. "Cardiovascular mortality—the hidden peril of heat waves." Prehospital and disaster medicine 14.4 (1999): 18-27.</p> <p>Åström, Daniel Oudin, Forsberg Bertil, and Rocklöv Joacim. "Heat wave impact on morbidity and mortality in the elderly population: a review of recent studies." Maturitas 69.2 (2011): 99-105.</p> <p><a href="https://scholar.google.com/scholar?hl=en&amp;as_sdt=0%2C3&amp;q=cardiovascular+disease+heat+mortality&amp;btnG=&amp;aq=reichstein">https://scholar.google.com/scholar?hl=en&amp;as_sdt=0%2C3&amp;q=cardiovascular+disease+heat+mortality&amp;btnG=&amp;aq=reichstein</a></p>	<p>Data limitations prevent us from being able to present a finding on subpopulations within the categories of socially vulnerable populations that we examine. We agree that there are additional factors that may increase or decrease vulnerability of subgroups within our broader categories, and note that as a key limitation to our work in the Approach chapter. Thank you to the reviewer for providing these useful references - we have added them to the literature review section of the Extreme Temperature technical appendix.</p>
NA	Introduction	6		<p>None of the estimates presented in this report should be interpreted as definitive predictions of future impacts at a particular time or place. Instead, the intention is to produce estimates of future effects using the best available data and methods, which can then be revisited and updated over time as science and modeling capabilities continue to advance.</p> <p>This is double-speak. This report obviously estimates and predicts future risks to specific populations, and will be (and should be!) interpreted and used as such regardless of this kind of lawyer language. It's better to clarify the limitations of the predictions and estimations (spatial, temporal, demographic), rather than to tell us not to use the estimated impacts. Or- you need to explain to the reader the difference between this impact analysis and a "forecast".</p>		<p>We agree that the report estimates and projects future risks, however, we acknowledge a difference between 'projections' that are made in light of stated uncertainties and "definitive predictions" that imply an exacting level of certainty. As an authoritative Agency on climate science information, it is important to convey to the reader how the results should be interpreted, and it would be inappropriate for anyone to think that this report contains "definitive predictions". We have edited this paragraph to clarify that the results should be viewed in concert with the stated sources of uncertainty.</p>
NA	Approach	7	Figure 1	<p>In step 3, please you be more specific about what you're analyzing? Risk (expected impact)? Relative Risk? Both?</p>		<p>We have clarified language in this section, Table 3, and other parts of the Introduction and Approach sections to be clear about what is being analyzed and how the results should be interpreted.</p>
NA	Approach	10		<p><i>Southern great plains</i></p> <p>This isn't the right term for the US gulf coast.</p>		<p>We agree that 'Southern Great Plains' is typically not a term used to describe the Gulf coast. In this instance, we are referring to the Texas coastline, as the state lies within the Southern Great Plains region as defined by the National Climate Assessment. Because this report uses the NCA regional delineations, we use this terminology for consistency. We have added an endnote providing clarification about this use of terminology.</p>
NA	Approach	13		<p>The method in Table 3 appears to calculate the relative likelihood that a socially vulnerable subpopulation will be highly impacted by climate change, with impact defined in a binary fashion as (yes/no; does the individual live in a "high impact" area among the highest third of impacts?). That is not the same as risk (expected impact). If I'm reading this right, this language needs to be clarified in the executive summary. I suggest using the language I've underlined above in this paragraph, which is clear and precise, at least to my mind. It would also then be important to define "impact", and "vulnerability", which would appear to be determined differently than the risk framework illustrated in Figure 1. You appear to define "impact" in a binary fashion (yes/no impacted), whereas in Figure 1 all three circles are sliding scales, with social vulnerability as a relative risk ratio (usually), exposure as a probability (usually), and Hazard as a severity (death, dollars, illness, etc.), yielding an expected risk in units of probability of death or illness or expected loss in dollars. This is why I was confused in the introduction; your method is an unconventional binary method based on my reading of Table 3. A good place to explain exactly what you mean by "impact" would be in the "Step 2" explanation on page ten. The word "impact" is used frequently in the report, so clearly defining it in the front matter- and defining it clearly in contrast to the more typical risk-based impact accounting of climate vulnerability (Risk or Expected impact = Hazard-Probability x Vulnerability x Hazard-Cost, or "R=TVC" model of risk) - is very important.</p>		<p>Throughout the report, we have clarified that the analyses estimate the likelihood that socially vulnerable groups live in areas projected to be highly impacted by climate change. We have provided details about how these calculations are made, how the results should be interpreted, and what the values do not represent (e.g., relative risks). In response to this comment and similar comments, we have also created a glossary that defines terms such as impact and vulnerability. We have also revised the narrative description of Figure 1 (Climate Change Risk Framework) to more precisely describe our approach to assessing risks to socially vulnerable populations, including how we are defining risk and why our approach is appropriately using that term. We have also added detailed to Figure 1 to help the reader understand the overlapping dimensions of climate hazards, vulnerability, and exposure.</p>
NA	Approach	14	Figure 1	<p><i>Figure 1</i></p> <p>The Figure 1 label is being reused; will this be edited in the final report?</p> <p>This is the R=TVC model of risk I am talking about.</p>		<p>The figure numbers are restarted at the beginning of each chapter of the report. Therefore the figure numbers are correct as written (they two 'Figure 1' labels just appeared in different chapters).</p>
NA	Air Quality	16		<p>Now I understand from the "Approach" language that you're defining "Impact" using three qualitative categories, where the categories are defined based on a sector-specific R=TVC risk model. So by "high impact", do you mean "a high-impact census tract is one with estimated future risk in the highest third of all US census tracts, measured using a sector-specific model and unit of risk"? or... what's the correct definition? This should be clarified above in the introduction.</p>		<p>We have revised the steps in the Approach section to more clearly describe what is meant by high impact.</p>
NA	Air Quality			<p>The sector specific models used are credible, and the results presented in this section pass scientific muster as well as common sense. I haven't published specifically on PM2.5.</p>		<p>No changed needed</p>
NA	Air Quality			<p>Ozone is a major air quality issue that isn't necessarily a PM2.5 issue. How is it factored in to your methods? You should probably mention this, even if briefly, so readers don't need to dig in the appendix.</p>		<p>We agree of the importance of ozone health effects. We have included multiple references to the ozone methods and results in Appendix D. The ozone analysis was included in the Appendix because it did not show disproportionate risks to socially vulnerable populations.</p>
NA	Air Quality			<p>In several parts of this section, a brief "why" or "because" statement is needed to make the reading understandable and less dry, and also to point the way to possible mitigation strategies. For example, on page 24, it would help to say that "In the Southern Great Plains, minorities have an estimated 77% higher risk compared to non-minorities [BECAUSE ON AVERAGE MINORITIES IN THE SOUTHERN PLAINS ARE DIFFERENT IN A SPECIFIC WAY]. Why are minorities in that region at higher risk; do they live in different kinds of neighborhoods, work in different occupations, have a different genetic profile...? Where the literature speaks to the "why", a brief citation and statement as to "why" is super helpful.</p>		<p>As noted above, we agree that the "why" and the "because" are important questions, but in a general sense, answering those questions is beyond the scope of the report. We are also reluctant to speculate on these reasons without more time and data to dig deeper. Data from the report will be made available to the public to facilitate an option for more detailed "deep dives" in subsequent research.</p>
NA	Overall			<p>On page 24 and in other chapters, the use of a list of bullets instead of a paragraph is poor style IMHO.</p>		<p>This report contains a significant amount of narrative text so we decided to present this information in a more condensed format.</p>
NA	Overall			<p>Additionally, the small figures with three categories don't appear to be a good use of space. If there are only three numbers, it's adequate in my opinion to just list them in the text.</p>		<p>We have designed the layout with this comment in mind, and, think that the final figures are structure appropriately.</p>
NA	Temperature Mortality			<p>I am an expert who has published repeatedly on temperature mortality and morbidity. There are four significant limitations to the type of method used in this study, which should be explained;</p> <p>1.Harlan et al. demonstrated in several recent papers that hospital coding of cause of death or illness is a significant cause of "dirty data"; this tends to cause under-reporting of heat related illness and death when there are comorbidities, and results in a low bias in heat related health risks for all populations.</p>	<p>Harlan, Sharon L., et al. "Neighborhood microclimates and vulnerability to heat stress." Social science &amp; medicine 63.11 (2006): 2847-2863.</p>	<p>In response to Point 1., we note that the Schwartz et al. approach (which is used in Mills et al. 2015, and is the basis for the temperature mortality analysis used in this report) does not depend on hospital coding, and instead relies on associating all-cause mortality with temperature events.</p>
NA	Temperature Mortality			<p>2.The location of reported illness or death- at the hospital- is spatially removed from the location where the affected individual works, resides, or goes to school. This has an unknown effect on the reported rates of populations, but we know that it creates a high-bias in risks for the populations that tend to live near hospitals. Those populations tend to be, on average, lower income, because hospitals are rarely located in affluent neighborhoods.</p>		<p>As noted in the response to Point 1 above, the Mills et al. 2015 work does not depend on hospital coding.</p>

NA	Temperature Mortality		3.From Harlan et al. (again), we know that the differences in heat-related risks between individuals in a census tract caused by gender, occupation, access to air conditioning at home, etc. are larger than the differences in average risk between populations in neighboring census tracts. While the population effects found by a census tract level analysis are real, they are not the main pattern in the data; they are a result of correlations with the more important factors. You have a section on heat related risks specifically due to labor; I suggest pointing that out in this section so that readers know to go to the next section for those details.		Thank you for directing our team to this study - we now reference the Harlan et al. (2006) study, and the 2013 EHP follow-up, in the limitations section of the Extreme Temperature technical appendix, as well as the Labor technical appendix.
NA	Temperature Mortality		4.Within an urban area, the urban heat island creates differences in temperature on the order of ten degrees Celsius over very fine "micro" scale distances. This means people within a city are being exposed to significantly higher or lower temperatures than the climate norms would suggest. Because these temperatures are highly correlated with socioeconomic, the hot spots are where low-income and minority populations tend to reside, and the cool spots are where white and affluent populations tend to reside. This urban climate microscale effect creates two biases in the results. First, the role of race, gender, income, age, etc. is overestimated compared with the role of the temperature hazard. Second, heat related health risks are likely to be more severe than the results indicate (biased low) for low-socioeconomic status communities, at least in warm climates (and biased high in cold climates).		We edited the limitations section to cite this work and note the underestimation bias associated with a county- versus neighborhood-scale analysis, as shown in the Harlan et al. (2006) study of eight Phoenix neighborhoods.
NA	Temperature Mortality	28	On page 28, Jenerette et al. is a good citation on the significant role of micro-scale temperature and environment; it's one of the only papers that documents this effect.	Jenerette, G. Darrel, et al. "Micro-scale urban surface temperatures are related to land-cover features and residential heat related health impacts in Phoenix, AZ USA." Landscape Ecology 31.4 (2016): 745-760.	We have added that study as a citation in the background section
NA	Temperature Mortality	30	On page 30, this statement could use a "because"; <i>Several Midwestern cities (including Pittsburgh, on the western edge of the Northeast region) are projected to experience some of the highest mortality rates associated with extreme temperature.</i> [BECAUSE... they are not as heat-adapted as many warmer-climate cities so people are less resilient? Hondula et al., below. This fits the pattern of France and Chicago, where it is the lack of AC and lack of adaptive measures that caused huge mortality]. And, following to relative risk on the next page, it makes sense the Black minority populations and low income populations are at higher relative risk, because they have less access to AC and tend to live in hotter neighborhoods and in less heat-adapted regions.		We have added a statement providing a potential explanation for the difference.
NA	Temperature Mortality	30	On page 30, I am under the impression that your methods produce risk estimates only for "urban" populations- not rural. They are city scale, not regional results; or, they exclude rural populations. Is that correct? If so, please note this here and in the introduction.	Hondula, David M., et al. "Cities of the Southwest are testbeds for urban resilience." Frontiers in Ecology and the Environment 17.2 (2019).	We believe the text is clear that the analysis is only confined to the 49 large cities covered in the study. We think it is obvious to the reader that these populations live in urban settings and that clarification is not needed.
NA	Labor	33	On page 33, I would place more emphasis on the employer than on the worker. Many employers will choose to force people to work on dangerously hot days; it's not entirely the worker's choice. This is an important framing for an EPA report because any regulation on hot work days will necessarily focus on regulating employers, not employees.		We have added a sentence describing that employers can place pressure on workers. However, we note that because this is an econometric study, these supply-side pressures (at least how they were observed in recent temperatures) should be reflected in the function underlying the analysis.
NA	Labor	34	On page 34, there is good evidence that the excess-mortality temperature threshold varies by city and region; 90 degree days isn't the only number. It varies widely by region, and may change in the future! Hotter regions have higher thresholds. In Phoenix, a third of the year is over 100 degrees F max daily temperature, but outdoor events and work are almost never reduced due to this. This seems like it may be a significant problem with the methods. Also, please clarify here; do you mean "degree-days", "degree-days-over-90-C", or working hours on days where the maximum temperature exceeds 90 C, or something else? Not clear.	Petitti, Diana B., et al. "Multiple trigger points for quantifying heat-health impacts: new evidence from a hot climate." Environmental health perspectives 124.2 (2016): 176-183. Harlan, Sharon L., et al. "Heat-related deaths in hot cities: estimates of human tolerance to high temperature thresholds." International journal of environmental research and public health 11.3 (2014): 3304-3326.	The revised extreme temperature appendix provides the city specific thresholds and slopes for impacts, as well as baseline impact data. The threshold for extreme heat effects in Phoenix is approximately 5 degrees C higher than the next highest city threshold (Dallas), and up to 10 degrees C higher than some midwestern cities. This effect certainly represents a city-specific adaptation to heat stress, which should carry over to effects on labor. The labor study, however, is not focused only on cities, but on weather-exposed workers in all locations throughout each region. While we acknowledge that the method may not be appropriate for measuring extreme heat effects for areas as small as Phoenix in isolation, we find that the regional scale results are well-calibrated with historical data on reduced work hours. A separate effect may involve adaptation to higher temperatures, involving worker acclimatization, changes in work practices, evolution of industry type or seasonal activity levels, or in some cases alteration of workplaces. Those effects are captured in the method only to the extent that they are currently practiced or reflected in historical data through 2018.
NA	Labor	34	On page 34, the estimate of labor hours lost is in my opinion a weak or questionable point in the methods; it needs a strong argument. This is both due to the in-progress nature of the methods citation, and also due to the (IMHO) dubious argument that labor hours "are" lost during heat waves. Employers generally don't give people time off due to heat. They might start work earlier, hand out water, provide some short breaks, etc., but I have never heard of cancellations (and I live someplace VERY hot). Certainly, people lost labor hours if they were ill (or dead), but I am not aware of evidence of labor hours lost voluntarily during heat waves. If you are aware of that evidence, it's important to present it and defend the model. This is leading-edge work, but that means you need to be more careful here, please.		To characterize time devoted to work at the individual level, this analysis relies on data from the American Time Use Survey for the 16-year period between 2003 and 2018 (focusing on workers in weather-exposed industries). ATUS is a nationally representative cross-sectional survey describing how Americans over age 15 spend their time. Respondents complete a detailed diary of how they allocated the preceding 24 hours by activity, location, and length of time (down to the minute). For the periods of economic growth during the 2003-2018 reference period, the empirical relationships between temperature and labor allocation are quite similar to those found in a similar previous study from a more limited time span (2003-2007), providing important evidence on the robustness of the negative relationship between extreme temperature and hours worked in exposed sectors. However, we find that extreme temperatures do not lead to changes in hours worked during the Great Recession, underscoring the importance of worker bargaining power and supply-side concerns in shaping labor responses to extreme temperatures. So we agree with the reviewer that that employers can exert influence on labor allocation, however, the underlying methodology suggests that these effects are confined to periods of economic contraction. Overall, applying the results from the non-recession years to the expected periods of economic expansion over the remainder of the 21st century under a range of future climate scenarios, the time allocated to labor could decrease by up to 1.5 percent per worker in highly exposed industries by 2090.

NA	Labor		Do your methods adequately consider "increased" outdoor labor hours due to a longer growing season, longer tourist season, longer construction season, milder winter days, etc.? This is an important counterbalance to the lost-hours-due-to-heat argument. Do these labor methods consider rural occupations like farming?		<p>The underlying methodology, as described in Neidell et al. (2021), used the American Time Use Survey data to evaluate changes in labor allocation with all extreme temperatures (including cold). In the original study (Graff-Zivin and Neidell 2014), the researchers analyzed the empirical relationship to determine potential benefits to labor allocation in the U.S. during winter months, however such benefits were not found. In other words, the study did not find strong evidence that high risk workers vary their time working on days below 85 degrees, so cold temperature effects are not included in the analysis of this report. Instead, the analysis focuses specifically on the impact of discrete very high temperature days, which are expected to occur more frequency under continued climate change and can have detrimental health impacts for exposed workers.</p> <p>With regards to the length of the working season for various industries (e.g., agriculture, tourism, construction), the labor method used in this report is not ideally suited to answer questions about how longer warm seasons may lead to more or less time spent working among high risk workers. Building on findings from (Graff-Zivin and Neidell 2014), our investigation focused specifically on the impact of discrete very high temperature days, which are projected to occur more frequency under continued climate change and can have detrimental health impacts for exposed workers. We have added an endnote acknowledging this caveat.</p> <p>The study used individuals in industry codes that identify workers in agriculture, forestry, fishing, hunting; mining; construction; manufacturing; and transport and utilities sectors. Because agricultural workers were included, the approach should capture effects in rural areas.</p>
NA	Labor		Do your methods consider increased or decreased labor hours due to non-heat climate change effects, like hurricane evacuation and recovery? Please explain. Overall, I think the methods used in the Labor section are weaker, and perhaps too weak. At the very least some significant clarification is needed.		<p>The methods do not evaluate changes in labor allocation in response to non-heat climate effects. As mentioned in our responses to other comments, the original estimation evaluated effects due to changes in extreme cold temperatures, but no substantial signal was observed (therefore the analysis does not include that effect in the projections shown in this report). The methods do not evaluate changes in labor allocation in response to other climate drivers, such as snow, storms, etc. We have inserted a statement clarifying this in the Background section.</p> <p>We believe that the additions and edits to the methods description clarify the strengths and limitations of the approach for this analysis. We note that the underlying impacts modeling method was subject to a recent journal peer review (Neidell et al. 2021) and those reviewers found that the approach was sound.</p>
NA	Roads		I am a civil engineer and hydrologist, so I am qualified to evaluate the HTF road work (and the coastal flooding work). The results make sense to me in general, and the methods appear sound.		No change needed.
NA	Roads	41	The approach on page 41 (step 7) involves a cost-benefit analysis to identify which HTF might be mitigated versus not mitigated. This is an adaptation mechanism and a mitigation policy. This risks inconsistency in approach between sections- and is inconsistent with language in the introduction explaining that adaptation and mitigation is not considered in the analysis.		<p>As described in the Introduction to this report, adaptation is modeled using broad decision rules that are efficient and reasonable to implement at a national-scale. However, we note that adaptation actions are typically implemented at local scales. As such, the general adaptation scenario considered in the analyses is intended to be illustrative, and will not capture the complex issues that drive adaptation decision-making at regional and local scales. As such, the adaptation scenario and estimates presented should not be construed as recommending any specific policy or adaptive action.</p> <p>This adaptation scenario does not represent a specific policy at national or regional levels, as no specific programs, authorities, or policy mechanisms are considered or evaluated. The statement in the 'Interpreting the Results' section is intended to affirm this notion - i.e., that the report does not evaluate specific adaptation policies, only considers how illustrative adaptation responses could reduce risk.</p> <p>To help clarify the text in the 'Interpreting the Results' section, we have edited the text to describe that mitigation is referring to greenhouse gas mitigation, not flood mitigation.</p>
NA	Roads	43	Page 43; why are minorities disproportionately affected by HTF- especially Latinos? Are the results dominated by coastal Texas and Florida demographic patterns?		<p>Yes that is a reasonable inference, as those locations are particularly susceptible to HTF impacts. However, as noted above, while we agree that the "why" and the "because" are important questions, in a general sense answering those questions is beyond the scope of the report. We are also reluctant to speculate on these reasons without more time and data to dig deeper. Data from the report will be made available to the public to facilitate an option for more detailed "deep dives" in subsequent research.</p>

NA	Coastal Flooding			[Coastal Flooding and Inland Flooding] The methods appear sound- with one concern. Flooding and floodplains are such a “micro” scale issue; it depends narrowly on elevation and on civil infrastructure; the census tract is not an appropriate scale for analysis. Similar biases and concerns over bias are present here due to the correlations between the hydrology and the socioeconomic, as I explained with microscale urban heat patterns. Low-socioeconomic status is associated with older neighborhoods with less infrastructure to prevent flooding, within a census tract. This should be discussed. The rural-urban divide enters into the discussion here, as well. Rural areas have little to no civil infrastructure to protect them from flooding, whereas urban areas have massive infrastructure.		We note that the Coastal Flooding and Property and Inland Flooding and Property Analyses were conducted at the Census block group scale, which is considerably smaller than Census tracts. However, we agree with the reviewer that the analyses are not able to eliminate all of the biases due to the correlations between the hydrology and the socioeconomic. In both sections, we have added endnotes discussing how the scale of the analysis is not able to capture all of the micro-scale hydraulic and infrastructure dynamics important for precisely estimating flood risk. In response to the comment on the urban/rural divide with regards to infrastructural protection, we note that the following sentence is located in the Inland Flooding and Property section: "In addition, the underlying flood risk dataset incorporates the mitigating impact of current flood control structures – these structures are likely to be more common in many densely populated urban areas, which also correlate with the locations of some socially vulnerable populations."
NA	Coastal Flooding	54		The approach on page 54 (step 2) involves a cost-benefit analysis to identify where coastal flooding might be mitigated or not by seawalls. This is an adaptation mechanism and a mitigation policy. This risks inconsistency in approach between sections- and is inconsistent with language in the introduction explaining that adaptation and mitigation is not considered in the analysis. If a community is excluded from seawalling due to cost-benefit prioritization, one would imagine that people might be compensated... or not. This is the problem with trying to model adaptation, and it is probably better to be avoided. This is, of course, a judgment call, not a question of fact or science.		As described in the Introduction to this report, adaptation is modeled using broad decision rules that are efficient and reasonable to implement at a national-scale. As such, the general adaptation scenario considered in the analyses is intended to be illustrative, and should not be construed as recommending any specific policy or adaptive action. This adaptation scenario does not represent a specific policy at national or regional levels, as no specific programs, authorities, or policy mechanisms are considered or evaluated. The statement in the 'Interpreting the Results' section is intended to affirm this notion - i.e., that the report does not evaluate specific adaptation policies, only considers how illustrative adaptation responses could reduce risk. We find that there are merits to evaluating potential adaptive responses, even when based on simple cost-benefit frameworks (as has historically been done under US Army Corp project evaluations). This information provides an additional dimension to how socially vulnerable individuals can be disproportionately affected by climate change (and human responses to those risks).
NA	Inland Flooding	68		On page 68, it seems inaccurate to write that “the socially vulnerable groups analyzed in this report do not, in general, experience substantially disproportionate risk compared to their reference populations”. Based on Figure 3, it appears that the minority group is a notable 12% less likely to be flooded by inland flooding than the general population, and specifically is much less likely to be flooded than the white non-hispanic population. Doesn't that make the white non-hispanic population the vulnerable group for the purposes of flooding? The risk to minorities is disproportionately *low*.		We have revised the key finding and underlying text to more accurately summarize the findings for minorities and white, non-Hispanics.
NA	Inland Flooding	69	Figure 3	Figure 3 on Page 69; “white, non-hispanic” is a “minority”? Perhaps relabeling is needed.		We have redesigned all similar figures in this report to more clearly note that we do not consider white, non-Hispanics to be minorities.
NA	Inland Flooding	69	Figure 3	In the same result, why is white-non-hispanic most likely to be vulnerable to inland flooding at 2 degrees of warming, but pacific islanders at 4 degrees? This is not intuitive and needs explaining more than many other results.		We have added the following sentences to provide explanation of the changes in results, which are driven by the demographic distribution of populations subject to the worst flooding damages under each level of global warming: The highly localized nature of the occurrence of extreme flooding events, and the substantial variation across regions, means that results in Figure 3, averaged to the national level, may obscure some of the more informative results at the regional level (presented in the next section). In addition, national results show substantial changes across social vulnerability measures with increases in warming, likely a result driven by changes in the number of socially vulnerable individuals subject to the worst flooding damages as temperatures change.
NA	Summary of National Results	75	Figure 1	On page 75, Figure 1 is hard to read. Too small.		We have made sure the figure is easier to read in the final layout.
NA	Summary of Regional Results	78		Page 78 is a good place to insert some language in each regional bullet about “why” these impacts and populations are the issue- what is it, socially, physically, economically, etc., that causes these patterns? Do you know? Some speculation or interpretation is very helpful here, if you are clear that it’s only interpretation and not the study’s results.		We have added some explanations throughout the report providing potential rationale for what may be driving many of the results. However, the scope of this report is not intended to explore the underlying drivers at a detailed level. Because this report analyzes six impacts across four socially vulnerable populations at a national scale, it would require a large amount of effort to identify socioeconomic conditions of the specific locales that are potentially driving the results. And these conclusions would likely be speculative in nature, which offers somewhat minimal value.
NA	Overall			Children are a vulnerable group under most considerations. They have to walk to school, they are less able to express themselves when they are sick or threatened, they play outside in the heat or bad air, and their bodies are less able to handle hazards. I expected to see children as a vulnerable population. Ditto for male/female. There are large differences in exposure between men and women, and this matters for air quality, heat, and road closures, among other factors. I expected to see male-female differences studied or at least seriously discussed.	Vanos, Jennifer K., et al. "Hot playgrounds and children's health: a multiscale analysis of surface temperatures in Arizona, USA." Landscape and Urban Planning 146 (2016): 29-42.	Within the health literature, vulnerability by age and gender are commonly assessed, but in the other sectors these differences are less important. Our choices for social vulnerability metrics were designed to be used across all six sector impact studies. For the air quality sector, we nonetheless did choose did look at childhood asthma prevalence as a key impact metric, consistent with the relatively rich air quality epidemiological evidence.
NA	Overall			Adaptation and policy is the 1000-pound gorilla in your room (so the speak). It's a huge consideration that promises to affect risk dramatically. You can't model it, but it may make sense to at least discuss, in each section, the types of adaptations that are likely and how they could possibly affect the vulnerable groups in differential ways.		We agree that adaptation is important. As noted above, in the revision we added a new "sidebar" in the Approach chapter that describes the treatment of adaptation for all six sectors analyzed, and we also added a more thorough discussion of the impact of adaptation in the section of the Approach chapter headed, "Sources of Uncertainty."

NA	Overall		You cited Eisenman et al. 2016 a lot; it's a good reference, but for some of those facts there are much better citations.		We added additional references for the technical appendix in particular, but also for the main report
NA	Overall		Harlan et al. aren't cited at all, and are a leading research team on heat and mortality. Work some of Sharon's stuff in here?		The revised technical appendix now includes several citations from among Harlan's literature.
			Power outages threaten to be a major issue for heat morbidity due to failure of AC. How can you work that angle in?		
NA	Overall				It's true that power outages could be important - and for that reason a new study has been considered to characterize this effect. The current difficulty is in estimating the marginal impact of climate both on increasing the severity of current power outages (an effect which to our knowledge has not been measured), or on attributing more frequent power outages to specific climate indicators which can be robustly estimated from GCM projections. This area continues to be of interest to the report authors.
1	Introduction		Yes.		No change needed.
2	Overall		Yes		No change needed.
3	Overall		Yes		No change needed.
4	Overall		Yes		No change needed.
5	Overall		Yes		No change needed.
			Even though summary results are presented clearly, the context is missing with respect to assumptions, modeling uncertainties, and static behavior of population in face of changing conditions.		
6	Overall				The revised report describes assumptions and caveats in two primary ways. First, the Approach chapter contains a section describing the sources of uncertainty that broadly apply to all or most analyses of the report. Second, each impact chapter briefly describes the most important assumptions and caveats specific to that particular impact. Given the desire to keep the sections easily readable, we do not provide a comprehensive list of all caveats in the main text, and instead refer the reader to the technical appendices for each chapter where they are described in detail.
			The findings and conclusions are summarized; however, context is not clear w.r.t. assumptions, modeling uncertainties, and static behavior of population in face of changing conditions. If someone quoted/communicated the results without the underlying context it will be confusing.		
7	Executive Summary				The revised report describes assumptions and caveats in two primary ways. First, the Approach chapter contains a section describing the sources of uncertainty that broadly apply to all or most analyses of the report. Second, each impact chapter briefly describes the most important assumptions and caveats specific to that particular impact. Given the desire to keep the sections easily readable, we do not provide a comprehensive list of all caveats in the main text, and instead refer the reader to the technical appendices for each chapter where they are described in detail. We have also made it more clear throughout the report that the analyses assume constant demographics, but project future risks on these populations.