Fifth National Climate Assessment

Public Comment Period & National Academies Review Annotation

The U.S. Global Change Research Program (USGCRP) released the draft Fifth National Climate Assessment (NCA5) for public comment from November 10, 2022 - January 31, 2023, concurrent with review by a special committee convened by the National Academies of Sciences, Engineering, and Medicine (NASEM, November 10, 2022 - March 20, 2023).

The NASEM peer review panel evaluated the draft NCA5 and published a review report that captured consensus responses to questions posed within a carefully designed Statement of Task. The final NASEM review report can be accessed here and an acknowledgment generated by USGCRP leadership can be found here. The NASEM peer review report included overarching comments and recommendations (Part 2), a narrative review of each chapter (Part 3), and chapter-specific line-by-line comments (Appendix A). After carefully considering each comment in Appendix A of the NASEM peer review report, the NCA5 writing teams revised their draft chapter and/or noted the rationale for actions taken in their response to each comment, as appropriate. The NCA5 authors' responses to the NASEM review panel's line-by-line comments can be accessed here.

A Federal Register Notice announced the availability of the draft Fifth National Climate Assessment for public comment. Input from the public was collected via an online comment system. Names and affiliations of participants in the draft NCA5 Public Comment Period were withheld from the authors, Review Editors, Federal Steering Committee, and staff throughout review and revisions. Anonymity helped preserve integrity of the drafting process. During registration, all reviewers consented to have their names associated with relevant comments once the report was published. Chapter writing teams considered each comment, Chapter writing teams considered each comment and, as appropriate, revised their draft and/or noted the rationale for actions taken in their response to each comment. The authors' responses to the public comments received can be accessed here.

Independent Review Editors were chosen by the NCA5 Federal Steering Committee from a pool of external experts solicited through an open call for nominations, announced via Federal Register Notice (1 June 2022 - 1 July 2022). Each chapter was assigned a Review Editor to evaluate author responses to both the NASEM review and public comments, and the revised chapter drafts themselves, to confirm that the chapter writing teams had given due consideration to all review comments prior to submission for final agency review and clearance.

The full report underwent several additional rounds of review after authors' responses were generated. Therefore, subsequent edits may have been made that are not part of the attributed set of comments included on the following pages.

Chapter	Page/Line	Comment	Response
00: Front Matter	P6/L2	Suggest citing United States Code since the Act is codified in nonscattered sections: (15 U.S.C. § 2921 et seq.).	References will be updated according to the standardized reference format for the report.
00: Front Matter	P7/L10	Suggest adding "since the [Fourth National Climate Assessment (NCA4)]" to the text, "and how methods to understand changes in Earth systems have advanced since NCA4."	
00: Front Matter	P7-8/L15-4	Suggest consistent reference to other chapters; sometimes just the chapter is in parentheticals, other times the name of the chapter and the chapter number are in parentheticals.	Cross-chapter references will be standardized at the end of the report production process.
00: Front Matter	P8/L1-2	Suggest including Figure 1 or specific regional maps after the introduction in each regional chapter.	This is planned to be done in the final form of the report.
00: Front Matter	P9/L3	Suggest "these" instead of "covered."	Text revision was considered.
00: Front Matter	P9/L114-18	Does "calibrated" mean calibrated with the Intergovernmental Panel on Climate Change (IPCC) terms? Suggest more precise language or defining "calibrated" or chose different phrasing: "Authors used the IPCC terms to describe confidence and likelihood in their key messages, where appropriate."	A table describing in detail the precise calibrated language will be included in the final form of the report, as well as as a hover-over feature to help readers understand how it was used in NCA5.
00: Front Matter	P9/L19-25	Suggest a hover function where readers online can see both the definition of confidence and likelihood and the adopted IPCC scale for each term when they hover their mouse cursor over a confidence and likelihood rating (included on page 0-10, lines 1-6) in the text.	This feature is already planned for the final form of the report.
00: Front Matter	P13/L8-15	This paragraph is not written for broad audiences with little exposure to climate change and should be revised for clarity: suggest adding an introductory sentence to introduce global warming levels and internal variability; suggest adding a "for reference" introduction to the last sentence in this paragraph; and avoid "in which" where possible because it is unclear. "Conversely" is confusing here because it is not quite conversely—it is more of an "actually"; and the sentence in lines 11-13 uses the word "level" multiple times, which muddles the message. Suggest reworking these sentences to clarify the language as follows (from line 8 on): "Global warming levels can be impacted by internal variability in the climate system. Internal variability in the climate system means that even as the world rapidly warms, some years will be hotter, and some years will be cooler than the multidecadal average. Annual variability, for example when the global annual average temperature is 1.5°C (2.7°F) hotter than it was from 1850 to 1900, does not mean the 1.5°C global warming level has been reached. However, annual variability like this can mean that climate impacts that were projected to occur at a given global warming level may occur even before projections indicated. In addition, temperatures in different parts of the world could be warmer than the global average. For reference, a global warming level of 2°C (3.6°F) would result in regional temperatures in parts of the United States that are more than 2°C above preindustrial levels (Figure 1.16)."	Authors considered this suggestion and revised as they deemed appropriate.
00: Front Matter	P13/L16-17	"Runaway impacts" is not clear; suggest revising to clarify what this phrase means.	Authors considered this suggestion and revised as they deemed appropriate.
01: Overview	P4/L6-7	"Worst harms" is not defined in the report. Suggest instead, "faster and deeper cuts in [greenhouse gas (GHG)] emissions are achievable."	This suggestion has been implemented.
01: Overview	P4/L16	Should reference Chapter 3 (Earth System Processes) key message on extreme events.	This suggestion has been implemented.
01: Overview	P4L20	Suggest citing all of Chapter 4 (Water) rather than just Key Message 4.2.	This suggestion has been implemented.
01: Overview	P4L23	Does the evidence cited in the report demonstrate that every individual American will have less harm from reduced warming? The evidence shows some Americans having some benefits. The report does support a conclusion that a reduction in adverse impacts is correlated with less warming.	Text has been added to convey that some regions or sectors may experience near-term and short-lived benefits of warming, but that overall these benefits are far outweighed by harms, and even more so as the world warms further.
01: Overview	P4/L25	"Individuals" should be mentioned. Key Message 32.5 states that governments, organizations, and individuals can reduce emissions.	This suggestion has been implemented.
01: Overview	P4/L25-31	This paragraph should be more inclusive and discuss other low- carbon energy sources discussed at length in Chapters 5 (Energy Supply, Delivery, and Demand) and 32 (Mitigation) (e.g., hydrogen, carbon capture, utilization, and storage [CCUS], nuclear). Discussing only renewables is not an accurate picture of the state of the science, the technology, or industry.	Implemented. Added mention of other low-carbon energy sources as other options, particularly for harder to decarbonize sectors. However, the focus on renewables reflects the literature of net zero scenarios which often maintain—but do not greatly expand—existing nuclear and hydropower capacity in the absence of significant cost declines (such as improved economics from small, modular nuclear designs) and/or constraints on the deployment of other renewables.
01: Overview	P4/L28	Sustainable land-use is credited with helping to reduce emissions, but it is not clear where this is mentioned in the chapters. The chapters cited are Chapters 5 (Energy Supply, Delivery, and Demand), 12 (Built Environment, Urban Systems, and Cities), and 32 (Mitigation). The section on land-use in the mitigation chapter states that net sequestration of carbon on US land has decreased from 1990 to 2020.	Implemented. We have restructured this section to clarify. The discussion of land sinks has also been updated in KM32.1. Land sinks have fallen since 1990, but in order to meet net zero goals, enhanced sinks are required in most scenarios.
01: Overview	P4/L35-36	The statement implies that the decrease was due entirely to increased use of renewables. Chapter 32 (Mitigation) notes that increased use of natural gas and renewables offsets coal use. The role of natural gas should be acknowledged.	This suggestion has been implemented.

Chapter	Page/Line	Comment	Response
01: Overview	P5/L4	“Risks” rather than “harms” would be more appropriate because anticipatory adaptation can be taken to reduce risk of harm. In many cases, if the harm happens, it may not be made less severe.	This suggestion has been implemented.
01: Overview	P5/L1-16	Key Message 31.4 discusses some examples of where climate services are being applied to support decision making. This should be summarized in Section 1.3.	The text references KM31.4 and provides examples of adaptation actions supported by climate services.
01: Overview	P5/L11	Cite Key Message 4.2 rather than 24.4. Also note that the Committee’s comments on Chapter 24 point out such modifications are also being made to adapt to sea-level rise.	This suggestion has been implemented.
01: Overview	P6/L2-3	This is an example of a statement that is technically correct but is policy prescriptive because it implies a preference for a policy outcome. If examples of climate action that also address equity and justice can be given in the report, they can be summarized in this section of the Overview	This text has been revised to remove the policy prescriptive language and better convey the findings of the underlying chapters. Additional cross-references to underlying chapters have also been added to support the paragraph text.
01: Overview	P6/L5	Suggest not using contractions in formal reports. Use “do not” rather than “don’t.”	This suggestion has been implemented.
01: Overview	P6/L7	The adverb “fairly” makes this statement policy prescriptive. The statement should be rewritten to be policy relevant without appearing to advocate a policy prescription.	This text has been revised to remove the policy prescriptive language and better convey the findings of the underlying chapters.
01: Overview	P7/L4-6	Should add a sentence saying that studies suggest that both a more equitable and lower cost action on climate change would imply that the United States should cut emissions in advance of the global average (Key Message 32.1) (Schaeffer et al., 2020).	We feel this may be beyond the US-focused scope of NCA5 to discuss what is a more equitable response at the global scale. Ch 32 has added that "US CO2 emissions reaching net-zero around midcentury would be consistent with Paris goals, though a wide range of trajectories is possible based on considerations of international equity, burden-sharing, costs, and policy assumptions." We will point to that text {32.1}, but consider it too much detail for the Overview.
01: Overview	P7/L3-8	The paragraph is technically correct but leaves out a lot of important and policy relevant information. Carbon sequestration, which the literature suggests is needed to meet net zero by mid-century emissions levels, is not mentioned. In addition, the paragraph does not mention barriers to implementation of low-carbon emissions options. Also, Chapter 5 (Energy Supply, Delivery, and Demand) does not address how GHG emissions can be reduced from the energy sector but focuses on climate change impacts on that sector.	This suggestion has been implemented. This will be addressed in a revised figure on net zero that highlights carbon sequestration needs. In section 5.2, we discuss how pathways to net zero require large scale changes.
01: Overview	P7/L5	Delete “preferably” because it makes the clause policy prescriptive	The "preferably" here describes the terms of the Paris Agreement; it is not indicating a policy preference.
01: Overview	P7/Figure 1.1	The figure is good and informative. Is it possible to have the divergence of scenarios start around 2020? If that is not possible, the caption should explain why the scenarios diverge around 2015.	The caption has been edited to note the model runs begin in 2015. Observed trends through "today" (2023) will be added to the figure.
01: Overview	P7/L9	The figure depicts carbon dioxide (CO2) emissions, which is closely correlated, but not exactly climate futures. The Committee suggests indicating that CO2 is the largest driver of climate change.	This suggestion has been implemented.
01: Overview	P7/L12-14	Suggest adding a discussion of emissions and sinks in the United States and using the word “net” before “US GHG emissions.” The second sentence in (see Chapter 3).this paragraph should align with any changes made in Chapter 32 (Mitigation) based on the Committee’s review (see Chapter 3).	This suggestion has been implemented.
01: Overview	P7/L13	The phrase “avoid the worst harm” is vague. The Committee suggests replacing that phrase with reference to the 1.5°C and/or 2.0°C targets in the Paris Accord.	This text has been changed to "current national and international climate commitments." The warming targets for these commitments are defined in the previous paragraph.
01: Overview	P8-9/L35-1	Suggest offsetting “and are exacerbated by” with commas	This suggestion has been implemented.
01: Overview	P9/L29-30	This sentence is unclear as written; suggest: “many communities are learning climate change response techniques from tribal and Indigenous leadership.”	This text has been revised for clarity.
01: Overview	P10/L2	Are the words “first and worst” scientifically defensible? There is literature, (e.g., EPA, 2021) that finds that, as the report terms, “minority” communities face relatively higher and hence disproportionate risks to climate hazards. But do they face these risks before other communities do? The word “worst” also seems loaded. The statement will be effective without the words “first and worst.”	This text has been revised to remove "first and worst."
01: Overview	P10/12-13	The sentence is unclear and should be revised. Is the point that we have to adapt no matter how effective mitigation is?	This sentence was removed during edits to reduce length.
01: Overview	P10/Figure 1.2	It is useful to display long term temperature trends in the United States The figure title should show the years in the data range used to create the figure (e.g., 1900-2020). The reader may notice areas that have been cooling. The caption should address explanations for observed cooling and, if appropriate, why the western half of the country appears to be warming more than the eastern half.	This figure has been revised to show a historical temperature trend (line graph) for the US. The caption has been revised to capture the new figure content and make clear the data range and baseline years.
01: Overview	P11/L1-2	The word “worse” in the title has a vague meaning. It would be more precise to replace it with, for example, “more frequent and severe.”	This text has been revised to remove "worse."

Chapter	Page/Line	Comment	Response
01: Overview	P11/L12	The sentence on heat and wildfire jeopardizing outdoor sports and recreation may be overstated and does not consider other benefits of higher temperatures for warm weather recreation. The verb "jeopardize" is vague and unclear as to what the effect of extreme weather on warm weather recreation is estimated to be. While there is a lot of literature on climate change impacts on cold weather recreation, particularly skiing (e.g., Wobus et al., 2017) there appears to less literature on effects on warm weather recreation, but new literature has been published in recent years (e.g., Chan and Wichman, 2020, 2022; Gellman and Wibbenmeyer, 2022). These studies find there could be net benefits to total recreation from increased temperature but may not fully consider impacts of high heat, increased precipitation, and fire. Gellman and Wibbenmeyer (2022) addresses fire. The phrasing in the draft does adequately describe the complexity of the relationship of climate change and US recreation. This can be better addressed in the Overview and in appropriate underlying chapters such as Chapter 19 (Economics) and some of the regional chapters.	This text has been removed. Effects on recreation are discussed in more detail in sections 3.8 and 3.10.
01: Overview	P12/L4-5	It is not clear why the Focus on Complex and Compound Events is cited. Key Message 4.3 and Chapter 28 (Southwest) can also be cited.	This suggestion has been implemented.
01: Overview	P12/L6-7 including Figure 1.4	The presentation of the billion-dollar disaster figure does not appropriately put the change in billion-dollar disasters in context. The paragraph in lines 6-11 attributes increase in billion-dollar disasters to "worsening weather" and line 16 states that the increase is "in part because of human caused warming." A different figure on billion- dollar disasters is displayed in Chapter 2 (Climate Trends), but shows the disasters that occurred in 2021, not the long-term trends. Figure 1.4 is introducing new information not in the underlying report. Line 15 states correctly that the data on billion-dollar disasters are adjusted for inflation. The National Oceanic and Atmospheric Administration (NOAA) uses the Consumer Price Index (CPI) to adjust the size of the disasters.26 However, the exposure to such disasters appears to be increasing. Three trends should be noted to appropriately put the "Billion-Dollar Disaster" data in context. First, changes in property values versus CPI should be noted.27 Second, population increased from 226 million in 1980 to 331 million in 2020—a 46 percent increase.28 Third, increased development in vulnerable areas (Iglesias et al., 2021).	This text has been revised to make clear that climate is part of the reason for increasing disaster costs, but that other non-climate factors such as population growth and property values also factor in economic calculations. Trends in billion-dollar events are also covered in the Indicators Appendix and regional chapters (e.g., Southeast), so this figure is using infomation conveyed in the underlying chapters, just shown in a different format.
01: Overview	P13/L11-12	What do the terms "significant" and "well-being" mean in this statement? The terms are vague and subject to misinterpretation.	This text has been removed.
01: Overview	P13/L30	As noted above, the phrase "first and worst" is used regarding inequitable impacts. Please use words that are supported by evidence on inequitable impacts.	This phrase has been removed.
01: Overview	P13/L35	Suggest defining redlining for broad audiences. The definition is included below in Section 3.3, page 1-20, lines 13-14. Suggest moving the definition up or referring readers to where it is defined.	A definition of redlining has been added. This will also appear in the NCA5 Glossary.
01: Overview	P16/Table 1.2 Southwest row 2nd column	The statement about groundwater is an oversimplification. See comments on Chapter 28 (Southwest).	We agree that this is a simplification, but space in this table is limited and readers are referred to KM28.1 for more information.
01: Overview	P17/L2	"The things Americans value most are at risk." Does the report examine what Americans value most? This is a quotable statement but is it supported by the evidence base?	This statement has been removed.
01: Overview	P17/L6-9	The sentence beginning "The threats to the people and places we love…" is policy prescriptive. Also, the Committee suggests removing "to unavoidable change."	This statement has been removed.
01: Overview	P17/L12-15	Not all impacts of flooding are negative. There can be some positive ecosystem benefits (see page 4-6, lines 3-10).	The text has not been revised to suggest there may be some benefits of flooding, as the underlying chapter text overwhelmingly notes negative impacts.
01: Overview	P17-18/L12-12	The section should also discuss impacts of climate change on water quality.	Text has been revised in this section to better capture impacts on water quality.
01: Overview	P17/L20-21	The statement about excessive rainfall is in Chapter 24 (Midwest)	This statement is from 6.1 but the same paper is referenced in 24.1. A reference to 24.1 has been added.
01: Overview	P17/L34	The Committee agrees with the statement about vulnerability of small water systems but does not see supporting information in Chapters 4 (Water) or 28 (Southwest).	Additional references have been added to support this paragraph.
01: Overview	P17/L37	Chapter 4 (Water) does not discuss how nature-based solutions (NBSs) can improve water supplies. It does address the role of NBSs and flooding.	Additional references have been added to support this paragraph.

Chapter	Page/Line	Comment	Response
01: Overview	P18/L14	The Committee suggests caution in using “will” in this key statement because it implies there is virtually no uncertainty about the outcome. While the report cites published literature projecting decreases in agriculture output, uncertainties about potential changes in baseline conditions and the effectiveness of adaptation should result in some reduction in likelihood or confidence in this statement. The heading that disruptions to the food system are “expected” to increase is appropriate. “Expected” is a useful way to summarize what is projected, whereas “will” conveys certainty about the projection. See the traceable accounts regarding Key Message 11.1.	This statement was edited to expected.
01: Overview	P19/L1-5	The statement on the effect of carbon fertilization and changes in climate is confusing. It is not clear whether the first sentence means that CO2, temperature, and precipitation acting together reduce yields or whether each factor alone reduces yields. The second sentence states that high CO2 concentrations and longer growing seasons by themselves have beneficial effects. The Committee suggests clarifying the relationships among the driving variables and the combined effect.	The statement was edited for clarity.
01: Overview	P19/L13-17	The paragraph as written is fine. What is not addressed here or in Chapter 11 (Agriculture, Food Systems, and Rural Communities) is whether adaptation by the agriculture sector could offset the adverse impacts of climate change. Is it technologically possible or do we not know? Are there barriers to implementation of technological and managerial changes that would result in adaptation being less effective? Such informative could be very informative to the agriculture sector.	These questions are now addressed in the Traceable Accounts for KM 11.1
01: Overview	P20/L5-9	The sentences describing how low-income households are more vulnerable to higher energy costs are true. The Overview should note, however, that annual energy expenditures are projected to decrease because reduced heating costs are projected to offset increased cooling costs (see Chapter 19 [Economics]).	We changed the sentence to be entirely about high temperature extremes to avoid confusion. Please note that the projected offset is not reflected in the latest iteration of the Economics chapter. The Traceable Account for KM 19.1 acknowledges the benefits of warming in some places (e.g., avoided heat expenditure) but does not make a statement about offsetting cooling costs. The chapter does state that “The finding that currently warm places are more negatively impacted by additional warming than colder places is widely supported and garners high confidence.” Furthermore, the energy chapter states that "Lower-income households may not have air-conditioning or refrain from its use, leading to higher health risk" (5.2) and the health chapter states that "During higher ambient temperatures and heat waves, cooling measures may be physically or financially inaccessible" (15.2) and “Air-conditioning access is limited for low-wealth and unhoused populations. The high cost of electricity prevents effective use of air conditioning.” (15.3)
01: Overview	P20/L27-31	There is an implication here that these extreme events and other changes are directly due to climate change. However, authors should make it clear that these events may have become more likely because of climate change, not that they were directly caused by climate change. Consider adding a sentence at the beginning indicating that no single event can be directly attributed to climate but that the odds of some events has increased due to climate change.	The authors have retained the current text, which demonstrates the implications of extreme events for society, regardless of their cause, and is supported by recent advances in extreme event attribution literature.
01: Overview	P20/L231-33	The text states that millions of internal migrants are “expected,” which we interpret to mean are projected. Chapter 19 (Economics) discusses migration but states that numbers cannot be projected. Chapters 28 (Southwest) and 26 (Southern Great Plains) raise the possibility of migration into the United States from Mexico but do not project numbers. The Committee cannot find discussion in the report on internal migration nor any projections of how many people would migrate. The Committee’s understanding is that while migration is quite possible it is difficult to project how many migrants there can be, where they come from, and where they go. The Committee suggests carefully reviewing the relevant chapters and revising statements on migration to reflect what is in those chapters. The Committee cautions against reporting specific projections largely because the field of migration projections from climate change is in a nascent stage and specific projections should be treated with caution.	Current text is approved. Each projection is noted as locality specific giving validity and accuracy to the statement.
01: Overview	P21-22/L26-3	The science suggests that climate change will cause more intense, but fewer hurricanes. The statement should be consistent with this.	Changed to "more intense storms." The science is clear that climate change will cause more intense hurricanes and more frequent *strong* hurricanes, but changes in overall storm frequency are highly uncertain.
01: Overview	P22/L10-14	The paragraph on adaptation of infrastructure is sound but, as noted above, it does not address whether adaptation has the potential to offset adverse impacts of climate change, or how expensive or feasible such measures may be. Infrastructure adaptation is often incremental. Since the report discusses the need for transformation, is the effectiveness of incremental adaptation limited, particularly under higher emissions scenarios?	These are interesting and valid points. The paragraph now states that "infrastructure...can help build resilience to climate change." The reader can refer to the referenced chapters for more in-depth discussions. The concept of transformative adaptation is discussed elsewhere in both Ch. 1 and Ch.31.
01: Overview	P22/L13-14	Suggest adding “among other actions” to the end of this sentence.	This suggestion has been implemented.

Chapter	Page/Line	Comment	Response
01: Overview	P22/L24	The word “devastating” may not be appropriate for a scientific report.	"Devastating" has been removed.
01: Overview	P22/L25	The term “well-being” is vague. Perhaps it would be more focused to address the extent of health impacts from climate change across the country (i.e., whether the health of Americans is being adversely affected by climate change).	Thank you for your suggestion. In this case, we are adding the concept of "well-being" to provide a more holistic picture about Public Health following the World Health Organization that defines "health" as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmiry." The broad concept of well-being is an inclusive concept for social determinants of health: "the conditions on which people are born, live, work and age."
01: Overview	P23/L1-2	“Of families and communities across the country, with more people exposed to a compounding mix of health hazards, including.” Please add “increasing the odds of.”	This sentence has been revised to clarify, but does not include the commenter's suggested text (increasing odds). The text conveys that these impacts are already underway, not just projected for the future.
01: Overview	P23/L8	Does the report support the statement that climate change harms everyone’s health?	The sentence has been revised to better reflect the underlying report.
01: Overview	P23/L14	Suggest “contexts” instead of “impacts.”	This suggestion has been implemented.
01: Overview	P24/L12	Recommend starting this section with the point that climate is not the only stressor on ecosystems: land-use, air, and water pollution are also occurring at the same time and adding stressors (Chapters 6 [Land Cover and Land-Use Change] and 7 [Forests]).	The text has been revised to include non-climate global stressors, such as overfishing, pollution, and habitat fragmentation.
01: Overview	P24/L19-21	The Committee suggests phrasing this as a risk management matter (i.e., the risks of passing ecological tipping points increases with higher emissions).	This sentence has been revised to improve accuracy and clarity.
01: Overview	P24/L23-24	“Many climate impacts, particularly changes in ocean conditions and extreme events, already threaten coastal, and aquatic, and marine ecosystems (Figure 1.10).” Include “increase in the odds for some extreme events.”	The text notes potential changes in extreme weather events.
01: Overview	P25/L1-3	Is the projection about fish die-off tied to a particular scenario or scenarios? This is important to help readers understand how likely the outcome is and whether mitigation reduces the likelihood of the outcome.	The scenario has been added to the sentence.
01: Overview	P25/L21	The title of the section states “and abroad.” The Fifth National Climate Assessment (NCA5) focuses on impacts on the United States. Chapter 17 (Climate Effects on US International Interests) focuses on international impacts on US international interests and does not summarize international impacts (page 17-18, lines 19-20). Thus, it is not appropriate to have “and abroad” because international impacts are not a subject of NCA5.	This suggestion has been implemented.
01: Overview	P25/L25-26	The finding on projected international economic impacts is based on one study (Swiss Re, 2021) which was not published in a peer- reviewed journal and appears to be an extreme estimate. Chapter 19 (Economics) (page 19-12) finds that for each 1°F increase in average temperature, US Gross Domestic Product (GDP) is projected (not “will”) be reduced by approximately 0.13 percent. Several citations are given. Since the latter comes from a chapter about economics rather than international impacts, the Committee suggests citing that projection instead of the international GDP projection.	This text has been revised and the commenter's suggestion has been implemented.
01: Overview	P26/L9-15	Authors should mention justice concerns regarding mitigation and adaptation (i.e., that mitigation and adaptation are done in a way that does not adversely impact already overburdened communities).	This suggestion has been implemented.
01: Overview	P27/1-2	A more accurate heading would be “Many regional economies and livelihoods….”	This suggestion has been implemented.
01: Overview	P27/L3-4	The sentence is technically correct (see comment above), but it does reflect the entire draft NCA5 report, which identifies some sectors and regions that are projected to have some benefits.	Additional text has been added to section 2.5 to note the limited, short-term benefits that some people or regions might experience at lower warming levels.
01: Overview	P27/L3-7	Please add a sentence or phrase here emphasizing that usually already overburdened communities suffer more.	Text on overburdened and underserved communities has been extensively revised throughout this chapter.
01: Overview	P27/L18-22	The paragraph only mentions adverse impacts on Midwest agriculture and does not mention any positive impacts such as improved wheat yields (see Key Message 24.1, page 24-4, lines 10- 11). The Committee recognizes that on the whole, US agriculture is projected to face losses. Chapter 1 (Overview) should reflect the breadth of findings on agriculture.	Additional text has been added to section 2.5 to note the limited, short-term benefits that some people or regions might experience at lower warming levels. This section is focused on damages.
01: Overview	P27/L23-26	Suggest including a note about building out new energy technology. The Inflation Reduction Act (IRA) includes many changes in the tax credit system to build out a variety of energy sources and there are worker apprenticeship and vulnerable populations considerations built into the credits. This discussion is frequently omitted from the Chapter 1 (Overview) discussion of energy, and fossils fuels are compared repeatedly to renewables, which is not the full picture. Suggest: “…shift as the energy sector transforms toward more renewables and low carbon technologies, electrification of more sectors of the economy, and power infrastructure….”	Implemented change as suggested.

Chapter	Page/Line	Comment	Response
01: Overview	P27/L27-29	The examples for outdoor industries are geographically limited and only focus on certain activities. Please refer to the Committee's comments on page 1-12, lines 1-2, on the broader recreation literature. Studies that have examined impacts on total recreation in the United States have estimated net increases in welfare and expenditures. This can be tempered by noting decreases in cold weather recreation and how sea-level rise, more intense storms, and fire can limit recreation gains and reduce it in some cases.	Additional text has been added to section 2.5 to note the limited, short-term benefits that some people or regions might experience at lower warming levels. This section is focused on damages.
01: Overview	P28/L1-8	Figure 1.14: The Committee has comments on recreation in Chapters 1 (Overview) and 19 (Economics). Chapter 1 (Overview) points out limitations on recreation from extreme events and reduced cold weather activities such as skiing but does not address the effect of higher temperatures on warm weather recreation and whether a longer time period with warm weather will be offset by extreme events.	Text has been added to section 3.10 that demonstrates an expected mixed outcome for warm weather recreation in the Northwest.
01: Overview	P28/L3-4	Figure 1.12: What is the citation for the statement that Colorado ski resorts have lost revenue of because of declining snowfall? Vail Resorts does not report declining revenues since 2019.29 These years were affected by COVID-19, but revenues in 2022 were about 10 percent higher than 2019.	Thanks for the correction. The text in the caption was updated to refer to projected losses in the Pacific Northwest, as supported by the Northwest chapter. The photo will be changed to one located in Washington instead of Colorado to better align with the text.
01: Overview	P28/L13-15	The Committee applauds the caution applied to projections of climate change on crime and domestic violence, mental health, and happiness. We also note that the literature on annual recreation impacts does not find there will be a reduction in overall recreational but most certainly a reduction in some aspects, such as skiing, and adverse impacts on many warm weather recreation activities from extreme events and fire.	The text has been revised to note that some types of outdoor recreation will be negatively impacted.
01: Overview	P29/L13	The title should be "cultures, heritages, and traditions."	This suggestion has been implemented.
01: Overview	P29/L14-15	The language in the sentence is sweeping and the Committee questions whether it is fully supported by the draft NCA5 report. Is the language meant to imply that all community ties, pastimes, and landscapes are being threatened or some? Is the clause "Americans are losing the things that make them feel at home" appropriate for a scientific report?	The text "Americans are losing the things that make them feel at home" has been replaced with "As climate change transforms US landscapes and ecosystems, many deep-rooted community ties, pastimes, Traditional Knowledges, and cultural or spiritual connections to place are at risk."
01: Overview	P29/L24-26	The focus of the bullet is on cold weather recreation with no mention of how warm weather recreation can be affected. Even though the discussion is on what aspects of Americans' lives are being lost or threatened, by leaving out what could be benefits to warm weather recreation, the discussion is unbalanced.	This section has been significantly revised. Examples of economic impacts on tourism and recreation have been moved to section 3.8, which discusses economic damages and losses to livelihoods. The text notes that many, not all, outdoor recreation activities are at risk.
01: Overview	P30/L1-13	The discussion on outdoor activities and particularly the analysis of implications for outdoor industry does not reflect the literature on climate change impacts on recreation. The discussion ignores that higher temperatures will lead to a longer season for outdoor recreation (see literature cited in comment on page 1-12, lines 1-2). The chapters cited do not address tourism across the country and Chapter 19 (Economics) does not cover tourism. The literature establishes that some aspects of tourism are projected to be adversely affected, but it does not find that all recreation or tourism will be reduced.	The text has been revised to note that some, but not all, outdoor recreational activities will be negatively impacted.
01: Overview	P31/L3-5	In the sentence beginning, "The extent of…" what is meant by "today?" Does this imply that decisions made "tomorrow" are ineffective or less effective? It is not clear that the draft NCA5 report has addressed effectiveness of timing of mitigation measures.	This sentence has been revised. It removes references to "today" and focused instead on the pace and scale of emissions reductions.
01: Overview	P31/L7-22	The Committee agrees that the more GHG emissions are reduced the more risks are reduced, but the statement is incomplete in that it does not address sequestration or removal and options to reduce radiative forcing. The Committee suggests using the term "net emissions" to include sequestration. Authors should cite Chapters 7 (Forests), 11 (Agriculture, Food Systems, and Rural Communities), and 32 (Mitigation).	Implemented. A revised figure is highlighting net emissions and additional text throughout is emphasizing net emissions and the need for removal.
01: Overview	P31/L24-28	Chapter 3 (Earth System Processes) discusses use of climate scenarios, and Chapter 1 (Overview) should cite the chapter.	This suggestion has been implemented.
01: Overview	P31/L29	Insert "emissions" before "scenarios" to clarify these are emissions scenarios.	This suggestion has been implemented.
01: Overview	P31/L29-31	The sentence beginning "This is due to…" is confusing. Chapter 32 (Mitigation) should also be listed as a source backing up the statements because it addresses infrastructure, economics, and policy.	This suggestion has been implemented and the text in this paragraph has been revised for clarity.
01: Overview	P35/Figure 1.17	Suggest including the y-axis labels on the right graphs as well as the left.	This figure has undergone some copyediting to improve readability. However, the commenter's suggestion to add y-axis labels to the right column graphs has not been implemented, as the graphic designers deemed this action would make the figures harder to read, not easier. Additional text has been added to the caption to ensure readers can orient themselves to the six graphs and understand the baseline being used for each.
01: Overview	P36-41/Section 5	Note that the general comments on Chapter 1 (Overview) in Chapter 3 of this report raise concerns about this section having many policy prescriptive statements. The content of many of these statements can be revised to be policy informative without appearing to be policy prescriptive.	Revisions have been made to this section to ensure that statements lay out an action-consequence sequence.

Chapter	Page/Line	Comment	Response
01: Overview	P36/L2-7	The entire paragraph is policy prescriptive. The term “worst consequences” is unclear particularly regarding how much of a change in climate is associated with them. Does “avoided” mean they will not happen, they will be less severe, or the risks are reduced? Did the draft NCA5 report find that anything less than “large-scale” and “drastic” decarbonization of the economy will be ineffective? What about carbon sequestration or other options to reduce radiative forcing? The sentence on transformative mitigation and adaptation is policy prescriptive.	This section has been updated to address some of the terminology and discussion of carbon sequestration. But the overall paragraph lays out an action-consequence sequence that we feel is not policy prescriptive.
01: Overview	P36/L5	Would “near term” be more accurate than “immediate?”	This suggestion has been implemented.
01: Overview	P36/L9-10	The first sentence of the paragraph is policy prescriptive. Beyond that, does the draft NCA5 report analyze the timing of emissions reductions?	This sentence has been revised to avoid being policy prescriptive. Ch 32 and the scenarios from the EMF study that are now available do analyze the timing/pace of emissions reductions.
01: Overview	P36/L11	To be more accurate, the statement should say many options are “relatively cost effective.” Neither the statement nor the analysis addresses whether the benefits of the options are greater than the costs.	This sentence was removed.
01: Overview	P38/L8	Suggest changing the title of the section to “net emissions.”	This suggestion has been implemented.
01: Overview	P38/L18-19	This statement does not reflect content in Chapters 5 (Energy Supply, Delivery, and Demand) and 32 (Mitigation). Low-carbon, hydrogen, and nuclear should also be included.	Changed to: "Decarbonizing the electricity sector, primarily through expansion of wind and solar energy, supported by storage, while generally maintaining nuclear and hydropower capacity."
01: Overview	P38/L29-34	These sentences omit the challenges of grid stress, the need to build out distributed energy resources, zero-and low-carbon electricity sources, and resources needed to build out infrastructure to support the energy transition (i.e., critical minerals) (cite Chapter 5 [Energy Supply, Delivery, and Demand] and 32 [Mitigation]). Suggest updating the last sentence in the paragraph to read “recent legislation (IRA) has incentivized the deployment of low carbon, zero carbon, and renewable energy generation.”	Implemented. Also added references to Ch 17, 18 and Focus on Risks to Supply Chains. Updated sentence to "low- and zero-carbon."
01: Overview	P39/L1	While transformative adaptation can reduce unequal vulnerabilities it is not evident that it will automatically do so. As noted elsewhere, it is not difficult to think of transformative adaptations that could continue or even exacerbate unequal vulnerabilities. Such potential outcomes are discussed briefly on page 31-10, lines 24-26.	The authors removed the reference to unequal vulnerabilities from this heading and that topic is now discussed throughout the text.
01: Overview	P39/L9-11	Is the issue that all transformative adaptation should meet these criteria to be considered or is it that to be just, transformative adaptation should meet these criteria? This could be considered policy prescriptive.	We rewrote this paragraph to make it clear that addressing historical injustices is one component of transformative adaptation.
01: Overview	P39/L9-16	This is a very important paragraph that should be rewritten in language that broad audiences can understand.	The paragraph has been rewritten in plain language and reorganized.
01: Overview	P39/L18-24	It is not clear how the restoration of the watershed was transformative. Was it a result of the governance process that was used?	We replaced this example of a governance change with examples of collaboration and information-sharing between local governments at a regional level.
01: Overview	P40/L2-18	This section seems repetitive; if needed, these points could be made in other sections or shortened. The next section and other justice concerns could be expanded instead.	This section is primarily about co-benefits of adaptation and mitigation actions and these may or may not have an equity or justice lens. The sections before and after it have been edited to avoid repetition.
01: Overview	P40/L19	The section title is policy prescriptive because it implies a preference for a particular policy approach.	The section title has been edited.
02: Climate Trends	P2-13/L20-24	Citations are missing for statements in this section.	Citations have been added.
02: Climate Trends	P3/L15	Suggest not beginning a paragraph with a nebulous subject like “this.” What, specifically, has consequences for the United States?	The sentence was reformulated.
02: Climate Trends	P3/L16	Suggest replacing “this changing climate” with “climate change.”	The phrase was deleted from the revised text.
02: Climate Trends	P4/12-13	The last sentence could be construed as policy prescriptive. The penultimate sentence is excellent, however, and would be a perfectly fine way to end the paragraph. Suggest removing the last sentence altogether.	Authors have removed the last sentence of this paragraph to avoid the perception of policy prescription.
02: Climate Trends	P4/L17	Suggest replacing “even more warming” with “higher than average warming.”	Implemented.
02: Climate Trends	P7/L5-9	Definition of aerosol optical depth (AOD) in the figure caption is welcome but suggest adding some context for the units. Is this a trend in AOD per year? Overall change in AOD during the period in question? How does the magnitude of the trend compare to the mean? Without the latter, it is not possible to know if the trend is impactful (i.e., is it 0.1% change or a 50% change?). It is not clear from the figure caption.	The caption has been revised as follows: "Aerosol pollution over and downwind of the eastern US has decreased significantly in recent decades. This figure shows the trend from July 2002 to December 2021 in aerosol optical depth (AOD, unitless), a measure of the total amount of aerosol in the atmosphere derived from satellite observations. The trend is calculated from deseasonalized aerosol optical depth anomaly and is shown as change per decade and the trend over and downwind of the eastern US is significant at the 95% confidence level. The mean AOD between January 2003 and December 2007 is around 0.18 over eastern US and is around 0.13 between January 2017 and December 2021. Reduced aerosol emission results in improved air quality and decreased cooling effects from aerosols. Data source: Aqua MODIS (Moderate Resolution Imaging Spectroradiometer) observations from July 2002 to December 2021. Figure source: NASA Langley Research Center."

Chapter	Page/Line	Comment	Response
02: Climate Trends	P11/L4-5	More support is needed for the statement that US sea-level is accelerating. Figure 2.5 shows trends, not acceleration. Appendix 4 shows a single sea-level curve for the United States—assuming the authors are referencing Figure A4.10—but it may be difficult for the general reader to ascertain acceleration in the curve. Suggest adding either a quadratic or trend lines pre- and post-1990 to Figure A4.10. Also suggest removing the reference to Figure 2.5 here, because it does not relate to acceleration.	Removed the reference to Figure 2.5. Sentences on acceleration reflect analysis in Dangendorf et al. 2019 and Sweet et al. 2022.
02: Climate Trends	P11/L9-12	Suggest adding the role of Pacific Ocean-atmosphere variability (i.e., Pacific Decadal Oscillation [PDO]) in suppressing rates of sea-level rise (SLR) along the west coast of North America (e.g., Bromirski et al., 2011; Moon et al., 2013).	This material was added.
02: Climate Trends	P12/L25-37	Suggest connecting the statements in this paragraph to specific US regions and territories (e.g., changing Pacific cyclone tracks and El Niño-Southern Oscillation [ENSO] for US-Affiliated Pacific Islands [USAPI] and changes to hurricane frequency for the Southeast).	The text in this section has been adjusted to make these connections more explicit. However, out of concern that linking ENSO to hurricane development to a specific region may imply a change in landfalling hurricane risk, this additional connection has not been drawn.
02: Climate Trends	P13/L13-17	The last sentence in this section is out of place as this section is not about flooding and would be more relevant as the last sentence in the section of text on page 2-11.	This sentence was moved to the "Sea level rise Is expected to continue accelerating" section.
02: Climate Trends	P15/L27	Paleoclimate research has been very helpful in understanding the western US climate changes. It will be helpful to add some discussion with references on paleoclimate here.	Authors now cite tree-ring based studies to put these changes into context.
02: Climate Trends	P16/L14	It will be helpful to add a reference like Albano et al. (2022) that provides a more complete and newer assessment than Williams et al. (2020), including being continental US scale rather than Southwest limited and being based on multiple different data sources.	Authors cited this study.
02: Climate Trends	P17/L1-2	Is this Sweet et al. citation correct? The referenced report is about SLR scenarios.	Citation has been corrected.
02: Climate Trends			
02: Climate Trends	P18/L31-35	The mixing of degrees Celsius and Fahrenheit in this paragraph is confusing. Suggest choosing one or providing both in all cases not just some cases.	Authors use °C to refer to GWLs and °F otherwise, a distinction that has now been clarified in the text.
02: Climate Trends	P21/L17	Please add the data source: CMIP5 or CMIP6? It is not clear what LOCA2 means.	LOCA2 is downscaled CMIP6 data used throughout NCA5. Authors added a link to the dataset when available.
02: Climate Trends	P22/L5	Please add the data source: CMIP5 or CMIP6? It is not clear what LOCA2 means.	LOCA2 is downscaled CMIP6 data used throughout NCA5. Authors added a link to the dataset when available.
02: Climate Trends	P22/L7-10	It should be noted and referenced that the recent multidecadal drought in the Southwest United States is at least partially due to natural variability and not entirely due to human-driven climate change.	This is now noted.
02: Climate Trends	P22/L13	Missing the upper bound on the range “3 to ? billion”.	Fixed.
02: Climate Trends	P27/L17-20	The word “likely” has a specific meaning in NCA5 in terms of probability (>66%). The values presented here appear to correspond to the entire range of scenarios from Low to High, which does not correspond to the likely range as it is defined for NCA5.	The range here refers both to sea level scenarios as laid out in the Sweet et al. (2022) technical report and the IPCC AR6 report. 12-20 inches in 2050 represents the broad range of CONUS SLR projections under the full range of emissions scenarios and sea level scenarios (they overlap). A reference to AR6 has been added to indicate that this likely statement does not just come from the technical report.
02: Climate Trends	P27/L26	The tone of the sentence sounds too strong. Consider rephrasing.	Generic comment refers to the following heading: "The Nation has no choice but to adapt". Authors believe the tone is appropriately strong and consistent with the Adaptation chapter as a whole and Key Message 32.2 specifically. Therefore, the original wording has been retained.
02: Climate Trends	P29/L2	“Nonlinearly” is likely not an accessible word for broad audiences.	Removed.
02: Climate Trends	P34/L1	The key message title here differs from the title elsewhere.	The TSU will conduct a thorough copyedit, adding final Key Messages to respective Traceable accounts.
03: Earth Systems	P4/L2-3	This is the first line on land-use effects on climate: much of the land use effects will be direct albedo modification, but this is not mentioned.	This paragraph has been updated to mention direct albedo modification.
03: Earth Systems	P5/L29-30	Please add caveats: this statement is only true in a few places (i.e., North America and Europe) where they analyzed data. There are no data in places we expect to see increases (e.g., Asia).	Authors have revised the sentence to "Globally, aerosol concentrations have been declining since 2000, driven by reductions in some regions."
03: Earth Systems	P10/L9-10	Is “sequencing” the wrong word? Longer than a decade? Projections longer than 2 days start getting quite uncertain.	This comment is referring to page 12 (not page 10) of 3OD. Sequencing here refers to the order of high and low values, which could be annual mean (interannual variability), decadal mean (interdecadal variability), or at any time scales.
03: Earth Systems	P14/L3-4	Please try to indicate the proportion or be more specific.	Authors cannot indicate a proportion or be more specific, as the number of models having the characteristics addressed here varies depending on the specific MIP or even experiment that is considered.
03: Earth Systems	P16/L14	The discussion of global warming levels warrants a new paragraph.	Done.
03: Earth Systems	P17/L25	Perhaps use a more recent addition to the Shepard (2016) “storyline” citation, which is all about how to construct/populate storyline scenarios (for attribution or otherwise), (e.g., Albano et al., 2022).	A new paragraph describing storylines has been added to the Scenarios section. The citation to Albano et al. (2021) has been added.

Chapter	Page/Line	Comment	Response
03: Earth Systems	P18/L1	"Storms that might have been": perhaps it is worthwhile to mention "pseudo-warming experiments" here, as it seems that this is one of the recent approaches to disentangling natural from climate change contributions in some individual events (e.g., Gutmann et al., 2018; Michaelis et al., 2022; Ullrich et al., 2018).	These citations have been added to the text. The term "pseudo-global warming experiments" itself was not added since the term "pseudo" may cause some confusion. Instead the method was described as model experiments where warming is imposed.
03: Earth Systems	P18/L14-15	In addition to increased frequency and magnitude, "increases in duration" of various extreme events (heat waves and many storms) should be included here. In many settings, the duration can be deadly (in case of heat waves) or results in largest precipitation totals (e.g., Kossin, 2018; van Oldenborgh et al., 2018).	Authors have revised the sentence to "Extreme event attribution has shown that some extreme events are happening with greater frequency, magnitude, and duration due to anthropogenic climate change."
03: Earth Systems	P19/L31	California is a great example of the final statement in this paragraph (e.g., Polade et al., 2017).	Polade et al. (2017) has been cited in the revised draft.
03: Earth Systems	P19/L31-32	Please remove the "thus" as separate points which do not necessarily occur at the same time.	Done.
03: Earth Systems	P19/L36	This is an important paragraph, but does not talk about all the implications, including making it harder to do detection and attribution studies.	Due to the limited word count and the chapter's focus on processes, authors didn't go into depth about this here. Though, indeed, detection and attribution techniques that assume variability does not have forced changes are inadequate for some aspects of climate change, including precipitation.
03: Earth Systems	P20/L3	Total vapor transport is a natural combination of both changes in total vapor content and the circulation changes discussed here and goes a long way toward simplifying the statement of conclusions. Lavers et al. (2015) would simplify the discussion.	A very large literature separates the thermodynamic component of these changes (the roughly constant relative humidity water vapor increase, which have high certainty) from the dynamic changes (circulation, which has lower certainty). Especially because of the difference in certainty, authors think it best to keep them separate.
03: Earth Systems	P22/L11	Atmospheric water demand can change as well and could be discussed here (e.g., Albano et al., 2022; McEvoy et al., 2020).	This is discussed in Chapter 4, so authors cross-referenced their discussion here.
03: Earth Systems	P28/L31	Perhaps including in this chapter some of the changes in storm tracks impacting the west coast storms could be helpful and using more recent papers instead of Neelin et al. (2013).	Authors have added a newer reference on changes in storm tracks affecting the west coast.
03: Earth Systems	P34/L23-28	The authors should concentrate on citing the evidence base, not discussing the scientists themselves. Replace "Scientists have known" with "Scientific studies show."	This sentence has been reworded.
03: Earth Systems	P35/L1-6	This paragraph discusses topics that are not in this key message: should be moved or removed. Attribution is discussed later in the chapter.	KM3.1 is about the climatic drivers and attribution of global warming to human activities. This paragraph needs to be in the traceable account. Note that, later in the chapter, authors discuss extreme event attribution, which is about attributing specific extreme events to global warming. This paragraph is about attributing global warming to climatic drivers like greenhouse gases.
04: Water	P3/L6-7	Suggest placing the first clause of this sentence at the end of the sentence for greater clarity. As written, it is unclear whether climate change is responsible for greater exposure and vulnerability, which is what the sentence is trying to convey. Suggested modification: "Climate change is increasing the frequency, of water-related disasters in the United States and causing greater exposure and vulnerability to these disasters."	Thank you for the suggestion. In this context (Figure 4.1) climate change increases only the frequency of extremes. We have revised the sentence accordingly. It now reads, "Climate change, combined with greater exposure and vulnerability, is increasing the frequency of water-related disasters in the US (Figure 4.1)." More information about the three components of disasters is available in the caption.
04: Water	P3/L13-15	The statement about water security seemingly has nothing to do with the next sentence about water quality. It leaves the audiences to deduce the relation between climate impacts to water quality and water security. Suggest improved clarity in language and adding in- line descriptive and transitionary language, for example: "Water security refers to the adequate supply of clean water, whereas water quality refers to the availability of clean water. Human-caused climate change is expected to directly impact the availability of clean water, which indirectly threatens the availability of that water for use by people and ecosystems."	Thank you for the comment. We have revised and reorganized the text about water security to clarify that it depends on adequate supplies of clean water.
04: Water	P3/Figure 4.1	This is an effective representation of year-by-year changes in the occurrence and kinds of billion-dollar disasters since 1980. Can a brief listing of (or more specific term for) what kinds of storms constitute the "severe storms" category be included in the caption? The audiences will be broader than the meteorology community.	Thank you for the suggestion. We revised the text to define severe storms as thunderstorms, hail, high winds, and tornadoes.
04: Water	P5/L5-7	The words "regulations and standards" would be more accurate as "policies, regulations, and formal agreements."	This sentence refers to the regulations and standards for the design of infrastructure, like culverts and levees, so is not about policies or formal agreements. Given the meaning of the sentence, we have not revised the wording.
04: Water	P5/L14-16	This sentence is not accurate; it should mention climate change. It should read: "These and similar efforts are the first steps toward building resilient human and natural systems in the face of climate induced changes to the water cycle."	Thank you for the comment. We have revised the text according to the suggestion.
04: Water	P5/L18	"Human-caused climate change," rather than just "climate change."	Thank you for the comment. The title and text of this key message have been revised, and the term "human-caused" does not fit there any longer. However, we do use the term elsewhere in the chapter.
04: Water	P5/L20	Declaring that "many regions … see more precipitation" seems problematic here, when even Figure 4.3 shows that fully a third of the country is projected to see less. A few words added could hand this pivotal projection (for this chapter) more informatively: "see more precipitation in the northern parts, and less precipitation in the southern parts."	Thank you for the suggestion. We have added specifics to this statement and caption along the lines of the suggested text.

Chapter	Page/Line	Comment	Response
04: Water	P5/L21	More precipitation does not always yield more floods. Floods depend on a lot of additional factors, like antecedent soil moisture, precipitation form (rain versus snow), and vegetation/land cover. For example, as stated in the caption of Figure 4.12, well less than half of recent flood increases can be attributed to increasing precipitation.	We appreciate the comment, and have modified the text of the key message to better reflect it: “Heavier rainfall is expected across the nation" and have moved the flood damage phrase to KM 4.2. In addition, the opening sentence of the suppporting information under KM4.2 has been changed to reflect this point as well: “Changes in extreme precipitation amount and duration, snowpack, and soil moisture have combined with urbanization, land use change, and increasing property values to increase economic damages from floods overall.” A similar change was added to the caption of Figure 4.12.
04: Water	P5/L27-29	Suggest describing the water cycle and any natural variability. Then discuss climate change impacts to the water cycle. These topics are sometimes lumped together in the chapter.	We have added text about natural variability in this key message supporting information.
04: Water	P5/L30	This section on precipitation has no citations; please add some.	We have added a reference about precipitation trends, and cited KM 2.1, where the in-depth discussion of precipitation takes place.
04: Water	P6/L11-17	This section on evapotranspiration (ET) changes assumes audiences understand the how ET relates to climate change, but it likely will not. Suggest brief descriptions: How does ET relate to climate change? Explain to general audiences how climate change can influence ET. Explain in what regions will climate change cause ET to go up and in what regions will climate change cause ET to go down. When ET goes up/down is that good or bad? Why? This explanatory text could also be integrated into the caption text for Figure 4.4.	We have revised the text to provide specifics about the role of ET and the regions where it is changing, the direction of change, and the projected changes.
04: Water	P7/L8-23	Some of the citations in this section detailing snow and glacier changes are quite old. Is there new literature looking at this?	Thanks for your comment. We agree that several of the citations are not as recent as they could have been. These citations were mainly chosen to highlight a few of the most foundational and highly cited and most recognizable works that supported our text (namely, Hamlet et al. 2005, and Mote et al. 2005). We have updated the text references with more recent research, prioritizing work that has occurred since the last National Climate Assessment
04: Water	P7/L11	These references regarding snow versus rain transitions are old. Several more recent studies have revisited and honed understanding of how this works (e.g., Harpold and Brooks, 2018; Harpold et al., 2017).	We agree. Both citations were added in support of this section.
04: Water	P8/L17	This projection of increasing soil moisture “in the northern US” is essentially diametrically at odds with Figure 4.6.	Thank you for pointing that out. We have revised this text to more accurately describe Figure 4.6 and describe differences between the summer soil moisture projections shown here versus the annual soil moisture projections discussed more broadly in the literature. We have also edited the sentence about soil moisture seasonality to more accurately describe the conclusions in Marvel et al. 2021. Related, this is a particular challenge as there are a diversity of summer precipitation projections, so we have expanded our discussion of soil moisture consensus and lack thereof in the Traceable Accounts section.
04: Water	P9/L8-21	Are there regional differences in groundwater change expected due to climate change?	Yes, this is a good point. We expect groundwater impacts to vary greatly from region to region. Unfortunately, we are not aware of references that clearly project these regional differences but we have added the following text to the beginning of this statement to make that variability more clear: "Groundwater trends will vary regionally and are difficult to project because the intensity of both groundwater withdrawals and recharge depend on many human factors (e.g. land use, population, available surface water allocations, groundwater regulation) in addition to climate drivers like precipitation and temperature. "
04: Water	P9/L15	Are higher temperatures related to climate change? If so, make sure to say so.	We appreciate the comment. The report is clearly about climate change, and we are at the very limit of our word count, so we are not adding more words than necessary.
04: Water	P9/L15-20	The summary of projected western groundwater-recharge changes (i.e., “decreas[ing] natural recharge across much of the West,” stated without confidence level) is a key example of this kind of overbroad depiction of change and is directly contradicted by a key figure (6) in their primary citation (Niraulta et al. 2017), which shows very different outcomes in different regions, time frames, and from different climate models. This conclusion is based on one cited research paper and based on one model analysis untested by other groups, so that confidence should be relatively modest, at present. Furthermore, it would be a breakthrough if this NCA5 report acknowledged that groundwater recharge varies temporally with important lessons for climate-change assessment from understanding and quantifying these variations.	We agree this sentence was overly strong. We have revised these lines to read: "Natural groundwater recharge varies from year to year, but is projected to decrease slightly in the Southwest and increase slightly in the Northwest."

Chapter	Page/Line	Comment	Response
04: Water	P9/Figure 4.6	The projections of increased summer soil moisture over much of the Southwest here are a puzzle that should be discussed. The pattern also needs to be communicated to, and coordinated with, the authors of Chapter 28 (Southwest), who draw a different conclusion (projecting soil moisture declines there, even though their own soil moisture Figure 28.2a shows this same increase in soil moisture).	We have added this text: Summer soil moisture in the Southwest could increase if summer precipitation is higher, but there is greater confidence in decreasing annual soil moisture (Cheng et al. 2017; Marvel et al. 2021; Ch. 2 Fig 2.12).
04: Water	P10/L18	Streams dependent on glacial melt are expected to have increased flows in coming decades (as the ice melts) followed by flow declines later after the ice is essentially gone.	This is a good point. We recognize that the direction of the runoff change can be either positive or negative depending on the watershed/glacier characteristics. We added more references for the impact on streamflow in the "snow and glacier changes" section. We eliminated this text from the figure caption
04: Water	P11/Figure 4.8	This is a useful infographic indicating both the complexity of projecting future flood changes and the mechanisms that will determine those changes. Maintain tense alignment in all three text boxes (e.g., "Decreased flood magnitude…" should be listed for each bullet under "Decreases In Flood Activity" box rather than "Decreased flood magnitude…" and then "Decrease in magnitude").	We thank the reviewers for catching this, and have initiated the process to modify the text of the figure to correct it.
04: Water	P14/Box 4.1	The material presented in this box very much follows the discussion (and even choice of figures) from Harpold et al. (2017). This article is also where the warm snow drought/dry snow drought nomenclature was formally developed and recommended. Thus, the citations included here should be adjusted accordingly.	Thanks for pointing this out. We do agree that Harpold et al. (2017) was a foundational work for this nomenclature, and citations for this research were added to the box. However, previous research cited here (e.g., the Fosu and Margulis works, both from 2016), also used warm/dry terms and comparisons.
04: Water	P15/L4	It is not immediately clear what "the frontlines of climate change" are and this should be defined for broad audiences. This term is used throughout the report so this might be easily solved by adding the term to a glossary or index. Alternatively, a different term in the key message language could be used.	The glossary will provide a definition for frontline communities.
04: Water	P15/Figure 4.12	Clarify whether precipitation change is due to climate change in the figure title and caption.	Chapter 2 (Climate Trends) states that "there is robust evidence that human-caused warming has contributed to increases in the frequency and severity of the heaviest precipitation events across nearly 70% of the US" (pg. 2-15) and "Basic physical understanding and climate models both provide robust explanations for the links between climate change and observed changes in these extremes: this is why we also have very high confidence that storms are delivering more rainfall" (pg. 2-35). The figure title has been changed to "Flood Damages Associated with Climate Change-Driven Increases in Precipitation". The caption was also modified in response to comments from NASEM and NCA TSU. It now reads: "CAPTION: Cumulative observed inland flood damages across the contiguous United States (gray) and estimated portion due to changes in precipitation change (green) are shown for 1988–2021. Over this period, heavy precipitation has increased over most of the United States due to climate change (Ch. 2). Error bars (in green) show the plausible range of cumulative damages in 2021, calculated using a 95% confidence level. Roughly 20%–46% of increases in observed flood damages can be attributed to upward trends in precipitation (assuming the same historical development patterns over 1988-2021 regardless of whether or not precipitation changes occurred). Other important contributors to flood damage include urbanization and land use change which can exacerbate runoff, and increases in the number and value of flood-affected buildings and other assets. Adapted from Davenport et al. (2021)."

Chapter	Page/Line	Comment	Response
04: Water	P15/Figure 4.12	This is an interesting and informative way to show recent trends in US flood damages. It would be useful to briefly list some of the "other" causes of flood damage (besides increased precipitation) in the caption, since this is not stated in the text (other than an allusion to increasing amount of impermeable surface, which is not the only other cause).	The caption was also modified in response to comments from NASEM and NCA TSU. It now reads: "CAPTION: Cumulative observed inland flood damages across the contiguous United States (gray) and estimated portion due to changes in precipitation change (green) are shown for 1988–2021. Over this period, heavy precipitation has increased over most of the United States due to climate change (Ch. 2). Error bars (in green) show the plausible range of cumulative damages in 2021, calculated using a 95% confidence level. Roughly 20%–46% of increases in observed flood damages can be attributed to upward trends in precipitation (assuming the same historical development patterns over 1988-2021 regardless of whether or not precipitation changes occurred). Other important contributors to flood damage include urbanization and land use change which can exacerbate runoff, and increases in the number and value of flood-affected buildings and other assets. Adapted from Davenport et al. (2021)." In addition, the opening sentence of the section under KM4.2 has been changed to reflect this point as well: "Changes in extreme precipitation amount and duration, snowpack, and soil moisture have combined with urbanization, land use change, and increasing property values have increased economic damages from floods overall."
04: Water	P16/L5	High precipitation routinely overwhelms many stormwater-sewer systems around the country, probably more than captured by "can."	Changed "can" to "are"; added stormwater in addition to combined stormwater sewers; added two references from ASCE's Infrastructure Report Card and NASEM report on urban flooding.
04: Water	P16/L3-10	No mention is made of positive effects of floods on farmlands and floodplains (such as soil renewal and dissipation of flood impacts downstream). Including this observation would also provide an opportunity to mention corresponding reforms in US Army Corps of Engineers policy.	While we appreciate the aim of highlighting potentially positive impacts of floods, we would emphasize that these are not likely to be amplified by climate change. We have added the following sentences to the beginning of the "Flood Impacts" subsection under KM2: "Floods have important roles in the creation and maintenance of aquatic habitat, in regulating the reproductive cycles of fish and other river organisms, and in replenishing soil and nutrients in and around rivers and other water bodies. Human activities, however, have tended to reduce the positive impacts of floods while exacerbating the negative consequences." Our chapter team includes both current and former Army Corps of Engineers senior-level water managers. None were aware of any reforms that might correspond to those alluded to in this comment.
04: Water	P16/L11	This text does not mention climate change until the fourth paragraph and instead seems to expect the audiences to infer that the discussion pertains to climate change. Suggest improving clarity and focus of language to focus on specific climate change impacts to drought.	We have revised the text to focus more clearly on the discussion of temperature's role in causing or changing the character of drought. We also discuss that there is still some disagreement about degree and introduce aridification.
04: Water	P16/L19	"Megadroughts" are (historically) natural events. The point that megadroughts have happened many times in the natural past is neglected throughout this chapter, which makes for a dangerously one-sided presentation of, for example, developing conditions in the Colorado River basin.	Here we have edited the the text to make it clear that megadroughts are a natural phenomenon and point to the paleoclimate record.
04: Water	P16/Fig. 4.13	The caption says higher temperatures and human use can exacerbate or even cause drought. Please clarify whether this means higher human use of what resources (e.g., water, land). Also, should the last sentence be an "and" or an "and/or" rather than an "or" when discussing that drought can develop in a matter of weeks and/or last for decades?	Here we have clarified that higher temperatures increase drought severity and drought can drive greater demand from human systems. The last sentence should be an OR. While it is technically possible that a drought could develop in weeks and persist, we don't know that there are documented cases of very long drought (e.g., megadrought) developing so rapidly. For example, Christian et al. (2021 Global distribution, trends, and drivers of flash drought occurrence Nature Communications) shows that flash droughts are more common in the eastern US than the western US where drought durations are typically longer (Karl 1983, Su et al. 2021)
04: Water	P17/L4	Drought-driven streamflow (and lake level) declines also threaten cooling-water supplies for thermoelectric (traditional and nuclear power plants) systems, impacting many non-hydropower systems. Also correct this at page 4-18, line 10.	Thank you for the comment. We have revised the text to say power generation instead of just hydropower generation in the first instance, and electricity instead of hydropower in the second instance.
04: Water	P17/L5	Discussion lacks mention of transportation impacts of droughts and floods along major rivers.	We have addressed transportation impacts of flooding and drought with reference to the Transportation Chapter KM 24.4
04: Water	P17/L10	Consider replacing "insects" with "pests" to be more comprehensive.	We have replaced insects with pests.

Chapter	Page/Line	Comment	Response
04: Water	P17/L14	If increased groundwater pumping is region specific, authors should note that detail in the text. The literature cited does not represent the United States broadly. Bloomfield (2019) is looking at groundwater in the United Kingdom; Hanson et al. (2012) is using a case study of California not looking at the United States broadly and discusses a method to assess how climate change could affect surface water and groundwater rise in highly developed agro-urban watersheds; and Scanlon et al. (2012) looks at the high plains and central valley of California and does not represent a nation-wide trend. What about other types of watersheds? What about other regions? The literature cited does not represent the United States broadly nor does it represent the very broad statement in the supporting text.	We agree that our statements were overly broad here. We have revised the text in the grroundwater section on page 9 to more clearly highlight regional variability and uncertainty in future groundwater pumping trends. We have also added a citation for the most recent national groundwater usage study from the USGS there (Estimated Groundwater Withdrawals from Principal Aquifers in the United States, 2015, Circular 1464,John K. Lovelace, Martha G. Nielsen, Amy L. Read, Chid J. Murphy, and Molly A. Maupin). Unforutnately the national grounwater withdrawals estimates from the USGS report do not directly talk about groundwater pumping in response to drought so we don't have a national citation to add here. In response to this comment we have softened our language to note that this trend was only observed in some regions.
04: Water	P17/L17	Increased pumping can increase land subsidence, not “does.” Land subsidence depends on a lot of factors that all have to be aligned for it to occur.	We agree with this comment and have modified the language accordingly.
04: Water	P17-18/L23-11	Consider mentioning tribal rights to water in the drought-stricken Colorado River basin that have yet to be quantified.	We discussed this comment with Chapter 28 authors and they are addressing non-quantified tribal water rights there.
04: Water	P18/L21	Duration of precipitation is also projected to increase (e.g., Gutmann et al., 2018; Kossin, 2018) in ways that will mimic or exacerbate the impacts of heavier precipitation.	Our understanding is that the NASEM comment refers to two studies related specifically to increases in the duration of tropical cyclone rainfall. While we don’t disagree, it is rather difficult to square the comment with the text. Specifically, the comment pertains to a sentence describing attribution of Harvey’s rainfall and flood damage to climate change—not tropical cyclone rainfall changes more generally. Attempting to add in such a statement would likely detract from the overall flow of information in this box and perhaps elsewhere. We note that Chapters 2 and 3 both mention changes in storm duration, with Chapter 2 in particular describing decreases in tropical cyclone translational speed that could lead to heavier rainfall totals. Since this topic is addressed elsewhere and because adding mention of it here would seem to detract from the effectiveness of the message, we prefer not to make any change in relation to this comment.
04: Water	P18/Figure 4.15	This is a graphically simple depiction of the disproportional distribution of flood damages projected over the next 30 years. It is an excellent addition to this key message and Box 4.2 that should be discussed in both.	We appreciate the positive comment and have added a closing sentence to Box 4.2 to refer to this figure (note that the box text has also been modified in response to public and TSU comments).
04: Water	P18-19/Box 4.2	This material dives relatedly into the topic of Key Message 4.2 by focusing on the specific case of Hurricane Katrina flooding and Houston. It should refer to Figure 4.15 where it notes “as with recent floods elsewhere” to drive home the representativeness of what this Katrina example indicates more broadly. It also needs to cite the corresponding regional chapter and should tie back to climate change at least briefly to be entirely clear that, whether or not Katrina was enhanced by climate change (and lots of attribution studies suggest it likely was), it is a good model of how disparities arise and play out.	We appreciate the comment, and assume that it was intended to refer to Hurricane Harvey rather than Hurricane Katrina. That aside, we would point out that the three references in the sentence that runs from pg. 4-18 line 22 to pg. 4-19 line 1 are all climate change attribution studies that tie Harvey’s severity to climate change. While in principle we could make this more clear by directly labeling those references as attribution studies, we feel that the language is clear as currently written and that we’d risk adding jargon by attempting to label in this way. Note also that, in response to a prior comment, we have removed the phrase “as with recent floods elsewhere” as it may not hold up well over time depending on future flood occurrences. We believe, however, that the addition of the sentence “Climate change’s impact on flooding is expected to exacerbate these types of inequalities (Figure 4.15)” to the end of Box 4.2 helps emphasize the persistence and pervasiveness of these disparities.
04: Water	P19/L11	What type of infrastructure is being discussed? Add text to improve clarity of language.	Thank you for the comment. We added "drinking water delivery" to specify the infrastructure being addressed.
04: Water	P19/L11-17	This is stated entirely in terms of impacts on tribes, which is accurate and well-motivated, but many of these impacts also apply to other disadvantaged, underserved communities elsewhere, which should be acknowledged.	We agree that the wording was lacking. Word count makes it impossible to list all the overburdened communites, so we have revised the text to read, " Across the Nation, drinking water delivery infrastructure is aging and deteriorating (KM 12.2), increasing the risks of contamination and delivery of non-potable water (Vacs Renwick et al. 2019). These deficiencies affect already overburdened residents of both urban and rural areas and increase their vulnerability to flooding, drought, and waterborne diseases (KMs 15.1, 2). For some tribal and Indigenous communities ..."
04: Water	P21/L10	Suggest explaining why uncertainty always factors into water planning.	We have added a few words to the sentence: "Water resources planning has always occurred in the face of uncertainty arising from natural variability, ..."

Chapter	Page/Line	Comment	Response
04: Water	P21/L20-21	Saying that water disputes are typically resolved using litigation is not quite accurate. It depends on the scope of the dispute and the disputing bodies. If two people, two states, two countries, or tribes versus other users there are actually a variety of ways disputes can be resolved. Additionally, the reference cited does not support this statement. Suggest deleting this sentence and adding the text suggested in the next comment.	The sentence qualifies the statement with "in the western US." We have changed "typically" to "frequently" and we have added two Larry MacDonnell papers on the Law of the River as references. We have added "and in the context of existing legal frameworks" to the third sentence.
04: Water	P21/L21-23	This sentence is overly simplified, the references provided are not legal, and they do not discuss the entire body of law that applies to the Colorado River, which determines what allocation options are available for water rights holders. A more accurate sentence might say: "Climate change impacts to water supplies can result in competition, collaboration, or conflict. Tools may include litigation, administrative proceedings, treaty negotiations, compacts, and/ or cooperative agreements, among others. Under current severe drought conditions, water rights holders in the Colorado River basin, including Mexico, tribal nations, states, and other interested parties are struggling to adapt under the existing legal framework—one that was mistakenly based on the assumption of continued flows and on an above average historic estimate of total water available to apportion. While some of these efforts include tribes..." See suggested citation (Garofalo, 2019).	Thank you for the comment We have revised the paragraph as noted in the previous response.
04: Water	P21/L18-26	Suggest moving Figure 4.19 to under the discussion of the Colorado River here after line 26.	Thank you for the suggestion. We have moved the intervening section that separated the two Colorado River-related sections.
04: Water	P21-22/Box 4.3	This material does a nice, brief job of illustrating how interjurisdictional cooperation can succeed, but a word or two more about how climate change will be addressed under the new management plan, or at least how the expected success of the plan will likely be impacted by climate change, would make it much more relevant to this chapter and report. The corresponding regional chapter should also be cited.	We are limited to adding just few words. We've added the sentence "An adaptive management committee evaluates the plan's performance under climate change and recommends adjustments."
04: Water	P22/Figure 4.18	The caption should address the level of scientific understanding arrow across the bottom of the image.	We assume that this comment was meant to refer to Figure 4.8, rather than 4.18. In response to an earlier review comment, we have modified the language from "High Confidence" and "Low Confidence" to "Higher Confidence" and "Lower Confidence". We feel that while small, this change moves away from specific definitions of confidence toward a relative scale. The caption was also modified based on an earlier review comment to: "CAPTION: Floods result from combinations of factors, primarily extreme rainfall, soil wetness, and snowpack and snowmelt conditions. Each of these are subject to substantial variability and change across a wide range of timescales, from daily to decadal, in a warming climate. Adapted from Yu et al. (2020) under Creative Commons license CC BY-NC 4.0."
04: Water	P23/L17	It is worth noting, here and elsewhere in this chapter, that natural variability of storms and droughts (and temperatures) are projected to increase in magnitude (e.g., IPCC, 2021).	Thank you for this suggestion. Natural variability and extreme precipitation and drought are covered in depth in Chapter 3
04: Water	P24/Figure 4.19	The figure is important and yet left until the end of the chapter and then not fully discussed. This is where the issue of how much of the recent western megadrought is climate change and where the issue of how much normal climate variability can and will mask and/or interact with coming climate changes is finally given some illustration. Having this figure appear earlier in the chapter and having what it shows described there in detail would be a major improvement to the chapter as a whole.	Thank you for your comments on this figure; we appreciate that you find the message in the figure meaningful. We have conosolidated the Colorado River-related discussion but it remains in KM 4.3, where policy and collaboration are discussed. We have added a sentence about natural variability to the text supporting KM 4.1 .
04: Water	P26/L26-36	This projection is largely missing from the key messages, replaced instead with descriptions of a recent paper. Albano et al. (2022) provides useful multi-dataset comparisons and analyses of evaporative demand trends over the contiguous United States and might be considered in this traceable account.	We had described this paper in the Traceable Accounts which was not obvious because we were working under the impression that citations should not be included. See also our response to comment 56. We have also revised text about evapotranspiration and the caption to Figure 4.9 (climatic water deficit) to improve this discussion overall.

Chapter	Page/Line	Comment	Response
04: Water	P26/L26	Consider mentioning the status of the long-standing discussions of measured pan evaporation trends (or lack thereof) in this context in this traceable account (given the strong assertion regarding future evaporative demands here).	There is a lack of information on more recent trends in pan evaporation across the US. Pan evaporation is a useful concept to estimate atmospheric evaporative demand but it is strongly affected by local environmental conditions, which can drive contradictory trends in pan evaporation across a broader region (Chapman et al., 2021), as is observed across the US (Hobbins et al., 2004). For example, increases in local humidity (e.g., from irrigation) or land use changes (e.g., changes in tree density near the pans) could affect evaporation from the pans. Therefore, pan evaporation may not provide a reliable indication of regional scale trends in evaporative demand. Furthermore, decreasing pan evaporation in many situations is also a strong indication of increasing terrestrial evaporation (Brutsaert, 2006). Declining trends in pan evaporation across the US were reported in the latter half of the 20th century attributed to declines in radiation (i.e. dimming) and/or wind speed (i.e. stilling) (Roderick et al., 2009). Pan evaporation trends are strong affected by local wind conditions that are not adequately represented by gridded wind fields used for the estimation of potential evapotranspiration. References: Arthur Chapman, R., Midgley, G.F. and Smart, K., 2021. Diverse trends in observed pan evaporation in South Africa suggest multiple interacting drivers. South African Journal of Science, 117(7-8), pp.1-7.; Brutsaert, W., 2006. Indications of increasing land surface evaporation during the second half of the 20th century. Geophysical Research Letters, 33(20); Hobbins, M.T., Ramírez, J.A. and Brown, T.C., 2004. Trends in pan evaporation and actual evapotranspiration across the conterminous US: Paradoxical or complementary?. Geophysical Research Letters, 31(13); Roderick, M.L., Hobbins, M.T. and Farquhar, G.D., 2009. Pan evaporation trends and the terrestrial water balance. II. Energy balance and interpretation. Geography Compass, 3(2), pp.761-780.2004). For example, increases in local humidity (e.g., from irrigation) or changes in tree density near the pans could affect evaporation from the pans. Therefore, pan evaporation may not provide a reliable indication of regional scale trends in evporative demand. Furthermore, decreasing pan evaporation in many situations is also a strong
04: Water	P26/L31	Neither changes nor variability in recharge have been well quantified or projected.	Thank you for this comment. We have expanded the Traceable Accounts discussion of uncertainty in groundwater recharge magnitude and direction in response to climate change, to read, " Groundwater recharge is similarly uncertain (Niraula et al. 2017; Meixner et al. 2016). Projected increases in large precipitation and flooding events are likely to increase recharge (known as episodic recharge events). However, the quantity of this recharge is less certain and highly dependent on the nature and timing of the storms that occur. Also, while increases in recharge may be counteracted by changes in plant water usage and snowpack that can decrease natural recharge, the magnitude of these recharge changes has not been well quantified. Separating the impacts of groundwater pumping from climate trends is particularly challenging due to a lack of long-term groundwater monitoring wells especially outside of the most heavily groundwater-developed areas."
04: Water	P26/L33	The advancement of snowmelt timing is also projected to increase overall (annual) streamflow totals in many areas (e.g., Ban and Lettenmaier, 2022; Barnhart et al., 2016).	The comment is correct. We acknowledge this through our Barnhart reference in the main chapter text (KM 4.1). But we also recognize that the integrated impact on streamflow/runoff is complicated, as the reviewers note below. For instance, Hale et al. (2022) showed that while earlier snowmelt buffered annual losses to streamflow, many snowy locations may still have decreases to total annual streamflow. The text commented on here was intended to focus only on climate change impacts on snow, and not the resulting streamflow, so we have not revised the text.
04: Water	P27/L5	This section makes many strong and concise statements but needs citations to support those statements regarding uncertainties and gaps.	We agree with this comment and have made extensive revisions to the Traceable Accounts section of the chapter and have added citations to support the statements.
04: Water	P27/L6	This chapter regarding water should be more careful about not ascribing most uncertainties to precipitation; rising temperatures (as has been acknowledged earlier in this chapter) are projected to have major impacts on future water. Better to drop the “especially precipitation” here. There will still be significant uncertainties about how much warming will occur and quantitatively how much that warming will impact water in which ways.	Thank you for the comment. We revised the text to make this change.
04: Water	P27/L28	This is a good acknowledgment of real uncertainties as to how complicated the pathways to eventual streamflow outcomes will be. It might be worth also acknowledging that the more recent literature has been turning up “second-order influences” beyond just precipitation and temperature impacts, including factors like humidity (e.g., Harpold and Brooks, 2018; Harpold et al., 2017).	We believe that our discussion in this passage highlights these second order influences, including evapotranspiration. These Harpold references were also added to the main text.

Chapter	Page/Line	Comment	Response
04: Water	P27/L37-38	See Albano et al. (2022), which has resolved many disagreements through a multi-dataset comparison of the various trends and non- trends.	Our discussion here was based in part on the findings in Albano et al. as well as a comparison of Hoerling et al. 2019 and Milly and Dunn 2020; obviously many other studies deal with this issue, as well. Unfortunately, these citations were missing because we were working with the understanding that citations were not allowed in the Traceable Accounts. We have now resolved that. However, we don't believe it's entirely fair to say that Albano et al. has resolved these issues, although the work has provided a great deal of information about the drivers of any differences in trends and confirmed temperature-driven increases in PET in parts of the Southwest. Figure 1 indicates two HUC-2 regions where trends spread from negative to substantially positive, as well as four other basins where the range of trends just includes zero. Their conclusions states, “Finally, we characterize the structural uncertainties in trends of ETo finding greater disagreement among datasets in the central and eastern United States as well as the Upper Colorado River basin and surrounding areas. “ We have expanded this discussion in the Traceable Accounts to provide greater detail and to clarify that in some places disagreements in the literature are about degree of change, not direction.
04: Water	P28/L6	This discussion regarding groundwater pumpage impacts is focused entirely on irrigation pumping and ignores the equally impactful and widespread issue of urban pumpage.	We agree with this comment and have changed the language throughout this paragraph to refer to groundwater pumping more generally and not just with respect to agriculture.
04: Water	P28/L17	Consider adding “outside of the most heavily groundwater-developed areas” to the end of this sentence. There are a lot of groundwater level data in places that are dealing with overdrafts; there is much less data collected where climate is a primary driver. There is also very little monitoring directed at tracking recharge variations.	We would like to note that even in heavily developed areas there can be a lack of monitoring expecially with respect to water usage. However the point is well taken that observations can be even more sparse outside these areas. To reflect both of these points we have added "especially outside the most heavily groundwater-developed areas" to the end of this sentence.
04: Water	P28/L22	This characterization of precipitation as only increasing is misleading and does not agree with the chapter’s own maps. The traceable account for Key Message 4.1 does not touch on the water quality issues raised in Figure 4.2.	Thank you for the comment. We have revised the text to add regional and seasonal nuance, and expanded discussions in the Traceable Accounts to include water quality, with citations.
04: Water	P28/L27	Some mention of confidence and likelihoods regarding water quality changes is needed.	We have added confidence and likelihoods statements regarding water quality changes.
04: Water	P28/L33	Given that this sentence starts out talking about natural conditions (and presumably variability), this statement that extreme events will increase amounts to a non sequitur (not an incorrect statement, but it does not follow from the “evidence” of the first half of the sentence).	We agree that the sentence was confusing and we have deleted it.
04: Water	P29/L20	Add “water quality” to this list of research needs.	Thank you, we have made this change.
04: Water	P29/L21	The “Major Uncertainties and Gaps” discussion neglects to mention the extreme limitations of our knowledge regarding water quality impacts of these extremes. It states, “There is uncertainty about…” and neglects to categorize how much uncertainty.	We have revised this section of the Traceable Accounts to include water quality: "Additional research into the effects of climate change on water quality is needed, particularly in the face of compounding factors such as aging infrastructure, wildfires, and increased agricultural runoff." We have also characterized the degree of uncertainty as moderate.
04: Water	P29/L25	The “Description of Confidence and Likelihood” discussion on lines 27-28 makes a weak case for (and nearly contradicts) the Key Message 4.2 conclusion that these systems cannot adapt quickly. Mostly this paragraph is a restatement of the claims of Key Message 4.2 rather than a description of how confidence/likelihood were assigned.	We have revised this section of the Traceable Accounts to describe how confidence and likelihood were assigned.

Chapter	Page/Line	Comment	Response
04: Water	P30/L23-24	This same assertion that a lack of downscaled projections is the limiting factor was made, with no more evidence here than in Key Message 4.3. Either here or there, more citations supporting this assertion are needed.	There is relatively little published research about the availability, suitability and accessibility of existing downscaled projections for water management needs – a key research gap which we now document in the Traceable Accounts. Ironically, anecdotal evidence for this lack of information appears in the NASEM review. The Fifth National Climate Assessment effort was stymied in producing maps and figures showing spatially complete high-resolution climate changes for Puerto Rico, the US Virgin Islands, and the US Affiliated Pacific Islands. Downscaled gridded projections for Alaska and Hawaii were available through the much-appreciated efforts of a single research group, although the suite of products were not as extensive. If the NCA had difficulty finding and/or developing downscaled projections for OCONUS regions to meet routine research needs, it stands to reason that practitioners are challenged by availability in these regions, as well. Even within CONUS, downscaled products containing the necessary variables of suitable quality are not always available, or at least perceived to be available. Stakeholders in the Colorado River Basin, possibly one of the most data-supported regions in the country, requested physically consistent downscaled projections for a wider range of climate, hydroclimatolical, and ecoclimatological variables (Dahm et al. 2023, Circ1502)
04: Water	P30/L34	Some literature support for this assertion that adaptation efforts are proceeding slower than climate change would be extremely useful; not disputing it but would very much like to have that evidence at hand.	Thank you for the suggestion. We have 2 references in the text and repeat them in the Traceable Accounts.
04: Water	P31-42	None of the citations for the figures from University of Colorado are in the bibliography.	NCA5 captions include the developer institution of the figure as "source," and rely on the metadata for details about the inputs and data behind the figures. For example, the metadata for Figure 4.3 contains an entry in the field "Dataset Citation" that is "Vano, J., J. Hamman, E. Gutmann, A. Wood, N. Mizukami, M. Clark, D. W. Pierce, D. R. Cayan, C. Wobus, K. Nowak, and J. Arnold. (June 2020). Comparing Downscaled LOCA and BCSD CMIP5 Climate and Hydrology Projections - Release of Downscaled LOCA CMIP5 Hydrology. 96 p." The metadata will be accessible in the web version of the NCA5 by clicking on an icon near each figure.
05: Energy	P3/L1-18	The introduction does a great job defining words in text, for instance adaptation and the changing risk profile.	Thank you. We have used the definitions in the glossary.
05: Energy	P3/L23-25	The last sentence of the key message should be reorganized to have active voice and more clearly establish that the extreme precipitation, extreme temperatures, sea-level rise, and more intense storms, droughts, and wildfires are likely to damage energy infrastructure and disrupt energy system operations. Using active voice in sentences with confidence and likelihood ratings helps the rating make more sense.	Thank you. We have modified the sentences as suggested. It now reads: Climate change threats, including increases in extreme precipitation, extreme temperatures, sea level rise, and more intense storms, droughts, and wildfires, are damaging infrastructure and operations and is affecting human lives and livelihoods (virtually certain, high confidence).
05: Energy	P3/L29-30	Mention permafrost impacts on distribution and energy consumers. These are discussed on page 5-7, lines 3-7, in terms of production.	Thank you for this comment. We have modified the text to include these broader potential impacts on all stages, including production and distribution, and the impact on consumers. The sentence now reads:Warming temperatures in Alaska also endanger inland oil and gas production, and delivery as permafrost thawing thawing compromises the structural stability of wells, pipelines, storage tanks, railroads, and roads, and impacting consumers, as well as potentially contributing to emethane leakage.
05: Energy	P5/L1-3	Add language to improve clarity to this sentence: “and are projected to be impacted by changes in solar irradiance.”	The relevant paragraph in the Energy Supply/Inland Generation section has been updated to expand discussion on factors affecting solar energy generation, without using the term 'solar irradiance'.
05: Energy	P5/L10-31	The discussion about electricity generation and water availability omits discussion of how some low- and zero-carbon technologies use more, in some cases much more water. Thus, the demand for water could increase with the deployment of some low- and zero-carbon electricity and energy generation processes. Citations are included in the chapter but CCUS, small modular nuclear reactors, and hydrogen can all increase water demands.	A sentence was added : "Deployment of some low- and zero-carbon technologies such as carbon capture, utilization and storage (CCUS) increases the water dependence of thermoelectric power plants (Rosa et al. 2021). Advances in cooling approaches for small modular reactors provide options for addressing water availability constraints (Mays 2021)". In traceable account, we also further discuss the need to better understand the water dependencies depending on future pathways, especially the complex interactions when the water dependencies are for consumptive use, withdrawals with little consumptive use."Projections of future energy infrastructure under current policies as well as decarbonization pathways now systematically investigate water demands across sectors (Mouratiadou et al. 2018) as different technologies rely on either water withdrawals or consumptive use with complex interactions and coordination with other water uses. Higher resolution modeling is needed to address regional institutional priorities and vulnerabilities (Hadjimichael et al. 2020)"

Chapter	Page/Line	Comment	Response
05: Energy	P5/L15-16	The connection of dam-removal-to-protect-vulnerable-species to climate change is not clearly articulated and should be clarified.	Thank you to the reviewer for this comment. Dam removal is not attributed to climate change and rather a change in societal values to restore connectivity along a river and address water security and river services. The text has been modified to clarify, and the final sentence of the paragraph now reads: "Water-dependent generation is stressed by droughts (EIA 2021g, 2022b; Voisin et al. 2020), snowpack depletion (EIA 2022b), increases in stream temperature (Webster et al. 2022), reservoir evaporation (Zhao et al. 2021) and dam removal to restore rivers and their societal and ecological roles (Sharma et al. 2019), and increasing demands for other water uses (Brown et al. 2019)."
05: Energy	P5-6/L17-7	Suggest adding brief discussion in first paragraph of this section on oil and gas delivery that discusses what oil and gas are used for besides electricity so that even in a "transitioned" world, their development, use, and delivery is relevant.	Thank you for this comment. The text has been modified to acknowledge the energy and non-energy role of petroleum products in the economy. The sentence now reads: Disruption of petroleum supplies can impact the transportation sector, backup electricity generators, space heating, and Industrial manufacturing products such as plastics, polyurethane, solvents, and hundreds of other intermediate and end-user goods (IEA 2022).
05: Energy	P5/L21	Use of the term "risks" in this case does not seem to conform to recommendations of the IPCC on risk language.	"magnify future risk" has been changed to "magnify the potential for energy shortfall"
05: Energy	P5/L27-29	For the sentence discussing operations relying on reservoir storage, clarify whether this is particularly difficult in some regions of the United States as compared to others.	Thank you - this is specifically true in Texas. Operations in the Southeast also rely on reservoir operations for cooling water but are more concerned by extreme heat rather than droughts. The locations were clarified in the text. "Operations relying on reservoir storage for cooling water face increasing vulnerability from stoage levels dropping below critical thresholds , particularly in the Sorthwest (Turner et al. 2021). IWe also added In many regions, warmer temperatures can reduce generation from thermoelectric power plants due to water temperature discharge limits (Cheng et al. 2020). "
05: Energy	P6/L1	Is this only true of aging assets?	No, thank you for noticing the error. Extreme temperatures cause deterioration or aging of all assets. We have changed the sentence to: "Electricity infrastructure, including transformers and transmission lines, deteriorate faster in extreme temperatures, and cables have reduced carrying capacity with rising air temperature (Allen-Dumas et al. 2019; Fant et al. 2020)."
05: Energy	P6/L9-10	Subsidence and landslides—specifically climate change driven?	Subsidence and landslides are increasing with climate change, and the cited article mentions the mechanisms. We have changed the sentence to: "Flood scours, subsidence and landslides, which are increasing with drought and groundwater pumping are damaging buried powerlines and natural gas pipelines . (Oruji et al. 2022)."
05: Energy	P7/L12	Suggest using "as well as" instead of "and" in line 12 between consumption and peak demand patterns.	Agree with this suggested change. It appears that this edit may have already occured during our last round of editing to reference "overall electricity demand as well as peak demand...."
05: Energy	P7/Figure 5.2 and L18-13	Suggest integrating Figure 5.2 into text discussing electricity demand by discussing timelines depicted in the figure in the text.	Reference to the figure has been added. The sentence now reads "Increased temperatures can further increase overal elecrticity demand as illustrated un Figure 5.2 "
05: Energy	P8/L1	Clarify that this is a projection.	Revised text: By 2050, warming summer temperatures are expected to increase residential electricity demand most strongly in the southern half of the US and the Midwest, whereas warmer temperatures will reduce residential natural gas mostly demand in the South (Rastogi et al. 2019)."
05: Energy	P8/L7-24	Suggest offsetting the explanatory clause in the second sentence of the key message with commas: "Compounding and cascading hazards related to energy systems and additional stressors, such as cyberthreats and pandemics, create…"	Commas added as suggested.
05: Energy	P8/L33-34	Suggest cross-referencing the hydrogen box in Chapter 32 (Mitigation).	The hydrogen box is now crossreferenced. The sentence reads:Clean hydrogen (DOE, 2022) produced with renewable energy including bioenergy can help decarbonize several sectors, including transportation and industry (Oliveira et al. 2021; Thombs 2019; Cheng et al. 2018; Chapter 32)

Chapter	Page/Line	Comment	Response
05: Energy	P9/L1-7 and 8-12	Suggest describing why some energy supply chains are more susceptible to supply chain disruptions. Suggest more clarity when discussing the critical mineral (CM) supply chain disruptions. Are the regions in the United States or other countries? What geopolitical and environmental factors influence how these materials are extracted, used, and recycled. This discussion omits the key points that the United States is reliant on processing facilities in other countries and at the same time is reliant on CMs to successfully transition to a netzero economy. While the United States has lots of CM resources and can mine them, often the separations and processing facilities are not sited here due to environmental concerns, thus the United States is reliant on a more global supply chain to source the processed minerals, or the end-use products made with processed CMs. This might be a good place to mention both the Trump and Biden Executive Orders on critical minerals. This comment is also included in Key Message 32.4. So, if this ends up being covered there, suggest cross-referencing Chapter 32 (Mitigation) here.	Agree that this needed more of a US focus. Revised paragrapth to make it clear that the "regions" refers to other countries outside of the US. Also crosswalked with Chapter 32 and added the following sentence and reference: Securing reliable, and environmentally sustainable sources of critical minerals, and domestic supply chains, is a national priority for meeting the growing demand for low carbon energy technologies (U.S. Federal Government, 2021).
05: Energy	P9/L20-30	Please clarify the connection to climate change.	The following language was added: Cybersecurity risks can compound the vulnerability of the power grid to climate change and extreme weather, especially if these events coincide (Ratnam et al. 2020, Mahzarnia et al. 2020).
05: Energy	P9/L31	It might be helpful to add to the discussion of vulnerable communities the impacts of transitioning to a different electricity profile and different energy generation sources to energy sector workers who will not be trained to work in different technologies and may resist the movement to low- and zero-carbon renewable energy.	We added a paragraph at the end of the subsection. In it, we address the vulnerability (the subject of the subsection) rather than speculating about resistance to the transition. Energy inequalities are associated with lower-carbon energy sources. While the energy transition will create new economic opportunties, communities and individuals that relying on employment and tax revenues from coal, oil or natural gas can become more economically vulnerable. Individuals who held fossil fuel jobs may have trouble finding a new job because of a skills gap , wage loss and long-distance commutes or the need to relocate (Wang et al. 2021). The number of solar and wind energy construction jobs in former coal communitee may not be sufficient to replace the supply of former coal jobs. Reuse of existing fossil fuel infrastructure to transition, to clean energy sources may allow economically vulnerable communities to tranisition in place (J.Hansen et al 2022). Employment and wage loss in fossil fuel setors could be offset by increases in low-carbon resource industries, through counties in Appalachia, Texas and the Gulf Coast region, and the Intermountain West are likely to experience the most significant impacts including to local services, as the tax base diminishes (Raimi et. al. 2022, Wang et al. 2021).
05: Energy	P9/L31	It might be valuable to note that overburdened communities are likely to disproportionately benefit from decarbonization by way of reduced ground, water, and air pollution and potentially by the and increased resilience and addition of jobs from renewable energy.	In response to this comment, authors revised the relevant paragraph to include "Overburdened communites may benefit most from decarbonization and increased energy system resilience...".
05: Energy	P9/L32	If this sentence applies to climate impacts to energy systems, add that to the sentence: “Overburdened communities are disproportionately affected by climate impacts to energy systems.”	This sentence does not apply to climate impacts to energy systems, but is more generally referring to climate impacts to overburdened communities. See response to comment number 20 as well.
05: Energy	P11/L9ff	This should start several steps earlier (i.e., “higher winter temperatures” lead to “insects survive winter” leads to “infestations damage and kill trees” leads to “increased tinder,” etc.).	Thank you. We added a sentence as an example of cascading hazards and some necessary supporting references. "For example, higher temperatures (Robbins et al. 2022) and drought (Fettig et al. 2019, Gely et al. 2020) can lead to increased tree mortality from insects, which, combined with increased tree mortality from increased evapotranspiration and decreased soil moisture (Madakumbura et al. 2020), lincreases wildfire risk (Littell et al. 2016)." In our changes to the caption, we now say "Trees die often following insect outbreaks." We do not include the point about insects overwintering, because the literature we examined shows complex insect dynamics that relate not only to species physiology but also to competition among species. There is some uncertainty about the overwintering of insect pests component, and this is beyond the scope of this energy-focused chapter with text limitations.
05: Energy	P12/L1	The word “on” in the key message title seems out of place. Suggest “Progress continues toward enhancing” or “Progress continues to enhance” or suggest rewording the title.	The title has been changed to " Efforts to Enhance Energy System Resilience are Underway"
05: Energy	P12/L15-17	Be careful with interchanging the words “mitigation” and “adaptation.” They are sometimes used interchangeably in this chapter and in this report and this will create confusion for general audiences. Here, it seems the activities for the oil industry are adaptive to climate impacts to infrastructure, not mitigation efforts. Suggest removing "mitigation" from this paragraph altogether since it is discussing adaptation measures to boost resiliency of energy systems and infrastructure.	Thank you. We have removed the word "mitigation" and altered the sentence to say, "Options for oil production include . . ." Based on public comments, we have checked the glossary definitions of mitigation and adaptation to be consistent with usages in the rest of the report. The points made in this paragraph were more consistent with usage of the term "resilience," so we also altered the first sentence of this paragraph to read, "Activities to increase energy system resilience include upgraded grid design, hardening of energy infrastructure, ..."

Chapter	Page/Line	Comment	Response
05: Energy	P12-13/L22-15	The two topics—planning for energy system resilience and hardening energy systems to reduce vulnerabilities to climate change—could be combined into one shorter section. Both discus modeling advances, for instance.	Thanks for your comments. The two topics are connected, but each addresses different perspective, the "planning for Energy System Resilience" paragraphs focus on the advanced modeling capabilities to more accurate project future climate and their impacts on the energy infrastructure for better planning to improve energy system resilience; the "hardening energy systems to reduce vulnerabilities to climate change" is to use the model projection to make Energy systems/Infrastructure "hardened" to improve its resilience under future climate change. We think there is merit to keep them separate and to addersss the comment we revised "planning for energy system resilience " to "Improved Climate Modeling to inform Energy System Resilience"
05: Energy	P14//L7	Suggest defining Internet of Things devices in the text. Or just use “smart devices, like internet connected appliances and cameras” or something similar.	Changed to "smart devices, like internet connected appliances" as suggested. The NCA5 glossary does not have the term IoT.
05: Energy	P16/L10-13	Suggest explaining what types of costs for solar and wind decreased and why this was.	Lanugage has been added describing advances that have contributed to cost reductions. The response includes: "Advances contributing to cost reduction include: technological advances, improved efficiency in both energy generation and manufacturing, reduced capital costs, and accumulation of operational experience."
05: Energy	P17/L12-16	Suggest detailing where these demonstration projects are located to improve reader convertibility with the topics.	Due to word limitations, authors were unable to expand on where the demonstration projects are located.
05: Energy	P17-18/L17-18	Suggest including a description of the IRA and new two-tiered tax credit scheme that emphasizes worker protections and vulnerable communities for developers and generators to qualify for the full amount of credit. Suggest including a discussion of energy-sector workers who are vulnerable to the energy transition changes to their livelihoods.	The chapter authors recognize that the IRA will play a significant role in accelerating the energy transition and advancing objectives of energy equity. That said, due to the length, scope, and mission of this document, the detailed evaluation of specfic policies (or measures within specific legislation) is not feasible within the NCA. With that caveat, it is noted by the authors that the IRA and BIL prioritize economic investments for overburdened communities, particularly those living with legacy pollution. These laws advance the Justice40 Initiative, which commits to delivering 40 percent of the overall benefits of climate, clean energy, and related federal investments to communities that are marginalized, overburdened by pollution, and underserved by infrastructure and other basic services (CRS 2022). Language to reflect the scale and significance of the IRA has been added to the chapter to reflect the reality that the Bipartisan Infrastructure Law of 2021 (BIL 2021) and the Inflation Reduction Act of 2022 (IRA 2022) are the largest investments in climate and energy in American history. The authors have also replaced figure 5.7 with a figure that accounts for increase deployment of renewabke energy as a result of IRA.
05: Energy	P20/L14-15	Expressing confidence that frequency and intensity of extreme events will increase seems to be a broader statement of confidence than generally accepted in the professional literature since it seems to encompass all types of extreme events and cover all locations in the United States (and presumably territories).	The authors have reviewed the confidence levels and support the updated classifications as reflected in the traceable accounts section of this chapter. We have also added lanugage to cross reference to chapter 2, including: "Climate change affects all aspects of the energy system—supply, delivery, and demand (Figure 5.1)—through the increased frequency, intensity, and duration of extreme events and through schaning slimate trends (Ch.2.) " The authors have provided further edits to ensure consistency with the Chapter 2 insights that highlight that “changes in smaller-scale short-lived severe weather such as tornadoes and thunderstorms are more difficult to assess and direct observations of these events and the conditions associated with them are incomplete” and that “direct observational records for these hazards are largely insufficient for identifying trends due to factors including observer biases, limited length of record, and changes in the observing systems”.
06: Land	P7/L12-13	Not all wildfires are climate driven;suggest making thesentence clear that in some places there is an increase in wildfire risk due to climate change.	Text was added to clarify that the effects of climate change on wildfire risk and intensity are variable, and a reference to Chapter 7 was added
06: Land	P7/L18-19	These threats also come from land-use as well, so including other stressors in this discussion would add to the complexity but also highlight the risk to these systems.	We have clarified the fact that land use as well as climate change (and their interactions) both affect the resilience and function of the land system. We added text here pointing ahead to a more extensive treatment in KM6.2. We altered the title of key message 6.2 to be clear that we are talking not only about climate change effects, but also about land use effects. We added a new first sentence to the section "Interactions in the land system" that says "Land use and climate change individually and interactively affect land systems and the services they provide to humans.". We added a new paragraph at the end of the "Interactions in the land system" that elucidates interactions between climate and land use changes.
06: Land	P7/L20	Add something here on Great Lakes shore erosion.	We appreciate the suggestion. New text and a cross-reference to further information in the Midwest chapter is added in this location: "Decadal-scale variability in Great Lakes water levels drive shoreline erosion (KM24.5)"

Chapter	Page/Line	Comment	Response
06: Land	P8/L23-24	Revise to make thisa complete sentence.	This sentence and the several related sentences have been revised and re-organized to support a better flow
06: Land	P10/L7-8	This is not consistent with Chapter 7(Forests)—the sink is created by growing stock and harvest products. It also contradicts the citationto Pugh et al. unless the CO2effect on the regrowth areas is alsoattributed.	We thank the reviewer for the comment. The text in this passage is assessing the attribution of land carbon sinks, examining the mechanisms responsible for those sinks in the context of LCLUC. While uncertainties are large, the literature supports the statement that a net sink due to increasing atmospheric CO2 concentration is the most significant mechanism, with regrowth following previous harvest or disturbance as the next most important factor. The two factors interact, as increasing CO2 influences both undisturbed/unmanaged and disturbed/managed systems. The statement here regarding a sink fertilized by rising CO2 are not in contradiction with material in Chapter 7 (Forests, 3OD), which does not address the CO2 fertilization sink. The statement here regarding a sink resulting from regrowth following previous disturbance seem to us to be fully consistent with the assessment in Chapter 7, for example in Box 7.2 (Forests and Carbon) and the references cited there, e.g. Domke et al. 2022. The literature assessed does consider the influence of CO2 fertilization on all land types, and also considers the separate attribution of CO2 fertilization and legacy land use effects on a common landbase of regrowing forest. Our statements are consistent with that usage. We have removed the Gurney and Eckels 2011 reference and associated text, since on further inspection we found that it did not adequately address attribution of the land sink to CO2 fertilization.
06: Land	P10/L10-11	A significant land sink is not attributed to abandonment of agriculture. Domke et al. (2021) and EPA (2022) do not document this. Agriculture abandonment isarelatively small sink compared to forests remaining forests and urban areas.	We thank the reviewer for this comment. We are referring here not to same-year abandonment agriculture or conversion of agriculture to forest (which we agree is a small sink as documented by Domke et al 2022), but rather to the legacy effects of historical agricultural land abandonment and forest regrowth, as ocurred for example across the eastern U.S. as agriculture moved west. We have changed the text here to clarify that we are describing the impact of legacy land use changes on the present-day carbon sink.
06: Land	P11/L32-33	Harvest and management reduce ecosystems resilience? Is this true as a general comprehensive statement? Some forest management will in fact be required such as assisted regeneration.	This comment helped us refine our description of how management and climate change interact to determine resilience. To make this clear to the reader, we adding the following sentence to the end of the first paragraph in the "The Value of Resilience" Land use and management also affect ecosystem resilience, and interact with climate change to determine the structure and function of the land system (Chambers et al. 2019; North et al. 2022). The fact that human decisions can influence resilience provides opportunities for climate mitigation (Chapter 31) and adaptation (Chapter 32) and is a foundation for nature-based solutions (Keestra et al. 2022).
06: Land	P12/L33-37	This is a confusing discussion and should be revised for clarity.	This has been revised and expanded for clarification
06: Land	P13/L1-2	In other places it is the opposite; this is not a generalizable example.	This sentence is making reference to the specific case for the Southeast U.S., and is not intended to be a general statement. We have added several sentences before this to provide additional context.
06: Land	P22/L27-28	There is substantial uncertainty in both biogeochemical and biophysical impacts of land-use and land cover change. This implies only the biophysical are uncertain, while the impacts on the carbon cycle end soils especially of different land-use management techniques is not well understood.	We agreed with the reviewer and have removed this sentence.
07: Forests	P3/L1	The introduction could set up the key messages more. Perhaps it would be nice to see some introductory synopsis of what the message is and how we know it with confidence.	We thank the reviewers for the comment. The chapter text has been revised to incorporate the suggestion.
07: Forests	P3/L5	The introduction lists the goods and services that forests provide, including “spiritual renewal”but does not mention the Indigenous cultural values of forests and this seems important to mention up front. These cultural values are, on the other hand,covered well under Key Message 7.2.	We thank the reviewers for the comment. The chapter text has been revised to incorporate the suggestion.
07: Forests	P4/L3-6	It would be interesting to see the frequency distribution of the map above (i.e., the distribution of number of years by region and nationally).	We thank the reviewers for the comment. The figure on this page shows forest cover at large scale (US) using 30-m x 30-m pixels between 1985–2020. Insets (A-I) show relevant factors driving forest change. Left unchanged.
07: Forests	P5/L5-8	Should include a statement that these were driven by climate change factors not natural factors. Is the increase due to climate change and is that documented? There is no reference to Domke et al. (2022), nor is it readily found in the literature. Domke etal. (2021) is there. If this is reference to an update, it is very important and should be accurately referenced.	We thank the reviewers for the comment. The chapter text has been revised to incorporate the suggestion. Corrected to Domke et al. (2023).

Chapter	Page/Line	Comment	Response
07: Forests	P5/L17	Could be better worded. See comments in Chapter 2.	We thank the reviewers for the comment. The chapter text has been revised to incorporate the suggestion.
07: Forests	P5/L18-19	This sentence is described in the introduction,not Key Message 7.1; is this the right place for this sentence? It is actually covered more in the text for Key Message 7.2;perhaps move there?	We thank the reviewers for the comment. The chapter text has been revised to incorporate the suggestion. The associated text has been deleted.
07: Forests	P5/L24-26	This statement is in need of an example.	We thank the reviewers for the comment. The chapter text has been revised to "Climate change affects disturbances such as wildfires, insects, and diseases. Weather events, such as droughts, hurricanes, windstorms, and flood events, may exacerbate disturbance effects, especially in extreme cases (Figure 7.3; Chs. 8 and 9)."
07: Forests	P6/L6	An example is needed of “effects.”	We thank the reviewers for the comment. The text has been revised to "Climate change is affecting the likelihood and scale of wildfire effects in US forests. For example, the amount of forest burned by wildfires in the West is increasing relative to the mid- to late 20th century..."
07: Forests	P6/L11	Make sure readers know prescribed fireis intentional.	We thank the reviewers for the comment. The text indicates "Human activities such as forest management (e.g., timber harvesting, prescribed fire..."
07: Forests	P6/L19-20	What is a national scale; does this mean consistently and widespread across the United States?	We thank the reviewers for the comment. The chapter text has been revised to incorporate the suggestion. Revised to "The effects of climate change on forests in specific regions of the United States are discussed in several of the regional chapters (e.g., Ch. 21-24, 27-29)."
07: Forests	P6/L21-23	For example, cite Andela et al. (2017), which shows that globally fire burn area is going down, perhaps because of land management/use.	We thank the reviewers for the comment. The reference is not relevant as it focuses on a global analysis.
07: Forests	P8/L11	This interpretation is incorrect:“western tree species are migrating poleward through seedling success (Sharma et al. 2021).”The paper said,“Whereas fecundity may be primed to lead tree migration in the West, local climate complexity that comes with rugged relief affects how migration potential should be interpreted. The combination of dry climates and fast climate change in the intermountain West explains fecundity and recruitment vectors in Fig. 3 E and F that point toward the cool, moist regional climates of the Northwest. However, for migration, these cool-moist conditions are locally found at higher elevations. The regional centroids average over this variation contributed by steep terrain.”	We thank the reviewers for the comment. The relevant chapter text has been deleted.
07: Forests	P13/L16	Domkeet al. (2022) is not referenced,nor can it readily be found in the literature.	We thank the reviewers for the comment. Corrected as Domke et al. (2023).
07: Forests	P14/L4-9	Sources shouldbe specified. This figure needs to be reconciled with the national GHG inventory, EPA (2022) or EPA (2021). The sinks estimatehere are not consistent with Domke et al. (2021) nor the national GHG inventory. The caption needs to better describe the figure. What is NEE and other acronyms?Explain that harvested wood product (HWP)“transfers”are a sink when the areas regrow, otherwise it is a sink that does not have emissions associated with it which is different. Is NEE from the regrowth? Or from new lands converted, or CO2fertilization and productivity?	We thank the reviewers for the comment. The chapter text has been revised to incorporate the suggestion and estimates have been updated and aligned with the latest (EPA 2023) GHG Inventory.
07: Forests	P14/L12	Change to “...are a critical component of the hydrological system and the provision of clean water.”We do not think “forests produce water”is the intended meaning.	We thank the reviewers for the comment. The chapter text has been revised to incorporate the suggestion.
07: Forests	P15/L1-3	State that this is an example of how climate change affects forest changes and in turn other impacts, in this case water flow and flooding.	We thank the reviewers for the comment. The chapter text has been revised to incorporate the suggestion.
07: Forests	P16/L24-25	Figure7.10 does not show adaptation practices. It shows land ownership.	We thank the reviewers for the comment. Figure 7.10 is linked to Table 7.1, which contains adaptation examples
07: Forests	P21/L6-7	This statement needs a citation.	We thank the reviewers for the comment. Added Vose et al. (2018).
07: Forests	P22/L11-14	The reference to Sharma et al. may have been misstated. Check if it actually shows evidence of migration, or evidence to suggest migration.	We thank the reviewers for the comment. This was cited incorrectly. Sharma et al. (2022).
07: Forests	P22/L15	See more literature on this (e.g., Novick et al.,2022).	We thank the reviewer for the comment. The reference is not relevant to KM 7.1.
08: Ecosystems	P5/L1	It would be useful to emphasize in caption as well as text that “transforming into new systems”means “transforming into new, often degraded systems less able to provide ecosystem services.”	Thank you for this language, which we have incorporated into the sentence.
08: Ecosystems	P5/L13	Clarify if the “delayed harvest of plants”in the Northern Great Plains means“delayed harvest of crops.”Also, explain the significance of “loss of rivercane;”other biodiversity examples are more familiar or obvious ties to ecosystem services.	This refers to the harvest of wild berries, which while a edible crop, is naturally occuring (not planted) so we have retained 'plants' rather than crops here to be accurate. The rivercane example is from the Southeast Regional chapter section where it is discussed in more detail.
08: Ecosystems	P7/L20	Consider including Ibanez et al. (2022) as another possible citation on multiple stressors.	We believe the reference in question is "Altered cyclone–fire interactions are changing ecosystems" which has been added
08: Ecosystems	P8/L8-10	Consider replacing words like “transformative”and “stable,which have a positive effectwith “degraded”or “ecosystem collapse.”	We thank the NASEM for this comment, but respectfully disagree here. Transformation as a term is the more accurate one from the literture. Not all change is degradation, and not ecosystem collapse, so we feel this term is the best one to use to describe the large patterns we are seeing.
08: Ecosystems	P10/L9	Avoid the phrase “is complex”and replace it with a more specific statement. Ecologists often use this phrase when talking about ecosystems even though what is really meant is that there are surprises, or that there are direct and indirect effects of climate change that act together on ecosystem functions (e.g.,pollinator webs, food webs).	We have removed "is complex" from the sentence.

Chapter	Page/Line	Comment	Response
08: Ecosystems	P11/L8	The “Monitoring Transformations”subsection could, through minor rewording, more clearly convey that these monitoring networks (Figure8.8) have been established in recent decades in direct response to global change.TheNational Ecological Observatory Network (NEON)may have fully come online since NCA4. It is worth emphasizing this because otherwise it sounds as if ecologists have always monitored, when in fact this is a recent development.	Thank you for this suggestion. We have reworded the second sentence in this paragraph to read "A number of monitoring networks have been established in recent decades in direct response to climate and other changes, such as the National Ecological Observatory Network (NEON) (Figure 8.8), in recognition of the fact that only long-term monitoring programs can detect gradual changes and infrequent but extreme events and their aftermath in the context of normal temporal variability (Hillebrand et al. 2020)"
08: Ecosystems	P13/L14	This paragraph and associated Figure8.9 are confusing because the figure exemplifies coral reef adaptation, but there is no mention in the text of corals. Instead, authors used Tetlin National Wildlife Refugeas an example, which is a great example, but it is not clear if they used the Resist-Accept-Direct (RAD)framework. The Committee suggests doing some minor rewording to address this disconnect.	We have edited to be more clear this was a RAD example, and to refer to the figure both more generally and Fig.8.9b for that example.
08: Ecosystems	P14/L19	Avoid using the term “complex”and replace it withsomething more specific.	We have removed "complex" from the sentence and replaced with "compound"
08: Ecosystems	P17/L13	Change “Box 8.2”to “Box 8.1”(there is no Box 8.1).	The numbering will be finalized by TSU and should be correct at that time.
08: Ecosystems	P19/L1	Box 8.2is anice example, but a few more words about why large-bodied species are vulnerable to extinction andclimate change would be useful—it is the second time body size has been mentioned.	We have clarified that body size relates to hunting pressures as well related issues like low reproduction rates.
08: Ecosystems	P20/L1	Should “disease risk,” whichfocuses on diseases of animals and their vectors, also include plant disease (fungal and other plant pathogens) that affect natural ecosystems (e.g., Sudden Oak Death) and crops? A few possible references for discussing plant disease are Burdon and Zhan (2020)and Juroszek et al. (2020).	Yes, this suggestion for plant diseases has been added to the table along with the references. Thank you.
08: Ecosystems	P20/L12	Table 8.1 is informative, but the Committee suggests adding a column identifying where this risk occurs in the United States.	We have added more specific examples with where they occur regionally, but feel that trying to identify the entire range is not feasible for these diseases.
08: Ecosystems	P22/L7	The Committee appreciates that the statement about invasives that have declined in response to climate change is so well referenced but suggests adding a few examples into the text. The focus on the subsection is on invasives expanding due to climate change, so it is difficult to get a sense of the relative importance of these two groups.	The section has been revised to clarify that invasive plants and vertebrates are likely to decline while invertebrates and pathogens are more likely to increase in range with climate change.
08: Ecosystems	P29/L16	Could emphasize not just "buy-in" from local already vulnerable communities, but solutions that are desigend and led by those communities (i.e., "co-produced with other actors).	Thank you for this suggestion. We have now revised the paragraph to include "community-driven and collaborative approaches."
08: Ecosystems	P33/L27-32	The climate envelope models are used in nuanced ways to assessfuture climate change vulnerability. They predict habitat distribution and often use other environmental predictors in addition to climate (e.g., soil, topography, vegetation cover). There are procedures for incorporating dispersal rates (i.e., can organisms occupy shifting habitat), identifying and limiting confidence in predictions to novel environments, and focusing on habitat suitability changes within the current range (exposure). What this approach does not address is plasticity and adaptation.	We appreciate the comments highlighting the nuanced nature of some climate envelope models which include local modifications to weather by features such as topography. More recent approaches, which are cited in this report, use hybrid tools which include mechanistic (process-driven as opposed to correlational) components such as dispersal, which have been shown to improve upon envelope (correlation-only) approaches. New references have also been added here.
08: Ecosystems	P33/L35-37	It is not necessarily useful to think of range shifts as being driven by extreme weather events. Extreme events are likely to affect population processes via mortality and so forth, especially in combination with other global change stressors. Other modeling approaches are needed to forecast ecological changes on the order of decades, and those frameworks are being used.	This chapter highlights the value of considering the role of both long-term changes in average climatic conditions but also shows the critical importance of considering short-term extreme weather events which can have long-lasting and potentially irreversible impacts on species distributions.
08: Ecosystems	General	An additional reference, Warren et al. (2018), could be added on range shifts (global).	We added two additional references to Figure 8.11. We did not add Warren et al. 2018 because this paper describes modeled range shifts of insects; Figure 8.11 depicts documented (e.g., observed) range shifts. Warren et al was referenced in a different section of the chapter on future projections.
08: Ecosystems	General	The following papers on natural climate solutions could be good additional references: Griscom et al. (2017), Law et al. (2021, 2022), and Novick et al. (2022).	Thank you for these suggestions - they have all been added.
09: Coasts	P4/L2-4	This opening statement conflates regional and global mean change, as well as absolute and relative sea-level in confusing ways. (1) Stating that sea levels are rising and accelerating globally gives the impression that this is true everywhere, but it is not. There are many locations where relative sea-level rise in the United States is falling (e.g., some locations in Alaska) and/or not accelerating (e.g., most of the US west coast). It would be more accurate to say, “Global average sea-level is rising and accelerating due to thermal expansion…”. (2) The inclusion of vertical land motion here is tricky, because it is the only reference to relative sea-level in this statement. It does not represent variations in the thermal expansion and addition of water mass that are referenced in the first part of the statement. It is also a highly local (not regional) effect. It would be best to edit the second part of this opening sentence to be more specific about where the named variations occur, such as “…, with variations occurring along local and regional coastlines due to…”.	This edit was accepted. There are also additional changes in this section to include more varition on regiona SLR trends.
09: Coasts	P4/L5	“Accelerating, rising” is awkward phrasing.	Thank you for this comment, this sentence has been revised in response to multiple comments.

Chapter	Page/Line	Comment	Response
09: Coasts	P4/L6-7	Authors should choose between feet in figure and inches in text. Reading and interpreting the text will be easier if the same units used in the text are also used in the figures.	Thank for you for the comment. The authors are using feet, as American units are more recongizable for decision makers. However, in most locations, we habe included SI units in paranthesis.
09: Coasts	P4/L10	The phrase “on average 3–7 days per year” is too vague. Is this 3-7 days in at least one location across the whole country? Or 3-7 days at every location across the country? If the latter, it is unclear how this is a useful statistic given the huge amount of spread between locations around the United States.	Thank you for the comment. This text has been revised to provide regional context and no longer references 3-7 days on average.
09: Coasts	P4/L17	Missing dash in range of SLR in meters provided in the parenthetical.	This was edit corrected.
09: Coasts	P4/L28-29	Suggest the reference to Figure 9.2 be moved to the previous sentence, which is what the figure shows. The figure does not pertain to differences across emission scenarios, which is what the sentence describes.	Thank you for the comment, we have moved this figure reference to the previous sentence.
09: Coasts	P4/L28-29	Include the emissions scenario the numbers in the paragraph are based on.	Thank you for the comment. This was edited to higher SLR instead of emissions.
09: Coasts	P5/L5-9	Including the idea that coastal landscapes evolve across a range of timescales due a range of climate-driven and natural phenomena is great. It would be good to provide similar context for the previous section on SLR and high tide flooding, stating that sea-level (e.g., ENSO) and tides (e.g., nodal cycle, harbor dredging) also evolve on a range of time scales due to a range of natural and climate-driven reasons.	Thank you for the comment. On page 5, lines 18-28, we now discuss natural variablility due to factors such as PDO and ENSO which results in different rates of SLR along the Pacific Coast. On page 7, lines 24-27, we added additional discussion on climate variability influencing HTF: "These flood frequency increases could be further amplified with higher amounts of SLR, if storm conditions worsen or in any particular year due to climatic variability, e.g., by ENSO or other reasons (Sweet et al., 2018; Thompson et al., 2021)." Also, the following was added in the KM1 traceable accounts, page 28, lines 16 and 17: "For near-term impacts (to 2050), uncertainties and research gaps include the impact of natural climate variability on the observation-based trajectories"
09: Coasts	P19/L26-30	A major source of uncertainty prior to 2050 is the impact of natural climate variability on the projections.	Thank you for this comment, we have added additional information to the KM 9.1 traceable accounts.
09: Coasts	P20/L28-37	This paragraph needs references.	Thank you for the comment, references have been added to this paragraph.
10: Ocean	P3/L2	Suggest beginning the sentence with the subject of the chapter, i.e., “Oceans span tropical, temperature, and polar regions; support diverse and productive marine ecosystems; and provide innumerable benefits to the US.”	Thank you for this suggestion. For brevity, we have eliminated this portion of the sentence.
10: Ocean	P3/L2-9	Defining and making clear that NCA5 assesses a huge region of the United States, not just the continental US, is well done here, but a simple reference to Figure 10.1 would emphasize this point.	Thank you for this suggestion. We incorporated this change but placed it in the paragraph below the point identified in this comment, as we felt it was a better fit with the text in that paragraph.
10: Ocean	P4/L8	Specify higher emissions scenarios.	We use the standardized language for the NCA5; please see front matter Table 3 for specific CMIP6 SSPs corresponding the "high" and "very high scenarios". Additionally to clarify, we changed the text to "high and very high" scneario scenarios.
10: Ocean	P4/L1-11	Key Message 10.1: there are no likelihood statements provided. However, these statements may have quantitative evidence to support them, and if so, should include likelihood statements (this is also true for Key Message 10.2 and Key Message 10.3).	We appreciate this suggestion. However, we have intentionally decided not to include likelihood ratings for most of our statements. Likelihood can be determined for some impacts, but it is specific to the species, process, ecosystem/ecoregion being studied and scenarios and time spans under which these studies are conducted. It is difficult to roll up likelihoods from many independent studies to support overarching, high-level statements such as in the key messages. To avoid confusion by citing a range of likelihoods derived from disparate studies conducted under different projections, we have focused on confidence language instead of likelihoods.
10: Ocean	P5/L28-29	Consider adding ENSO events to the list of impactful extreme events for marine ecosystems. The last one was devastating to coral reefs throughout the Pacific.	Since ENSO is a climate oscillation that means different things for different regions, we focused the text on the proximate extreme conditions (e.g., we include heatwaves, which are the mechanism by which ENSO impacts coral reefs in the Pacific)
10: Ocean	P6/L1-6	Overall Figure 10.1 is a good figure, but please expand the figure caption to explain all the symbols and where the information comes from.	Thank you for this suggestion. While we agree this information would be valuable, general guidance has been not to provide a long list of citations in the figure captions. We have consulted with the Technical Support Unit and plan to add a list of references aligned with the symbols to the metadata to support the impacts shown in this figure.
10: Ocean	P6/L13	Suggest specifying very high emissions scenario.	We do specify the scenario in the current text which reads "very high scenario (SSP5-8.5)".
10: Ocean	P7/L6-8	This is an important point that could be elevated to part of the key message.	Thank you for this suggestion. We have incorporated a portion of this statement about adaptation at the pace of change into the key message.

Chapter	Page/Line	Comment	Response
10: Ocean	P7/L9	Suggest making a referenced statement somewhere in this box stating whether the severity and/or frequency of such marine heat waves is expected to increase with ongoing and future climate change.	Thank you for the suggestion. At the end of the box, text has been added to describe expected future changes in extreme warm temperatures. We added references to the Climate Trends chapter, Smith et al. 2022 (describing the emergence of novel climate in the NE Pacific) and Pershing et al. 2019 (describing increasing climate surprises that will challenge decision making).
10: Ocean	P8/L1-7	Figures 10.2, 10.4, and 10.5: the figure captions should contain all the information to explain the figure as well as the citations so that the figure is self-contained.	Thank you for this suggestion. The general guidance we have received has been not to provide a long list of citations in the figure captions. We have consulted with the Technical Support Unit and plan to add a list of references for each of these figures to their metadata.
10: Ocean	P10/L17	Specify emissions scenarios.	Thank you for this comment. We do specify the emission scenario : " under a very high scenario (RCP8.5) than under an intermediate scenario (RCP4.5))".
10: Ocean	P12/L10	Suggest either using a less technical term than "extirpation" or defining the term in the text.	Thank you for this comment. We have replaced "extirpation" with "loss of."
10: Ocean	P13/L4-13	Consider mentioning wave energy conversion, a nascent technology, which may be particularly useful for the west coast, Hawai'i, and USAPI, even though it is mentioned on page 10-15, line 15.	Thank you for the suggestion. A mention of wave energy conversion has been added.
10: Ocean	P15/L4-6	Here is a good place to highlight the need for continued investment and expansion of the National Ocean Observing System.	Thank you for this suggestion. We have expanded text on the need for investment and expansion of ocean observations nationally.
10: Ocean	P18/L13-14	The Front Matter rubric emphasizes evidence and publications, not data. It would be more accurate to remove "data" from the statement here.	Thank you for pointing out this discrepancy with the Front Matter. We have removed "data" from this statement.
10: Ocean	P18/L23-32	Indigenous island communities are highly impacted by ocean change (see Chapters 23 and 30) and should be highlighted here	Thank you for your suggestion. The text was modified accordingly: In the corresponding text of the traceable accounts we added "Island" to the Indigenous communities references ("particularly coastal and island-based Indigenous communities (Huntington et al. 2022). "). We also added text to the preceding seciton on governance (P17) "Inclusive and participatory frameworks for evaluating these trade-offs will support equitable deliberations about potential outcomes and uncertainties of specific options, which is especially critical for Indigenous communities with critical sociocultural connections to marine ecosystems and marine subsistence harvesters that rely on marine resources for food, nutritional, and economic security (Crosman et al. 2022, Daniel et al. 2019, Cisneros-Montemayor et al. 2017).
12: Built Environment	P1/L1	Ensure chapter title is consistent with built environment definition, and if not revise the title.	Many thanks for this comment. The chapter takes a broad definition of the built environment sector that is consistent with how the term was used in NCA4 (Ch. 11 which shared the same title). Our definition encompasses physical and social infrastructure that underpin the function of urban systems and wellbeing of residents. It includes commercial, industrial, and residential buildings, open space, parks/gardens, as well as transport, energy, water supply, and waste manage systems. This definition is consistent with the literature and is consistent with how readers will understand the built environment and urban systems sector.
12: Built Environment	P3/L2	Recommend stronger first sentence.	We appreciate the comment. We have strengthened the first paragraph by emphasizing the importance of cities to American culture, history, and the economy, and mirrored that sentiment emphasizing the importance of making choices in cities and the built environment for all Americans in the future.
12: Built Environment	P3/L3	Use of urban residents' livelihoods automatically sends a tone that this chapter is only about the urban built environment. Is that what the authors intended?	We appreciate the comment. Yes, this chapter is titled 'Built Environment, Urban Systems, and Cities', hence we have a focus on the built environment sector across urban and suburban areas. Still, we have strengthened the first paragraph by emphasizing the importance of cities to American culture, history, and the economy, and mirrored that sentiment emphasizing the importance of making choices in cities and the built environment for all Americans in the future.
12: Built Environment	P3/L7	Recommend stronger first sentence, such as "recent science shows how climate change is having cascading and compounding effects on the built environment."	Many thanks for this comment. We have strengthened this sentence.
12: Built Environment	P3/L12	Suggest cross-referencing Chapters5 (EnergySupply, Delivery, and Demand), 13 (Transportation), and 18 (Sector Interactions, Multiple Stressors, and Complex Systems).	We appreciate the comment and have added a cross-reference to all of these chapters.
12: Built Environment	P3/L14	Suggest changing "historically disadvantaged communities" to a term consistent with other chapters. Other terminology suggestions include overburdened, highly impacted, or historically underinvested.	Many thanks for this comment. This chapter has revised its usage of equity language and terminology to be consistent with NCA5 guidelines, including the removal of unattributed deficit language.

Chapter	Page/Line	Comment	Response
12: Built Environment	P3/L23-25	Recommend stronger first sentence that is more accessible.	We appreciate the comment. We have revised this sentence to make it more focused and accessible.
12: Built Environment	P3/L29	Suggest changing “historically disadvantaged communities” to a term consistent with other chapters. Other terminology suggestions include overburdened, highly impacted, or historically underinvested.	Many thanks for this comment. This chapter has revised its usage of equity language and terminology to be consistent with NCA5 guidelines, including the removal of unattributed deficit language.
12: Built Environment	P3/L36-37	Suggest increasing readability for broader audiences.	We appreciate the comment and have changed this to a more active verb. The chapter has also undergone extensive editorial review to ensure readability for a broader audience.
12: Built Environment	P4/L3	Largest 10 cities plus the top 5percentof suburbs:consider having Figure 12.1 actually show those 10 cities and the suburbs with labels using data from 2018 rather than the map shown (2015).	We appreciate this comment. Unfortunately, Moran et al 2018, which is a global study, does not list the specific cities and suburbs that account for half of all emissions. We have updated Figure 12.1 with more recent data on absolute and relative GHG emissions across the country. It is more important to show the data trend rather than to highlight the 10 largest cities.
12: Built Environment	P4/L16-18	Opportunity to increase readability for broader audiences.	Many thanks for this comment. This sentence has been modified slightly to improve readability.
12: Built Environment	P5/L1	Figure 12.2: Suggest explaining and contextualizing the importance of the data shown. It is also difficult to tell if there are clear differences in the maps that are visible with the maps being that small. It appears that there is a mall change to states like Montana, Wyoming, and Utah. Perhaps focusing on areas that are predicted to have the greatest change would be more meaningful.	Many thanks for this comment. The figure has been changed completely. It now shows a population trend line graph into 2100 rather than a map. This improves readability of the figure.
12: Built Environment	P5/L13	Appreciate the reference to Chapter 6 (Land Cover and Land-Use Change) but consider also including the title of the chapters when being referenced. This is consistent with cross-referencing done in other chapters.	Many thanks for this comment. The way this chapter cross-references other chapters in NCA5 has been amended according to NCA5 style guidelines.
12: Built Environment	P8/L9	Suggest adding something like: “If mitigation and adaptation measures are not deployed quickly and sufficiently then urban areas will continue to be significant drivers of climate change...”	Many thanks for this comment. We have revised the sentence accordingly.
12: Built Environment	P8/L17	Suggest modifying Key Message 12.2 title to be a statement.	Many thanks for this suggestion. The KM title has been revised as suggested.
12: Built Environment	P8/L19	Suggest replacing “existing loads” with more accessible language.	The authors appreciate the comment. The authors repeated prior deliberations on the use of these words and concluded they are the most accurate plain language description.
12: Built Environment	P8/L22	Suggest replacing “infrastructure deficits” with more accessible language.	The authors appreciate the comment. The authors repeated prior deliberations on the use of these words and concluded they are the most accurate plain language description.
12: Built Environment	P9/L6	“Linking extreme events to climate change is critical for assessing, disclosing, and managing risk to urban systems.” is an important point that is just left hanging at the end of this paragraph. Suggest incorporating it into the introduction or key message and expanding on why it is important for the built environment.	The authors appreciate the comment. This sentence has been rewritten to better contextualize this point in the context of disclosing climate risks to the built environment. This point builds on the earlier discussion on built infrastructure losses and the increasing amount of information available to make decisions about how to respond to climate risks. Although this is an important insight, the chapter team believes it is not necessary a point to highlight in the key message.
12: Built Environment	P10/L15	Suggest referencing health impacts broadly instead of using “diseases such as asthma.”	Many thanks for this comment. The incorporation of this citation has been altered significantly for clarity.
12: Built Environment	P11/L12	Suggest adding a specific example about the disproportionate burden on populations. For instance, Houston’s urban heat island mapping showed a 17-degree difference between two neighborhoods on the same time and same day.	Many thanks for this suggestion. We have embedded this point in our revised Figure 12.6 which illustrates urban heat island effects across Atlanta, Houston, and Minneapolis. In the revised section KM12.2, we have also elaborated on the disproportionate burdens on frontline communities.
12: Built Environment	P12/L7	Consider including this point in the introduction or at the beginning of this key message.	Many thanks for this comment. The point about aging infrastructure and infrastructure deficits is now included in KM12.2.
12: Built Environment	P12/L14	While this section talks about the reduced “life expectancy of heating, air-conditioning, ventilation, and filtration systems as well as road pavements and tarmac surfaces,” it does not mention the impact of people, especially overburdened and vulnerable people.	Many thanks for this comment. This paragraph is specifically about cascading effects of climate change on built infrastructure systems, hence the examples focus on heating, AC, ventilation, and transport systems. Additional discussions of risks to people are detailed at the beginning of section KM12.2 and further elaborated in section KM12.3 and KM12.4.
12: Built Environment	P12/L18	Another use of “loading” that should be clarified for broader audiences.	The authors appreciate the comment. The authors repeated prior deliberations on the use of these words and concluded they are the most accurate plain language description.
12: Built Environment	P12/L28	Perhaps an opportunity to highlight some of what is being done, such as LEED for Cities,andupdates to building and zoning codes.	Many thanks for this suggestion. Examples of building and zoning code updates (and other mitigation and adaptation efforts in cities) are highlighted in Table 12.1.

Chapter	Page/Line	Comment	Response
12: Built Environment	P12/L29	Very general statement. Which systems? Perhaps an opportunity to link to other chapters.	Many thanks for this comment. We have slightly broadened this sentence to improve clarity.
12: Built Environment	P12/L32	Caution how "local beliefs about climate change" is being used; perhaps local action or inaction (based on beliefs) would be another way to phrase this statement.	Many thanks for this comment. The sentence has been revised accordingly.
12: Built Environment	P12/L34	Perhaps provide one or more examples for how to increase awareness, or better yet, action, and provide an example of what has worked.	Many thanks for this comment. We have added several illustrative examples of how cities have worked to improve communication and decision-support around climate action in the Table embedded within Section KM12.4. However, without extensive or robust efforts to evaluate overall effectiveness of these approaches, it is difficult to say whether specific examples have worked.
12: Built Environment	P12/L38	Suggest using more accessible language.	Many thanks for this comment. This sentence has been removed to ensure clarity in the main idea of the paragraph
12: Built Environment	P13/L4	Add "climate" before "risks."	Many thanks for this comment. The sentence has been revised accordingly.
12: Built Environment	P14/L1	Suggest using a more informative statement for the key message title, such as: "Climate Action Opportunities for Cities."	Many thanks for this suggestion. The KM title has been revised as suggested.
12: Built Environment	P14/L11	Confirm the 2014 reference is needed; has this system been updated in the last 8 years? It appears to be a dated reference.	Many thanks for this comment. The reference refers to the US Climate Resilience Toolkit, which is a online resource/respository led by NOAA and initially launched on November 17, 2014. This explains the 2014 reference. However, the US Climate Resilience Toolkit is constantly updated.
12: Built Environment	P14/L14	Consider referencing BRIC in this section.	Many thanks for the suggestion. We have inserted the example of FEMA's Building Resilient Infrastructure and Communities (BRIC) program in this sentence.
12: Built Environment	P14/L16	Suggest providing a quantitative percentage of plans that did not explicitly address climate risks. If this information is not clear, consider rewording.	Many thanks for this comment. To the best of our knowledge, there is no quantitative assessment of the percentage of hazard mitigation plans across the country that explicitly address climate risks. The literature shows that not all do, and so our assessent sentence reflects this.
12: Built Environment	P14/L18	Suggest adding "and for climate adaptation and resilience." This statement is incomplete without this additional information as this section is covering both mitigation and adaptation.	Many thanks for this comment. We feel that hazard mitigation/resilience planning and GHG reduction planning are properly separated in this and the preceding sentence.
12: Built Environment	P15/L2	Suggest defining/describing what a co-benefit is here.	Many thanks for this comment. We have slightly revised this sentence to better attribution mitigation and adaptation co-benefits. A more extensive definition can be found in the NCA5 Glossary.
12: Built Environment	P16/L11	"Nature based solutions" and "green infrastructure" are both mentioned here, and Figure 12.2 references "natural infrastructure." Suggest using consistent (and the most common) language.	Many thanks for this comment. We use these terms interchangeably to refer to mitigation and adaptation options that harness the potential of nature. Green and blue forms of infrastructure are therefore categories of natural and nature-based options. Formal definitions of nature-based solutions and green infrastructure found in the NCA5 glossary.
12: Built Environment	P17/L6	Replace "struggle" with "seek."	Many thanks for this comment. We have revised the wording in this sentence to improve clarity.
12: Built Environment	P17/L13	Tribal communities or Tribal Nations?	Many thanks for this comment. This sentence notes governments at all levels, which include Tribal Nations.
12: Built Environment	P17/L17	Capitalize Chief Resilience Officers and note that some states have appointed Chief Resilience Officers.	Many thanks for this comments. These terms have now been capitalized. Our chapter does not mentioned state-level Chief Resilience Officers given that we focus on urban areas, cities, and the built environment.
12: Built Environment	P17/L18	Capitalize Chief Heat Officers and include Chief Sustainability Officers here too.	Many thanks for this comment. These terms are now capitalized.
12: Built Environment	P18/L3	Clarify if the communities referenced here are "rural."	Many thanks for this comment. Our chapter focuses on assessing science from cities and urban communities, although we acknowledge that built environment systems can extend beyond core population centers. For assessment on rural communities, see Chapter 11 Agriculture, Food Systems, and Rural Communities.
12: Built Environment	P18/L7	Clarify if taxes are declining or is revenue declining.	Many thanks for this comment. This sentence has been revised to note the presence of fiscal risks such as declining revenues and taxes from properties an businesses.
12: Built Environment	P18/L12	Give examples of states that are exceptions.	Many thanks for this comment. We have revised this sentence to include some examples.
12: Built Environment	P18/L13	Which cities? This chapter is in need of specific examples and less generalities.	Many thanks for this comment. We have revised this sentence to include an example.

Chapter	Page/Line	Comment	Response
12: Built Environment	P18/L15	Is it capacity, or ability, due to constraints including capacity?	Many thanks for this comment. This sentence has been revised to highlight the limited ability of many infrastructure providers to pass on costs of climate change.
12: Built Environment	P18/L29	Suggest changing the first sentence to read, “Local urban planning efforts incorporating climate actions show varying progress...”	Many thanks for the suggestion. We have modified this sentence for clarity and conciseness.
12: Built Environment	P18/L37	Provide examples of what is working.	Many thanks for this comment. We have inserted additional examples into the table in section KM12.4 to illustrate several examples. This section also highlights the difficulty of measuring the social impact of many urban adaptation and mitigation efforts, so it is difficult to assess whether efforts are 'working'. The second paragraph in section KM12.4 has been slightly revised to highlight this point.
12: Built Environment	P19/L3	Consider reworking this paragraph for readability.	Many thanks for this comment. The chapter and paragraph have undergone extensive editorial review to ensure readability for a broader audience.
12: Built Environment	P20/L3	Consider “residents’” interests instead of “citizens’.”	Many thanks for this comment. The sentence now refers to residents.
12: Built Environment	P22/L2	Consider explaining why cities are underreporting GHG emissions.	Many thanks for comment. This sentence has been slightly revised to note the challenges with data availability and accuracy for cities to report on their GHG emissions.
12: Built Environment	P27/L5	Consider resident support instead of citizen support.	Many thanks for this comment. The sentence now reads 'resident support'.
13: Transportation	P1/L2-5	Text can be added to define mobility in addition to the current language on the transportation network	Mobility has been defined with a parenthetical of modal categories.
13: Transportation	P1/L11-14	Text can be added on planning for future transport needs for people.	Authors changed the word system to "transport needs".
13: Transportation	P1/L16-19	An opportunity to add text on emerging mobility options.	Authors added the phrase "toward improving mobility and increasing mobility options".
13: Transportation	P3/L14	Are risk assessment and long-term costs the key to equitable investments? Lines 20-21 provide concrete suggestions: “Inclusive decision-making and data-informed processes.”	Authors updated the text to say that achieving equitable outcomes includes risk assessment and long-term cost assessment. Other approaches are also necessary and part of the process.
13: Transportation	P3/L24	Replace “remains” with “is.” Not long ago (2016), the power sector was the largest sector.30 (See https://afdc.energy.gov/data/10802.)	"Remains" is now replaced with "is".
13: Transportation	P3/L25	Perhaps replace “industry” with “sector.”	"Industry" is now replaced with "sector".
13: Transportation	P3/L32	Limiting global warming requires a path toward “achieving net-zero.”	Authors added "a path toward" in the sentence mentioned.
13: Transportation	P4/L10	Remove the White House citation.	The citation has been removed.
13: Transportation	P6/L4-6	Remove, “Cells with few or no bullets…” and complete a more comprehensive literature review.	Where there are fewer citations in the table cells more work is needed. An exhaustive literature review produced little supporting evidence. This is important for future work. No change was made.
13: Transportation	P6/L1-6	Table 13.1 caption uses term “bullets” in line 5. However, the table does not include bullets.	The final table as formatted by TSU does indeed bulletize the information.
13: Transportation	P8/L5	Spell out “DOT” acronym since this is its first use.	It is now spelled out.
13: Transportation	P9/L9	Perhaps replace “greater” with “increasing” or quantify what it is greater than.	KM2 has been rephrased significantly in response to additional comments; this term is no longer used.
13: Transportation	P10/L13-14	Perhaps replace the first “expected” since the sentence currently reads as “expected to perform well beyond expected.”	This section was rewritten (reference no longer exists).
13: Transportation	P13/L3	For most scientists, “significantly” would imply some test and confidence. Replace with a less loaded word.	This section was rewritten (reference no longer exists).
13: Transportation	P15/L1-6	This paragraph, which continues from the previous page, lacks citations.	Authors revised the paragraph to include several citations.
13: Transportation	P15/L27-28	Mention “non-combustion electricity generation.” It would be helpful to have a sentence devoted to the implications of fuel cell technology for transport.	No change has been made as we don't want to create bias by drawing attention to any one particular technology.
13: Transportation	P19/L18	This is the only time “rural” was mentioned in the entire chapter.	Rural is now mentioned in the introductory text.
13: Transportation	P19/L23	Spell out “TSU” acronym since this is its first use.	Spelled out TSU in text.
13: Transportation	P19/L34	Replace “…from other authors” to “…from other chapters.”	Replaced the word "authors" with "chapters".
13: Transportation	P21/L32-36	Replace semicolons with commas or break up the sentence.	Sentence has been revised.
14: Air Quality	P3/L35-36	Give examples of human-caused emissions.	We thank the reviewer for this comment. Examples of human-caused emissions are now given in the second sentence in the Introduction: "Ozone and fine particulate matter (PM2.5) are air pollutants ... that derive from emissions from a variety of natural and human-caused sources, including industry, power plants, vehicles, and agriculture."
14: Air Quality	P4/L25	Remove the period in “warming (KM 14.5)., is...”.	We thank the reviewer for spotting this typo. We have now fixed it.
14: Air Quality	P5/L4	Remove the underscore in “concentrations in the Northeast_”.	We thank the reviewer for spotting this typo. We have fixed it.
14: Air Quality	P5/L8-11	The caption for Figure 14.1 needs to be self-contained, and have citations	We appreciate this comment. We have added detailed description and citations for Figure 14.1 to the Traceable Accounts.
14: Air Quality	P6/L1-2	Font size of figure title changes.	We thank the reviewer for spotting this discrepancy, and have now fixed.

Chapter	Page/Line	Comment	Response
14: Air Quality	P6/L4-5	The figure captions shoulddescribe everything in the figure and explain all the acronyms. It looks quite busy: consider converting this to a mean and a range for each color instead?	We thank the reviewer for this comment. In light of this comment and others in the public review, we have simplified the figure. Details are provided in Traceable Accounts, and the underlying datasets and a detailed description will also be provided in the metadata accompanying the report.
14: Air Quality	P7/L34	Remove “and”in “problems, and worse outcomes for birth...”	We thank the reviewer for spotting this error. This extra "and" has been removed.
14: Air Quality	P8/L5-6	Climate change could increase the odds of wildfires, although land conversion is likely to decrease the land available for wildfires, so it may not be so certain that activity will increase. Perhaps modify to “...the chance of wildfires in many regions will increase.”	Thanks for this comment. The exact change specified here did not fit the sentence, but we have changed "is projected to increase" to "may increase".
14: Air Quality	P9/L3-5	Figure 14.3 caption should describe what is being shown: are these model-or observation-based? The grey versus the colored dots? Figure captions should be self-contained.	Thank you for this comment. We agree that figure captions should be self-contained and added additional description of the data shown in the figure.
14: Air Quality	P18/L15-22	Figure 14.10 is not very clear and seems unnecessarily busy. Perhaps just showing the range of values would be clearer.	Thank you for this comment. We have revised and significantly simplified this Figure. The new figure is 1 panel that plots the ratio of benefits to costs. The left panel of the former figure (showing $/ton values) has now been removed and is replaced by the range and median of studies in the main text of this section. The figure of the ratio of benefits to costs has now been simplified to plot all points along a single horizontal axis, and the figure has been shrunk vertically.
14: Air Quality	P18/L19	Spelling error in “... (in 2020 US collars)”.	With the revision to Figure 14.10, the figure caption no longer includes this text, since the figure no longer reports $/ton of health benefits.
14: Air Quality	P23/L21-34	This paragraph is missing citations: please include appropriate citations. Additionally, there was no previous citation to the epidemiology and toxicology studies that are referenced again here.	Thank you. We have added these references.
14: Air Quality	P26/L34	Add period between “change Conclusions”.	Thank you. We have revised as suggested to correct this error.
15: Human Health	P3/L16-18	This key message needs a confidence rating after the first sentence	Thank you for your comment. We added a confidence rating, "Very high confidence."
15: Human Health	P4/L10	Suggest using a dash instead of a comma.	Thank you for your comment. We removed the comma and used a dash. It now reads "...drought has been responsible for the second-highest number of climate-related deaths - approximately 99 per year."
15: Human Health	P5/L1-4	These two sentences could benefit from more specific details or examples. Is the second sentence referring to just the west or the entire Unites States? (Roughly half of increases in burn areas can be attributed to a warming climate.)	Thank you for your comment. We have made the following suggestion: Roughly half of the increases in burned areas in the United States can be attributed to a warming climate
15: Human Health	P5/L7-9	Suggest linking wildfire smoke to air quality first then associating it with impacts, and suggest defining cardiovascular-, cerebrovascular-, and respiratory-related health issues in line or providing examples of each.	Thank you for your comment. We have changed the sentence to specify exposure to wildfire smoke. We have opted to remove cardiovascular, etc. from our paragraph as the citations provide examples of specific health impacts.
15: Human Health	P5/L16	Clarify if increased rabies exposure referring to human exposure or animal exposure. If not to humans, please clarify the link to increased animal exposure to rabies and human risk as the tick-borne disease section does in line 36 on the same page.	Thank you for this comment. We added on details about spillover to humans at the end of the sentence, which now reads: The range of vampire bats in Texas and Florida is expected to increase in response to rising temperatures, which can lead to increased rabies exposure to humans through complex spillover pathways (Hayes and Piaggio 2018; Escobar et al., 2023).
15: Human Health	P5/L25	Suggest defining “vector.”	This term is defined in the Glossary. Also note that "dengue" should be removed from the definition of zoonotic disease in the Glossary. It is not a zoonoses.
15: Human Health	P6/L12	Suggest making the key the same color code as the images on the map.	Thank you for this suggestion. We have requested this change through TSU.
15: Human Health	P6/L19-20	This section is about both food and water;therefore,the first sentence should include water as well. Suggested text: “Climate change negatively impactsfood security, nutrition, water security, and water quality, which harms health, particularly for communities.”	Thank you for your comment. We have specifically added water quality and security, as well as additional citations to key messages in other chapters pertaining to food and water. The sentence now reads "Climate change negatively impacts water quality, water security, food security, and nutrition, which harms health, particularly for communities that rely on agriculture, fishing, and subsistence lifestyles (KMs 4.1, 11.2, 25.3)."
15: Human Health	P7/L23	Is the word “relatives”intended to be a different word? Otherwise, consider clarifying the meaning of “fauna relatives.”	Thank you for your comment. "Relatives" is the intended word. KM 24.2 includes a definition of using "relatives" instead of "resources", as noted in the report: "Indigenous groups throughout the Midwest recognize natural resources as persons and extended family (a kin-centric viewpoint) and use terminology such as“relatives” or “beings” instead of species at times (Reo and Ogden 2018)". Here is a citation for use of "Relatives": Reo, Nicholas & Ogden, Laura. (2018). Anishnaabe Aki: an indigenous perspective on the global threat of invasive species. Sustainability Science. 13. 10.1007/s11625-018-0571-4.
15: Human Health	P7/L27	This sentence is missing a citation.	Thank you for your comment. We have added a citation.

Chapter	Page/Line	Comment	Response
15: Human Health	P8/L13	If possible, provide a more recent reference for this sentence.	Thank you for your comment. The authors reviewed and think this is the most relevant citation for this sentence. However, in the paragraph we do include newer citations, including Thiery et al. 2021a, Hickman et al. 2021, Palinkas and Wong 2020, Coffey et al. 2021, and Thompson et al. 2018.
15: Human Health	P10/L3-4	The first sentence in the key message needs a confidence rating.	Thank you for your comment. We have used "unequivocally" and "it is an established fact" in the first and second sentence per NCA5 guidance and does not need a confidence rating. The 1st sentence now reads, "Climate change unequivocally worsens physical, mental, spiritual, and community health and well-being, and social inequities." The 2nd sentence now reads, " It is an established fact that climate related impacts disproportionately harm communities and people that have been marginalized."
15: Human Health	P10/L17	“BIPOC”and “low-wealth communities”may be fine words here, but the language to define specific vulnerable populations should be consistent across chapters in the report. As the language is now, many chapters use different terms to define similar populations. Suggest conformity and consistency across chapters.	Thank you for your comment. The authors have used language based on citations, Federal sources, and the general state of science and practice. While there may be some inconsistencies in language between chapters, the authors are using health-specific language in this chapter and have coordinated with other chapters where relevant.
15: Human Health	P10/L25-27	Suggest listing the six climate-related hazards in the caption of Figure 15.4.	Thank you for your comment. The authors have decided to keep the six climate-related hazards listed in the figure, to avoid repetition. The hazards will also be listed in alternative text for accessibility.
15: Human Health	P11/L29-33	Suggest referencing Chapter 16(Tribes andIndigenous Peoples)for these two sentences.	Thank you for your comment. We have added a reference to Key message 16.1, "Climate Impacts and Risks for Tribes and Indigenous Communities"
15: Human Health	P11/L30-31	It is not necessarily clear what “on the frontlines of climate change”means. Suggest defining in-line.	Thank you for your comment. We have removed this language for clarity. The sentence now reads "Indigenous peoples are among the first to face the threats and impacts of climate change."
15: Human Health	P12/L13	Suggest defining “redlining”inline and given that this term is used throughout the report it may also be included in a glossary.	Thank you for your comment - "redlining" is included in the glossary
15: Human Health	P12/L17-21	Consider explaining why Black and Latinx communitiesaremore likely to live in areas with high air-pollution levels.	Thank you for this comment. "Communities of color in the United States are systematically exposed to higher levels of air pollution." In the text we cite: Lane, et. al., 2022, who explore almost a century of how discriminatory mortgage appraisal practices, i.e. redlining, by the federal Home Owners’ Loan Corporation (HOLC), relates to present-day intraurban air pollution disparities in over 200 U.S. cities. Due to space limits we do not expand further in this section. The matter is addressed additionally in Key Message 20.5.
15: Human Health	P12/L24-27	Does the use of “women” here refer to all women? Additionally, clarify what populations women are being compared to when stating that they are more likely to live in poverty.	Thank you for your comment. Yes, this referers to all women, and particularly women of color. The text has been updated to read: "Women, and particularly women of color, are more likely to live in low wealth communities (Semega et al. 2020; James et al. 2016)"
15: Human Health	P13/L14	Describe why or how the discriminatory beliefs impact care.	Thank you for your comment. I have added more description on why discriminatory beliefs can impact care. I included a sentence on the reluctance of sexual and gender minorities (SGMs) to access care from faith-based organizations and a sentence on how health-care workers can also refuse to provide services to SGMs based on their religious bias during disasters.
15: Human Health	P13/L15-25	In the Figure 15.5 caption,specify what the underlying socioeconomic and demographic factors are. What does the sentence about a seemingly decreasing trend mean? Instead of “That would explain...”specify what “that”is. The first four sentences in this caption are unclear and unspecific.	There are many socioeconomic and demographic variables included in the Social Vulnerability Index used in this graphic. Thus, we are not listing all the factors in the caption for the graphic. The list of these variables are available at Model Variables Listing (vulnerabilitymap.org).
15: Human Health	P14/L6	Suggest a different word than “mainstream.”Consider also revising these sentences to have consistent tenses and reduce wordiness; they are confusing as written. A possible rewording could be “Proactive and continuous risk-management is critical to human health and well-being, particularly to protect at risk groups and health care facilities. Integrated approaches emphasize health in policies for food, infrastructure, water, and sanitation.”	Thank you for your comments. We have revised the first sentence as you suggested, and it now reads, "Proactive and continuous risk-management is critical to human health and well-being, particularly to protect at risk groups and health care facilities. " For the second sentence, the authors prefer to keep the wording as is, but we have added food systems and cited KM 11.1.

Chapter	Page/Line	Comment	Response
15: Human Health	P15/L2	Suggest clarifying why is there a growing “at risk”population and who this population includes.	Thank you for this suggestion. We revised the sentence to say: "...combined with urbanization (Khan et al. 2021) and the ageing of the US population (Vespa et al. 2018)..". We added the following citations in support of this statement: Khan, I., Hou, F. and Le, H.P., 2021. The impact of natural resources, energy consumption, and population growth on environmental quality: Fresh evidence from the United States of America. Science of the Total Environment, 754, p.142222. Vespa, J., Armstrong, D.M. and Medina, L., 2018. Demographic turning points for the United States: Population projections for 2020 to 2060 (pp. 25-1144). Washington, DC: US Department of Commerce, Economics and Statistics Administration, US Census Bureau.
15: Human Health	P15/L1-31	This section is missing the climate connection;audiences need that connection to be made overtly.	Thank you for your comment. This section is in the context of climate change, and the opening paragraph outlines the connections between climate change and heat-related illness and death. The authors felt that additional wording on the connection between climate change and heat is not needed in this section.
15: Human Health	P15/L32-37	This section is missing the climate connection;audiencesneed that connection to be made overtly.	Thanks for your comments. We have added a lead-in sentence: Considering both lower and higher representative concentration pathways, wildfire pollutant emissions are expected to increase and consequently will result in significant health burden (Neumann et al 2021).
15: Human Health	P16/L3-12	This section is missing the climate connection;audiencesneed that connection to be made overtly.	The following statement has been added to the beginning of the paragraph, citing references already included: Climate change is a significant contributing factor to the increase in vector-borne disease cases reported over the last 20 years (Bisanzio et al. 2020; Kugeler et al. 2021; Beard et al. 2019)
15: Human Health	P17/L13-24	This section is missing the climate connection;audiencesneed that connection to be made overtly.	The paragraph concerns vulnerability and adaptation assessments to understand and prepare for the health risks of climate change.
16: Indigenous	Intro (P3/L1-12)	The introduction would benefit from more text before the images that take up almost two full pages.	This change has been implemented.
16: Indigenous	P4/L12	Suggest ending the current sentence with a connection to Figure 16.3: “...strategies for adaptation to those changes which includes a holistic worldview.”	This change has been implemented.
16: Indigenous	P6/L3	Suggest “legal systems” rather than “legal environments.”	This change has been implemented.
16: Indigenous	P6/L23	Add the word “climate” in to replace “the” so that it reads “for the heightened severity of climate disruption.”	This change has been implemented.
16: Indigenous	P6/L25	Omit the word “their.”	This change has been implemented.
16: Indigenous	P7/L8-9	Suggest reordering to reflect the order of the key message as written and add energy if kept in this key message.	Authors have revised this text with this comment in mind.
16: Indigenous	P8/L4	Remove the period between “barriers” and “(Figure 16.4.”	This change has been implemented.
16: Indigenous	P9/L1-23	This section on COIVD-19 should reference the Focus on COVID-19 and Climate Change. If looking for an area to slim down, this paragraph is quite long and could be shortened.	This change has been implemented.
16: Indigenous	P10/L8-11	This holding did not occur in a vacuum; it is based on the evolving US tribal law and policy (here assimilation) from the 18th to the 20th century that influenced tribal actions. Suggest clarifying this in text to reflect this distinction: “Due to the evolution of colonial policies and US tribal law from the 18th century to present day, and the influence those laws and policies had on Indigenous actions, some Indigenous peoples face intricate land-based jurisdictional circumstances today that prevent recovery of their historically occupied territory. For example, the US Supreme Court’s holding in Carcieri v. Salazar (2009) prohibited contemporary land restoration for certain Indigenous peoples that historically acted on colonialist laws and policies.”	This change has been implemented.
16: Indigenous	P10/L11-12	Please add transition sentence between first paragraph to the second paragraph under “relocation.”	This change has been implemented.
16: Indigenous	P10/L25	Do these opportunities (a range of options) currently exist or is the use of the word “opportunities” to imply a change or possibility for progress? The options or changes could be explained in more detail.	This change has been implemented.
16: Indigenous	P13/L5-8	This sentence would benefit from an explanation why funding is not often distributed in “ways” (typo, not “was”) that Indigenous peoples can access.	This change has been implemented.
16: Indigenous	P13/L15-16	Suggest providing examples of coordinated infrastructure projects that mutually support one another.	This change has been implemented.
16: Indigenous	P13/L16	Please correct to be “Indigenous peoples’.”	Authors have revised this text with this comment in mind.

Chapter	Page/Line	Comment	Response
16: Indigenous	P14/L19	“Knowledge” can be both singular and plural: suggest removing the “s” from “knowledges.”	When referencing Indigenous knowledges, in sections of text pertaining to multiple tribes and communities, we would like to reflect the diversity and plurality of these knowledge systems across the 100s of tribes and Indigenous communities this chapter is reporting on. Use of plural also aligns with glossary standards for Indigenous peoples terminology developed for NCA and aligns with the Climate & Traditional Knowledges Workgroup (CTKW) Guidelines for Considering Traditional Knowledges in Climate Change Initiatives (https://toolkit.climate.gov/tool/guidelines-considering-traditional-knowledges-climate-change-initiatives) -DDC
16: Indigenous	P15/L3	The term “peoples” is more commonly used than “persons.”	Reviewed and checked
16: Indigenous	P15/L15	Please correct to be “Bureau of Indian Affairs’.”	This change has been implemented.
16: Indigenous	P16/L26	Suggest adding the research term, “land-based healing incitive” (Johnson-Jennings et al., 2020; Redvers, 2020).	Authors have revised this text with this comment in mind.
16: Indigenous	P20/L28-38	This is a great overview and could possibly be summarized or placed into introduction of chapter.	Built some of this text into intro
17: International	P3/L6-9	The final sentence of the first paragraph of the introduction is policy prescriptive and should be reworded slightly.	We thank the reviewer for the comment.The text has been revised to incorporate the suggestion. We edited the sentence to read "The pace of emissions reduction and adaptation response would need to accelerate this decade to both limit warming to 1.5°C (2.7° F) or 2°C (3.6° F) above preindustrial levels and to build resilience to existing and future climate impacts ." Also, the statement is supported by the literature.
17: International	P3/L16-17	The final sentence is too vague to be meaningful and should be revised.	We thank the reviewer for the comment.The text has been revised to incorporate the suggestion. We edited the sentence for clarity and now it reads "Adapting to a changing climate depends in part on the effective integration of climate information into decision-making at global, regional, national, and local levels."
17: International	P3/L16-25	Suggest removing this paragraph as it does not seem relevant to the chapter topic.	We thank the reviewer for the comment. We maintained paragraph as chapter topic includes information on responses to address complex challenges.
17: International	P4/L22-24	Last sentence of Key Message 17.1 is policy prescriptive and should be reworded slightly.	The senteced was revised to read "Adapting to a changing climate depends in part on the effective integration of climate information into decision-making at global, regional, national, and local levels." The statement is supported by the literature.
17: International	P6/L3	In Figure 17.1, the bullet “Climate resilience” under the heading “Climate resilience” is redundant and should be removed.	We thank the reviewer for the comment. This suggestion will be incorporsted in the figure revision. Climate resilience bullet will be removed.
17: International	P12/L10-11	The projection reported in the sentence is not present in the referenced source.	We thank the reviewer for the comment.The text has been revised to incorporate the suggestion. We revised the referenced source and bibliography to the correct source (Swiss Re 2021(b)).
17: International	P12/L25-26	Rising sea levels should not be listed as “less well quantified.” Sealevel rise is well observed and quantified.	We thank the reviewer for the comment.The text has been revised to incorporate the suggestion. We struck "less well-quantified" and ellaborated on the key distinction is extreme events (acute risks) vs. chronic risks (gradual).
17: International	P12/L26-27	Increasing average temperatures are not the concern. Global average warming is a useful indicator of climate change, but the impacts to health and agriculture will be regionally specific due to shifting patterns of temperature and precipitation.	We thank the reviewer for the comment.The text has been revised to incorporate the suggestion.We revised the text to state "the effects of increasing temperatures in vulnerable regions on health and agriculture."
17: International	P16/L2	The discussion suffers with combining observations and projections in one sentence (e.g., poverty rates).	We thank the reviewer for the comment.The text has been revised to incorporate the suggestion. We edited the text for clarity to include evidence and projections.
17: International	P21/L21	Suggest using a different word than “significant,” as it is an undefined term.	We thank the reviewer for the comment.The text has been revised to incorporate the suggestion. We replaced "significantly" with "exponentially".
18: Complex Systems	P6/L18-22	Is this an example of polarization or systematic discrimination?	We have clarified that both are relevant in the revised wording.
18: Complex Systems	P6/L25-28	Not clear what this has to do with complex systems.	The text has been heavily revised to emphasize cascading and compounding dynamics central to the focus of this chapter.
18: Complex Systems	P13/L4-16	Paragraph has no citations.	Additional citations have been added as well as references to other chapters' key messages.
18: Complex Systems	P13/11-16	Sentence filled with jargon.	Earlier attempts at extreme brevity are now instead relaxed, and the text has been expanded to reduce jargon and improve clarity, also with additional citations and references to other key messages for further description.
18: Complex Systems	P13/L19-26	Does the deep uncertainty to the complexity of the systems or the scenarios?	It refers to both. KM 18.1 indicates that changing scenarios (e.g., uncertainty in any one system) exacerbate complexity across systems given pre-existing gaps in cross-system relationships. We now cross-reference with KM 18.1 to increase clarity for the reader.

Chapter	Page/Line	Comment	Response
18: Complex Systems	P14/L6-8	Sentence is true but can price signals exacerbate unequal impacts?	Yes, that is correct. The sentence notes the "sometimes" effectiveness of market-based actions, but has now added references and discussion of the potential for inequitable access.
18: Complex Systems	P16-17/L26-10	Traceable account for Key Message 18.1: The Committee questions the ranking of high confidence in this emerging field. Many of the findings are based on one study, Reed et al. (2022), which is not consistent with the definition of high confidence provided in the Front Matter.	We noted in the text that Reed et al. (2022) "was an in-depth assessment by the research community directly building from NCA4, as well as recent literature outside the scope of that report. In addition to citing the report itself, Key Message 18.1 directly cites underlying literature from the MSD vision report. Given this foundation, the Key Message draws from an expansive evidence base, for which agreement in the literature pertains both to areas of agreement across studies and to deep uncertainties that remain." We have now revised the traceable account to explicitly indicate the many relevant key references, rather than the prior more succinct presentation.
19: Economics	P4/L3	Lipton et al. (2018) is about migraines. From the title of the publication, it is not clear it has anything to do with climate change.	Thank you for catching this error: the citation was meant to be Lipton, D., M.A. Rubenstein, S.R. Weiskopf, S. Carter, J. Peterson, L. Crozier, M. Fogarty, S. Gaichas, K.J.W. Hyde, T.L. Morelli, J. Morisette, H. Moustahfid, R. Muñoz, R. Poudel, M.D. Staudinger, C. Stock, L. Thompson, R. Waples, and J.F. Weltzin, 2018: Ecosystems, Ecosystem Services, and Biodiversity. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA, pp. 268–321. doi: 10.7930/NCA4.2018.CH
19: Economics	P4/L16	The literature is filled with studies on the economic impact of climate change on agriculture and only one citation is given here. Does the new work on agriculture completely negate older studies (e.g., Rosenzweig and Parry, 1994)?	Schlenker and Roberts (2009) is a seminal study that is highly representative of other recent findings throughout the literature. Our citations in this sentence and throughout the chapter are not meant to be exhaustive given the limits on the length of the chapter. Rosenzweig and Parry (1994) is based on process-based agronomic models, whereas Schlenker and Roberts (2009) use a statistical model estimated using observed yield and weather realizations. A major limitation of agronomic models like the one of Rosenzweig and Parry (1994) is that they are validated using experimental data, which may not be reflective or real-world conditions. At least within the economics community, the statistical methods pioneered by Schlenker and Roberts (2009) are generally considered more appropriate for studying climate change impacts on agriculture, and have become standard. The quantitative results from these studies are generally considered more authoritative than the results from processed-based models that are not validated using observational data. For a more complete discussion of the differences between process-based and statistical models, see Roberts et al., "Comparing and combining process-based crop models and statistical models with some implications for climate change," Environmental Research Letters, 2017.
19: Economics	P6/Table 19.2	"Student Learning" row: The Park et al. study finds that the adverse impact can be offset by use of air conditioning.	We have added "no adaptation" to the cell text to clarify this point. We elected not to add the air conditioning number, as the interaction used is not causal, and thus we cannot say definitively that air conditioning mitigates adverse impacts
19: Economics	P9/Figure 19.2	The figure is hard to read and might be easier to read if it is displayed in a landscape format.	We are working with TSU to improve the layout of this figure to make it more readable.
19: Economics	P18/L27-28	The literature on climate change and violence is thin and needs a lot more analysis to establish a reasonable level of confidence	After revisitng these citations, we maintain our assessment of the literature given the large number of studies contained in the review studies. This is in line with our treatment of other literatures mentioned in this chapter.
19: Economics	P18/L24-27	Judicial decisions, political turnover, etc. seems to be somewhat speculative	We have examined the cited references and our assessment is that they represent the best scientific methods for assessing these risks.
19: Economics	P21/L11-33	Consider including uncertainties about societal changes (e.g., population, income, and technology).	Thank you for this comment. We have included a reference to uncertainty in projections of population, income, and technology in the paragraphs mentioned.
19: Economics	P24/L3-17	Consider including adaptation	Thank you for this comment. We have mentioned adaptation in the paragraphs flagged.
20: Social Systems	P4/Figure 20.1	Consider clarifying the purpose of this figure. Is the purpose to introduce three dimensions of justice for assessment analysis?	We have rewritten the introduction, which we believe better clarifies the purpose of the figure. All key messages also reference justice and so the figure works better as an introductory conceptual framing for the chapter.
20: Social Systems	P8/L15	Add a period after "2017) …"	We have thoroughly copy edited.

Chapter	Page/Line	Comment	Response
20: Social Systems	P9/Figure 20.2	This figure does not provide essential information and could be described in one to three sentences.	We appreciate that this figure is simple; and understand that the information could be conveyed in language. However, we have decided to keep it. Despite it's simplicity, we understand that the process of including stakeholders in communications about climate change are still rare. We think the simplicity adds to the accessibility and straightforwardness of the point.
20: Social Systems	P10/L8-11	Remove the period between "society. (Oreskes..."	We have better copy edited the chapter.
20: Social Systems	P13/Figure 20.3	If this figure intends to demonstrate that social systems influence migration and that climate change may exacerbate but that planned relocation could increase just outcomes, the message is not well understood through this Bronfenbrenner ecological framework and more recent frameworks have been presented in the literature.	We have made changes to the figure in order to make it clearer and more straightforward. We are using as a model a very prominent framework in the climate migrations literature; which is distinct from the Bronfenbrenner ecological framework in conceptualizing the interactions among ecological and social systems, and which de-emphasizes the individual. Additionally, we are pulling in the social science literature that conceptualizes the coast itself as socially constructed.
20: Social Systems	P14/L11	Add a period after "...2022)."	We have copy edited the chapter.
20: Social Systems	P14/L22	Use lowercase "h"in "Hired."	We have copy edited the chapter.
20: Social Systems	P15/L17	Remove "a"in the "right to a fair...."	We have copy edited the chapter.
20: Social Systems	P15/L19	Add a comma between "oil gas."	We have copy edited the chapter.
20: Social Systems	P17/L18	Suggest "Indigenous knowledge"instead of "Indigenous knowledges."	Because Indigenous peoples are a multi-cultural group; Indigenous knowledges (vs. Indigenous knowledge) is commensurate with the language of Indigenous studies and other disciplines.
20: Social Systems	P18/L11	Replace "such" with "human."	The Chapter has changed so significantly in response to NASEM comments that we cannot track this suggested edit.
20: Social Systems	P21/L30	Italicize "high confidence"for consistency.	We have done so.
20: Social Systems	P23/L31	Add "a"between "identify [a] research gap"and remove "research."	We have changed the chapter so significantly in response to the NASEM comments that we cannot track this suggested edit; but we have copy edited the chapter thoroughly.
20: Social Systems	P26/L8-9	Add "is"between "Much of that literature [is] also based..."	We have changed the chapter so significantly in response to the NASEM comments that we cannot track this suggested edit, but we have copy edited the chapter thoroughly.
21: Northeast	P4/L18	Suggest using more recent projections if possible, and the statement could benefit from some people-focused context	Thank you for the comment. The authors conferred with the Chapter 2 team and will be referencing the most recent projections as provided in that chapter. We also added Gonzalez (2019) as a reference, and restructured the paragraph to make it shorter and to the point.
21: Northeast	P4/L27	Suggest expanding this discussion. The Northeast is heating faster than most regions of North America and extreme heat events cause more deaths each year than all other extreme weather events combined. This should be reflected in a more balanced summary of extreme precipitation and extreme heat impacts.	To address the point that the impacts of extreme heat are significant in the region, we specifically mention them in the KM1 narrative text. We consulted with Chapter 2 authors and have clarified that our coasts are warming faster than other regions, which is already stated in Chapter 2. However, the point made about impacts has been underscored in the revised text.
21: Northeast	P4/L31	Social impacts are suggested but there is little mention of social impacts afterwards.	The authors significantly revised KM 21.1 to respond to other NASEM comments while preserving narrative flow. The new text includes more discussion of social vulnerability and impacts to overburdened populations.
21: Northeast	P4/L34	Suggest using the term "hurricane" instead use of "cyclone," based on the NOAA definition: "Hurricanes, typhoons, and cyclones are actually all the same type of storm, but have different names based on where they form. In the North Atlantic and central and eastern North Pacific, these storms are called "hurricanes." In the western North Pacific, they are called "typhoons" and in the South Pacific and Indian Ocean, they are called "cyclones."31 (31 Tropical cyclones are rare in the South Atlantic: https://www.noaa.gov/education/resource-collections/weatheratmosphere.)	Thank you for the comment. We revised the text to use the phrase "tropical systems and nor'easters." We originally used the term "cyclone" to recognize that storms do not have to be tropical or of hurricane strength to produce a damaging storm surge in the Northeast ("hurricane" implies a system has a 64kt or greater sustained wind: https://glossary.ametsoc.org/wiki/Hurricane). Examples of storm surges from storms that were not hurricanes include the extratropical transition of Sandy in 2012, or the Ash Wednesday storm of 1962. The American Meteorological Society Glossary of Meteorology does refer to both "tropical cyclones" and "extratropical cyclones" for these systems, but we recognize that using "cyclone" shorthand is jargon to the public.
21: Northeast	P4/L36	Suggest "projected" rather than "expected." This is a numerical projection and is probably based on a specific scenario which should be mentioned in the text.	Thank you for the comment. The relevant paragraph has been edited substantially, so this language and the Sweet et al. 2022 reference are no longer used.
21: Northeast	P5/L1	Increased nighttime temperatures also have significant implications for public health.	The authors significantly revised KM 21.1 to respond to other NASEM comments while preserving narrative flow. The new text expanded the discussion of heat wave impacts. While we agree nighttime temperatures have implications, for space the authors chose to focus on broader points on health impacts of heat waves with Northeast-specific citations.

Chapter	Page/Line	Comment	Response
21: Northeast	P5/L11	“Pluvial” should be defined parenthetically as “fluvial" is in line 18.	Thank you for the comment. Due to a substantial rewrite, authors refer now to "urban and flash flooding".
21: Northeast	P5/L16-17	Needs a reference.	Thank you for the comment. Authors added the Beven et al. 2022 reference to this section.
21: Northeast	P6/L27-39	The paragraph is not specific to the Northeast region.	Thank you for the comment. Added reference to ProQuest Newspaper figure; updated text to reflect relevance to NE region.
21: Northeast	P6/L30	Cite Chapters 14 (Air Quality) and 15 (Human Health).	Thank you for the comment. Suggested citations of Ch 14 & 15 added.
21: Northeast	P8/L12	Suggest using “climate change” rather than “warming” because the sentence includes discussion of acidification.	Thank you for the comment. We have replaced the word "warming" with "climate change"
21: Northeast	P12/L30-38	The discussion of oxygen loss lacks explanation for general audiences and introduces related concepts (added nutrient load) without showing the connection.	Thank you for the comments. We have clarified the connection between nutrient enrichment and oxygen loss.
21: Northeast	P14/L14	The term “mitigation” is used in the context of adaptation as mitigation of impacts.	Thank you for the comment. We have revised the sentence by removing the word "mitigation" in this case and revising to "to reduce potential climate change impacts."
21: Northeast	P14/L38	Based on racial discrimination is an important omission. Redlining is an important example of structural racism that has many present-day ramifications that have increased vulnerability to climate impacts.	Thank you for the comment. Suggestion accepted and added to text.
21: Northeast	P15.L6-17	Suggest noting implications for morbidity/mortality as well	Thank you for the comment. This is addressed later in the chapter; No change required.
21: Northeast	P16/L10-13	These lines present an opportunity to identify connections between important equity-related issues (e.g., air quality, urban areas, redlining, environmental justice).	Thank you for the comment. Suggestion accepted and added to text.
21: Northeast	P16/L13	“Reasons for the regional differences are unclear.” Please see literature on redlining and urban heat islands as well as air quality and environmental justice literature.	Thank you for the comment. Suggestion accepted and added to text.
21: Northeast	P16/L18	Perhaps “genital and urinary” rather than “genitourinary.”	Thank you for the comment. Suggestion accepted and added to text.
21: Northeast	P16/L23-33	Important to integrate the idea of a just transition here with broad implications not only for energy insecure populations but also for impacts to fossil fuel-dependent livelihoods and communities particularly in West Virginia.	Thank you for the comment. A cross-reference was added to a relevant discussion in a key message in the Social Systems and Justice chapter.
21: Northeast	P17/L22-23	Suggest adding “structural, political, and socioeconomic.”	Thank you for the comment. Suggestion accepted and added to text.
21: Northeast	P17/L33	Suggest adding “and burdens” so the sentence reads “…benefits and burdens…”	Thank you for the comment. Suggestion accepted and added to text.
21: Northeast	P18/L17-20	The sentence could be interpreted as being policy prescriptive. Alternative wording could be “In response to the announcement of intended withdrawal from the Paris Agreement in 2017 (the withdrawal had to wait 3 years), states, municipalities, tribes, and businesses…”	Thank you for the comment. The proposed edit changes the message relayed here, as reflected in the cited literature. While we disagree that policy prescription could be inferred with this statement, we agree that subjectivity was introduced with the word "serious". As such, we deleted that word and clarified who was raising these questions (i.e., international and sub-national constituencies), while also making it more clear that the consequence of this political uncertainity at the federal level was activating sub-national climate action.
21: Northeast	P26/L5	Suggest adding “households” to communities and businesses (there are a number of state-level incentives for household-level mitigation).	Thank you for the comment. Suggestion accepted and added to text.
21: Northeast	P27/L3	Suggest giving context on the Federal Emergency Management Agency (FEMA) flood map underestimation of risk.	Thank you for the comment. Suggestion accepted. Authors added context and a reference regarding FEMA underestimation of flood risk.
21: Northeast	P28-29/LL26-19	Lack of well-defined metrics is another important obstacle for private-sector investment.	Thank you for the comment. Comment accepted and added to text.
21: Northeast	P29/L14-15	Cites “USA facts 2021” as the only source for the paragraph.	Thank you for the comment. Added new reference in paragraph, a Congressional Budget Office report on transportation and water systems.
21: Northeast	P32/L5-7	The discussion on research gaps regarding Key Message 21.2 mentions “multiple sources, especially farmers…” regarding droughts and high moisture. This appears to be introducing new evidence and is not cited. Recommend moving this to the text on Key Message 21.2.	The authors concurred with this comment and moved this evidence to the main text on Key Message 21.1. Authors no longer consider this a gap after finding further evidence.
21: Northeast	P34/L6-14	An additional question is whether jurisdictions will be able to overcome non-financial barriers to adaptation (since finance is covered in Key Message 21.5).	Thank you for the comment. The suggested text has been added.
22: Southeast	P3/L2	The word “eons” is too technical. Consider rephrasing.	We thank the reviewer for the comment. We have edited "eons" to say "centuries" instead.
22: Southeast	P3/L8	The word “animus” is too technical. Consider rephrasing.	We thank the reviewer for this suggestion and have changed the word "animus" to the more appropriate term "aggression."

Chapter	Page/Line	Comment	Response
22: Southeast	P3/L11	The word “chattel” is too technical. Consider rephrasing.	We thank the reviewer for this comment, and have rephrased the technical term "chattel slavery" to read "slavery and intergenerational ownership of individuals as property."
22: Southeast	P4/L12	Suggest including research on Ida or any of the major storms more recent than Katrina.	We have changed this to demarcate the poor responses to a range of hurricanes, including now citing a paper on Ida (2021).
22: Southeast	P9/L25	Please specify what “the region” represents.	We have added specificity referring to "the region" as "the Southeast," the subject of this particular chapter.
22: Southeast	P11/L9	Suggest also including North Carolina (Cherokee).	We have replaced the states listed with the broader "across the southeast" description.
22: Southeast	P11/L26-27	Change to present tense.	We have accepted this change.
24: Midwest	P3/L26	Wording choice. Once something is “built "it is “aging. "Perhaps cite the median age of infrastructure here?	We thank the reviewer for this comment. We have adjusted the language to remove the redundancy.
24: Midwest	P4/L16	There is no likelihood statement.	Per USGCP guidance, likelihood statements should be used "if and only if the uncertainty associated with the finding can be expressed quantitatively or probabilistically established." In this case, the authors have assessed that the current literature does not provide an adequate quantitative measure of the environmental and economic sustainability outcomes. Therefore, the authors have chosen not to include a likelihood statement with this sentence but do include a confidence based on the breadth of the work.
24: Midwest	P4/L23	Annually may be used incorrectly. Suggest clarifying by stating that “annual precipitation has increased,” not that “it increased annually.”	Authors have changed the sentence according to the suggestion. The sentence now reads: "Annual precipitation has increased by 5%–15% across much of the Midwest. . ."
24: Midwest	P5/L3-7	It is not clear that the left panel is properly explained and related to the others.	Thank you for your comment. Authors have clarified both how the SPI is defined as well as made clear the differences between the far left panel (observed) and the middle and far right panels (projections).
24: Midwest	P8/L18	Please change to “crop insurance losses continue.”	This wording has been changed as suggested.
24: Midwest	P10/L8,11	There is no likelihood statement.	Per USGCP guidance, likelihood statements should be used "if and only if the uncertainty associated with the finding can be expressed quantitatively or probabilistically established." In this case, we cannot provide a quantitative assessment of likelihood.
24: Midwest	P15/L9	There is no likelihood statement.	Per USGCP guidance, likelihood statements should be used "if and only if the uncertainty associated with the finding can be expressed quantitatively or probabilistically established." In this case, we cannot provide a quantitative assessment of likelihood.
24: Midwest	P15/L32-33	This sentence leaves the reader wondering why this difference.	Thank you for this comment. The authors have added a statement to assist with interpretation of the drivers of this change. However, it is worth noting that ground-level ozone and population characteristics are both complex and influenced by a subset of drivers which make it difficult to attribute to one sole cause.
24: Midwest	P16/L18-19	Suggest clarifying this logic. Certainly, other regions have higher population.	Thank you for this comment. To clarify the logic authors have added additional information from (Sorenson et al. 2021): "This may be due to the larger population in this region, compared to other study regions, or the lack of personal protective behaviors (Sorenson et al. 2021)."
24: Midwest	P19/L3-5	This diagram shows the annual values, from which one can infer the change. Suggest removing first two words.	Authors have accepted this recommendation and rewritten the statement as "Annual reports of Lyme disease..."
24: Midwest	P20/L15-19	This sentence (“Sufficient...”) borders on tautology. Perhaps “more" are needed but that begs the question how much more. Perhaps the chapter authors can be more specific here. Twice as many? Or perhaps the sentence can say that Centers for Disease Control and Prevention(CDC) suggests a model of how increases in resources correlates with improved outcomes.	Thank you for this comment. It is not possible to quantitatively determine the relative increase in data, technical services, and tools needed across the Midwest to increase effective management of climate-related health risks. However, authors agree with the comment to explicitly highlight the cited CDC 2022 report as an example of the type of resource needed to increase effective management of climate-related health risks. We have added a sentence to this effect.
24: Midwest	P20/L29	There is no likelihood statement.	Per USGCP guidance, likelihood statements should be used "if and only if the uncertainty associated with the finding can be expressed quantitatively or probabilistically established." In this case, we cannot provide a quantitative assessment of likelihood.
24: Midwest	P20/L30	This fails to mention the electric grid, one of three sectors mentioned in the key message first sentence.	This has been addressed by reviewing the ASCE ranking of electric grid condition and now grid distribution and transmission is included in the opening statement

Chapter	Page/Line	Comment	Response
24: Midwest	P20/L32	...are in need of repair." Can this be quantified? What fraction? What dollar value? Or provide some other sense of the magnitude of the problem.	Thank you for this comment and recommendation. The authors addressed this comment through providing a reference to the per capita cost of estimated infrastructure repairs for the MW region.
24: Midwest	P21/L3	"Recent grades" assumes the reader knows what is being graded; please rephrase.	Thank you for this comment. The authors have rephrased this sentence with the definition of the grading methodology by ASCE.
24: Midwest	P21/L19	"...high (A1B) and very high (A2)"The chapter authors should consider how to mix Special Report on Emissions Scenarios(SRES)and later scenario generations, so the reader does not get confused or overwhelmed.	The authors thank the reviewer for this comment. Per USGCRP guidelines, the use the Special Report on Emissions Scenarios (SRES) is acceptable and the authors have utilized the qualitative statements (high, very high) consistent with other scenario language throughout the report.
24: Midwest	P23/L14	Does this imply that a return period of 1 year signifies an extreme event? Also, given the non-stationarity, should chapter authors not be encouraging the use of exceedance probability language?	The authors thank the reviewer for this comment. They have addressed the reviewer's concern by referencing the increase in extreme precipitation events in figure 2.7 and noting that extreme events are locally-dependent on trends and conditions.
24: Midwest	P25/L31-34	This suggests an interesting challenge. Is there any assertion that this small percent increase poses a problem? Is the annual value really the most helpful one to cite?	The uncertainty in changes grow as you go to smaller times steps like monthly or seasonally so annually is a good overall summary of changes and that is an accepted way to present things. If you have 5 or 10 decades of say a 0.5% or 1% change average out from a range of extremes, that can be quite significant. For example, a 1% change in the eastern Midwest over 7 decades is a 7% chance. 7% of 40 inches annually is 2.8 inch change. We also know our models are not that good at the magnitude of changes. In the last decade for example, in the Ohio Valley our increase annually average almost 2 inches which was over a 5% change and the number of significant floods was more in the last decade in many locations than at any time in the last century on a large scale basin. We do not expect any changes to this statement. The goal of this literature review is to offer supporting documents of potential changes that feed into the cumulative approximate local gridded runoff changes that follow.
24: Midwest	P27/L19	Is the type of aquifer the most important information about the groundwater system to convey? Perhaps the status of the groundwater system would be more pertinent in this report. Given the topics discussed in the text, a map of what percent of water resources comes from groundwater may be more pertinent. Also use only or mark the Midwest boundaries.	Thank you for the comment. We have added a boundary for the Midwest region in the figure. The goal of the aquifer graphic was to show where the aquifers with deeper ground water were located versus the gray areas which geographically rely on surface water and the vulnerability created by changing precipitation, runoff, evapotranspiration including droughts and drinking water quantity. It was not focused on the health of the aquifers. An item could be added to traceable accounts noting the need to focus in NCA6 on the health of our aquifer systems.
24: Midwest	P28/L24	"Precipitation is expected to increase..."on the order of 1percent according to the key message.	We thank the reviewer for their comment. We do not see where the 1% was stated in our key message, however, we do state in the text the range of projected annual precipitation increase of 0.3% to 1.5% per decade in the eastern Midwest and 0.2% to 0.5% in the western Midwest. We recognize that using ensembles, there is a probabilistic distribution, and important to this chapter, the approximate cumulative local gridded runoff over multi decades increases far more as variability and extremes increase.
24: Midwest	P29/L8	Suggest citing literature that demonstrates change versus variability.	The authors thank the reviewer for this comment. The authors do not think that this text is needed in this section of the report to clarify the differences between climate change and variability. Both terms are defined in the report glossary and are usage here is consistent with these definitions. Since the IPCC climate scenario based models do not fully represent the Great Lakes and the actually bodies of water, the focus was on trends and general projections of temperatures and precipitation.
24: Midwest	P30/L7	Change "impact of" to "impact on."	Thank you. This change have been accepted.
25: Northern Great Plains	P4/L1-3	Suggest defining the region; which states are included? Add some context for the region.	Thank you for the comment. The author team has added a list of the states in-text to the draft to clarify for the region.
25: Northern Great Plains	P4/L2-3	The sentence could be written about any region.	Thank you for this comment. The authors have made this language more specific to address the identified issue. The new text reads "Economic dependence on crops, rangelands and recreation make residents vulnerable to climate-related changes in weather, as wells as flows of water, nutrients, and wildlife across the landscape (Wienhold et al. 2018; Briske et al. 2021; Miller et al. 2022a)."

Chapter	Page/Line	Comment	Response
25: Northern Great Plains	P4/L7-8	Suggest splitting this sentence into two sentences.	Thank you for this comment. The author team has reworded based on this suggestion. Rewording states: The region's relatively limited development and rurality (Figure 25.1) provide intact natural areas. This matrix of farms and wildlands are habitat for resident and migrating species, which are threatened by changing water availability.
25: Northern Great Plains	P4/L26-27	A region diversifying could be a lot of different things—for example, economic diversification; suggest "experiencing population diversification" or "becoming more culturally diverse."	Thank you for this comment. The report text has been revised to incorporate the suggestion. The text has been changed to say "becoming more culturally diverse."
25: Northern Great Plains	P5/L14-15	"Challenges" is used twice in this sentence; suggest using "changes" the second time the word is used.	Thank you for this comment. The report text has been revised to incorporate the suggestion.
25: Northern Great Plains	P6/L15-16	This language (days then nights in parentheticals) is confusing; suggest clarifying in text.	Thank you for the comment. The author team has changed the wording to remove reference to "days."
25: Northern Great Plains	P6/L17-19	Suggest clarity in language by inserting introductory sentence: "The region has experienced less very cold days (defined as a maximum temperature of 0°F or lower) than the historic average (defined as …) for the past few decades. For instance, there have been less very cold days than the long-term average in Montana since 1985, in…".	Thank you for the comment. The report text has been revised to incorporate the suggestion. The text now reads: "The region has experienced fewer very cold days (defined as a number of very cold days (maximum temperature of 0°F or lower) than the long-term average (defined as 1900-2020) for several decades. For instance, the number of very cold days has been below the long-term average in Montana since 1985, in Nebraska since 1990, and in Wyoming, North Dakota, and South Dakota since 2000 (Frankson et al. 2022a-e)."
25: Northern Great Plains	P6/L22-26	Insert "resources" after "on groundwater." Suggest describing whether this is in the whole Northern Great Plains (NGP) region or just some states? Suggest citation of Siirila-Woodburn et al. (2021).	Thank you for this comment. The report text has been revised to incorporate the suggestion. Added "resources" after groundwater. Added citation, also keeping existing 2018 citation as the new 2021 paper is for Montana and Wyoming only in the NGP.
25: Northern Great Plains	P9/L15	Suggest mentioning the states that are headwater states for the Colorado River basin.	Thank you for this comment. The report text has been revised to incorporate the suggestion.
25: Northern Great Plains	P12/L18-24	Spiritual health is mentioned in the key message language and not in the supporting text. Please incorporate spiritual health into supporting text or remove from key message language.	Thank you for this suggesstion. Text supporting the key message has been added into the chapter narrative.
25: Northern Great Plains	P12/L26-27	Rephrase with active voice to remove passive voice: "Literature recognizes a spectrum of…".	Thank you for this suggestion. The text has been resived as follows to address this concern: Climate change adversely affects mental and spiritual health in multiple ways (Ch 15; Adams et al. 2021; Palinkas and Wong 2020).
25: Northern Great Plains	P12/L31	Note that the Burke and Yazd studies are about national mental health risks, not specifically about the NGP. This is not the only place in the chapter where national studies are cited to for a statement about the NGP region. Please ensure that citations to literature discussing national trends are represented that way in the supporting text.	Thank you for the suggestion. We have revised the narrative to make the distinction between regional and natioinal studies.
25: Northern Great Plains	P13/L18-19	Is there any more recent literature on West Nile virus or vector-borne diseases in the region than 2014? Check Chapter 15 (Human Health).	Thank you for this suggestion. The narrative has been revised as follows and the list of citations updated: Rising temperatures, as well as other climate impacts, are expected to increase prevalencethe risk of some vector-borne diseases, such as West Nile virus (Harrigan et al. 2014; Paull et al. 2017; Smith et al. 2020)."
25: Northern Great Plains	P14/L5-8	Suggest defining nutrient load to incorporate the volume of the nutrient, passing through a single location, over a set period of time rather than just the volume. Is there more recent literature on this than 2014-2015?	Thank you for this comment. The author team has updated the definition as suggested, added more discussion on water quality issues to the Traceable Account, and added a few citations to the paragraph including editing the final sentence of the paragraph to read "Nutrient runoff from agricultural land spikes after heavy rain and contributes to harmful algal blooms and transport of nutrients to the Gulf of Mexico (KM 25.5; Lu et al. 2020; Michalak 2016; Otten and Paerl 2015)."
25: Northern Great Plains	P15/L4-23	Suggest renaming "loss of biodiversity" to "compound biodiversity impacts of climate events" to mirror earlier section discussing "compound health impacts of climate events."	Thank you for this comment. The report text has been revised to incorporate the suggestion.

Chapter	Page/Line	Comment	Response
25: Northern Great Plains	P18/L11-20	This section (three paragraphs) is unclear. The example is Texas, but then discusses outages in the NGP region. Were there power outages in NGP states due to Texas strains on the grid? Suggest revising to improve clarity and indicate the relationship to NGP region. Move last sentence up. Use active voice where possible. A rewrite could be something like this: “Climate change impacts and mitigation efforts are expected to increase energy demand across North America. Higher summer temperatures and heatwaves are expected to increase energy demand across the country, while higher winter temperatures and fewer cold snaps are expected to reduce energy demand for heating in the Northern Great Plains. Increased energy demands from outside the Northern Great Plains will place demands on regional energy resources and electricity supply. Climate change will also stress energy infrastructure (e.g., rail, pipelines, distribution lines, transmission lines). Energy infrastructure is vulnerable to climate extremes. For instance, the power outages that resulted from the 2021 extreme cold event in Texas illustrate the importance and connection between demand, supply, and distribution across the US during extreme weather events.”	Thank you for this comment. The report text has been revised to incorporate the suggestions. The author team adopted the use of active voice and reworded much of the paragraph. The author team removed the Texas reference as it did not directly refer to the NGP region and added a sentence to the traceable accounts regarding the absence of literature on the effects of external power grid demands due to extreme climatic events on the region.
25: Northern Great Plains	P18/L21-37	Add in transition phrases and sentences; this section reads rather choppy. Discuss the expected impacts of energy-sector changes to energy-sector jobs.	Thank you for this comment. The report text has been revised to incorporate the suggestions. The author team added an introductory paragraph to help focus the section and then made sure to add topic sentences to the section paragraphs to provide more clarity and focus to the section. The author team decided to not increase the discussion on energy-sector changes to energy-sector jobs as the various cases that could occur are numerous and unable to be covered adequately in the chapter. The author team have left it as a general assumption that jobs will change if the energy-sector changes. Instead, the team included a sentence in traceable accounts outlining how scenario planning for energy-sector changes and their implications for changes to the available jobs will be key for the region.
25: Northern Great Plains	P20/L19	Offset “and exacerbating existing” with commas.	Thank you for this comment. The report text has been revised to incorporate the suggestion.
25: Northern Great Plains	P20/L27	Rather than contextualize this as “renewable and nonrenewable” suggest “shifts in energy demand, production, and policy will change land-use needs for low and zero carbon energy infrastructure and development” to improve consistency with other chapters in the report (Chapters 5 [Energy Supply, Delivery, and Demand] and 32 [Mitigation]).	Thank you for this comment. The report text has been revised to incorporate the suggestion. The author team removed the "renewable and nonrenewable" language from the key message to better align with chapters 5 and 32. In addition, the author team chose not to specify the type of energy infrastructure development as the type of energy infrastructure development is dependent on what the shifts in energy demand, production and policy will be.
25: Northern Great Plains	P21/L11	Since there is some discussion on mitigation, the section heading should be changed to state that it covers barriers to mitigation and adaptation.	Thank you for this comment. The report text has been revised to incorporate the suggestion.
25: Northern Great Plains	P21/L15-16	It is not accurate to say this region discourages a transition and economic diversification. It is accurate to say there is resistance to turning completely away from fossil resources entirely. Suggest citation of Righetti et al. (2021).	Thank you for this comment. The report text has been revised to incorporate the suggestion. It is not the region that discourages, but dependence on revenue and jobs that discourages the region from taking action to transition. It isn't materially different from saying there is resistence to turning away from fossil fuels.
25: Northern Great Plains	P21/18-19	This paper cited does not discuss water regulations and rights and this is not accurate without more clarification. What water regulations and rights are the chapter authors referring to here? Please clarify.	Thank you for this comment. The report text has been revised to incorporate the suggestion. The author team clarified that this reference discusses regulations and rights around surface water storage, and more specifically, around the implementation of beaver dam analogs to capture water on the landscape.
25: Northern Great Plains	P22/L4-11	Integrate with energy discussions in Chapters 5 (Energy Supply, Delivery, and Demand) and 32 (Mitigation). This chapter could be from a different report with only categorization of “renewables” versus “non-renewables” and that categorization oversimplifies the issues. See discussion of other low- and zero-carbon technologies in other chapters: Chapter 32 (Key Message 32.4); labor section on page 29 (Key Message 32.2); Low-carbon fuels needed for some transport and industry applications; and Chapter 5 page 5-17. Nuclear, innovated low-, negative-, and zero-carbon solutions, increased production of low-carbon electricity including nuclear as well as fossil fuel electricity with CCUS.	Thank you for this comment. The report text has been revised to incorporate the suggestion. To expand and integrate the energy transition discussion beyond renewables, the author team added this text (in italic): The Inflation Reduction Act of 2022 is expected to accelerate deployment of renewable energy sources (Jenkins et al. 2022) and the region may benefit from investments in hydrogen hubs, carbon capture storage and utilization, and advanced nuclear reactors. To support that assessment, we added references to NCA Chap 5 and to the Wyoming Energy Authority 2023.

Chapter	Page/Line	Comment	Response
25: Northern Great Plains	P23/L10	This section omits discussion about the transition period between now and when the nation can be more fully reliant on renewables. The IRA reflects this with funding mechanisms for industry and commercial build out. Suggest more inclusive discussion of this transition period and the IRA support for many different types of energy development to better align with other chapters in the report (see comment above).	Thank you for this comment, although the author team does not feel additional changes are needed at this time. The chapter has a robust discussion of how the transition may play out in the NGP region. The request here to align the transition discussion with Chapter 32 Mitigation isn't appropriate. Chap. 32 cites decarbonizatoin pathway models that work backwards from Net Zero targets to explain the types of infrastrucure and energy facilities that would meet emissions targets. Documenting the technologies needed to meet net zero goals is different from an assessment of transition policy and progress in the NGP region. The NGP chapter cites literature specific to the NGP, including state policy and capacty limitations that will shape the way technology is adopted in the region that may be different from the modeled assessments.
25: Northern Great Plains	P23/L19-21	Nuclear also requires significant water for cooling; hydrogen does as well for production. Biofuels do use significant water for irrigation and for cooling if burned for electricity. Water use within a state is controlled by state law; water use for water that crosses state lines will be impacted by various federal and state legal mechanisms and can be quite complex.	Thank you for this comment. The report text has been revised to incorporate the suggestion. The author team recognizes the important tradeoffs between energy and water use in this region, and the complex role that water law can play in that space. In order to address this comment (and not dig too deeply into the complexity of water law), the author team has added a statement which says "Water law can influence the ability of industry to access water rights in low-flow years because of climate change (Mackinnon, personal communication, 2020)." MacKinnon is a well-respected water lawyer and professor at UW.
25: Northern Great Plains	P23/L25-26	Clarify if the planting of low-input tall grasses is already happening or should happen.	Thank you for this comment. The author team has revised this sentence to indicate that these actions are being taken on pilot scales but show promise for wider adoption.
25: Northern Great Plains	P23/L34-35	Drawbacks are not considered here. Depending on how used, e.g., if biofuels are burned for electricity production, a significant amount of water is still needed for cooling, just like fossils.	Thank you for this comment. The author team has added a sentence with a new citation (Stoy et al.) that outlines the potential drawbacks when trying to do large-scale conversion of land to biofuels.
25: Northern Great Plains	P24/L2	Please add the state the prairie pothole region is in.	Thank you for this comment. The report text has been revised to incorporate the suggestion. The author team edited the first sentence to read "In the eastern Prairie Pothole Region, of Minnesota, North Dakota, South Dakota, and Iowa,"
25: Northern Great Plains	P28/L16-28	Without a definition, the term “prior appropriation” is not likely to be well understood by broad audiences. Prior appropriation affords a right to use (not own) water. Put in simplified terms, the first person to put water to a beneficial use has the right to continue to use that water and if their use does not continue, neither does the water right. Most western states have codified the prior appropriation doctrine into statutes that define beneficial use, prioritize certain uses, and administer water rights through a permitting system that specifies administrative and or court processes necessary to modify water rights. In line 18, it would be more accurate to say the “ability to acquire water rights” rather than the “reallocation” because, legally, the water right would need to be sold or abandoned or enlarged, which all have different impacts on priority. When discussing water rights under the Colorado River Compact (CRC) then allocation is the correct word, but the CRC is not discussed until the next sentence. The phrase “turning water users off” in line 28 is not accurate, though it is “puny.” Suggest removing first half of sentence. Start sentence with “Different approaches...”	Thank you for these comment. Authors reworded this section based on the reviewer comments and added additional clarification regarding "prior appropriation" following the reviewers suggestion. The suggested change was made in line 18 to say "acquire water rights" and removed the phrase "turning water users off" as suggested.
25: Northern Great Plains	P28/L32-34	Please provide some examples of drought planning and improving ranch resilience.	Thank you for this comment. Authors edited this paragraph to note that "drought planning" was a strategy to improve resilience. There were several sentences in the paragraph that explain what drought planning is, and authors worked to clarify them in the paragraph.
25: Northern Great Plains	P29/L8-9	The sentence reads as being policy prescriptive but can be easily revised to be policy informative, for example, “In response to flooding, improved monitoring was instituted...”	Thank you for the comment. The author team has made the suggested edit to read "In response to significant flooding in 2011 and 2019 in the upper Missouri River basin (UMRB), improved monitoring was implemented to inform water management decisions."
25: Northern Great Plains	P30/L33-36	This sentence should mention public lands.	Authors appreciate the suggestion, which has been incorporated.
25: Northern Great Plains	P32/L12	With the image above, it is hard to tell what “this work” is referencing—the image in Figure 25.10 or the previous text? Citing to the figure and moving the image to after all of the text in this section might make more sense.	Authors appreciate the suggestion; "This work" has been replaced by more explicit text that makes clear that the reference is to the work of adapting scenario-based adaptation for public resource stewardship.
26: Southern Great Plains	P6/L11-13	Is this estimate for the whole nation or just for this region? The statement needs clarification.	The text has been revised to clarify this statement that the estimate is for this region specifically.

Chapter	Page/Line	Comment	Response
26: Southern Great Plains	P33/L13-14	The statement about faith-based organizations “praying for those who suffer” is inappropriate for NCA5 and should be removed from this sentence.	The text has been revised to incorporate this suggestion.
27: Northwest	P4/L6-8	Give example of damage in Washington and Oregon (i.e., “...as witnessed by [x] in Washington and Oregon...”).	We have added an example on ARs in Washington and Oregon.
27: Northwest	P6/L3	Should be “Table 27.1.”	This revision has been made.
27: Northwest	P7/L1	Suggest key message title be more of a statement: “Frontline Communities Affected Most byClimate Impacts.”	We have amended this key message to be a short statement.
27: Northwest	P7/L19	Remove “are”in “While are many types of...”	This revision has been made.
27: Northwest	P9/L8	Suggest “community resilience” instead of “community resiliency.”	This revision has been made.
27: Northwest	P9/L16	Suggest chapter references include the chapter title, consistent with other chapters.	This revision has been made.
27: Northwest	P9/L22	Suggest tribes and Indigenous communities be included in the recommended glossary. Also suggest “both on and off reservations”is not needed and may not be inclusive of all tribal experiences in the way the chapter authors desire.	This revision has been made - have deleted "on and off reservations".
27: Northwest	P9/L31	Suggest managedretreatlanguage be as inclusive as possible and consistently used throughout all chapters. Consider any possible linkages to Chapter 9 (Coastal Effects).	Have amended language and cross-referenced with the Coasts chapter (KM 9.3) on managed retreat.
27: Northwest	P11/L11	Consider using “wildfire” instead of “fire.”	This revision has been made.
27: Northwest	P12/L27	Consider using more accessible language for “extirpations.”	We have removed the term "extirpation" and used terms like "local extinctions" to be more accessible.
27: Northwest	P13/L9	Seems like there is a missing word after “endangered.”	This revision has been made.
27: Northwest	P14/L6	Suggest title be a statement, not a label. May want to include salmon.	This revision has been made.
27: Northwest	P15/L25	Should be “increased.”	This revision has been made.
27: Northwest	P16/L7	Suggest key message title be a statement: “Climate Changes Impacts on Economies and Livelihoods.”	We have amended this key message to be a short statement.
27: Northwest	P16/L14	Suggest referencing Chapter 11(Agriculture, Food Systems, and Rural Communities).	Have cross-referenced with Ch. 11 whenever relevant in this section.
27: Northwest	P16/L16	Add citation.	Have added citation here.
27: Northwest	P18/L1	Suggest referencing Chapter 9 (Coastal Effects).	Have cross-referenced with Ch.10 rather than Ch.9, as Ch. 10 has more content on commercial marine fisheries.
27: Northwest	P18/L13	Suggest referencing Chapter 7 (Forest).	Have cross-referenced with Ch. 7 on forestry goods/services and impacts from climate change.
27: Northwest	P18/L14	Remove “‘s”from “Northwest’s.”	This revision has been made.
27: Northwest	P19/L22	Suggest title be more of a statement.	We have amended Box 27.3 in response to public comments about integrating tribal examples more. This box now is more focused on tribal agricultural economies' climate adaptation responses. Title has been amended to reflect this change.
27: Northwest	P20/L15	Suggest key message title be a statement. Also, currently this section is focused on water, transportation, and energy only. Suggest “Built Infrastructure”is too broad of a title for the current content. Authors should limit title to “Climate Impacts on Infrastructure Systems,” or expand the content that follows.	We have amended this key message to be a short statement.
27: Northwest	P20/L17	Key Message 27.1 includes housing;however,housing is not referenced below. Suggest including housing below (preferred) or removing housing from the key message.	We have amended or "Urban Areas and Urban Infrastructure" to be about housing.
27: Northwest	P20/L25	Suggestproviding more focus by saying infrastructure systems are threatened.	This revision has been made.
27: Northwest	P21/L8	Add citation.	We have added a citation to support this statement.
27: Northwest	P24/L8	Suggest Box 27.4 be assessed to determine if this is necessary or if there is a way to better integrateor connect with a number ofother boxes and the Focus On...Featureon wildfire.	Keeping this box because intended to highligh a specific and detailed response action.
27: Northwest	P24/L28	If kept, include chapter title in reference.	Have cross-referenced to KM 14.2.
27: Northwest	P24/L34	If kept, include chapter title in reference.	Have cross-referenced to KM 12.1.
27: Northwest	P25/L6	If kept, include chapter title in reference.	Have cross-referenced to KM 12.2.
27: Northwest	P25/L9	Suggest key message title be more of a statement.	We have amended this key message to be a short statement.
27: Northwest	P25/L16	“Climate resilience” instead of “Climate resiliency.”	This revision has been made.
27: Northwest	P26/L3	Spell out “BIPOC”since first time using this acronym orreplace with “people of color”to be more consistent with language used throughout the chapter.	This revision has been made.
27: Northwest	P26/L4	Should be “additional.”	This revision has been made.
27: Northwest	P26/L14-16	Suggest mentioning PM standard to help reader gauge significance of 95 micrograms.	Thank you for this comment. The authors have discussed and believe that contextualizing the 95 micrograms in relation to historic near-zero PM2.5 measurements is sufficient enough to note the significant changes during this time. Given word limits, the authors have chosen not to expand further.
27: Northwest	P28/L1	Remove “and”in “preparedness for and disasters...”	This revision has been made.

Chapter	Page/Line	Comment	Response
27: Northwest	P28/L20	Suggest “Address Inequities” instead of “Bridge Inequities.”	This revision has been made.
27: Northwest	P29/L20	Spell out “BLM”acronym toavoid ambiguity.	This revision has been made.
27: Northwest	P30/L15	Suggest more accessible language here (e.g., “Northwest Environmental Sense of Place”).	We have added "sense of place" but have kept amenities.
27: Northwest	P32/L6	Should be “medicinal plants.”	This revision has been made.
27: Northwest	P34/L5-6	Add citation.	This sentence in the traceable account has been removed.
27: Northwest	P38/L11	Should be “adaptation.”	This revision has been made.
27: Northwest	P39/L6	Add space between “Government”and “2021.”	This revision has been made.
27: Northwest	P40/L36	Convention is to say,“Indigenous knowledges.”	This sentence already references "Indigenous knowledges".
27: Northwest	P41/L16	Statement “...that the region”seems incomplete.	We have elaborated to finish this thought. Thanks for pointing this out in this comment.
27: Northwest	P42/L12	Should be “impacts on [not of] tribal...”.	This revision has been made.
27: Northwest	P42/L26	Replace “is”with “are.”	This revision has been made.
28: Southwest	P3/L11	Should sea-level rise be included in this list of impacts? It has been going on for many decades.	Adding suggested language to the introduction
28: Southwest	P4/L12	The population of the Southwest is strongly urbanized, but the region/landscape is notable for its vast rural and wild areas, sparsely populated overall.	We thank the reviewer for the comment and note that the introduction as currently written states "The region is heavily urbanized, with 9 out of 10 people living in cities like such as Albuquerque, Denver, Las Vegas, Los Angeles, Phoenix, Salt Lake City, and San Francisco...The region also encompasses expansive rural areas with livelihoods centered on ranching, mining, agriculture, and tourism."
28: Southwest	P6/L1	Walton et al. (2017) is worth including here.	We have added this citation.
28: Southwest	P6/Figure 28.2a	Any notions why soil moisture is shown increasing across interior California and Nevada here, despite other expectations projected in Chapter 3 (Earth System Processes)?	Thank you for the comment. The VIC model is pulling projected climate data from an ensemble of 27 GCMs that were downscaled with LOCA. In discussion with Chapter 4, we agree that some of these GCMs project increased precipitation over the Southwest and when the multimodel mean is used, these add heightened "wet" influence in some locations. In the figure caption we do refer the reader to Chapter 4 figures that use the same data - but their figures also show projected conditions for the driest and and wettest projections. We will emphasize this statement more strongly.
28: Southwest	P7/L11	This projection of decreasing rainfall is only supported by a couple of studies and is likely to be very geographically variable (e.g., see Figure 6 in Niraulta et al. (2017)—the source for this statement in Chapter 4 [Water]—which shows a lot of place-to -place, model-to- model, differences in recharge outcomes).	Note, we discuss decreased recharge, not rainfall. While there is significant variation in projected recharge rates, several studies suggest a general decline; we have now cited these in the text.
28: Southwest	P7/L16	Pumping “can cause” land subsidence but does not always and does not everywhere even in the Central Valley. There are drawdown thresholds that have to be crossed before subsidence begins.	This is correct. The study we summarize (Lund et al.) finds subsidence in "parts of the San Joaquin Valley." We have qualified the statement to clarify this point.
28: Southwest	P7/L31	No nature-based options listed?	Enhanced aquifer recharge may occur through nature based solutions such as soil moisture retention; we believe it is implicit that many strategies, including nature-based solutions, fall under this broad category
28: Southwest	P10/L1	Marine species compositions and geographic distributions. The arrival of new species far from their historical ranges is generally the most public-obvious change in this regard.	Agreed. Distributional shifts are important in the marine environment, which we do highlight with one of the clearest examples in the literature, Pacific sardines.
28: Southwest	P10/L16	No citation. Is this from Chapter 10 (Oceans and Marine Resources) of the draft NCA5 report or someplace else?	We thank the reviewer for the comment. Yes, as noted in the caption, Figure 28.4 is adapted from NCA5 Figure 10.2 (from the 3OD) and the final Figure 28.4 caption will include appropriate citatin and cross-referenece.
28: Southwest	P11/L10	Is “fishers” the correct word here?	The authors have observed that scientists use the term "fishers". This decision was made based on Kleiber and Branch 2015 paper, "Should we call them fishers or fishermen?"
28: Southwest	P11/L15-16 and 30-31	Notably more reference to nature-based/nature-informed solutions here than in Key Message 28.1.	We greatly appreciate the reviewer’s comment about the report/chapter and hope that the content is useful.
28: Southwest	P12/L6	Saltwater intrusion changing groundwater quality (especially) and tables.	Clarification added
28: Southwest	P13/L3	The Delta is not shown in these maps. The easternmost water body shown in upper panels is Suisun Bay, just below the mouth of the Delta.	Caption clarified to not mention the Delta
28: Southwest	P14/L8-9	In contradiction to the assertion here, Chapter 3 (Earth System Processes) (Key Message 3.12) notes and cites literature that frost hazards from “false springs” increase in current projections. Please revise to acknowledge, correct, or coordinate the assumption here with that finding.	Thank you for this comment. The sentence has been to revised to specify that the decreased exposureto frost applies in California, whereas the Intermountain West is expected to be more exposed to frost hazards from false springs
28: Southwest	P15/L16	Consider adding “forestry” to this list of vulnerable producers. Forestry is not generally considered agricultural, but it fits in among these dryland working lands in a way that is not discussed anywhere else in this chapter (notably not under Key Message 28.5).	This sentence refers is to cropland and rangeland producers vulnerable to reduced precipitation. Forest products vulnerability to climate change is attributed mainly to warming. Elsewhere in this section we have added a passage focused on forest products. Additional information about forest vulnerability is included in the Wildfire section

Chapter	Page/Line	Comment	Response
28: Southwest	P16/L14	This discussion focuses strictly on managing farmed fields but neglects the problems that will have to be managed on the increasing fallowed fields—distinct but of equal regional importance.32	Thank you for this comment, we agree this is importnat to include. A reference to fallowing fields has been added - as well as the challenges and opportunities associated with fallowing. There is little recent research in the region outside of California.
28: Southwest	P17/L7	These programs require a lot of foreknowledge of what outcomes are desired. Is this a place to mention potential for maladaptations sticking to current insurance goals and programs past their useful era?	We added that federal insurance might provide a disincentive for farmers to adapt to climate change - but most literature is in the policy realm, therefore we are unable to fully address this issue. Research is primarily in the midwest and cannot reliably be extrapolated to the SW
28: Southwest	P17/L37-38	The economic and livelihood impacts of the 2012-2016 California drought have proved more complex than might be expected at first glance (e.g., far less agricultural-economic impact overall); please consider incorporating perspectives from recent studies, like Medellin-Azuara et al. (2016).	We have focused in this review on literature published since the last National Climate Assessment. We agree there are significant complexities in livelihood and economic impacts, but due to chapter length restrictions we are unable to address them here.
28: Southwest	P18/L23	Is California intentionally left off this list? Is this just a study-design aspect of the cited article or is California simply not like these others?	Forage from BLM and other public lands is much less critical to the livestock industry in California than in interior states. However, BLM forage is an important resource in the state's northeast corner so this sentence has been amended accordingly.
28: Southwest	P19/L30	Is there any other epoch that provides numbers of hospitalizations to compare this 2018-2020 number to?	We replaced this paragraph with " Between 2016 and 2020, 7,687 hospitalizations in the Southwest were due to heat and heat related illnesses, in comparison to 5517 in the previous five years (2011 to 2015) (CDC 2022)"
28: Southwest	P19/L33	Consider adding pre-natal, natal, and neo-natal outcomes to this list (e.g., Amjad et al., 2021).	Thank you for this suggestion. We have adjusted the text to better highlight this vulnerable time period and findings in the southwest region, and now reads as "Pre- and postnatal exposure to high heat and air pollution are shown to be particularly dangerous in the region (Ilango et al., 2020; Avalos et al. 2017; Barreca and Schaller 2020, Lu et al., 2022)".
28: Southwest	P19/L38	The term “cocci” should be used instead of Valley Fever because the World Health Organization and CDC are increasingly moving away from geographic stigmatizing names (e.g., COVID-19). It is an illness that often goes unrecognized until someone is ill, which can mask the geography of the disease. The 100-year projections are for cocci to become far more widespread at the end of the century,33 so that the name Valley Fever will be even less appropriate; this projection would also be good to mention here.	We have changed the terminology to coccidioidomycosis and updated citations, also referring to KM15.1 (Human Health) where coccidioidomycosis is covered in more detail related to climate change in the U.S.
28: Southwest	P20/L9	The sudden appearance of SSP5-8.5 here is out of place compared to the more frequent use of “extreme emissions” and other scenario descriptors elsewhere in the report and chapter.	We have written this now as "very high scenario" (SSP5-8.5) in the text based on guidance from the TSU for descriptive terms. We have also added in "low scenario" for SSP1-2.6 in the figure).
28: Southwest	P22/L4	There is notably little white in the interior Southwest of these maps; but also, notably little land in many of those interior areas (much of Nevada, New Mexico, Utah, and Colorado) that already has few if any intensively harvested agricultural lands.	Correct. The land area in white has no crops, which is stated in the caption. We did not differentiate by crops. in general, if any portion of the land areas in the pixel has any type of crop, it is included in the analysis. The work capacity is important for more than just agricultural, so we have made sure this is more clear in the caption, adding construction work as an example.
28: Southwest	P23/L14	Is “immigrants apprehended” an accepted sampling/metric of the origins of migrants into the Southwest in general?	Thank you for your comment! Given the particular characteristics of the Central American/Northern Triangle immigration (large number of people coming undocumented), using the official number of people from this region who settled through permanent residence in the Southwestern region in a particular year is not a good estimation of the total number of people who moved in this region from the Central America/ Northern Triangle. "Immigrants apprehended" is an acceptable measure of how many people crossed the Southwestern border in a specific year; I also added to this " In 2021, 42% of Central American immigrants to the US lived in the Southwest region (US Census 2023)" The US Census publishes only selected data on the national origin of foreing born living in a specific state.
28: Southwest	P23/L18	Should “loss of financial resources/livelihoods” be included in this list of drivers?	The paragraph above this one states "Decreasing agricultural productivity, increasing levels of food insecurity, and adverse climate effects are among the main reasons why people emigrate from the Northern Triangle."
28: Southwest	P24/L2	Financial and political constraints?	We added "and political will" as the article cited states
28: Southwest	P24/L8	Where is the private sector in all of this?	We added: "Historically the private sector have had limited interest in investing in adaptation (Chapter 31. Adaptation). Globally, in 2017-2018, only 1.6% of all adaptation financing came from the private sector (World Bank, 2021). In the Southwest, however, certain sectors (such as insurance companies) came under pressure from the local authorities to get involved in tackling climate change by divesting their fossil fuel –based investments (CDI, 2023). "

Chapter	Page/Line	Comment	Response
28: Southwest	P24/L29	Some long-term context on the role of wildfires in Southwest landscapes and livelihoods would be useful to set the stage for the list of recent events here.	We appreciate this suggestion, but space is limited. The author team has deliberated and prioritized the information and illustrations to include. Based on these agreed priorities, the chapter has not been revised. However, we have included cross-references to Chapter 7 Forests and CCB 51 Focus of Western Wildfires.
28: Southwest	P25/L13	Change “is” to “has also been.”	This change has been made.
28: Southwest	P25/L13	Mudslides “and debris flows.”	This change has been made.
28: Southwest	P25/L15	It would be worthwhile noting that climate change is projected to make these "heavy rains" heavier (cite Chapters 2 [Climate Trends] and/or 3 [Earth System Processes]). Although Murray et al. (2021) presumably focuses on coastal communities, this risk is in no way limited to coastal settings. See also Cordeira et al. (2019).	A reference to increase in rain intensity has been added to this sentence.
28: Southwest	P25/L26	Houses “and infrastructure.”	This change has been made.
28: Southwest	P25/L15-16	Here and elsewhere, acknowledge that heavy rains are projected to become even more heavy under climate change.	This change has been made.
28: Southwest	P25/L24	If possible, provide a number that this fraction amounts to, or at least a number for the total impact, so that the reader knows whether the small fraction is a large or small amount in absolute terms.	We agree this would be useful to readers, however, calculating this fraction (if it's even possible) would require compiling a wide range of possible costs, some of which may not be measured. Instead we have amended the sentence to give examples of the kinds of economic impacts that exist beyond suppression costs.
28: Southwest	P26/L14	Does the forestry industry belong in this list of vulnerable industries?	Yes, thank you. The forest products industry has been added to the list.
28: Southwest	P26/L14	It would be worth including the forestry industry itself in this list.	Yes, thank you. The forest products industry has been added to the list.
28: Southwest	P27/L5	Bark beetles should be mentioned.	In response to a reviewer's suggestion, we have added forest products to the section on Food and Agriculture. The role of bark beetles is addressed there, and we also refer readers to the chapter on Forests.
28: Southwest	P27/L15	California-important work is worth citing here (e.g., Westerling, 2018).	We thank the reviewer for the comment. We already have references here describing the situation in California, but we have cited Westerling's work elsewhere in the narrative.
28: Southwest	P27/L27	This is as close as this chapter comes to acknowledging the climate- driven issue of bark beetles and the disturbances and wildfire risks they cause.	In response to a reviewer's suggestion, we have added forest products to the section on Food and Agriculture. The role of bark beetles is addressed there, and we also refer readers to the chapter on Forests.
28: Southwest	P28/L10	See Xu et al. (2022), which demonstrates 20 percent reductions of surface-air warming trends on and around managed forecasts and lands.	Thank you for this suggested reference, which has been added to this section.
28: Southwest	P28/L26	First mention of fire weather. This is a key instigator of wildfire in the Southwest. The question of whether instances of dire fire weather will increase with climate change is as important as the long-term secular changes in general dryness, etc.	We agree that increased incidences of extreme fire weather will be an important driver of Southwest wildfires. However, we have been unable to identify documentation of this in the peer-reviewed literature beyond the Goss et al. paper cited here
28: Southwest	P28/L30	The introduction of Indigenous ways of managing fire is a major topic around the Southwest. This late introduction of the topic is unfortunate. It should be discussed earlier and more.	We agree that Indigenous use of cultural burning is a major topic. We first mention the cessation of Indigenous burning in the opening paragraph of this section. Because resumption of the use of Indigenous practices is advised as an adaptation strategy, we focus on that topic in the concluding portions of this section.
28: Southwest	P28/L30	In context of Key Message 28.4, at least, the lack of any mention of wildfire impacts on infirm and limited mobility persons, and remote underserved, under connected, and easily isolated communities is a problem (see, e.g., Blunt et al., 2022, California Burning; or Gee and Anguiano, 2021, Fire in Paradise, for examples).	We have added information on this issue under KM 28.5 (wildfires) where we discuss vulnerabilities during wildfires. We have also added this important point in the "Box" on wildfires.
28: Southwest	P29/L27	For a study that documents this for the entire Southwest, and indeed the continental US, see Albano et al. (2022).	We appreciate this reference and have added it to both the main text and the traceable account.
28: Southwest	P30/L6	The temporal variability of recharge rates and locations is even less well understood. It is also more directly tied to understanding and quantifying the likely impacts of climate change on recharge.	We have edited the text to specify this point.
28: Southwest	P30/L11	Add atmospheric rivers to this list of precipitation mechanisms/modes that need more climate-change research.	We have edited this sentence for clarity and to include atmospheric rivers as an area in need of more research.
28: Southwest	P30/L19	This reliance on intuition is problematic here. At the very least, history tells us that Indigenous and rural people and communities are often better "equipped" with traditional ecological knowledge to not locate themselves where risks are high.	We have edited this sentence to point out a specific gap and remove the reference to intuition.

Chapter	Page/Line	Comment	Response
28: Southwest	P31/L2-3	Provide a citation for this statement. There are dozens of studies that have shown that snow-fed streamflow (runoff) amounts have not been declining, in contrast to snowmelt timing, among others. If this statement is intended to mean that the part of runoff that comes from the declining snowpacks is declining, this may be true; but runoff in (historically) snow-fed streams of the Southwest has not been shown to be declining (e.g., Barnett et al., 2008). If the former is what this is intended to say, please reword to be clearer.	We have edited the text, including removing this specific sentence, to clarify. While precipitation amounts may not be changing, runoff efficiency -- the volume of water resulting from a given volume of snow -- is being reduced due to greater atmospheric demand due to higher temperatures as part of "hot droughts"
28: Southwest	P35/L34	West Nile virus is not discussed in the body of this chapter and does not belong in this traceable account.	Thank you for noticing this. West Nile Virus in the southwest has been added into the main text in KM 28.4.
28: Southwest	P37/L7	It is odd that, after not referencing Westerling's seminal work at all in the body of this chapter, his work appears front and center in this traceable account. The traceable account should not introduce new citations.	Thank you for noticing this omission. While we have focused in this chapter on citing articles published after 2017, we agree that Westerling's work is seminal, and have added references to this work the narrative.
29: Alaska	P3/L4-6	Suggest adding references for, "glaciers are shrinking, permafrost is thawing, and sea ice is diminishing. The growing season is longer, and fish, birds, wildlife, and insects have increased in numbers in some areas and dropped sharply in others."	This is an introductory overview to engage the reader. The details and references are below. We have added "As described below" to indicate this, rather than trying to add lots of references to this paragraph.
29: Alaska	P5/L20-27	Projections of a wetter Alaska are treated as almost beneath notice, but it is likely that in a warmer Alaska, more precipitation is likely to cause even more transportation and ecosystem issues and accelerate the thawing of permafrost. Alaska is already seeing more intense and prolonged storms due to poleward migration of Pacific storm tracks and possibly increased meridional loops and flows associated with thawing of the Arctic Ocean.	We have added text and references to expand the discussion of precipitation changes. Between the version that NASEM reviewed and our receipt of those comments, the following text was added in the immediately preceding paragraph: "Alaska's statewide average annual total precipitation is projected to increase by 20.6% by the end of the century under a moderate scenario SSP2-4.5) and 35.8% by the end of the century under a very high scenario (SSP5-8.5), for 2081–2100, relative to 1981–2010, based on average of 32 and 33 global climate models, respectively; data: Iturbide et al. 2021, Gutierrez et al. 2021)"
29: Alaska	P5/L28	Change "affect" to "will affect." This paragraph is not strictly or even mostly about the climate changes thus far, and instead is mostly about projections.	We have revised the preceding paragraph, which now speaks to climate changes thus far as well, and we think it's important to say that the effects are here and now and not just off in the future.
29: Alaska	P5/L31	Suggest changing "limit" to "constrain."	We have made the suggested change.
29: Alaska	P5/L33-34	Suggest adding references.	We have added a reference.
29: Alaska	P6/Figure 29.2	The park road illustration doesn't accurately capture the nature of the problem. Briefly describe why these two case studies were chosen for the figure. Page 29-6, line 4: Change tourist economy to tourism economy. The Ocean Conservancy is cited, but it would be better to cite the sources of data presented in the figure.	We are re-drawing the figure to reflect this comment. We have added an explanation of the choices in the caption. Ocean Conservancy is not the source of information, just the employer of the author who developed this figure. We have changed "tourist economy" to "tourism economy" as suggested.
29: Alaska	P7/L3-11	This discussion could be strengthened if it were expanded on some. Why is responding to climate change uniquely complicated in Alaska?	We have rewritten the paragraph to be more specific to Alaska.
29: Alaska	P7/L7-8	This is not the most illustrative example. An earthquake is a very different kind of event as compared to climate change. For example, there are good warning and coordination systems in place, and so "Alaskans working together" is true, but they are supported by extensive, established systems of response.	We have added the point about careful preparation and planning. We believe the earthquake example is a powerful one for many Alaskans.
29: Alaska	P8/Table 29.1	Suggest adding or editing to "nature-based solutions."	To us, "nature-based solutions" is jargon (more so than "ecosystem-based management"), and tends to speak only to one segment of our intended audience.
29: Alaska	P8/Table 29.1	This is a really nice table. The table could be improved by removing some jargon (i.e., ecosystem based) and also adding key message numbers	We have added KM numbers. We believe "ecosystem-based management" is a widely used term and prefer to use this term.
29: Alaska	P8/L6	Key Message 29.1. Our Health: Suggest adding likelihood evaluations. Consider an alternate word to resilience or expand on this—resilience to what?	Likelihood evaluations are reserved for cases when quantitative assessments are possible, which is not the case for any of our KMs. We have added an explanation of what Alaska would be resilient to.
29: Alaska	P3/Figure 29.1	Title in text does not match title embedded in figure. Add scale and legend. Great caption. This could be an example for other figures that synthesize a large amount of information.	We are making corrections to this figure to reflect this and public comments.
29: Alaska	P9/L1-3	Suggest adding references to support this statement and use more precise language than "many Alaskans".	This is a general introduction to the KM, with a cross-reference to a subsequent KM where the idea is developed further. We do not wish to use citations repeatedly through the chapter, per instructions to authors. We have added details to "Many Alaskans."
29: Alaska	P9/14-16	This could be strengthened with more references.	References have been added
29: Alaska	P10/L10-11	This statement: "adaptations have the potential to exacerbate these inequalities" could use some additional context. It reads somewhat abstract; perhaps offer an example?	We have reworded this sentence to provide a better explanation of what we mean.
29: Alaska	P10/L23-24	Could chapter authors say something more specific about how rabies and climate are connected? For example, "...with potential connections to changing climate conditions, because of the shifting range of species [citation]."	We have added this point to the sentence.

Chapter	Page/Line	Comment	Response
29: Alaska	P10/L32-39	Suggest chapter authors more explicitly connect the dots between harmful algal blooms (HABs) and food sources, to further discuss why HABs matter for human health. It is not explicit in this paragraph.	We have re-written the HABs discussion to address this point.
29: Alaska	P11/L3-6	Was this because of indoor plumbing? How do other factors like co- habitation affect this relationship? If more than one factor is described in the study, it might be better to frame this as a contributing factor versus a causal relationship.	These studies found lack of complete indoor plumbing to be the strongest association with COVID-19 incidence. We have edited the sentence to reflect this information.
29: Alaska	P11/L12	A figure allowing the reader to envision how the pass is structured and works here would be very effective.	Though we were unable to incorporate this as a figure, additional information about PASS has been added to this paragraph to provide additional context
29: Alaska	P11/L19-20	“As an example illustrates” is odd wording. Is there supposed to be an example here that is missing?	We have re-worded this to refer directly to KM 15.1 without using the word "example."
29: Alaska	P11/L21-22	Suggest adding a reference for the link between mold and pregnancy	Thank you. We added a reference that links the harms associated with mold and pregnancy.
29: Alaska	P11/L28-36	The Committee agrees with the points raised on mental health impacts due to climate change. However, the citations are on First Peoples located in Canada. We suggest referencing research conducted with Alaska Natives or generalize the statements. If citations are not available, then suggest changing “Alaska Native populations whose ... are particularly vulnerable” (line 33) to “are potentially vulnerable.”	We have changed "are" to "may be" and added "Based on research with Inuit in Labrador" to the start of the sentence.
29: Alaska	P4/L11	“...a wide variety of more recent arrivals.” is unclear. Does this mean that recently non–Alaska Native Indigenous peoples have migrated to Alaska? If so, is that number represented in the one fifth population reference?	For simplicity's sake, we have removed this phrase entirely.
29: Alaska	P12/L1-11	This paragraph addresses COVID-19 essentially from the perspective of “is the health care system up to ‘it’ for COVID and other disasters.” But in Alaska, the problem of getting people to the health care system is often the real crux. Some discussion of how transportation improvements play into the effectiveness of the health care system would be very helpful here.	The paragraph has been significantly revised and addresses healthcare access now, too.
29: Alaska	P15/Figure 29.5	Very nice figure. The Committee suggests adding a summary in the caption as to why the proportion of race by region matters.	Thank you. We have added that point to the caption.
29: Alaska	P16/L16	Whose data are these from fall 2018?	"Fall 2018" refers to a publication by James Fall of ADF&G, not to the season. This ambiguity will not be a problem in the final version, where in-line citations will be replaced by numbered end notes.
29: Alaska	P18/L3-4	Consider adding to each of these claims (climate change contributing to collapse and collapse undermining jobs/ways of life).	Key messages should be brief. The details come in the text that follows.
29: Alaska	P19/Figure 29.7	Significant parts of Alaska’s “modern” economics and services base have been built upon, and rely upon, the fossil fuel industry. As much as any place in the country, when mitigation requires major changes and cutbacks of that industry, what will be the impacts on Alaska’s communities?	The potential for mitigation to affect the oil and gas industry is noted in Figure 29.7. We do not wish to speculate on the effects that would have on Alaska's communities, since so much is uncertain.
29: Alaska	P20/L5	How many fishery disasters has Alaska had? Since 14 are listed perhaps add total number of disasters (e.g., 14 of X) or omit the number entirely.	We have revised this to omit the number as suggested.
29: Alaska	P20/L11-12	Consider adding references here for how climate change is impacting each species listed.	We have added references, which are extensive because of the number of species and aspects of life history that are addressed.
29: Alaska	P21/L5-10	Suggest adding references.	We have added references as suggested.
29: Alaska	P22/Figure 29.8	Perhaps the authors can find another image to better convey their point of importing fish into a fishing community.	We tried, but due to the rules about photo use, we didn't have many options.
29: Alaska	P22/L5	Key Message 29.4. Our Built Environment: Suggest rephrasing part of the key message to consistently format the likelihood statements (i.e., “Further warming will to lead to greater needs and costs for maintenance or replacement of buildings, roads, airports, and other facilities (high confidence, very likely)).	The inclusion of likelihood was an error that has been corrected.
29: Alaska	P4/L11	Suggest using more precise language than “recent arrivals.” For example, briefly discuss the periods of settlers arriving to the state.	For simplicity's sake, we have removed this phrase entirely. Adding more details would just lengthen and already long introduction.
29: Alaska	P23/L22-23	Might consider adding something about how there have been efforts to broadly model permafrost, but localized assessments are not available, and cite associated modeling efforts.	We have restructured this paragraph and added references about the uncertainty about permafrost in local community erosion, as well as the complexity of modeling these processes, with appropriate references.
29: Alaska	P24/L5	Consider using a different term than managed retreat because of its problematic connotations.	We have deleted the phrase "managed retreat."
29: Alaska	P24/L10-18	Authors might consider briefly mentioning the legal challenge related to relocation, in that no one entity seems to be legally responsible to pay for these moves	We have added a sentence to make this point.
29: Alaska	P24/L27	This paragraph discusses climate impacts on the fossil fuel industry but should discuss the impact of (likely) major changes in that industry, in reaction to climate change, on Alaska.	Boxes are brief, and this one is about thawing ground rather than wider implications of changes in fossil fuel use nationwide.
29: Alaska	P25/L14-18	This could be strengthened by adding references to support the discussion about conflicts over fish and wildlife resources.	We have added a reference.

Chapter	Page/Line	Comment	Response
29: Alaska	P29/L11-14	This section could be strengthened with a good definition of security. The differing kinds of security explained feel like they were forced together, but a good definition could help make this section more coherent.	We have added a definition of security to start this section.
29: Alaska	P30/Figure 29.13	Suggest splitting this figure into two because the text and information is nearly too small to read	The figure is being re-drawn.
29: Alaska	P30/L16-21	This section could be strengthened with more references.	References have been added
29: Alaska	P30/L22	The Committee is unclear as to whether this paragraph is mostly talking about opening of the Bering Sea, versus more about opening of the Arctic Ocean traffic.	We have attempted to clarify that it is about the Arctic with reference to fisheries in the Bering Sea in particular.
29: Alaska	P31/L25	This word likely should not be italicized, because it is not within a key message.	Using "likely" was an error and has been changed.
29: Alaska	P4/L14-16	Suggest adding references.	We have added a reference.
29: Alaska	P32/Box 29.7	Nice balance of local perspective and the broader context needed to understand the comment. This could be a reference for the other boxes.	Thank you!
29: Alaska	P32/L12	Change “would” to “will.”	The requested change has been applied
29: Alaska	P39/L29	Consider adding climate impacts on other racial/ethnic groups in Alaska to the research gaps section	We have re-written this statement to include the word "research".
29: Alaska	P4/L25-27	Suggest adding references.	We have re-organized this section and added references.
29: Alaska	P5/L4-9	What are the projections under other scenarios? Or justify why only RCP8.5 was used.	We have added the projection from SSP2-4.5, a moderate scenario to the sentence as well.
29: Alaska	P5/L10	Suggest revising “Many of the most evident” to “More obvious impacts.”	We have revised this sentence to address the comment.
29: Alaska	P5/L10-14	Suggest adding references for each of these claims. The Committee notices that the ocean and climate related statements are much better referenced overall as compared to the cryosphere related references.	We have re-organized this section and added references.
30: Hawai'i-Pacific	P10/L14	How does rising temperature affect freshwater resources? Is there a reference that directly relates temperature to freshwater resources? The other factors listed are clearly relevant, but temperature should be removed from the list if no reference exists to provide a verifiable physical link.	We thank the reviewer for this comment. We have cross referenced the Water Chapter KM 4.1's descriptive text which states, "...warming will also increase the rates at which water is transferred to the atmosphere from open water, soil, and plants, increasing aridity and drought risk and threatening surface and groundwater supplies". This helps to support how temperature, as a driver of evapotraspiration, is a component in freshwater availability.
30: Hawai'i-Pacific	P10/L24	Most traditional fishponds (at least in Hawai‘i) are saltwater or brackish. This section is about freshwater resources, so please clarify that this refers to traditional freshwater fishponds or remove if not.	We removed reference to fishponds in this section, thank you for catching this. Fishponds are reflected in the food section below.
30: Hawai'i-Pacific	P10/L25	Same as above for energy and microgrids. Are these related to freshwater resources?	We appreciate the comment. We have removed the text that references energy and microgrids, as we agree there there are not clear links to freshwater resources.
30: Hawai'i-Pacific	P11/L14-15	This should be added to research gaps on page 30-36.	Added "Very little research has been done regarding enhanced mobilization of subsurface contaminants from rising sea levels, despite the existence of many known and unknown contamination sites very close to sea level. " to research gaps section.
30: Hawai'i-Pacific	P12/L4-5	Is there information about such declines for the Pacific Islands in particular?	Our fisheries experts are not aware of any additional information or data on this subject, although it's possible they exist.
30: Hawai'i-Pacific	P12/L16	Is the semicolon supposed to be after the Galappaththi reference?	punctuation was addressed in text.
30: Hawai'i-Pacific	P12/L17	Should this be “and decrease local access”?	Addressed, mahalo
30: Hawai'i-Pacific	P13/L16-19	This sentence was challenging to digest quickly. Suggest replacing “flooding depressing” with “increased flood frequency depressing.” Also suggest replacing the semicolon with a period. The sentence about Hawai‘i is a separate statement.	Wording and punctuation changed as suggested
30: Hawai'i-Pacific	P14/L20	Suggest replacing “length, this increases” with “length, the project increased.”	Wording changed as suggested
30: Hawai'i-Pacific	P16/L9-13	The citations provided here pertain to the increases in the physical climate events, but the way this sentence is phrased, it could be read as if these references connect the physical events to health (which they do not). To avoid confusion and misattribution, it would be best to restructure this sentence to lead with stating the that the physical events will increase with the stated references, and then follow with the statement that the events will be connected to increasing health impacts and add references (perhaps referring to those in the following paragraph).	Ordering of text and references changed as suggested
30: Hawai'i-Pacific	P18/L17-26	This paragraph only mentions climate in passing. Suggest reworking to provide more concrete connections to climate (rather than general epidemiological trends), perhaps via the references on line 20?	Addressed in text. Additions were made to specify the changes in climate that are anticipated to affect vector-borne disease prevalence in the Pacific Islands.
30: Hawai'i-Pacific	P21/L11	Period missing at the end of the paragraph.	Addressed in text.
30: Hawai'i-Pacific	P32/L33-34	A word is missing in this sentence between “protecting” and “from.”	Addressed in text.
30: Hawai'i-Pacific	P40/L11-14	This is pertinent information that should be repeated for any key messages that use these models (or similar) as a basis.	We've moved this text to the Process section at the opening of the Traceable Accounts in order to avoid reduntant text.

Chapter	Page/Line	Comment	Response
31: Adapation	P3/5-7	Refer to Chapters 2 (Climate Trends) and 3 (Earth System Processes) rather than literature.	Thank you for this comment. We will reference Ch. 2 and 3 when referencing climate trends and earth system processes.
31: Adapation	P3/L9-14	It seems this point on whether incremental adaptation is sufficient, which is critical to the chapter, should not be in the introduction, but addressed in more depth in the key messages. The first sentence is quite vague. Hard for the reader to know where the statement applies.	Thank you for this comment. We have shortened the introduction and more description of incremental
31: Adapation	P3/L13	Suggest including “regions” with levels and sectors.	Thank you for this comment. We will include "regions" with levels and sectors in this section.
31: Adapation	P3/L28-30	This is policy prescriptive. Could say “Shi and Moser find...”	Thank you for this comment. We will confer with the TSU to determine how best to address this comment to ensure it is not policy-prescriptive.
31: Adapation	P7/L9-11	This sentence is unclear as written. Fossil fuel reliant communities cannot adapt?	Thank you for this comment. We have edited this sentence to clarify this further.
31: Adapation	P7/L32-34	This is a very important sentence given the emphasis of the chapter on the need for transformative adaptation. Is the failure of incremental adaptation expected under all climate change scenarios, for example, even those limiting warming to 2 or 1.5°C?	Thank you for this comment. The chapter authors do believe that the failure of incremental adaptation is expected under all climate change scenarios because the level of adaptation currently does not even address current-day climate impacts. The Climate Trends chapter also agrees that the level of warming we have already baked into our atmosphere requires adaptation.
31: Adapation	P8/L5-7	Does the statement about insufficiency of funding for adaptation consider the funding for adaptation in the Bipartisan Infrastructure Bill and the Inflation Reduction Act, both enacted in 2022?	Thank you for this comment. We are exploring whether the recent literature or assessment of BIL and IRA has a breakdown of the funding available for adaptation. If it does, we will include this. If it does not, we will not.
31: Adapation	P9/L5	Suggest key message title be more of a statement and less of a label.	We are revising the title to be a statement.
31: Adapation	P13/L16-19	Suggest key message title be more of a statement and less of a label.	We are revising the title to be a statement.
31: Adapation	P13/L24	Suggest adding wildfire to this list.	We changed 'fire' to 'wildfire'
31: Adapation	P14/L15	Suggest changing out “amenities” for something more detailed like “economic development” or “workforce.”	We have revised to say "recreational and economic amenities" since we actually meant to refer to the amenities such as aesthetic and cultural value that people attach to living near shorelines.
31: Adapation	P14/L15	Are matching funds also a barrier?	We have added a note about funding inequities above and added an example that specifically references cost-share requirements.
31: Adapation	P14/L32	Does this fire reference refer to urban fires of wildfires?	Thank you for this clarifying question; this was a typo on our end. We changed the wording to specify wildfire.
31: Adapation	P16/L5	Suggest either including communities after “wealthy” or rewording the sentence to be clearer. Adaptation for well-resourced communities may lead to negative outcomes for already overburdened communities.	We have made this change (adding 'communities' to the parenthetical).
31: Adapation	P16/L26	Suggest key message title be more of a statement and less of a label.	We have edited the key message title consistent with NASEM guidance for the entire report.
31: Adapation	P18/L3	Please add states to “some cities and utilities,” as some states also have centralized offices focused on resilience and/or sustainability.	We have made this change (adding 'some cities and utilities').
31: Adapation	P18/L14	Suggest adding the chapter title with the reference.	We are following TSU guidance that chapter titles are not necessary in cross-referencing.
31: Adapation	P18/L18-25	The paragraph is policy prescriptive but can be rewritten.	We have edited the paragraph to soften the policy-directed language (e.g., "benefits from" vs. "requires")
31: Adapation	P19/L23	The paragraph is policy prescriptive.	We have edited the paragraph to soften the language (e.g., changing "will" to "may")
31: Adapation	P20/L21	Suggest key message title be more of a statement and less of a label.	We have edited the key message title consistent with NASEM guidance for the entire report.
31: Adapation	P24/L9	Suggest key message title be more of a statement and less of a label. Suggest more approachable language like “Paying for Adaptation.”	We have edited the key message title consistent with NASEM guidance for the entire report.
31: Adapation	P24/L11	Recommend ordering the key message statements with medium confidence statements last, not first.	We have edited the key message title consistent with NASEM guidance for the entire report.
31: Adapation	P25/L30	Remove “but.”	We have made this change.
31: Adapation	P26/L1	Figure 31.6 may not communicate what the authors are trying to communicate. Rethink if this should be showing that there is no financial incentive to proactively adapting coastal properties and if proactive adaption costs are missing from rail or so faint they cannot be seen. It also appears that no additional costs are similar to reactive adaptation costs.	Thank you for this comment. We are revising the figure to include data for both 2050 and 2090 and will be removing the information on coastal property due to caveats with the data that cannot be fully explained in the text.
31: Adapation	P27/L22	Suggest adding titles to the key messages being referenced here and throughout.	Due to word limits, TSU guidance is to only list the KM numbers.
31: Adapation	P27/L23	Suggest adding titles to the key messages being referenced here and throughout.	Due to word limits, TSU guidance is to only list the KM numbers.
31: Adapation	P28/L34	Suggest adding titles to the key messages being referenced here and throughout.	Due to word limits, TSU guidance is to only list the KM numbers.

Chapter	Page/Line	Comment	Response
32: Mitigation	P3/L2-4	This sentence is a confusing sentence to start out the chapter with. Also, the introduction is short. Suggest starting with a summary or definition statement about mitigation (like the second sentence, line 5) and then providing an overview of the chapter before delving into key messages.	We have followed your suggestion to move the definition of mitigation to the first sentence, and have also expanded the introduction to include a short summary of each of the chapter's key messages.
32: Mitigation	P3/L19	Suggest in-line definition of the Paris Agreement and description of nationally determined contributions (line 25) for general audiences.	We have revised the text to define both the Paris Agreement and NDCs.
32: Mitigation	P3/L22-24	Please add to the sentence that net-zero can be reached earlier than mid-century depending on considerations of international equity and burden-sharing (van Soest et al., 2021). Reaching net zero before mid-century would also likely be a lower cost scenario (Schaeffer et al.,2020).	We now mention overall costs as a consideration in meeting net-zero prior to 2050 and cite Schaeffer et al. 2020 and Feijoo et al. 2020 from the same special issue.
32: Mitigation	P3/L28	If the number is negative 6 percent or a decline, suggest spelling out negative or stating that this is a decline.	We have added a minus sign to make the decline clear.
32: Mitigation	P4/L1	In the figure, the net-zero label on the graph is a bit confusing because the graph shows just emissions, not emissions and sinks. Suggest relabeling the graph to highlight the years when emissions reductions goals will occur rather than the "net zero emissions benchmarks."	The figure has been revised to include sinks and thus clarify the net emissions.
32: Mitigation	P4/L15-16	Suggest defining key GHG "sources" and "sinks" in this section, and then describing major trends among those. Suggest adding projections 50 and 100 years into the future to meet statutory charge. In this first section, suggest including citations for where all the data are from.	We now call out the main sources and sinks, with citations to the data sources. However, this key message and supporting text are retrospective; future emissions shown in the figure are targets only—which do not extend beyond 2050. We do now mention that stabilizing the climate entails *maintaining* net-zero emissions over the longer-term.
32: Mitigation	P4/L18	Is there a reason the net emissions are depicted with the end year of 2019 rather than 2020 or 2021? Perhaps pandemic-related anomalies? Suggest explaining this in the traceable accounts section.	We now explain our choice to report 2019 emissions in the main text.
32: Mitigation	P5/L5-6	Suggest a citation after this sentence.	We have added citations to the referenced estimates.
32: Mitigation	P5/L9-11	This sentence is not clearly written. Suggest more clearly specifying what is offsetting what and suggest defining emissions intensity and energy intensity in-line, for audiences: "changes in US energy-related emissions were primarily driven by increases in population and GDP per capita. However, these increases were offset by decreases in energy related GHG emissions, emissions intensity, and energy intensity. Energy intensity refers to ___, while emissions intensity refers to ____."Does "Decreases in energy emissions" refer to energy intensity? If yes, then please use "energy intensity" so the supporting text aligns with the labels in the figure.	We have revised the sentence to be clear and also define the intensity terms.
32: Mitigation	P6/L1-6	Suggest describing the relationship between the energy sector and the electricity sector (e.g., electricity sector emissions comprise what portion of energy sector emissions).	We now include the percentage of energy emissions related to electricity.
32: Mitigation	P6/L1-6	Suggest explaining why coal use declined and renewables increased(e.g., tax credits, gas prices).	We now mention that natural gas electricity was "lower-cost."
32: Mitigation	P6/L7-12	Spell out "MWh" and ensure broad audiences can understand the figure.	We now spell out megawatt hours in the axis label.
32: Mitigation	P6/L14-20	Suggest noting what forms of transportation use the fuels listed and are the highest emitters (e.g., cars, trains, planes). Be specific so audiences can understand linkages to their lives.	We now note the vehicle types which primarily consume the relevant fuels.
32: Mitigation	P6/L19-20	Suggest defining what "vehicle-km" is for the audiences. Suggest clarifying text: "improvements in energy per vehicle-km were more modest" (and suggest what a negative 8.6% means). Also, consider including a time range for when the change the sentence discusses occurred.	We have added the time period, explained passenger-km and vehicle-km units, and elaborate on the more modest improvements in energy per truck-km.
32: Mitigation	P11/L4	This is a great example of an in-line definition and provides a great reference for how to do this where the Committee has suggested adding in-line definitions in other places.	Thanks for the praise, and we've tried to emulate this in response to other comments requesting definitions.
32: Mitigation	P11/L17-27	May want to consider defining "dispatchable or firm" for audiences.	We think that the parenthetical explanation "which can be available on-demand" will be understandable by the general public.
32: Mitigation	P11/L29-31	Great job including recent developments (i.e., IRA), though the IRA is likely to help all electricity sources not just solar and wind.	The sentence here is about solar and wind, so not taking a position as to the effect of the IRA on other sources of electricity. However, we do not think the IRA will benefit fossil fuel generators.
32: Mitigation	P11/L35-36	The phrase "assuming appropriate market structures and incentives" is unclear. Please add more language to clarify what this clause actually means.	We have simplified the sentence by deleting the unclear phrase and instead stating that *"…expansion of energy storage generally supports greater reliance on wind and solar."*
32: Mitigation	P12/L10-13	Consider adding a sentence discussing the ability to expand transmission and interregional infrastructure.	We have added some text on siting of new transmission infrastructure in KM4 (the "Siting and Land Use" section).
32: Mitigation	P13/L1-2	Figure 32.9(b) is not clear in what it is depicting, and the caption is not helpful to describe it. Suggest adding labels to the figure on the y-axis and indicating the timescale on the graph.	We have revised the caption and figure titles to clarify the meaning of the figure.
32: Mitigation	P14/L3	List examples of alternative fuels (i.e., "such as …").	We have clarified the sentence with examples as suggested.

Chapter	Page/Line	Comment	Response
32: Mitigation	P15/L7-13	This sentence is hard to follow, particularly the last two clauses: "fundamental changes in processes as well as carbon capture and storage." What are the fundamental changes in processes referred to? What are the challenges expected with CCUS? Suggest: "Similarly most industrial energy demand could be electrified using existing technologies. Achieving net-zero emissions in some industries may present special challenges—particularly related to the costs of supplying high-temperature heat with electricity, adapting to changes in processes, and developing regulatory frameworks to support carbon capture and storage projects."	We have added some specific examples to the sentence that clarify the sort of changes required for steel- and cement-making.
32: Mitigation	P16/L4	Offset "thus" with commas.	Done.
32: Mitigation	P16/L9	How is this food wasted? Individuals, in production, by commercial industry? Give examples if possible.	We have added a note explaining that *"more than 40% of which is food discarded by retailers and consumers."* and supplied a reference to the most recent food waste report by the UN Food and Agriculture Organization.
32: Mitigation	P16/L31-34	Not sure "tasty" fits well in this sentence.	We have revised the sentence and removed the word "tasty."
32: Mitigation	P24/L9-15	This discussion is very similar to the discussion under Key Message 32.2 that discusses shifting diets. It could be mentioned there and removed from here to save space.	We appreciate the suggestion and see the similarlities, but would like to keep this brief summary of nature-based CDR options in the CDR box.
32: Mitigation	P28/L1-6	Figure 32.16 is not cited to in any of the supporting text.	Thank you for pointing out the omission. We have added a reference to the Figure in the "Water Use" section.
32: Mitigation	P31/L28-33	This discussion might warrant mention of recent legislative actions attempting to address these disparities (e.g., IRA tax credits for electric vehicles, two-tier tax credit system now encouraging consideration of apprenticeships and community where sited).	We have added some examples from the IRA at the end of the paragraph.
32: Mitigation	P32/L1-5	This caption needs much more description.	We have expanded the caption.
32: Mitigation	P34/L1-4	Suggest caption include description of what classifies a "mitigation" activity. Many cities, universities, and local groups have acted in the absence of state leadership. Some states have governor leadership (i.e., executive orders) without legislative action, vice versa, or both.	We now give examples of a variety of mitigation activities and actors.
32: Mitigation	P38/L1-6	Figure 32.22: The Committee recognizes that this figure is under development, but as presently depicted, it is unclear based on the multiple titles and labels on the figure whether the figure is depicting emissions reduction potential by abatement measure, savings per abatement measure, cost per MMT of CO2e offset by each abatement measure, incremental cost per MMT of CO2e offset by each abatement measure, or some combination because the language and labels indicate all of the above. The Committee suggests adding much clearer labels, titles, and very clear caption text to explain this figure in both this chapter and Chapter 1 (Overview) (Figure 1.18). The x-axis should be labeled in the correct units and the box should be labeled in the correct units with the color gradients much more distinct (blues and yellows are not distinguishable from each other). In the caption, the term "marginal costs"should be explained as well as the key takeaways from the figure. Please give an example for the audiences from/ using the figure.	We have revised the figure as suggested and now provide more detailed explanation of it in the text and caption.
FB3: Covid-19	P F3-2/L8	Please add Mora et al. (2022) to the references.	Authors appreciate the suggestion and have reviewed the reference for consideration.
A3: Scenarios	P A3-3/L1-7	Figure should be self-standing so more information about each panel needs to be presented.	Thank you for the comment. After discussing planned and recommended changes, Figure A3.1 was removed and the IPCC AR6 figure is now referenced inline (Figure TS.2, Arias et al., 2021). The replacement figure shows the process of transforming (downscaling) CMIP6 model output to higher resolution and biased corrected output, i.e., LOCA2 and STAR data. The flow chart also shows when weights were added to the higher resolution data based on global equilibrium climate sensitivity, and when impact-relevant metrics were derived from downscaled precipitation and temperature values (e.g., days over 95°F, growing season length, precipitation over 2 inches; Figure A3.1).
A4: Indicators	P A4-8/L3-22	The discussion on billion-dollar disasters needs to note the complexity of this indicator and how it is not just influenced by change in frequency and intensity of extreme events but also by exposure to such events. The Committee'scomments on the billion-dollar damages figures in Chapter 1 (Overview)and in Chapter 2(Climate Trends)point out that the increase in the number of billion-dollardisasters may also be the result of increased population, particularly in hazardous areas, and in property values rising faster than the Consumer Price Index. Indeed, this indicator provides an excellent opportunity to discuss the complexity of some indicators, particularly those that measure societal impacts. The discussion should point out that such impacts can be affected by many factors.	We thank the Committee for this comment. The figure caption has now been expanded to state that climate change is leading to increases in the frequency, duration, and intensity of extreme events, and at the same time there have been continual increases in the numbers of buildings, infrastructure, and people in hazard zones/areas where these events may occur. Additionally, we mention that economic factors can also play a role, and use the potential for property values to increase at rates higher than the Consumer Price Index as an example.