

OMB Ecosystem Services Guidance: Explanation and Response to Public Input

February 28, 2024

1. Introduction

Analyzing the benefits and costs of regulatory alternatives often involves consideration of ecosystem services, or the contributions to human welfare from the environment or ecosystems. To help support such analyses, the Office of Management and Budget (OMB) has created guidance for assessing changes in ecosystem services in benefit-cost analysis. Through the guidance, OMB seeks to improve consistency and use of best practices by agencies when incorporating ecosystem services into their analyses.

OMB, through the Office of Information and Regulatory Affairs (OIRA), has issued this guidance consistent with Executive Order 14072 of April 27, 2022 (Strengthening the Nation's Forests, Communities, and Local Economies), and Executive Order 14094 of April 6, 2023 (Modernizing Regulatory Review). The Ecosystem Services Guidance is intended to complement more general OMB guidance contained in Circulars A-4 and A-94.¹

OMB published proposed guidance on August 2, 2023.² OMB also solicited public comments on this proposed guidance.³ In total, OMB received 79 public comment submissions.⁴ Simultaneously, an independent and external contractor, following a public nomination period,⁵ selected eight peer reviewers and organized a review of the proposed guidance. In drafting both the proposed and final revised guidelines, OMB consulted with relevant agencies and Executive Office of the President components, including the Office of Science and Technology Policy.

This document provides explanations of OMB's conclusions that are reflected in the guidance,⁶ as well as responses to public comments and peer reviewers' reports on the draft

¹ OMB, Circular A-4, *Regulatory Analysis* (Nov. 9, 2023), <https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-4.pdf> [hereinafter Circular A-4] and OMB, Circular A-94, *Regulatory Analysis* (Nov. 9, 2023), <https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-94.pdf> [hereinafter Circular A-94].

² Office of Management & Budget, *Assessing Changes in Environmental and Ecosystem Services in Benefit-Cost Analysis* (Aug. 2, 2023), <https://www.whitehouse.gov/wp-content/uploads/2023/08/DraftESGuidance.pdf> [hereinafter Draft Ecosystem Services Guidance].

³ Office of Management & Budget, *Request for Comments on Proposed Guidance for Assessing Changes in Environmental and Ecosystem Services in Benefit-Cost Analysis* 88 Fed. Reg. 50,912 (Aug. 2, 2023).

⁴ Regulations.gov, *Guidance: Assessing Changes in Environmental and Ecosystem Services in Benefit-Cost Analysis* (Aug. 2, 2023), <https://www.regulations.gov/document/OMB-2022-0016-0001/comment>. Citations to public comments in this document will reference the identity and docket number of the public comment, which can be retrieved at the previous URL.

⁵ Office of Management & Budget, *Request for Nominations of Experts to Peer-Review Draft Guidance on Valuing Ecosystem Services in Federal Benefit-Cost Analyses*, 88 Fed. Reg. 33,918 (May 25, 2023).

⁶ Office of Management & Budget, *Guidance for Assessing Changes in Environmental and Ecosystem Services in Benefit-Cost Analysis* (Feb. 28, 2024), <https://www.whitehouse.gov/wp-content/uploads/2024/02/ESGuidance.pdf> [hereinafter Ecosystem Services Guidance].

guidance.⁷ For convenience, it refers to input from both public commenters and peer reviewers as “comments”—and refers to the authors of both forms of input as “commenters”—throughout the document.

OMB believes that this guidance will help agencies improve their analyses. Many benefit-cost analyses involve ecosystem services, and standardized guidance on how to assess relevant changes and how to value such services will help promote consistency and predictability in these analyses. The guidance also aims to make it easier for agencies to incorporate ecosystem-service considerations into analyses, resulting in more robust analyses. While there could be costs associated with performing more robust analyses of ecosystem-service effects—as well as with drafting and transitioning to new guidance—OMB believes that the benefits of better analysis and better-informed public discourse resulting from this Guidance are likely to well exceed those costs.

Commenters expressed support for this assessment, particularly emphasizing the potential importance and informativeness of including ecosystem services in a benefit-cost analysis. While expert commenters raised a number of issues that are addressed in detail below, many also provided supportive overall assessments:

- “The document is a welcome addition to available guidance on ecosystem service valuation for government agencies. Much of the guidance is consistent with economic theory and research and provides useful insights into analytic methods and relevant citations.”⁸
- “Overall, I do want to congratulate the authors of the overall document on a generally well thought out set of guidelines for quantifying and where possible, monetizing ecosystem services in a manner consistent with OMB Circular A-4.”⁹
- “The proposed guidance on incorporating ecosystem services into benefit-cost analysis will improve the conceptual clarity and consistency of benefit-cost analyses across agencies and sectors.”¹⁰
- “We applaud the effort to advance incorporation of ecosystem service values into regulatory decision-making. The costs and benefits associated with changes in ecosystem service provision and/or valuation can be challenging to assess and measure, however necessary to fully understand the welfare implications of a regulatory change.”¹¹

⁷ Office of Management & Budget, *Individual Peer Reviewer Comments on OMB’s Proposed “Guidance for Assessing Changes in Environmental and Ecosystem Services in Benefit-Cost Analysis”* (Nov. 17, 2023), https://www.whitehouse.gov/wp-content/uploads/2023/11/Guidance-for-Assessing-Changes-in-Environmental-and-Ecosystem-Services-in-Benefit-Cost-Analysis-Peer-Reviews_508Compliant_updated.pdf. Citations to public comments in this document will reference the identity of the peer reviewer, which can be retrieved at the previous URL.

⁸ Peer Review Report of Lisa Wainger.

⁹ John Loomis, OMB-2022-0016-0012.

¹⁰ Erin Sills, OMB-2022-0016-0015.

¹¹ Marine Economies and Social Systems Lab, Virginia Institute of Marine Science, OMB-2022-0016-0016.

- “Enhancing the provision of ecosystem services can create large economic benefits for society, whereas the loss of these services has historically and will continue to have severe negative impacts on social welfare.”¹²
- “We strongly support the idea of incorporating ecosystem services into benefit-cost analysis by the US federal government. Doing so will improve benefit-cost analysis and the information available to the government when evaluating policies, management actions, or regulations.”¹³

2. Motivation for the Guidance

As noted in the request for comments on the draft Guidance (footnotes omitted):¹⁴

To manage resources optimally, agencies should assess the full suite of important impacts their actions have on the nation's natural assets, including benefits and costs to both the assets that an agency manages directly and to those managed by others, including, for example, other agencies; State, Tribal, Territorial, and local governments; and private resource managers. Interest in thoughtfully managing natural assets . . . has resulted in a variety of agency efforts over the years to better analyze effects on natural assets and on the ecosystem services that they deliver. These efforts are generally consistent with one another, but sometimes differ with respect to scope and focus, highlighting the need for government-wide guidance to help facilitate interagency consistency and coordination on ecosystem service analyses in the context of benefit-cost analysis. Given that certain agencies have developed their own ecosystem-service guidance documents—based on their own programs and statutory authorities—but others have not, a government-wide guidance will also help additional agencies develop their own expertise more quickly, so that they too can engage on ecosystem-service questions when relevant.

OMB received multiple comments on the motivation for the guidance. Some commenters reiterated that OMB guidance can “help promote consistency and predictability in agency analyses” and “make incorporating ecosystem-service considerations easier for agencies . . . resulting in lower analytic burdens for agencies and more sound analysis.”¹⁵ One commenter argued that OMB should “allow agencies to continue their own ecosystem work and incorporation of cost-benefit analysis.”¹⁶ As OMB makes clear in the guidance, agencies can use existing guidance or develop their own ecosystem services guidance. The guidance states that “Agencies should consult with OMB if questions arise regarding the application of this guidance relative to other guidance related to ecosystem services.”¹⁷ As multiple commenters pointed out above, OMB’s guidance can serve the beneficial purposes of promoting consistency across

¹² Environmental Defense Fund, OMB-2022-0016-0039.

¹³ Christopher Barrett, et al., OMB-2022-0016-0055.

¹⁴ Office of Management & Budget, *Request for Comments on Proposed Guidance for Assessing Changes in Environmental and Ecosystem Services in Benefit-Cost Analysis* 88 Fed. Reg. 50,912 (Aug. 2, 2023).

¹⁵ Outdoor Alliance, et al., OMB-2022-0016-0027. See also, Erin Sills, OMB-2022-0016-0015

¹⁶ American Public Gas Association, OMB-2022-0016-0030.

¹⁷ Ecosystem Services Guidance at 3.

agency analyses and in disseminating best practices across agencies, where consistent with laws applicable to the agency effort.

One commenter stated that the guidance is novel and raised a number of concerns related to this novelty.¹⁸ In contrast, multiple commenters argued that ecosystem services have been successfully incorporated into benefit-cost analyses by multiple agencies for many years, that some agencies have created their own guidance on the valuation of ecosystem services, and that there are no major challenges in incorporating important ecosystem services into benefit-cost analyses more broadly.¹⁹ To reflect this input from commenters, OMB has edited the guidance to include additional references to prior agency analyses that incorporate ecosystem services, to clarify the relationship between this guidance and prior guidance from other agencies as well as OMB's own guidance documents—namely Circulars A-4 and A-94—that include discussions of issues related to ecosystem services, and to clarify that substantial research exists on valuation of ecosystem services and incorporation of ecosystem services into benefit-cost analysis.

Commenters requested clarification of why the Ecosystem Services Guidance is necessary given recent updates to Circulars A-4 and A-94.²⁰ In particular, one commenter asked “how does *ecosystem services* analysis differ from more traditional environmental benefit-cost analysis, such that further guidance is needed”? The commenter also noted that “[b]enefit-cost analysis involving changes to environmental conditions (or environmental effects) has proceeded for decades under Circulars A-4 and A-94.”²¹ OMB agrees that analyses consistent with Circular A-4 and A-94 often involve ecosystem service effects or other effects on environmental conditions and that benefit-cost analyses that incorporate ecosystem service effects have been produced for decades under existing guidance. To reflect this, in updating the Ecosystem Services Guidance, OMB has emphasized places where the analysis of ecosystem services does and does not involve different considerations than analysis of other effects, and the updated guidance makes more reference to Circulars A-4 and A-94 when the guidance contained in those documents is sufficient to cover the analysis of ecosystem service changes. The Ecosystem Services Guidance provides more detail on how to examine ecosystem service effects and therefore provides a useful complement to Circulars A-4 and A-94.

Some commenters argued that separate guidance is needed because incorporating ecosystem services into benefit-cost analysis involves unique consideration of issues “including definition of baseline, temporal and spatial scopes, dealing with imperfect information, difficult to quantify preferences, applying appropriate benefits transfer analyses, and estimating uncertainty.”²² Other commenters emphasized that ecosystem service valuation involves substantial interdisciplinary input.²³ In response to these comments, OMB has added further discussion of the relationship between the Ecosystem Services Guidance and Circulars A-4 and

¹⁸ National Ocean Policy Coalition, OMB-2022-0016-0035.

¹⁹ See, e.g., Peer Review Report of Michael Beck. See also, Peer Review Reports of Ankur Desai and Robert Johnston.

²⁰ Peer Review Reports of Emily Bernhardt and Robert Johnston.

²¹ Peer Review Report of Robert Johnston.

²² Peer Review Report of Ankur Desai.

²³ John Loomis, OMB-2022-0016-0012.

A-94, noting particular areas where the incorporation of ecosystem services into benefit-cost analysis differs from other areas of benefit-cost analysis. OMB has also noted that a “multidisciplinary approach may be most effective” when examining the effects on ecosystem services of a regulatory change.²⁴

Commenters also noted that because the Ecosystem Services Guidance is building on Circular A-4 and A-94, many issues can be treated through reference to those documents, allowing for elimination of redundancy in the guidance.²⁵ OMB agrees that the Ecosystem Services Guidance builds on the guidance contained in Circulars A-4 and A-94. In finalizing the guidance, OMB has reiterated this relationship. The final guidance directs readers to those circulars for general guidance. OMB has also worked to highlight the unique considerations when incorporating ecosystem services into a benefit-cost analysis.

3. Structure of the Guidance

a. Overall Structure and Complexity of the Guidance

Multiple commenters stated that the Draft Ecosystem Services Guidance was too long or complex. For example, one commenter argued that the guidance would be “improved by being both more clear and more succinct about stating general principles for ecosystem service assessments.”²⁶ This statement was echoed by other commenters who argued that the draft guidance might “intimidate the regulator rather than inform and empower them” and recommended that clarified guidance be provided that would more easily help agencies to incorporate ecosystem services into their benefit-cost analyses.²⁷ Another commenter argued, “At present, the Guidance focuses on the complexity of the task of including ecosystem services in decision making.”²⁸

A different commenter recognized the challenge of producing guidance to meet “the needs of audiences that are both already well seasoned in ecosystem service benefit-cost analysis, including many federal agencies that manage natural resources, and those for whom these types of ecosystem services are a new consideration,” leading to more complexity in the resulting guidance document.²⁹

Commenters provided multiple suggestions for how to edit the guidance to improve clarity, reduce complexity, or otherwise improve the document. One commenter suggested that the guidance be narrowed to focus on the general process of incorporating ecosystem services into benefit-cost analysis rather than trying to cover “all applications.”³⁰ Another commenter suggested that the guidance should clarify that the central steps of an ecosystem services valuation start with a policy, which affects the physical environment, which in turn causes a

²⁴ Ecosystem Services Guidance at 6.

²⁵ Peer Review Report of Stephen Polasky.

²⁶ Peer Review Report of Stephen Polasky.

²⁷ Peer Review Reports of Emily Bernhardt and Robert Johnston.

²⁸ Peer Review Report of Michael Beck.

²⁹ Peer Review Report of Ankur Desai.

³⁰ Peer Review Report of John Battles.

change in ecosystem services, which themselves can (in some cases) be monetized.³¹ A third commenter suggested that the guidance could be clarified by “providing a systematic structure, perhaps illustrated with a single case study example, of the steps to scope, conduct and communicate a benefit-cost analysis.”³² A commenter suggested that the steps of the guidance should be edited to more closely follow the steps of a benefit-cost analysis as laid out in Circular A-4.³³ In contrast to the above suggestions, one commenter argued that the “main steps for considering and assessing ecosystems services are complete and clear.”³⁴

OMB appreciates these suggestions for how to improve the clarity and structure of the guidance document. In response to the comments, OMB has edited the guidance to more closely follow the steps of a benefit-cost analysis as outlined in Circular A-4 (while noting that the Ecosystem Services Guidance is also intended to be fully consistent with Circular A-94, so not all steps necessarily apply to all analyses). OMB has also restructured the guidance so that these steps are concisely laid out immediately after the introduction. More detailed guidance, again reorganized to follow the steps of Circular A-4, has been maintained in Part 3 of the Ecosystem Services Guidance for agencies that seek additional information. OMB has retained and clarified guidance that the central steps of an ecosystem service analysis should start with a policy change relative to a baseline, examine changes in the physical environment, then examine changes in ecosystem services. A detailed example of how to incorporate ecosystem services into a benefit-cost analysis is included in the Appendices to the guidance. For more information on edits to this example, see *Comments on Individual Figures, Tables, and Appendices*.

b. Comments on Individual Figures, Tables, and Appendices

Commenters provided a variety of suggestions for how to improve specific elements of the guidance.

In response to Figure 1 and Table 2, one commenter stated that they are “extremely useful rubrics for thinking about ecosystem services.”³⁵ One commenter requested a change to Figure 1, noting that “[g]iven the complexity of getting welfare correct in cases [with changing preferences], it would likely be best not to include changes in preferences in the description of Figure 1 and not raise it in the document. E.g., remove discussion of changes in the social systems of ‘social rules and norms changing.’”³⁶ In response, OMB has removed this element from Figure 1 and from the discussion of the figure. Discussion of changing social rules and norms has also been clarified throughout the guidance.

For Tables 1, 2, and 3, commenters expressed a series of related concerns. Some commenters requested clarification of Table 1, with one commenter noting that in the table, “many of the ecosystem services mentioned are not necessarily services,”³⁷ a view echoed by

³¹ Peer Review Report of Catherine Kling.

³² Peer Review Report of Lisa Wainger.

³³ Peer Review Report of Robert Johnston.

³⁴ Gund Institute for Environment, University of Vermont, OMB-2022-0016-0049.

³⁵ Peer Review Report of John Battles.

³⁶ Peer Review Report of Catherine Kling.

³⁷ Peer Review Report of Ankur Desai.

another commenter.³⁸ Similarly, on Table 2, one commenter stated that the terms “property values” and “water supply for real estate value” are better categorized as approaches for monetization rather than ecosystem services *per se*. The commenter concluded by stating that “the majority of examples in the table are very good.”³⁹ Similar comments were made by another commenter about Table 3.⁴⁰ OMB revised Table 1 to clarify that the examples illustrate possible ecosystem service effects, rather than just the services themselves. Table 1 is meant to serve as an entry point for ecosystem service considerations addressed in more detail later in the document.

OMB agrees that the term “property values” is more closely related to a monetization method rather than an ecosystem service *per se*. One commenter suggested that “instead of using ‘property values’ as the apparent ecosystem service, using local amenities (visual/aesthetic values) [as] the service would be a much better term.”⁴¹ In this table and elsewhere, OMB has followed this commenter’s recommendation to instead use the term “amenity value.”

OMB also agrees that “water supply for real estate value”—and related terms—potentially mixes the ecosystem service (water supply) with an element of valuation (real estate value in this case). OMB has maintained the use of these terms, however, to distinguish between the multiple ecosystem service endpoints created by water supply improvements. The headings of Table 3, Column 2 have been edited to clarify that the entries refer to the value derived from the ecosystem service.

Commenters expressed a variety of views about the appendices to the guidance. One commenter suggested that examples should be consolidated into the appendices, with a focus on a few examples that explore the most important steps of incorporating ecosystem services into a benefit-cost analysis.⁴² Some commenters suggested replacing the appendices with a small number of examples, either from the academic literature or from “agencies that are already doing this type of work (EPA, USFS, etc).”⁴³ One commenter recommended removing the appendices entirely.⁴⁴ Another commenter suggested that Appendix 4 should be removed, that Appendix 3 should be a separate report, and that various edits should be made to improve the other appendices.⁴⁵ Some commenters found the appendices helpful while suggesting various clarifications.⁴⁶

The appendices are intended to provide additional detail and resources for analysts with less familiarity with ecosystem service concepts. In response to these various comments, OMB has edited the appendices to improve clarity and reflect feedback on specific issues raised by the

³⁸ Peer Review Report of Robert Johnston.

³⁹ Peer Review Report of Catherine Kling.

⁴⁰ Peer Review Report of Robert Johnston.

⁴¹ Peer Review Report of Catherine Kling.

⁴² Peer Review Report of Ankur Desai.

⁴³ Peer Review Report of Catherine Kling. See also, Peer Review Reports of John Battles and Robert Johnston.

⁴⁴ Peer Review Report of Stephen Polasky.

⁴⁵ Peer Review Report of Lisa Wainger.

⁴⁶ See, e.g., John Loomis, OMB-2022-0016-0012 and World Wildlife Fund, OMB-2022-0016-0040.

commenters. OMB has also separated the appendices from the main guidance document and issued them as a separate resource document.⁴⁷

A set of commenters argued that the appendices—particularly Appendix 1—should be edited or removed because they focus only on ecosystem services rather than the various other effects that might occur due to a policy change.⁴⁸ OMB notes that the purpose of this guidance is to provide information on incorporating ecosystem services into analyses. Analysis of other effects of a regulatory change are covered in other guidance from OMB including Circulars A-4 and A-94.

4. Definition of Ecosystem Services

Commenters were generally supportive of the definition of ecosystem services used in the guidance.⁴⁹ Even where commenters raised concerns about the definition, they noted that it is widely used and accepted in academic literature.⁵⁰ Some commenters suggested that definitions of core concepts in the guidance, including the definition of the term “ecosystem services,” could be improved by including a glossary, table of definitions, or similar section.⁵¹ In response to this suggestion, the guidance now includes the section *Definitions of Key Concepts*, which defines important concepts.

Multiple commenters recommended citing the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) framework.⁵² OMB now cites IPBES in the discussion of the definition of “ecosystem services” in the *Definitions of Key Concepts* section.

Finally, one commenter pointed out an incorrect citation to Freeman, Herriges, and Kling (2014) in the draft guidance.⁵³ This reference has been corrected.

5. Effect of Ecosystem Services on Human Welfare

a. Production of Goods and Services

One commenter argued that there should be a discussion of biodiversity “as [a] core component of ecosystem services and a benefit in and of itself” and suggested edits to multiple parts of the discussion of the production of goods and services to reflect this comment.⁵⁴ In response to this comment, OMB has clarified the discussion of ecosystem service changes that

⁴⁷ Office of Management & Budget, *Guidance for Assessing Changes in Environmental and Ecosystem Services in Benefit-Cost Analysis: Appendix* (February 28, 2024), https://www.whitehouse.gov/wp-content/uploads/2024/02/ESGuidance_Appendix.pdf.

⁴⁸ National Ocean Policy Coalition, OMB-2022-0016-0035 and U.S. Chamber of Commerce, OMB-2022-0016-0071.

⁴⁹ See, e.g., Peer Review Report of John Battles; National Wildlife Federation, OMB-2022-0016-0050; Christopher Barrett, et al., OMB-2022-0016-0055.

⁵⁰ Bonnie Keeler, OMB-2022-0016-0063.

⁵¹ Peer Review Reports of John Battles, Catherine Kling, and Ankur Desai.

⁵² See, e.g., Peer Review Reports of Emily Bernhardt and Stephen Polasky; Gund Institute for Environment, University of Vermont, OMB-2022-0016-0049; and National Wildlife Federation, OMB-2022-0016-0050.

⁵³ Peer Review Report of Robert Johnston.

⁵⁴ Gund Institute for Environment, University of Vermont OMB-2022-0016-0049.

affect products such as fish, crops, and timber versus values related to biodiversity. Biodiversity effects have also been added in places like Table 1 through more inclusion of effects on “existence of wildlife and plant populations, places, or features.”⁵⁵

b. Non-Use Value

Multiple commenters recommended clarification of the terms “non-use value” and “passive use value.”

Some commenters stated that the references on non-use value were thorough and up-to-date,⁵⁶ and that the discussion of non-use value was important.⁵⁷ Other commenters argued that despite a “long footnote” and other discussion of non-use value in the Draft Ecosystem Services Guidance, the discussion should be further expanded.⁵⁸

Other commenters stated that the definition of non-use value is imprecise or that incorporation of non-use value could lead to double counting (see the section *Double Counting* for more on this point).⁵⁹ Another set of commenters suggested clarifications of how the term “non-use value” was defined in the guidance. For example, one commenter stated:⁶⁰

Another somewhat puzzling definition is found in footnote 24: “Economists often categorize benefits as non-use values when an individual forgoes current benefits by not consuming a good or service in the current period.” I am not aware of any formal definition of nonuse values that requires an individual to forgo current benefits. At a minimum, this statement should be clarified.

This commenter also argued that the Draft Ecosystem Services Guidance sometimes implied that passive use and non-use value were the same concept.

In response to these comments, OMB has clarified the term “non-use value” in the guidance. In particular, the guidance now refers to the definition found in Circular A-4 and does not equate non-use and passive use value.

c. Cultural Value

Commenters expressed differing views on the discussion of cultural value in the Draft Ecosystem Services Guidance. One commenter argued that the Draft Ecosystem Services Guidance did not include enough discussion of cultural value and argued that this can be the largest value stemming from ecosystem service changes.⁶¹ Another commenter recommended that the guidance should include examples of cases where qualitative inclusion of intergenerational and cultural values have been influential in decision making.⁶² A different

⁵⁵ Ecosystem Services Guidance at 17, 22.

⁵⁶ John Loomis, OMB-2022-0016-0012.

⁵⁷ Impax Asset Management PLC, OMB-2022-0016-0013 and Outdoor Alliance, et al., OMB-2022-0016-0027.

⁵⁸ Coastal Flood Resilience Project, OMB-2022-0016-0059.

⁵⁹ National Ocean Policy Coalition, OMB-2022-0016-0035 and Integral Consulting Inc., OMB-2022-0016-0064.

⁶⁰ Peer Review Report of Robert Johnston.

⁶¹ Peer Review Report of Emily Bernhardt.

⁶² Rachelle Gould, OMB-2022-0016-0069.

commenter stated that among the “several aspects of the report that are strong and should remain in further versions,” the section on “[c]hanges in culturally valued experiences is clear, somewhat novel, and important.”⁶³ OMB agrees that cultural values are an important ecosystem service and has maintained discussion of them in the guidance. The guidance states that in cases where cultural values cannot be assessed quantitatively, then “analysis may need to address such questions qualitatively.”⁶⁴

d. Greenhouse Gases

Commenters raised two sets of issues related to greenhouse gases (GHGs). One set of comments discussed the relationship between climate change and uncertainty. Responses to these comments are in the section *Accounting for Uncertainty*.

A second set of comments discussed GHG effects including emissions of GHGs or sequestration as ecosystem services. One commenter commended the inclusion of GHG effects in the set of ecosystem services but requested that “the guidance explicitly ban the use of regional greenhouse gas accounting models in these ecosystem service assessments.”⁶⁵ The guidance provides general recommendations and does not direct agencies to use specific analytical approaches.

Another commenter requested that the guidance be clarified to separate ecosystem services from valuation of those services.⁶⁶ This clarification is related to broader requests from multiple commenters for clarification of the distinction between ecosystem services and valuation of those services (see the section *Comments on Individual Figures, Tables, and Appendices*). For this comment, OMB has revised Table 3 and related text to clarify the distinction between ecosystem service changes and valuation of those changes.

6. The Effect of Regulatory Changes on Ecosystem Services

a. Developing an Analytic Baseline

Multiple commenters provided input on how the baseline for analysis should be established when doing an analysis involving ecosystem services. One commenter cautioned that the environment is dynamic, so there can be changes in ecosystem services over time even in the absence of regulation. Based on this observation, the commenter stated, “The guidance should provide a more detailed discussion of the appropriate methodological steps required to estimate an accurate environmental or ecosystem baseline.”⁶⁷ Similar comments about dynamic, changing, or shifting baselines were made by other commenters.⁶⁸

One commenter stated that the draft guidance recognized that the baseline for ecosystem services can change over time, noting that “[i]t is good that the Guidance Document explicitly states that baselines are not static and should include “relevant system dynamics.” OMB agrees

⁶³ Gund Institute for Environment, University of Vermont OMB-2022-0016-0049.

⁶⁴ Ecosystem Services Guidance at 11.

⁶⁵ Dogwood Alliance, OMB-2022-0016-0018.

⁶⁶ Peer Review Report of Robert Johnston.

⁶⁷ Integral Consulting Inc., OMB-2022-0016-0064.

⁶⁸ Peer Review Reports of Ankur Desai and Stephen Polasky.

with all of these commenters that ecosystem services are dynamic. The guidance retains the discussion of relevant system dynamics and has elaborated on potential sources for those dynamics.

7. Quantification, Monetization, Qualitative Description, and Accounting for Uncertainty in Ecosystem Services Valuation

a. Accounting for Uncertainty

Multiple commenters stressed the importance of accounting for uncertainty in the context of ecosystem service valuation. One commenter stated that though “[i]t is true that uncertainty is dealt with in Circular A-4, and what is discussed there does not need to be repeated in this Guidance Document . . . there should be some discussion of the uncertainty that comes from incomplete understanding or lack of data to accurately assess the ecological production function, the links between ecological and economic models, and how uncertainty can cascade from ecological uncertainty through to valuation uncertainty.”⁶⁹ This commenter specifically recommended that the guidance include discussion of uncertainty due to “ecosystem regime shifts, thresholds, or tipping points.” Another commenter stated that they “agree with the proposed guidance that agencies should take special care in accounting for catastrophic ecosystem-service impacts” including tipping points.⁷⁰ OMB agrees with this commenter that the current discussion of disaster risk covers some important aspects of non-marginal risks associated with ecosystem service changes.

A commenter also argued that “[g]iven the potential for climate change and system shocks to change future benefits, more discussion of methods to reveal and characterize uncertainty in a decision-relevant manner would be useful.”⁷¹ OMB believes that uncertainty—whether from climate change or other sources—is an important component of many benefit-cost analyses. In addition to coverage of the topic in the Ecosystem Services Guidance, the topic is discussed at length in Circular A-4.

One commenter argued that, in general, “[u]ncertainty is a much bigger challenge than acknowledged” in the Draft Ecosystem Services Guidance.⁷² As discussed above, OMB believes that uncertainty is important for many benefit-cost analyses and refers agencies to other guidance including Circulars A-4 and A-94 for further details on how to treat uncertainty in their analyses.

In another set of comments, one commenter noted that the Draft Ecosystem Services Guidance “states that ex ante WTP estimates are different than ex post estimates for a variety of reasons, but it does not mention the important difference with respect to uncertainty.”⁷³ The commenter recommended that the guidance specifically recommend that ex ante WTP measures

⁶⁹ Peer Review Report of Stephen Polasky. See also, Michael Ravnitzky, OMB-2022-0016-0021 and Network of researchers associated with the Beijer Institute of Ecological Economics, OMB-2022-0016-0044.

⁷⁰ James Goodwin, OMB-2022-0016-0046.

⁷¹ Peer Review Report of Lisa Wainger.

⁷² Peer Review Report of John Battles.

⁷³ Peer Review Report of Catherine Kling.

be used. Guidance to this effect is contained in Circular A-4, so OMB has removed the discussion of ex ante versus ex post WTP from the Ecosystem Services Guidance.

b. Adjusting Willingness to Pay Estimates

Two commenters recommended that WTP for non-market ecosystem services in particular should be adjusted upward using a relative price change adjustment.⁷⁴ One of the commenters laid out the justification for such adjustments as coming from changes in income and scarcity over time.⁷⁵ OMB appreciates the detailed recommendations from this commenter and will continue to review the literature on relative price change adjustments as it develops.

c. Benefit Transfer

Multiple commenters argued that benefit transfer was not given sufficient discussion in the Draft Ecosystem Services Guidance. For example, one commenter stated, “An important omission is benefits transfer and the many books and useful guidance documents on how to perform a defensible benefit transfer.”⁷⁶ These commenters suggested different studies or other resources that could be cited to give further guidance on application of benefit transfer in this context. OMB thanks the commenters for these suggestions. Additional references on benefit transfer have been incorporated into the guidance. The discussion of benefit transfer and related approaches has also been expanded in the guidance.

One commenter agreed with the Draft Ecosystem Services Guidance recommendations concerning meta-analysis and function transfer in the context of benefit transfer. The commenter noted, however, that “while the best practices citations are helpful, they can also be vague on specific threshold conditions for precision or accuracy needed for a ‘proper’ application of benefit transfer methods.” The commenter recommended that OMB provide best practices for area transfer in particular.⁷⁷ The guidance acknowledges that area-based benefit transfer has substantial and widely documented limitations and recommends benefit function transfer rather than transferring specific values to new areas as a general rule of thumb.

d. Double Counting

Commenters expressed a range of views on the discussion of double counting in the Draft Ecosystem Services Guidance. Some commenters thought that the guidance did not do enough to address or prevent potential double counting.⁷⁸ One commenter noted that “there is significant interrelation in ecosystem services,” increasing the risk of double counting.⁷⁹

Some commenters expressed the view that double counting is a uniquely challenging aspect of ecosystem services valuation, providing motivation for why this guidance is necessary

⁷⁴ Peer Review Report of Emily Bernhardt; Moritz Drupp, et al., OMB-2022-0016-0072.

⁷⁵ Moritz Drupp, et al., OMB-2022-0016-0072.

⁷⁶ Peer Review Report of Catherine Kling. See also, Peer Review Reports of Robert Johnston and Ankur Desai; BIOECON Network, OMB-2022-0016-0057.

⁷⁷ Earth Economics, OMB-2022-0016-0031.

⁷⁸ See, e.g., Integral Consulting Inc., OMB-2022-0016-0064.

⁷⁹ U.S. Chamber of Commerce, OMB-2022-0016-0071.

over and above guidance given in places like Circular A-4.⁸⁰ Relatedly, a commenter noted that the guidance appropriately provides cautionary notes related to double counting.⁸¹

Other commenters argued that the guidance had devoted too much attention to the issue of double counting. In providing recommendations for streamlining the guidance, one commenter stated that “the Guidance is quite clear on avoiding double-counting of benefits.”⁸² This view was echoed by other commenters.⁸³ Two commenters suggested that distinguishing between intermediate and final goods could help ameliorate concerns with double counting.⁸⁴

OMB appreciates the range of views on this issue. Double counting is an important concern in benefit-cost analysis and has some unique concerns in the context of ecosystem services. To balance differing views, the final guidance maintains a substantial discussion of double counting in the context of ecosystem services valuation, but some of the repetitious discussion of double counting has been removed, including discussion already covered in Circulars A-4 and A-94, in favor of a more targeted discussion of double counting in the section *Presentation of Results and Accounting Statement*.

e. Stated and Revealed Preference Valuation Techniques

In the request for public comments, OMB noted:⁸⁵

Many analytical steps that are important for assessing impacts on ecosystem services are covered within Circulars A-4 and A-94. Therefore, what this Guidance covers in the greatest depth is not necessarily what is most important for ecosystem-service analysis. For example, deciding on appropriate valuation methods—such as stated-preference or revealed-preference methods—is often a challenging step when valuing ecosystem services. To avoid duplication, this proposed Guidance generally directs readers to Circulars A-4 and A-94 on this topic, as valuation techniques are discussed there.

Some commenters suggested that both the draft of Circular A-4⁸⁶ and the Draft Ecosystem Services Guidance were out of date with current understanding of stated preference methods.⁸⁷ When referring the reader to information on stated preference methods, the finalized Ecosystem Services Guidance references the finalized Circular A-4.

⁸⁰ World Wildlife Fund, OMB-2022-0016-0040.

⁸¹ Marine Economies and Social Systems Lab, Virginia Institute of Marine Science, OMB-2022-0016-0016.

⁸² Peer Review Report of Stephen Polasky.

⁸³ Peer Review Reports of Emily Bernhardt and Ankur Desai.

⁸⁴ Peer Review Report of Robert Johnston; Integral Consulting Inc., OMB-2022-0016-0064.

⁸⁵ Office of Management & Budget, *Request for Comments on Proposed Guidance for Assessing Changes in Environmental and Ecosystem Services in Benefit-Cost Analysis* 88 Fed. Reg. 50,912 (Aug. 2, 2023).

⁸⁶ OMB, Draft for Public Review: Circular A-4, *Regulatory Analysis* (Apr. 6, 2023),

<https://www.whitehouse.gov/wp-content/uploads/2023/04/DraftCircularA-4.pdf>.

⁸⁷ Peer Review Reports of Catherine Kling and Robert Johnston.