



ECONOMIC IMPACTS ASSOCIATED WITH THE PROPOSED EXPANSION OF CRITICAL HABITAT DESIGNATION FOR THE SOUTHERN RESIDENT POPULATION OF KILLER WHALES

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EXECUTIVE SUMMARY

1. On November 18, 2005, the National Marine Fisheries Service (NMFS) listed the Southern Resident killer whale Distinct Population Segment (*Orcinus orca*) as “endangered” under the Endangered Species Act (ESA). NMFS issued a final rule designating critical habitat for the whales on November 29, 2006 (71 FR 69054). NMFS now proposes to expand the critical habitat area by adding waters along the Pacific Coast between Cape Flattery, Washington and Point Sur, California (Exhibit ES-1). This draft economic analysis focuses specifically on the economic impacts of designating these additional areas as critical habitat for the Southern Resident killer whales.
2. This report employs the best data available to analyze the economic impacts of designating particular areas as critical habitat. These impacts represent “benefits of exclusion.”¹ NMFS presents its formal consideration of the benefits of including particular areas as critical habitat (the “benefits of inclusion”) in the *Draft Biological Report* for the proposed revision of the critical habitat designation for the Southern Resident killer whales.² Together, these two reports inform NMFS’ consideration of whether the benefits of excluding any particular area outweigh the benefits of designating that area pursuant to Section 4(b)(2) of the ESA, as described in NMFS’ *Draft ESA Section 4(b)(2) Report*.³
3. Section 7 of the ESA requires Federal agencies (i.e., “action agencies”) to consult with NMFS to ensure that any action it authorizes, funds, or carries out will not likely jeopardize the continued existence of any endangered or threatened species. Through the consultation process, NMFS may recommend conservation efforts associated with these activities to avoid jeopardizing the continued existence of the species. Thus, a species listing determination and related jeopardy considerations alone may impose economic impacts, even absent critical habitat designation.
4. Once critical habitat is designated, section 7 of the ESA requires Federal action agencies to consult with NMFS to ensure that any action they authorize, fund, or carry out will not likely result in the destruction or adverse modification of critical habitat. NMFS may, through the section 7 consultation process, recommend changes to these activities to ensure that they would avoid destruction or adverse modification of critical habitat. The

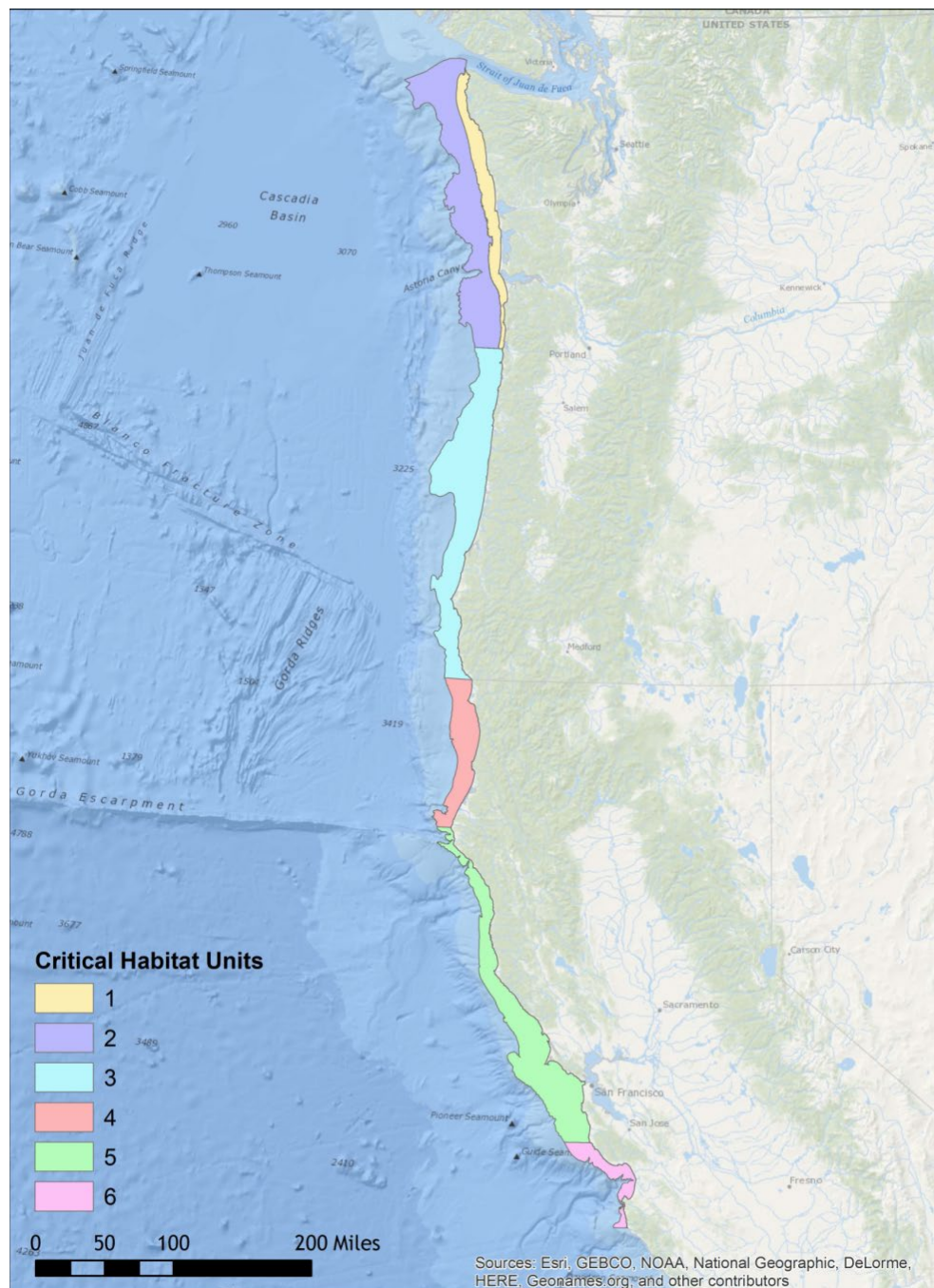
¹ This report also describes generally the potential economic benefits of expanding critical habitat for the species.

² NMFS. Proposed Revision of the Critical Habitat Designation for Southern Resident Killer Whales: Draft Biological Report (to accompany the Proposed Rule).

³ NMFS. Proposed Revision of the Critical Habitat Designation for Southern Resident Killer Whales: Draft ESA Section 4(b)(2) Report (to accompany the Proposed Rule).

incremental economic impacts of critical habitat designation stem from the additional effort to consider the potential for adverse modification as part of section 7 consultations, and any conservation efforts to avoid adverse modification that may be recommended as a result of consultation.

EXHIBIT ES-1. PROPOSED EXPANSION OF CRITICAL HABITAT FOR SOUTHERN RESIDENT KILLER WHALES



5. This economic analysis focuses on identifying the incremental impacts of critical habitat designation. These incremental impacts stem from conservation efforts implemented due to the critical habitat designation that would not otherwise be implemented due to the need to avoid jeopardy to the killer whales or due to protections of other listed species (e.g., salmon) or Federal, state, or local regulations or best management practices.
6. Exhibit ES-2 summarizes the key conclusions of this analysis for each of the economic activities that NMFS has identified may affect the essential features of the proposed expanded critical habitat for the killer whales, defined as water quality, prey, and passage.⁴ Overall, NMFS has not identified a particular project or activity for which it is likely that section 7 consultation with expanded critical habitat for the killer whales will result in different conservation recommendations than section 7 consultation without the expanded critical habitat. Absent the expanded critical habitat, NMFS regularly consults on these types of activities to consider the potential for jeopardy to the killer whales and makes conservation recommendations accordingly. NMFS anticipates that it is most likely that the baseline conservation recommendations relevant to the jeopardy analysis would also result in the projects and activities avoiding adverse modification of critical habitat. The reason for this is that protection of the essential features of critical habitat is generally important to the conservation and recovery of the whales themselves and is already incorporated into consultations outside of the need to consider adverse modification of critical habitat.
7. Although critical habitat designation is not expected to change conservation efforts implemented for the killer whales, the adverse modification analysis conducted as part of section 7 consultations (reflected in the incremental administrative costs of consultation) provides useful scientific information to build upon NMFS' understanding of the biological needs of, and threats to, the killer whales. While this scientific information is not the reason for the consultation process, it is an ancillary benefit of the consultations.
8. As summarized in Exhibit ES-2 and detailed in Chapter 2 of this analysis, economic impacts of the expanded critical habitat are most likely to be limited to additional administrative effort to consider critical habitat as part of future section 7 consultations. This analysis calculates the incremental administrative costs by combining the forecast of section 7 consultations by the estimated average administrative costs per consultation (Exhibit 1-3).

⁴ Activities that may affect the essential features of the proposed expanded critical habitat include those that have been identified as such by NMFS in the Draft Biological Report, have previously been the subject of consultation on Southern resident killer whales per the consultation history, or that have been identified through interviews with key action agencies.

EXHIBIT ES-2. SUMMARY FINDINGS BY ACTIVITY

ACTIVITY	SUMMARY FINDING
Fisheries	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline protections associated with the ESA-listing status of both the killer whales and salmon. As described in Section 2.3 of this report, this analysis considers the potential for the expansion of critical habitat to result in additional conservation efforts relative to commercial and recreational fishing. However, the management of salmon fisheries for the purposes of recovering the salmon, as well as to avoid jeopardy to the whales, is already very stringent regardless of the critical habitat expansion. Consultations on salmon fishing activities in Puget Sound, where killer whale critical habitat is already designated, do not identify conservation recommendations relative to critical habitat beyond those related to the whales themselves. Therefore, it is most likely that no additional conservation recommendations would be made specifically to avoid adverse modification of the killer whale critical habitat, and impacts of the rule on this activity are limited to the administrative costs of consultation.
Salmon Hatcheries	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline protections associated with the ESA-listing status of both the killer whales and salmon. As described in Section 2.4 of this report, relative to Federal funding of hatcheries, NMFS already considers the potential impacts of changes in hatchery production of salmon on killer whales. To avoid jeopardy to the species, NMFS has previously requested that reductions in hatchery releases be phased over time, and that monitoring be conducted to better-evaluate any potential impacts of prey reduction on the species. These conservation efforts would most likely result in avoidance of adverse modification of critical habitat and, thus, the proposed expansion to critical habitat is unlikely to generate additional conservation recommendations.
Aquaculture/ Mariculture	As described in Section 2.5, aquaculture/mariculture activities are unlikely to occur within the proposed expanded critical habitat over the ten-year timeframe of this analysis. As a result, this analysis does not anticipate Section 7 consultations for this activity.
Alternative Energy Development	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline protections associated with the ESA-listing status of the killer whales. As described in Section 2.6, existing Biological Opinions for two alternative energy projects include efforts to understand and minimize impacts to killer whales and other cetaceans. A third consultation, conducted following designation of killer whale critical habitat in inland waters of Washington, indicates that NMFS did not believe additional efforts were needed to protect killer whale habitat above and beyond what has been recommended to avoid jeopardy to the species.
Oil Spills and Response	As described in Section 2.7, oil spill planning and response activities are unlikely to occur within the proposed expanded critical habitat over the ten-year timeframe of this analysis. As a result, this analysis does not anticipate Section 7 consultations for this activity. To the extent that consultations on this activity do occur, the number of consultations is likely to be minimal, and the associated economic impacts would be limited to relatively minor administrative costs due to existing protocols to protect killer whales from oil spill impacts.
Military Activities	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline protections associated with the ESA-listing status of the killer whales. As described in Section 2.8, a number of existing measures are presently implemented to minimize the impacts on military training and testing activities on killer whales.
Vessel Traffic	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline protections associated with the ESA-listing status of the killer whales. As described in Section 2.9, codification of Traffic Separation Schemes following expansion of critical habitat are unlikely to result in additional conservation efforts.
Dredging and Disposal	As described in Section 2.10, it is unlikely that section 7 consultations will result in additional conservation recommendations due to baseline management of these activities under the Army Corps' Best Management Practices (BMPs). Existing requirements including designated in-water work windows and pile driving requirements, as well as BMPs that reduce the impacts of dredging on water quality, all serve to limit potential impacts to killer whales and their prey.

ACTIVITY	SUMMARY FINDING
Oil Exploration and Production	As described in Section 2.11, future activity levels and associated consultations are uncertain, analysis identifies that oil exploration and production activities are unlikely to occur within the proposed expanded critical habitat over the ten-year timeframe of this analysis. As a result, this analysis does not anticipate Section 7 consultations for this activity.
Geologic Surveys	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline management of these activities. As described in Section 2.12, seismic survey activity in the potential critical habitat expansion area is limited, and is already subject to a number of efforts to reduce potential impacts to killer whales and their foraging efforts.
Upstream Activities ¹	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline management of these activities. Upstream activities may affect killer whale critical habitat to the extent they adversely affect salmon and salmon critical habitat. As described in Section 2.13, conservation efforts to avoid jeopardy to the prey species itself, even absent the expansion of killer whale critical habitat, provide substantial protection to killer whale critical habitat.
Note: 1. Activities occurring upstream of the proposed critical habitat expansion area considered in this analysis include those contributing to water pollution (agricultural pesticide application, National Pollutant Discharge Elimination System [NPDES] permitting); liquefied natural gas terminals; desalinization plants; mineral mining; and power plant operations. No distance threshold exists or can be readily predetermined for how far upstream from the proposed expanded critical habitat consultation may occur. Section 1.3 describes how potential consultations for upstream activities are identified for this analysis.	

9. Overall, this analysis finds that the proposed expansion of critical habitat may increase administrative costs of consultation regarding killer whales by \$600,000 over the next ten years assuming a seven percent discount rate. This translates to an annualized impact of \$68,000. Exhibit ES-3 presents the total present value and annualized administrative costs associated with the proposed expansion of critical habitat by critical habitat unit (as identified in the Exhibit ES-2 map).
10. Exhibit ES-4 displays the expected present value economic impacts by activity type. Dredging and in-water construction activities represent the largest share of estimated costs (45 percent), while 42 percent of costs are associated with uncategorized activities, and nine percent is associated with consultations regarding fisheries. Exhibit ES-5 discusses key assumptions and limitations underlying the analysis of impacts.
11. All impacts are presented assuming a seven percent discount rate. Undiscounted impacts are presented in Appendix A; Appendix B provides additional information on present value and annualized impacts applying an alternative discount rate assumption of three percent for comparison.

EXHIBIT ES-3. TOTAL PRESENT VALUE AND ANNUALIZED ECONOMIC IMPACTS (2017 DOLLARS, 7% DISCOUNT RATE)

CRITICAL HABITAT UNIT(S)	PRESENT VALUE IMPACTS (7% DISCOUNT RATE)	ANNUALIZED IMPACTS
1/2	\$77,000	\$8,800
3	\$73,000	\$8,400
4	\$18,000	\$2,100
5	\$12,000	\$1,300
6	\$9,700	\$1,100
1/2, 3	\$20,000	\$2,300
1/2, 3, 4, 5	\$6,100	\$700
4, 5, 6	\$14,000	\$1,500
All units	\$60,000	\$6,800
Unknown units	\$52,000	\$5,900
Upstream (outside CH)	\$250,000	\$29,000
Total	\$600,000	\$68,000
Notes: <ol style="list-style-type: none"> 1. Exhibit ES-1 provides a map of the critical habitat units referenced in column 1 of this table. 2. Due to the difficulty in determining precise locations of future consultations occurring in Units 1 and 2, this analysis presents economic impacts collectively for these two units. Additionally, some consultations cover projects or activities that span multiple units or all units; thus, this table includes rows for groupings of units that collectively trigger the consultations associated with the estimated costs. 3. Estimates are rounded to two significant digits. 		

EXHIBIT ES-4. TOTAL PRESENT VALUE ECONOMIC IMPACTS BY ACTIVITY TYPE (2017 DOLLARS, 7% DISCOUNT RATE)

CRITICAL HABITAT UNIT(S)	FISHERIES	RENEWABLE ENERGY DEVELOPMENT	MILITARY	DREDGING AND IN-WATER CONSTRUCTION	HATCHERY OPERATIONS	SEISMIC SURVEYING	OTHER
1/2	\$1,500	\$1,500	\$0	\$67,000	\$0	\$0	\$7,500
3	\$0	\$7,600	\$1,500	\$48,000	\$0	\$3,100	\$14,000
4	\$0	\$0	\$0	\$18,000	\$0	\$0	\$0
5	\$0	\$0	\$0	\$12,000	\$0	\$0	\$0
6	\$0	\$1,500	\$0	\$8,200	\$0	\$0	\$0
1/2, 3	N/A	N/A	N/A	N/A	N/A	N/A	\$20,000
1/2, 3, 4, 5	N/A	N/A	\$6,100	N/A	N/A	N/A	N/A
4, 5, 6	\$11,000	N/A	N/A	N/A	N/A	N/A	\$2,900
All units	\$34,000	N/A	N/A	N/A	N/A	N/A	\$26,000
Unknown units	\$9,200	N/A	N/A	N/A	N/A	N/A	\$43,000
Upstream (outside CH)	\$0	\$0	\$0	\$110,000	\$3,100	\$0	\$140,000
Total	\$55,000	\$11,000	\$7,600	\$270,000	\$3,100	\$3,100	\$250,000

Notes:

1. Exhibit ES-1 provides a map of the critical habitat units referenced in column 1 of this table.
2. Due to the difficulty in determining precise locations of future consultations occurring in Units 1 and 2, this analysis presents economic impacts collectively for these two units. Additionally, some consultations cover projects or activities that span multiple units or all units; thus, this table includes rows for groupings of units that collectively trigger the consultations associated with the estimated costs.
3. A "N/A" indicates "not applicable" because the activity does not result in consultations at the spatial scale of the groupings of units described in the first column. This is different than a "\$0" entry, which simply indicates that no costs for the activity are associated with the specified unit.
4. The "Other" category includes consultations on activities such as scientific research, resource management plans, transportation projects, and water quality standards.
5. All estimates are rounded to two significant digits.

EXHIBIT ES-5. ASSUMPTIONS AND UNCERTAINTIES

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
Proposed expansion to critical habitat designation is unlikely to change the killer whale conservation recommendations resulting from future section 7 consultations.	May result in an underestimate of costs.	Potentially major. Given presently available information, NMFS anticipates that it is unlikely that the proposed expansion to critical habitat designation will generate additional or different recommendations for conservation efforts for the killer whale and its habitat. However, NMFS will review each individual project or activity at the time of consultation to determine whether additional conservation is needed to avoid adverse modification of critical habitat.
Proposed expansion to critical habitat designation is unlikely to change fishery management recommendations.	May result in an underestimate of costs.	Potentially major. This analysis recognizes that there is some possibility that fishery management recommendations could change as a result of the proposed expansion to critical habitat. However, changes are considered unlikely over the ten-year timeframe of this analysis because NMFS already considers prey as part of consultations that consider jeopardy to killer whales. Additionally, many of the salmonid evolutionarily significant units (ESUs) targeted as prey by the whales are themselves listed under the ESA, and substantial efforts have been made to identify and reduce the sources of threat to these ESUs. However, in the case that NMFS does recommend changes to fisheries as a result of this rule, there may be major implications on the findings of the analysis.
For offshore aquaculture and oil spill and response activities, this analysis relies on patterns of consultation within the past eleven years (2006 to 2016) to forecast future <i>rates</i> of consultation activity. This analysis assumes that past consultations provide a good indication of future activity. For these activities, the consultation history indicates that no consultations on this activity are likely to occur in the next ten years.	May result in an underestimate of costs.	Likely minor. Data are not available to determine whether activity rates are likely to change over time. To the extent that these activities increase over the next ten years, our analysis underestimates the potential incremental administrative burden of the proposed expansion to critical habitat for the killer whales. The estimated incremental impacts per consultation are, however, relatively minor and we accordingly do not anticipate variations in consultation rates to significantly change the findings of our analysis.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
For vessel traffic and upstream activities, this analysis relies on patterns of consultation within the past eleven years (2006 to 2016) to forecast future <i>rates</i> of consultation activity. This analysis assumes that past consultations provide a good indication of future activity.	Unknown. May overestimate or underestimate incremental impacts.	Likely minor. Data are not available to determine whether activity rates are likely to change over time. To the extent that these activities increase over the next ten years, our analysis underestimates the potential incremental administrative burden of the proposed expansion to critical habitat for the killer whales. The estimated incremental impacts per consultation are, however, relatively minor and we accordingly do not anticipate variations in consultation rates to significantly change the findings of our analysis.
For all non-Army Corps activities, this analysis relies on patterns of consultation within the past eleven years (2006 to 2016) to forecast future <i>locations</i> of consultation activity.	Unknown. May overestimate or underestimate incremental impacts in a given area.	Likely minor. Although the expected rate of consultation is not likely to vary much from year to year, the location of these consultations may change. As a result, relying on the approximate location of past consultation activity may underestimate impacts in certain locations while overestimating impacts in others. Generally, given the nature of these activities being focused in more populated areas, we expect the consultations will continue to be concentrated where they have been in the recent past.
This analysis relies on historical Army Corps permit data (2007 to 2016) to forecast future consultations related to Army Corps-permitted dredging and in-water construction projects	Unknown. May overestimate or underestimate incremental impacts.	Likely minor. Data are not available to determine whether Army Corps permit rates are likely to change over time. To the extent that permitting increases over the next ten years, our analysis underestimates the potential incremental administrative burden of the proposed expansion to critical habitat for killer whales. The estimated incremental impacts per consultation are, however, relatively minor and we accordingly do not anticipate variations in consultation rates to significantly change the findings of our analysis.
This analysis assumes that all forecasted civil works consultations will be formal.	May result in an overestimate of costs.	Likely minor. Some civil works projects may require informal consultation and some projects may be covered by programmatic Biological Opinions and not require future individual consultations. However, this analysis conservatively assumes that all forecasted civil works consultations will be formal.
This analysis assumes that if consultations on activities historically did not consider impacts to killer whales, consultations on those activities following critical habitat designation also will not consider killer whales.	May result in an underestimate of costs.	Likely minor. Critical habitat is only being designated in occupied areas. It is expected that projects that would require consultation to consider the expanded critical habitat would also require consultation to consider jeopardy to the species.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
This analysis does not forecast any incremental costs associated with oil and gas exploration and production.	May result in an underestimate of costs.	Likely minor. If the Bureau of Ocean Energy Management (BOEM) 2019-2024 Draft Proposed Program is approved, BOEM would be required to evaluate the potential for impacts to the proposed expansion to killer whale critical habitat. However, associated changes in regional offshore oil and gas development are significantly uncertain. Furthermore, NMFS has not identified an instance in which critical habitat for the killer whales would change the nature of the conservation recommendations made for killer whales as part of future consultations on these activities. Thus, any underestimate of costs associated with this uncertainty would most likely be relatively minor administrative costs of consultation.
The frequency of new seismic survey consultations is constant and is comparable to the average rate of consultations in recent years.	May result in an underestimate of costs.	Likely minor. If the BOEM 2019-2024 Draft Proposed Program is approved, there may be new seismic surveys related to oil and gas activity in the whales' expanded critical habitat area in the future. Furthermore, NMFS has not identified an instance in which critical habitat for the killer whales would change the nature of the conservation recommendations made for killer whales as part of future consultations on these activities. Thus, any underestimate of costs associated with this uncertainty would most likely be relatively minor administrative costs of consultation.
All third parties involved in alternative energy development, geologic surveys, and dredging and in-water construction-related projects are small entities.	May result in an overestimate of small entity costs.	Likely minor. For consultations that may involve third parties, whether the third parties bearing administrative costs are likely to be large or small entities is not known. This analysis therefore conservatively assumes all third parties involved in these consultations are small entities. This assumption may overestimate the cost to small entities, but not the total cost to all entities.
All third parties involved in alternative energy development, geologic surveys, and dredging and in-water construction-related projects pay for the development of a Biological Assessment.	May result in an overestimate of small entity costs.	Likely minor. For these projects, the action agency could pay part. This assumption may overestimate the cost to small entities, but not the total cost to all entities.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
Economic benefits are not quantified, since the specific role of the critical habitat in contributing to the conservation and recovery of the killer whales is not quantifiable.	Economic benefits are not quantified but described qualitatively.	The primary benefits of the designation stem from its contribution to the conservation and recovery of the killer whales via protection of the essential habitat features. Determining the incremental effect of the expanded critical habitat on killer whale conservation and recovery - apart from all other ongoing or planned conservation efforts for the species and its essential features - is complex. Chapter 4 accordingly provides perspectives on the types of economic values associated with killer whales but is not able to quantify these values.

CHAPTER 1 | INTRODUCTION AND FRAMEWORK FOR THE ANALYSIS

13. On November 18, 2005, NMFS listed the Southern Resident killer whale Distinct Population Segment (*Orcinus orca*) as “endangered” under the ESA. NMFS issued a final rule designating critical habitat for the whales on November 29, 2006 (71 FR 69054). NMFS now proposes to expand the critical habitat area by adding waters along the Pacific Coast between Cape Flattery, Washington and Point Sur, California. This draft economic analysis focuses specifically on the economic impacts of designating these additional areas as critical habitat for the Southern Resident killer whales.
14. Section 4(b)(2) of the ESA requires NMFS to consider the economic, national security, and other impacts of designating a particular area as critical habitat. The Secretary of Commerce may exclude an area from critical habitat if it is determined that the benefits of exclusion outweigh the benefits of specifying the area as part of the critical habitat, unless the failure to designate the area as critical habitat will result in the extinction of the species concerned.⁵
15. This report employs the best data available to analyze the economic impacts of designating particular areas as critical habitat. These impacts represent “benefits of exclusion.” NMFS presents its formal consideration of the benefits of including particular areas as critical habitat (the “benefits of inclusion”) in the *Draft Biological Report* for the proposed revision of critical habitat designation for the Southern Resident killer whales.⁶ Together, these two reports inform NMFS’ consideration of whether the benefits of excluding any particular area outweigh the benefits of designating that area pursuant to Section 4(b)(2) of the ESA, as described in NMFS’ *Draft ESA Section 4(b)(2) Report*.⁷
16. The purpose of the economic analysis is to provide information to assist the Secretary in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation. In addition, this information allows NMFS to address the requirements of Executive Orders 12866 (as affirmed and supplemented by Executive Order 13563) and the Regulatory Flexibility

⁵ 16 U.S.C. § 1533(b)(2).

⁶ NMFS. Proposed Revision of the Critical Habitat Designation for Southern Resident Killer Whales: Draft Biological Report (to accompany the Proposed Rule).

⁷ NMFS. Proposed Revision of the Critical Habitat Designation for Southern Resident Killer Whales: Draft ESA Section 4(b)(2) Report (to accompany the Proposed Rule).

Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).⁸

17. This chapter provides context for the analysis, including an overview of the Southern Resident killer whales and their habitat, regulatory history, and potential threats to the proposed expanded critical habitat area. It then describes the framework for the economic analysis and how it fits into NMFS' critical habitat rulemaking process. The remaining chapters are organized as follows:
 - **Chapter 2 - Evaluation of Key Economic Activities:** Chapter 2 provides information on each of the economic activity threats to the proposed expanded critical habitat defined by NMFS. This chapter provides information on the baseline management of these activities and evaluates whether and how the expanded critical habitat may trigger additional conservation recommendations for the killer whales and associated economic impacts.
 - **Chapter 3 – Incremental Economic Impacts of Expanded Critical Habitat:** Chapter 3 quantifies the estimated incremental economic impacts of the expanded critical habitat designation based on the evaluation in Chapter 2.
 - **Chapter 4 – Economic Benefits:** Chapter 4 addresses the potential economic benefits of the proposed critical habitat expansion.
 - **Chapter 5 – Initial Regulatory Flexibility Analysis (IRFA) and Energy Impacts Analysis:** In accordance with the requirements of the RFA, as amended, Chapter 5 evaluates the potential economic impacts of the proposed rule on small businesses. It also considers the potential economic effects on energy supply, distribution, and use, per Executive Order No. 13211.
 - **Chapter 6 – Assumptions and Uncertainties:** Chapter 6 reviews the key assumptions that underlie the analysis and the likely significance of these assumptions with respect to estimated impacts.
18. In addition, the report includes two appendices that provide additional information on the evaluation of incremental impacts consistent with direction from the Office of Management and Budget (OMB).⁹ Appendix A presents undiscounted economic impacts of the expanded critical habitat over the ten-year timeframe of the analysis. Appendix B provides information on the sensitivity of the economic impact results to an alternative discount rate assumption.

1.1 BACKGROUND

19. On November 18, 2005, NMFS listed the Southern Resident killer whales Distinct Population Segment (hereafter referred to as the “whales”) as “endangered” under the

⁸ Executive Order 12866, Regulatory Planning and Review, September 30, 1993; Executive Order 13563, Improving Regulation and Regulatory Review, January 18, 2011; 5. U.S.C. §§ 601 *et seq.*; and 2 U.S.C. § 1501, *et seq.*

⁹ OMB, “Circular A-4,” September 17, 2003.

ESA. The following year, on November 29, 2006, NMFS issued a final rule designating critical habitat for the whales. On January 16, 2014, the Center for Biological Diversity petitioned NMFS to revise the critical habitat designation for the whales to include marine waters along the Pacific Coast.¹⁰ Based on a review of research and data collection since the publication of the 2006 critical habitat rule, NMFS determined that an expansion of critical habitat designation was warranted.

20. The ESA defines critical habitat under section 3(5)(A) as:
 - i. the specific areas within the geographical area occupied by the species, at the time it is listed..., on which are found those physical or biological features (I) essential to the conservation of the species, and (II) which may require special management considerations or protection; and
 - ii. specific areas outside the geographical area occupied by the species at the time it is listed... upon a determination by the Secretary that such areas are essential for the conservation of the species.
21. Once critical habitat is designated, section 7 of the ESA requires Federal agencies (i.e., “action agencies”) to consult with NMFS to ensure that any action they authorize, fund, or carry out (termed “activities with a Federal nexus”) *will not likely result in the destruction or adverse modification of critical habitat*. NMFS may, through the section 7 consultation process, recommend changes to these activities to ensure that they would avoid destruction or adverse modification of critical habitat. The economic impacts of critical habitat designation stem from this consultation process and any conservation efforts recommended as a result of consultation.
22. Section 7 of the ESA also requires Federal agencies to consult with NMFS to ensure that any action it authorizes, funds, or carries out *will not likely jeopardize the continued existence of any endangered or threatened species*. Through the consultation process, NMFS may recommend conservation efforts associated with these activities to avoid jeopardizing the continued existence of the species. Thus, a species listing determination and related jeopardy considerations alone may impose economic impacts, even absent critical habitat designation.
23. In some instances, it is difficult to distinguish between impacts stemming exclusively from critical habitat designation and impacts resulting from other Southern Resident killer whale conservation efforts to avoid jeopardy to the species itself. That is, a specific conservation effort may address both jeopardy (ESA listing-related) and adverse modification (critical habitat-related) concerns.
24. This economic analysis focuses on identifying the *incremental impacts* of critical habitat designation. These incremental impacts stem from conservation efforts implemented due

¹⁰ Center for Biological Diversity. 2014. Petition to Revise the Critical Habitat Designation for the Southern Resident Killer Whale (Orcinus Orca) under the Endangered Species Act. Accessed at: https://www.biologicaldiversity.org/species/mammals/pdfs/Petition_to_Revise_the_Critical_Habitat_Designation_for_the_Southern_Resident_Killer_Whale.pdf

to the critical habitat designation that would not otherwise be implemented. This approach is consistent with the OMB guidelines for conducting economic analysis of regulations. OMB guidelines direct Federal agencies to measure the costs of a regulatory action against a baseline, which it defines as the “best assessment of the way the world would look absent the proposed action.”¹¹ Impacts that are incremental to that baseline (i.e., occurring over and above the baseline regulatory requirements or management practices) are attributable to the proposed critical habitat regulation.

1.2 OVERVIEW OF SPECIES AND HABITAT

25. As indicated by the definition of critical habitat, important factors in delineating a critical habitat designation include the species' life history, historical distribution and abundance, and physical and biological features of habitat that are essential to the conservation of species. To derive a measure of economic impacts occurring within discrete areas of proposed critical habitat, this analysis: (1) characterizes existing or potential threats to the proposed critical habitat occurring within these areas; (2) links these threats to particular human activities; (3) identifies the potential conservation efforts that would avoid the threats; and (4) to the extent feasible, quantifies and monetizes the economic impact of the conservation efforts.

1.2.1 SOUTHERN RESIDENT KILLER WHALES AND HABITAT FEATURES

26. The Southern Resident killer whale Distinct Population Segment includes three pods, identified as J, K, and L pods. The whales reside for part of the year in the inland waterways of Washington State and British Columbia known as the Salish Sea, principally during the late spring, summer, and fall. Pods also visit coastal sites off Washington and Vancouver Island, and travel as far south as central California and as far north as the Southeast Alaska.
27. The existing critical habitat for the whales comprises the Summer Core area around the San Juan Islands, the Puget Sound area and the Strait of Juan de Fuca area. Exhibit 1-1 displays the existing critical habitat areas for the whales.
28. Since the designation of critical habitat in 2006, NMFS has been actively involved in research to improve understanding of killer whale use of coastal waters, including research related to killer whale presence, prey selection and availability, vessel impacts, and pollution and contaminants. As a result of the deeper understanding NMFS has gained regarding habitat use and needs, NMFS proposes to revise critical habitat for the Southern Resident killer whales to include Pacific coastal waters from the U.S.-Canada border to Point Sur, California, extending out to 200 meters of water depth. The inshore extent is delineated by a continuous line along the coast at the 6.1-meter (20 foot) water depth contour (at extreme high water). The line crosses river mouths and entrances to semi-enclosed bays and estuaries.

¹¹ OMB, “Circular A-4,” September 17, 2003.

29. Exhibit 1-2 displays the additional areas being proposed for inclusion in the proposed expansion to the critical habitat designation. This economic analysis refers to the areas delineated in Exhibit 1-2 as the “proposed critical habitat,” as distinguished from the Exhibit 1-1 “existing critical habitat.”

EXHIBIT 1-1. EXISTING CRITICAL HABITAT FOR SOUTHERN RESIDENT KILLER WHALES

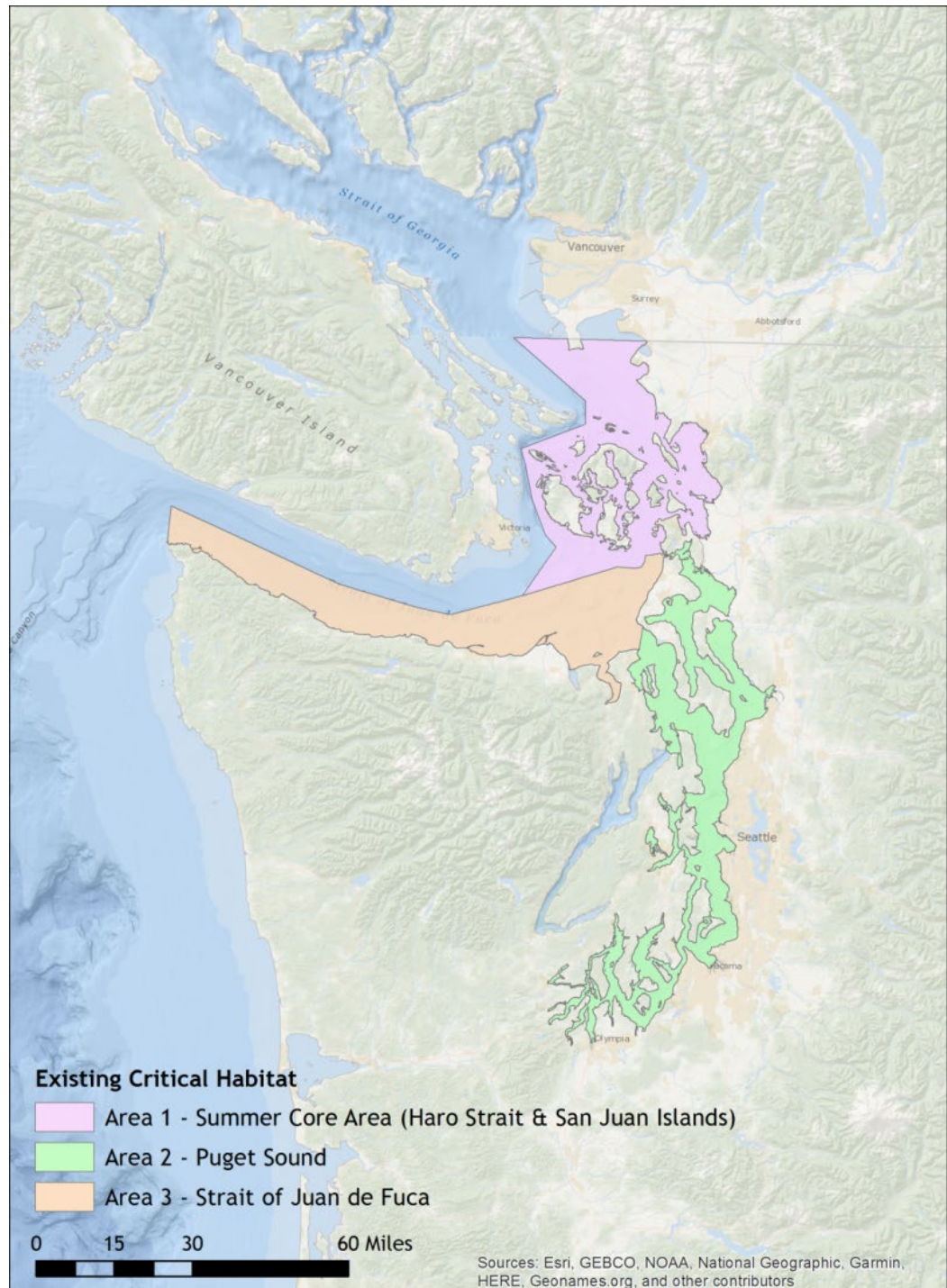
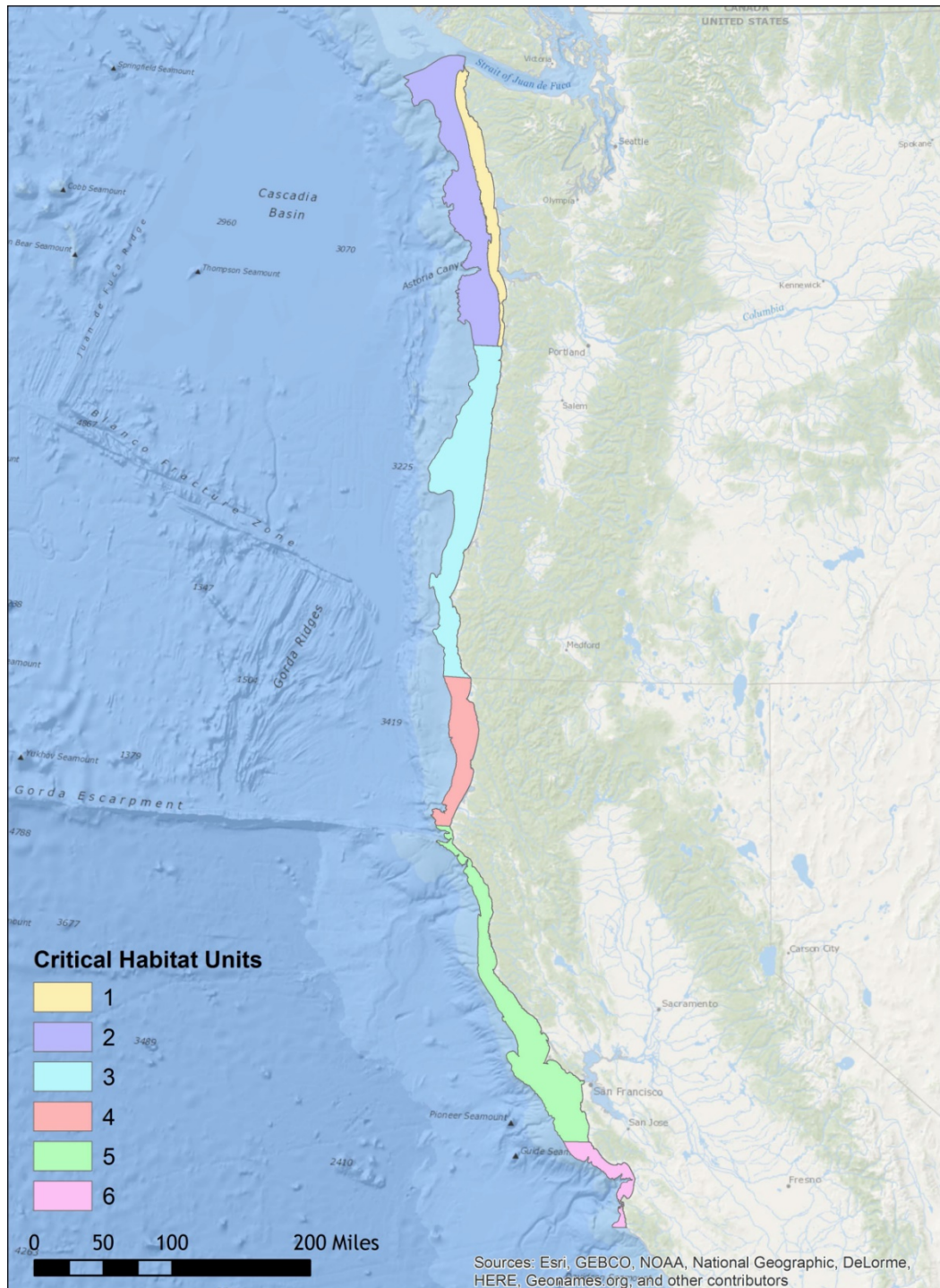


EXHIBIT 1-2. PROPOSED EXPANSION OF CRITICAL HABITAT FOR SOUTHERN RESIDENT KILLER WHALES



30. NMFS defines three physical and biological features of critical habitat that are essential to the conservation of the species (i.e., “essential features”), as follows:
- **Water quality to support growth and development:** NMFS has identified chemical pollution as a prime impediment to the recovery of the Southern Resident killer whales. This is especially true in high use areas used for foraging. Water contamination can inhibit reproduction, impair immune function, impede growth and development, or result in direct mortality.
 - **Prey species of sufficient quantity, quality, and availability to support individual growth, reproduction and development, as well as overall population growth:** Southern Resident killer whales are top predators, preferring to prey on Chinook within the coastal areas proposed for critical habitat, but generally having a more varied diet than in the existing critical habitat areas in the inland waters of Washington State. Killer whale survival rates and fecundity are strongly correlated with Chinook salmon abundance.
 - **Passage conditions to allow for migration, resting, and foraging:** Killer whales have a large range and require open waterways free from obstruction to move between habitat areas to find prey and fulfill other life functions.¹²
31. These are the same three essential features identified in the 2006 critical habitat designation.
32. As described in NMFS’ *Draft Biological Report* for the proposed revision to critical habitat for the whales, NMFS proposes six specific areas that are occupied by the whales and contain all three essential features that require special management. These specific areas—or critical habitat “units”—are based on the essential features and use patterns of the whales. For each unit, the offshore limit is 200-meters water depth, except for Unit 1, which extends to 50 meters water depth. Exhibit 1-2 identifies the geographic scope of each of the units.

1.2.2 ECONOMIC ACTIVITIES AND OTHER HABITAT THREATS

33. NMFS’ *Draft Biological Report* describes the following activities that have the potential to affect the physical and biological features in the proposed critical habitat areas and may require special management considerations or protection.
1. Salmon Fisheries & Incidental Bycatch
 2. Salmon Hatcheries
 3. Activities Contributing to Point Source Water Pollution
 4. Offshore Aquaculture/Mariculture
 5. Alternative energy development

¹² NMFS. Proposed Revision of the Critical Habitat Designation for Southern Resident Killer Whales: Draft Biological Report (to accompany the Proposed Rule).

6. Oil Spills and Response
7. Military Activities
8. Vessel Traffic
9. Dredging and Dredge Material Disposal
10. Oil and Gas Exploration and Production
11. Geologic surveys (including seismic surveys)
12. Liquefied Natural Gas Terminals
13. Desalinization plants
14. Mineral mining (including sand and gravel mining)
15. Power plant operations¹³

34. This economic analysis evaluates the potential for the additional critical habitat for the whales to result in changes to the level or management of these activities within or affecting the proposed critical habitat areas. In addition, to inform the consideration of impacts pursuant to the Section 4(b)(2), the analysis identifies the spatial distribution of these activities and, where possible, disaggregates impacts to particular geographic areas.

1.3 FRAMEWORK FOR THE ECONOMIC ANALYSIS

35. The guiding regulations specify that the *incremental* economic impacts of the critical habitat designation, rather than the coextensive economic impacts of both listing the species and designating its critical habitat, are relevant to the present analysis.¹⁴ NMFS is applying a modified cost-effectiveness analysis to inform its consideration of impacts. This approach allows NMFS to compare an assessment of the "benefits of exclusion" that includes both monetized and unquantified impacts, against an indicator of the biological "benefits of inclusion" for any particular area.¹⁵ This section describes this modified cost-effectiveness analysis framework, and then describes the 4(b)(2) exclusion process.

1.3.1 BENEFIT-COST ANALYSIS AND COST-EFFECTIVENESS ANALYSIS

36. When economic activities affect natural resources, such as listed species, analyses of the impacts of regulating those activities can take a number of approaches. Two possible approaches are benefit-cost analysis and cost-effectiveness analysis. Each of these approaches has strong scientific support as well as support from OMB through its

¹³ NMFS. Proposed Revision of the Critical Habitat Designation for Southern Resident Killer Whales: Draft Biological Report (to accompany the Proposed Rule).

¹⁴ 50 CFR § 424.

¹⁵ NMFS' modified cost-effectiveness analysis for critical habitat designation was first applied in 2005 with the designation of critical habitat for West coast salmon. Section 1.3.1 of the present report is an abbreviated form of the framework discussion provided in the West Coast salmon critical habitat analysis by the Northwest Fisheries Science Center (National Marine Fisheries Service, Northwest Fisheries Science Center. August 2005. Final Economic Analysis of Critical Habitat Designation for 12 West Coast Salmon and Steelhead ESUs.).

guidelines on regulatory analysis.¹⁶ Each also has well known drawbacks, both theoretical and practical, as discussed in the following section in the context of critical habitat designation.

37. Benefit-cost analysis (BCA) is the first choice for analyzing the consequences of a regulatory action such as critical habitat designation.¹⁷ BCA is a well-established procedure for assessing the "best" course or scale of action, where "best" is that course which maximizes net benefits.¹⁸ Because BCA assesses the value of an activity in net benefit terms, it requires that a single metric, most commonly dollars, be used to gauge both benefits and costs. The data and economic models necessary to estimate costs may be difficult or costly to gather and develop, and a comprehensive analysis of the costs associated with a regulatory action is not always feasible. Nonetheless, the principle is straightforward, and it is generally possible in practice to develop a monetary estimate of at least some portion of regulatory costs. This is the case for critical habitat designation, which has direct impacts on activities carried out, funded, or permitted by the Federal government. Conceptually, the "benefits of exclusion," which is the language used in section 4(b)(2) of the ESA, are identical to the "costs of inclusion," and so estimates of these costs could be used in a benefit-cost framework.
38. Assessing the benefits of critical habitat designation in a BCA framework is also straightforward in principle but much more difficult in practice. To the extent that the critical habitat provisions of the ESA increase the protections afforded the Southern Resident killer whales and their habitat, they produce real benefits to the species. In principle, these benefits can be measured first by a biological metric, and then by a dollar metric. A biological metric could take the form of the expected decrease in extinction risk, increase in the annual population growth rate, and so forth. A BCA would then value these quantified biological benefits in terms of willingness-to-pay, the standard economic measure of economic value recommended by OMB.¹⁹ This would produce a dollar estimate of the benefits of critical habitat designation, which could then be compared directly to the costs. In the case of the killer whales, however, the data required to complete an analysis of the monetary estimate of benefits of the critical habitat designation are not available.
39. Recognizing the difficulty of estimating economic values in cases like this one, OMB acknowledges cost-effectiveness analysis (CEA) as an appropriate alternative to BCA:
40. Cost-effectiveness analysis can provide a rigorous way to identify options that achieve the most effective use of the resources available without requiring monetization of all of [the] relevant benefits or costs. Generally, cost-effectiveness analysis is designed to compare a set of regulatory actions with the same primary outcome (e.g., an increase in

¹⁶ U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf>.

¹⁷ *Ibid.*

¹⁸ Zerbe, R., and D. Dively, 1994. *Benefit Cost Analysis in Theory and Practice*, New York: HarperCollins.

¹⁹ OMB, 2003.

the acres of wetlands protected) or multiple outcomes that can be integrated into a single numerical index (e.g., units of health improvement).²⁰

41. Ideally, CEA quantifies both the benefits and costs of a regulatory action but uses different metrics for each. In principle, conducting a CEA of critical habitat designation proceeds along the same lines identified above for BCA, except that the last step of assigning economic (dollar) values to biological benefits is not taken. Different configurations of critical habitat could be gauged by both metrics, with the cost-effectiveness (ratio of units of biological benefits to monetized and unquantified cost impacts) evaluated in each case. If alternatives have the same level of biological benefits, the most cost-effective is the one with the lowest cost.
42. Standard CEA presumes that benefits can be measured with a cardinal or even continuous measure. For critical habitat designation, however, constructing such a measure for biological benefits may be problematic. Although critical habitat designation for the killer whales is expected to have benefits, it is not feasible, given the state of the science, to quantify benefits reliably with a single biological metric (e.g., change in abundance or in probability of recovery). Thus, applying CEA in its standard form is not possible.
43. NMFS is applying an alternative form of CEA used in designating critical habitat for the killer whales. Although it is difficult to monetize or quantify the benefits of critical habitat designation, it may be possible to differentiate among habitat areas based on their relative contribution to conservation. This qualitative evaluation of the relative biological benefits may then be combined with estimates of the monetized and unquantified economic costs of critical habitat designation in a framework that essentially adopts that of CEA. Individual habitat areas are assessed using both their biological evaluation and economic cost, so that areas with high conservation value and lower economic cost have a higher priority for designation, and areas with a low conservation value and higher economic cost have a higher priority for exclusion.

1.3.2 PROCESS FOR 4(B)(2) EXCLUSION DECISIONS

44. Specific areas that satisfy the definition of critical habitat are not automatically designated as critical habitat. Section 4(b)(2) (16 U.S.C. 1533(b)(1)(A)) requires the Secretary to first consider the impact of designation and permits the Secretary to exclude areas from designation under certain circumstances.
45. "The Secretary shall designate critical habitat, and make revisions thereto, under subsection (a)(3) of this section on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security and any other relevant impact, of specifying any particular area as critical habitat. The Secretary may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific and commercial data available, that the

²⁰ *Ibid.*

failure to designate such area as critical habitat will result in the extinction of the species concerned."

46. To this end, NMFS undertakes the following general steps to implement section 4(b)(2):
1. Identify particular areas for possible exclusion from critical habitat designation;
 2. Determine the benefit of designation (biological benefits) of each particular area;
 3. Determine the benefit of exclusion (economic and other costs) of each particular area;
 4. Determine whether the benefits of exclusion outweigh the benefits of designation; and
 5. Determine whether the exclusions (if any) will result in extinction of the species.
47. This analysis focuses primarily on the third step, quantifying the benefits of excluding particular areas from critical habitat. The following section details the framework of this economic analysis.

1.3.3 ECONOMIC ANALYSIS APPROACH

48. OMB guidelines for conducting economic analyses of regulations direct Federal agencies to measure the costs of a regulatory action against a baseline, which it defines as the "best assessment of the way the world would look absent the proposed action."²¹ Specifically, the baseline includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical habitat. Impacts that are incremental to that baseline (i.e., occurring over and above existing constraints) are attributable to the proposed regulation. That is, the incremental impacts quantified in this analysis are those not expected to occur absent the designation of expanded critical habitat for the killer whales.
49. The incremental economic impacts of critical habitat designation generally reflect "opportunity costs" associated with the commitment of resources required to accomplish species and habitat conservation. For example, the costs incurred by a Federal action agency to consult with NMFS under section 7 represent opportunity costs of killer whale conservation, as the time and effort associated with those consultations may have been spent on other endeavors absent the critical habitat designation.
50. At the guidance of OMB and in compliance with Executive Order 12866, "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency to understand how society, as a whole, will be affected by a regulatory action. This analysis accordingly examines the state of the world with and without the designation of additional critical habitat areas for the Southern Resident killer whales:
- The "**without critical habitat**" scenario represents the **baseline** for the analysis, considering protections already afforded the whales. The baseline for this analysis

²¹ OMB, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf>.

is the state of regulation absent the expansion of critical habitat to coastal waters along the U.S. West Coast. In the baseline, the killer whales receive protection under the ESA, as well as under other Federal, state and local laws and conservation plans. The baseline includes sections 7, 9, and 10 of the ESA to the extent they are expected to apply absent the designation of critical habitat for the species in ocean waters along the U.S. West Coast. The analysis qualitatively describes how baseline conservation efforts for the killer whales may be implemented across the additional areas being considered for designation.

- The "**with critical habitat**" scenario describes and monetizes the **incremental** impacts due specifically to the expansion of critical habitat for the Southern Resident killer whales along the U.S. West Coast. Incremental conservation efforts and associated impacts are those that are expected to occur as a result of critical habitat designation. This report focuses on the incremental analysis.

51. To quantify the economic impacts of killer whale conservation efforts, the analysis involves the following general steps:

1. Identify the baseline of economic activity and the statutes and regulations that constrain that activity in the absence of the critical habitat designation in the additional areas being proposed;
2. Identify the types of activities that are likely to be affected by critical habitat designation;
3. Project the projects and activities identified in Step 2 over space and time based on the best available information on planned projects, permitting schedules, or average annual levels of activity;
4. Estimate the costs of administrative effort and, where applicable, conservation efforts recommended for the activity to comply with the ESA's critical habitat provisions;
5. Apply well-accepted discounting methods to calculate the present value cost in each year of the analysis and sum over time to calculate the total present value and annualized impacts; and
6. Aggregate the costs at the particular area level. The analysis reports impacts at the particular area level.

Identifying Baseline Impacts

52. The first step in the economic analysis is to identify the baseline level of protection already afforded the killer whales in the additional areas being proposed as critical habitat. The baseline for this analysis is the existing state of regulation prior to the designation of critical habitat, including the listing of the species under the ESA, and other Federal, state and local laws and guidelines. This "without critical habitat designation" scenario also considers a wide range of additional factors beyond compliance costs of regulations that provide protection to the species. As recommended by OMB, the baseline incorporates, as appropriate, trends in market conditions, implementation of other regulations and policies by NMFS and other government entities,

and trends in other factors that have the potential to affect economic costs and benefits, such as the rate of regional economic growth in potentially affected industries.

53. Baseline protections include sections 7, 9, and 10 of the ESA, and economic impacts resulting from these protections to the extent that they are expected to occur absent designation of critical habitat for the species. This analysis describes these baseline regulations and, where possible, provides examples of the potential magnitude of the costs of these baseline protections. The primary focus, however, is not on baseline costs, since these will not be affected by the proposed regulation. Instead, the focus of this analysis is on monetizing the incremental impacts forecast to result from the areas being considered for critical habitat designation.
- Section 7 of the ESA, absent critical habitat designation, requires Federal agencies to consult with NMFS to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species. Consultations under the jeopardy standard result in administrative costs, as well as impacts of conservation efforts resulting from consideration of this standard.
 - Section 9 defines the actions that are prohibited by the ESA. It prohibits "take" of endangered wildlife, where "take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."²² Economic impacts associated with section 9 manifest themselves in sections 7 and 10.
 - Under section 10(a)(1)(B) of the ESA, a non-Federal entity (e.g., a landowner or local government) may develop a Habitat Conservation Plan (HCP) for a listed animal species in order to meet the conditions for issuance of an incidental take permit in connection with a land or water use activity or project.²³ The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that effects of incidental take are adequately avoided or minimized. Development and implementation of HCPs is considered a baseline protection for the species and habitat unless the HCP is determined to be precipitated by the designation of critical habitat, or the designation influences stipulated conservation efforts under HCPs.
 - Enforcement actions taken in response to violations of the ESA are not included in this analysis.
54. In the case of the killer whales, ESA protections for listed salmon evolutionarily significant units (ESUs) additionally constitute baseline protection for the killer whales,

²² 16 U.S.C. § 1532.

²³ U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at <http://endangered.fws.gov/hcp/>.

given the salmon are included as part of the prey essential feature of critical habitat for the whales.²⁴

55. The protection of listed species and habitat is not limited to the ESA. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction. If compliance with the Marine Mammal Protection Act (MMPA), Clean Water Act (CWA), or state environmental quality laws, for example, protects habitat for the species, such protective efforts are baseline protections and costs associated with these efforts are not quantified as impacts of critical habitat designation.

Identifying Incremental Impacts

56. This analysis focuses on the incremental impacts of critical habitat designation. The purpose of the incremental analysis is to determine the impacts on economic activities due to the designation of critical habitat beyond those impacts due to existing required or voluntary conservation efforts being undertaken due to other Federal, State, and local regulations or guidelines. Incremental impacts may include the direct costs associated with additional effort for consultations (including consultations that otherwise would have been limited to jeopardy issues, reinitiated consultations, or new consultations occurring specifically because of the designation) as well as the direct costs associated with conservation efforts that would not have been required under the jeopardy standard. Additionally, incremental impacts may include indirect impacts resulting from reaction to the potential designation of critical habitat and triggering of additional requirements under State or local laws intended to protect sensitive habitat.
57. The direct, incremental impacts of critical habitat designation stem from the consideration of the potential for destruction or adverse modification of critical habitat during section 7 consultations. The two categories of direct, incremental impacts of critical habitat designation are: 1) the administrative costs of conducting section 7 consultation; and 2) implementation of any conservation efforts requested by NMFS through section 7 consultation to avoid or minimize potential destruction or adverse modification of critical habitat.

Administrative Section 7 Consultation Costs

58. When critical habitat is designated, section 7 requires Federal action agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (in addition to ensuring that the actions are not likely to jeopardize the continued existence of the species). The added administrative costs of including consideration of critical habitat in section 7 consultations and the additional impacts of implementing

²⁴ Certain areas being proposed as expanded critical habitat for Southern resident killer whales are already designated as critical habitat for other species (e.g., green sturgeon). However, the essential features of green sturgeon critical habitat being protected from adverse modification (e.g., food resources, sediment quality, water flow) differ significantly from those identified for killer whale critical habitat. As such, existing critical habitat for species other than salmonids does not offer specific baseline protection for the essential features of killer whale critical habitat.

conservation efforts to protect critical habitat are the direct result of the designation of critical habitat. These costs are considered incremental impacts of the rulemaking.

59. During a consultation, NMFS, the action agency, and the entity applying for Federal funding or permitting (if applicable) communicate in an effort to address potential adverse effects to the species and/or proposed critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, and the potential effects to the species and designated critical habitat associated with the proposed activity, the Federal agency, and whether there is a private applicant involved.
60. Section 7 consultations with NMFS may be either informal or formal. *Informal consultations* consist of discussions between NMFS, the action agency, and applicant concerning an action that may affect a listed species or its designated critical habitat and are designed to identify and resolve potential concerns at an early stage in the planning process. By contrast, a *formal consultation* is required if the action agency determines that its proposed action may or will adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. The formal consultation process results in NMFS' determination in its Biological Opinion (BO) of whether the action is likely to jeopardize a species or adversely modify critical habitat and recommendations to avoid those impacts. Regardless of the type of consultation or proposed project, section 7 consultations can require administrative effort on the part of all participants.
61. In general, three different scenarios associated with the designation of critical habitat may trigger incremental administrative consultation costs:
 1. **Additional effort to address adverse modification in a new consultation** - New consultations taking place after critical habitat designation may require additional effort to address critical habitat issues above and beyond those raised by the listing of the species. In this case, only the additional administrative effort required to consider critical habitat is considered an incremental impact of the designation.
 2. **Re-initiation of consultation to address adverse modification** - Consultations that have already been completed on a project or activity may require re-initiation to address critical habitat. In this case, the costs of re-initiating the consultation, including all associated administrative and conservation effort costs, are considered incremental impacts of the designation.
 3. **Incremental consultation resulting entirely from critical habitat designation** - Critical habitat designation may trigger additional consultations that would not occur absent the designation (e.g., for an activity that may affect the critical habitat but not the species). All administrative and conservation effort costs associated with incremental consultations are considered incremental impacts of the designation.

62. We find that the first category of administrative costs is most relevant to the additional areas being proposed for critical habitat designation for the killer whales as project proponents are generally already consulting on activities within the proposed critical habitat area. The administrative costs of a given consultation vary depending on the type and specifics of the project, and it may not be possible to predict the level of effort required for each future consultation. This analysis accordingly employs estimated average, incremental administrative costs per consultation, as described in Exhibit 1-3. These estimates are based on the expected amount of time spent considering adverse modification as part of future section 7 consultations, and hourly GSA rates as of 2017.²⁵ Based on the information in Exhibit 1-3, for example, the opportunity cost of the time spent on a single informal consultation regarding the whales (including consideration of both jeopardy and adverse modification) is approximately \$9,900, of which \$2,500 reflects the time spent to consider adverse modification. The time (and therefore cost) spent on informal consultations that consider multiple species, as is typical of consultations involving the whales, would be greater than the total costs presented in Exhibit 1-3.

²⁵ NMFS and Federal action agencies generally do not track time spent in consultation. As part of the information gathering process for multiple economic analyses of critical habitat over the past decade, IEc analysts have discussed with NMFS consulting biologists and with Federal action agencies whether better data are available to refine these estimates. Generally, the agencies have not provided additional information and have determined that these estimates are reasonable averages. Where better information is available to refine the estimates for a particular consultation or activity, the more specific cost estimates are applied.

EXHIBIT 1-3. AVERAGE ADMINISTRATIVE CONSULTATIONS COSTS (2017 DOLLARS)

INCREMENTAL ADMINISTRATIVE COSTS OF CONSULTATION						
CONSULTATION TYPE	NMFS COST	FEDERAL AGENCY COST	PRIVATE APPLICANT COST	TOTAL COST (WITHOUT BIOLOGICAL ASSESSMENT)	(OPTIONAL) BIOLOGICAL ASSESSMENT COST	TOTAL COST (WITH BIOLOGICAL ASSESSMENT)
NEW CONSULTATION RESULTING ENTIRELY FROM CRITICAL HABITAT DESIGNATION						
<i>(Total cost of a consultation considering both Jeopardy and adverse modification)</i>						
Informal	\$2,600	\$3,200	\$2,050	\$7,900	\$2,000	\$9,900
Formal	\$5,700	\$6,500	\$3,500	\$16,000	\$4,800	\$21,000
Programmatic	\$17,000	\$14,000	N/A	\$32,000	\$5,600	\$37,000
RE-INITIATION OF CONSULTATION TO ADDRESS ADVERSE MODIFICATION						
Informal	\$1,300	\$1,600	\$1,020	\$3,900	\$1,000	\$4,900
Formal	\$2,900	\$3,200	\$1,800	\$7,900	\$2,400	\$10,000
Programmatic	\$8,600	\$7,200	N/A	\$16,000	\$2,800	\$19,000
ADDITIONAL EFFORT TO ADDRESS ADVERSE MODIFICATION IN A NEW CONSULTATION						
<i>(Additive with baseline costs)</i>						
Informal	\$640	\$810	\$510	\$2,000	\$500	\$2,500
Formal	\$1,400	\$1,600	\$880	\$3,900	\$1,200	\$5,100
Programmatic	\$4,300	\$3,600	N/A	\$7,900	\$1,400	\$9,300
<p>Source: IEC analysis of full administrative costs is based on fully loaded (inclusive of overhead) hourly rate data from the Federal Government Schedule Rates, Office of Personnel Management, 2018, and estimates of level of effort required per consultation type derived from a review of consultation records from several Service field offices across the country conducted in 2002.</p> <p>Notes:</p> <ol style="list-style-type: none"> 1. While there is a wide range of effort involved in individual concentrations, the levels of effort per consultation represent approximate averages based on the best available information. The cost estimates in this report are accordingly rounded to two significant digits to reflect this imprecision. The cost estimates presented in this table may therefore not sum to the total costs reported due to rounding. 2. Estimates reflect average hourly time (based on fully loaded wages) required by staff for participation in consultation. 3. Costs of Biological Assessments associated with a given consultation may be borne by the Federal agency, third party (where applicable) or a combination of these parties to consultation. This analysis assumes all consultations include the cost of a biological assessment. 						

Impacts of Section 7 Conservation Efforts

63. Section 7 consultation considering critical habitat may also result in recommendations for conservation efforts specifically addressing potential destruction or adverse modification of critical habitat. For new consultations that otherwise would have been limited to jeopardy issues and for re-initiations of past consultations to consider critical habitat, the economic impacts of conservation efforts undertaken to avoid or minimize adverse modification are considered incremental impacts of critical habitat designation. For consultations that are forecast to occur specifically because of the designation (incremental consultations), impacts of all associated conservation efforts are assumed to be incremental impacts of the designation.

Indirect Impacts

64. The designation of critical habitat may, under certain circumstances, affect actions that do not have a Federal nexus and thus are not subject to the provisions of section 7 of the Act. Indirect impacts are those unintended changes in economic behavior that may occur outside of the ESA, through other Federal, state, or local actions, that are caused by the designation of critical habitat. When these types of conservation efforts and economic effects occur as a result of critical habitat designation, they are appropriately considered incremental impacts.
65. Under certain circumstances, critical habitat designation may provide new information to a State or local government about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under State or local laws. In cases where these impacts would not have been triggered absent critical habitat designation, they are considered indirect, incremental impacts of the designation.
66. In addition, project proponents, land managers and landowners may face additional indirect impacts, including the following:
- **Time Delays** - Both public and private entities may experience incremental delays for projects and other activities due to requirements associated with the need to reinitiate the section 7 consultation process and/or compliance with other laws triggered by the designation. To the extent that delays result from the designation, they would be indirect, incremental impacts of the designation. With respect to consultations on the killer whales, NMFS' *Draft ESA Section 4(b)(2) Report* highlights the potential for project delays specific to military training and testing activities for which the adverse modification analysis may be complex.²⁶ For all other activities, consultation regarding effects on killer whales occurs relatively frequently and is less complex and unlikely to delay projects. However, NMFS seeks comment regarding the potential for the proposed expansion to critical habitat for the whales to delay projects and activities.
 - **Regulatory Uncertainty** - NMFS conducts each section 7 consultation on a case-by-case basis and issues a biological opinion on formal consultations based on species-specific and site-specific information. As a result, government agencies and affiliated private parties who consult with NMFS under section 7 may face uncertainty concerning whether conservation efforts will be recommended by NMFS and what the nature of these conservation efforts will be. This uncertainty may diminish as consultations are completed and additional information becomes available on the effects of critical habitat on specific activities. It is difficult to identify whether and how regulatory uncertainty could change individuals' behavior (e.g., resulting in individuals avoiding activities within critical habitat).

²⁶ NMFS. Proposed Revision of the Critical Habitat Designation for Southern Resident Killer Whales: Draft ESA Section 4(b)(2) Report (to accompany the Proposed Rule).

However, the potential exists for such changes in behavior to generate indirect economic impacts due to critical habitat designation.

Geographic Scope of the Analysis

67. The 4(b)(2) exclusion process is conducted for a "particular area," not for the proposed critical habitat as a whole. This analysis is therefore conducted at a geographic scale that divides the area under consideration into smaller subareas. The statute does not specify the exact geographic scale of these "particular areas." For the purposes of this analysis, a "particular area" is defined as the specific areas (or critical habitat "units") identified by NMFS and mapped in Exhibit 1-2. Due to the difficulty in determining precise locations of future consultations occurring in Units 1 and 2, however, this analysis presents economic impacts collectively for these two units.
68. As activities occurring upstream may affect the essential features within the additional areas proposed for killer whale critical habitat, these activities may require consideration of potential effects on killer whale critical habitat as part of future section 7 consultation. This analysis accordingly presents economic impacts associated with economic activities occurring upstream that may affect the proposed critical habitat area.
69. No distance threshold exists or can be readily predetermined for how far upstream from the proposed expanded critical habitat consultation may occur. Action agencies determine whether consultation is needed based on whether they determine that a project or activity "may affect" the whales or their critical habitat. Historical consultations provide insight into the geographic scope of activities that action agencies have previously identified may affect killer whales. That is, the historical consultation activity describes the area over which action agencies have identified a potential connection between a planned project or activity and the whales (generally due to potential effects on the prey species). These previous consultations are the best available information to indicate where action agencies may also determine that projects or activities may affect the critical habitat for the whales. Accordingly, this analysis references the consultation history in identifying the upstream extent of projects and activities that may result in consultation to consider potential adverse modification to the proposed expanded critical habitat area.

Analytic Time Frame

70. Ideally, the time frame of this analysis would be based on the expected time period over which the critical habitat regulation is expected to be in place. Specifically, the analysis would forecast impacts of implementing this rule through species recovery (i.e., when the rule is no longer required). Recent guidance from OMB indicates that "if a regulation has no predetermined sunset provision, the agency will need to choose the endpoint of its analysis on the basis of a judgment about the foreseeable future."²⁷ The "foreseeable future" for this analysis includes, but is not limited to, activities that are currently

²⁷ The U.S. Office of Management and Budget, February 7, 2011. "Regulatory Impact Analysis: Frequently Asked Questions (FAQs)." Accessed on May 3, 2011 by http://www.whitehouse.gov/sites/default/files/omb/circulars/a004/a-4_FAQ.pdf.

authorized, permitted, or funded, or for which proposed plans are currently available to the public. Forecasted impacts are based on the planning periods for potentially affected projects and will look out over a ten-year time horizon. OMB supports this time frame stating that “for most agencies, a standard time period of analysis is ten to 20 years, and rarely exceeds 50 years.”²⁸ This analysis considers economic impacts to activities over a ten-year period from 2019 through 2028.

Discounting Impacts Over Time

71. The analysis employs standard discounting techniques to calculate the present value of economic impacts that are projected to occur in the future. The present value (PV_c) of impacts projected to occur from year t to T is measured in 2017 dollars according to the following standard formula:

$$PV_c = \sum_{t=t_0}^{t=T} \frac{C_t}{(1+r)^{t-2019}}$$

PV_c = discounted present value of future impacts

t = year of cost from year t_0 (2019) to T (2028)

C_t = cost of species conservation efforts in year t

r = discount rate

72. To calculate present values, guidance provided by OMB specifies the use of a real discount rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates, such as three percent, which some economists believe better reflects the social rate of time preference.²⁹ Accordingly, this analysis presents impacts at seven percent and provides a sensitivity analysis in Appendix B, summarizing impacts assuming a discount rate of three percent.

1.4 SUMMARY

73. The economic framework applied in this report sums project-level impacts to estimate the total economic impact of designating particular areas as critical habitat. This framework provides NMFS meaningful information for the 4(b)(2) exclusion process to distinguish between areas that have a relatively high or low benefit of exclusion. This information supports the use of a modified cost-effectiveness approach in designating critical habitat.

²⁸ *Ibid.*

²⁹ U.S. Office of Management and Budget, Circular A-4, September 17, 2003 and U.S. Office of Management and Budget, “Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice,” 68 Federal Register 5492, February 3, 2003.

CHAPTER 2 | EVALUATION OF KEY ECONOMIC ACTIVITIES

74. As described in Chapter 1, NMFS' *Draft Biological Report* identifies 15 activities that may affect the essential features of the additional areas being proposed for killer whale critical habitat and may require special management. This section discusses the regulatory baseline for these activities and evaluates the potential for the expanded critical habitat to trigger additional killer whale conservation efforts and associated economic impacts.

2.1 OVERVIEW OF ECONOMIC ACTIVITIES THAT MAY AFFECT THE EXPANDED CRITICAL HABITAT

75. NMFS identifies the following activities occurring within the proposed expanded critical habitat area that may affect the essential features of water quality, prey, and/or passage.
1. Salmon Fisheries and Incidental Bycatch³⁰
 2. Salmon Hatcheries
 3. Offshore Aquaculture/Mariculture
 4. Alternative Energy Development
 5. Oil Spills and Response Activities
 6. Military Activities
 7. Vessel Traffic
 8. Dredging and Dredge Material Disposal
 9. Oil and Gas Exploration and Production
 10. Geologic Surveys (including seismic surveys)
76. In addition, NMFS anticipates particular activities occurring adjacent to or upstream of the proposed expanded critical habitat may affect the water quality and prey availability essential features within the critical habitat. Activity threats occurring primarily upstream of the proposed expanded critical habitat include the following:
1. Activities Contributing to Point Source Water Pollution³¹

³⁰ Other fisheries, including those that employ traps and pots, have previously been identified as a potential threat to certain whale species due to the potential for entanglement in fishing gear. Although entanglement may constitute a jeopardy concern relative to the whales themselves, it does not present a threat to critical habitat (i.e., does not present a threat to prey species) and thus is not considered within this analysis.

³¹ NMFS' *Draft Biological Report* describes point source water pollution as a potential threat to the proposed expanded critical habitat, but does not highlight non-point source pollution. Non-point source pollution is generally not subject to

2. Liquid Natural Gas Terminals
3. Desalinization Plants
4. Mineral Mining
5. Power Plant Operations

77. Each of these 15 activities involves a Federal nexus (i.e., they are either permitted, funded, or carried out by a Federal agency) triggering the need for section 7 consultation with NMFS to ensure they do not jeopardize the Southern Resident killer whales or adversely modify their critical habitat. Accordingly, this analysis assumes that future occurrences of these activities within or affecting critical habitat for the whales will result in consultation. As described in Chapter 1, section 7 consultations generate administrative costs for the time and effort spent in conducting an adverse modification analysis and communications between the consulting parties. The administrative costs of these consultations are incremental impacts of the expanded critical habitat designation.
78. The remainder of this chapter evaluates the potential for future section 7 consultations on each of these activities to result in recommendations for additional conservation efforts for killer whales exclusively to avoid adverse modification of critical habitat. To the extent that NMFS recommends changes to the management of these activities due to the presence of expanded critical habitat—above and beyond any recommendations it would make for the conservation and recovery of the whales due to the listing status—the associated costs would be considered incremental economic impacts of the expanded critical habitat.

2.2 SUMMARY FINDINGS

79. Exhibit 2-1 summarizes the results of this evaluation. Based on a long history of consulting on the killer whales—including consultations that considered jeopardy as well as adverse modification for projects within the existing critical habitat for the whales within the inland waters of Washington—NMFS has not identified a particular project or activity for which it is likely that section 7 consultation *with* expanded critical habitat for the killer whales will result in different conservation recommendations than section 7 consultation *without* the expanded critical habitat.
80. Absent the expanded critical habitat, NMFS regularly consults on these types of activities to consider the potential for jeopardy to the killer whales and makes conservation recommendations accordingly. NMFS anticipates that it is most likely that these baseline conservation recommendations relevant to the jeopardy analysis would also result in the projects and activities avoiding adverse modification of critical habitat. The reason for this is that protection of the essential features of critical habitat (water quality, prey, and passage) is generally important to the conservation and recovery of the whales themselves

consultation except indirectly through the development of water quality standards. Consultations regarding water quality standards are addressed as part of the “Other” category of activities in this analysis.

and is already incorporated into consultations outside of the need to consider adverse modification of critical habitat.

81. This analysis forecasts the number of future consultations expected to consider expanded critical habitat for the whales over the next ten years. We first prioritized primary information on future projects based on communication with Federal action agencies that fund, permit, or carry out these activities. In addition, we relied on available data on historical projects, including the Army Corps' permit data, civil works project schedules, and NMFS' consultation history. Overall, the action agencies interviewed did not anticipate that the expanded critical habitat would increase the scope of projects consulting on killer whales and did not identify expected changes in conservation efforts.³²
82. In some cases, it may be more straightforward for NMFS to demonstrate that a project or activity may result in adverse modification of critical habitat than to demonstrate effects on the animals themselves (the "jeopardy" standard). For example, salmon fisheries and bycatch directly remove prey from the critical habitat, and the presence of prey is an essential feature. Reducing the availability of prey for the whales would factor into an analysis of the potential for jeopardy to the whales even absent critical habitat designation. Once critical habitat is designated, however, demonstrating the potential for the fishery to adversely modify critical habitat may be more straightforward than demonstrating the potential for jeopardy. Although the link to adverse modification may be more readily drawn, the outcome of the section 7 consultation—the recommended conservation efforts and associated costs—for the fishery would most likely be the same regardless of the presence of critical habitat.
83. Given presently available information, NMFS anticipates that it is unlikely that the proposed expansion to critical habitat designation will generate additional or different recommendations for conservation efforts for the killer whale and its habitat. However, NMFS will review each individual project or activity at the time of consultation to determine whether additional conservation is needed to avoid adverse modification of critical habitat.

³² An exception to this, as described later in this section, is that the Army Corps' Portland District expressed concern that the expanded critical habitat may result in NMFS recommending extending seasonal restrictions on dredging and construction projects. However, NMFS does not anticipate that the proposed expansion of critical habitat for the whales will require extending seasonal restrictions on these activities.

EXHIBIT 2-1. SUMMARY FINDINGS BY ACTIVITY

ACTIVITY	SUMMARY FINDING
Fisheries	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline protections associated with the ESA-listing status of both the killer whales and salmon. As described in Section 2.3 of this report, this analysis considers the potential for the expansion of critical habitat to result in additional conservation efforts relative to commercial and recreational fishing. However, the management of salmon fisheries for the purposes of recovering the salmon, as well as to avoid jeopardy to the whales, is already very stringent regardless of the critical habitat expansion. Consultations on salmon fishing activities in Puget Sound, where killer whale critical habitat is already designated, do not identify conservation recommendations relative to critical habitat beyond those related to the whales themselves. Therefore, it is most likely that no additional conservation recommendations would be made specifically to avoid adverse modification of the killer whale critical habitat, and impacts of the rule on this activity are limited to the administrative costs of consultation.
Salmon Hatcheries	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline protections associated with the ESA-listing status of both the killer whales and salmon. As described in Section 2.4 of this report, relative to Federal funding of hatcheries, NMFS already considers the potential impacts of changes in hatchery production of salmon on killer whales. To avoid jeopardy to the species, NMFS has previously requested that reductions in hatchery releases be phased over time, and that monitoring be conducted to better-evaluate any potential impacts of prey reduction on the species. These conservation efforts would most likely result in avoidance of adverse modification of critical habitat and, thus, the proposed expansion to critical habitat is unlikely to generate additional conservation recommendations.
Aquaculture/ Mariculture	As described in Section 2.5, aquaculture/mariculture activities are unlikely to occur within the proposed expanded critical habitat over the ten-year timeframe of this analysis. As a result, this analysis does not anticipate Section 7 consultations for this activity.
Alternative Energy Development	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline protections associated with the ESA-listing status of the killer whales. As described in Section 2.6, existing Biological Opinions for two alternative energy projects include efforts to understand and minimize impacts to killer whales and other cetaceans. A third consultation, conducted following designation of killer whale critical habitat in inland waters of Washington, indicates that NMFS did not believe additional efforts were needed to protect killer whale habitat above and beyond what has been recommended to avoid jeopardy to the species.
Oil Spills and Response	As described in Section 2.7, oil spill planning and response activities are unlikely to occur within the proposed expanded critical habitat over the ten-year timeframe of this analysis. As a result, this analysis does not anticipate Section 7 consultations for this activity. To the extent that consultations on this activity do occur, the number of consultations is likely to be minimal, and the associated economic impacts would be limited to relatively minor administrative costs due to existing protocols to protect killer whales from oil spill impacts.
Military Activities	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline protections associated with the ESA-listing status of the killer whales. As described in Section 2.8, a number of existing measures are presently implemented to minimize the impacts on military training and testing activities on killer whales.
Vessel Traffic	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline protections associated with the ESA-listing status of the killer whales. As described in Section 2.9, codification of Traffic Separation Schemes following expansion of critical habitat are unlikely to result in additional conservation efforts.
Dredging and Disposal	As described in Section 2.10, it is unlikely that section 7 consultations will result in additional conservation recommendations due to baseline management of these activities under the Army Corps' Best Management Practices (BMPs). Existing requirements including designated in-water work windows and pile driving requirements, as well as BMPs that reduce the impacts of dredging on water quality, all serve to limit potential impacts to killer whales and their prey.

ACTIVITY	SUMMARY FINDING
Oil Exploration and Production	As described in Section 2.11, future activity levels and associated consultations are uncertain, analysis identifies that oil exploration and production activities are unlikely to occur within the proposed expanded critical habitat over the ten-year timeframe of this analysis. As a result, this analysis does not anticipate Section 7 consultations for this activity.
Geologic Surveys	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline management of these activities. As described in Section 2.12, seismic survey activity in the potential critical habitat expansion area is limited, and is already subject to a number of efforts to reduce potential impacts to killer whales and their foraging efforts.
Upstream Activities ¹	Unlikely that section 7 consultations will result in additional conservation recommendations due to baseline management of these activities. Upstream activities may affect killer whale critical habitat to the extent they adversely affect salmon and salmon critical habitat. As described in Section 2.13, conservation efforts to avoid jeopardy to the prey species itself, even absent the expansion of killer whale critical habitat, provide substantial protection to killer whale critical habitat.
Note: 1. Activities occurring upstream of the proposed critical habitat expansion area considered in this analysis include those contributing to water pollution (agricultural pesticide application, National Pollutant Discharge Elimination System [NPDES] permitting); liquefied natural gas terminals; desalinization plants; mineral mining; and power plant operations. No distance threshold exists or can be readily predetermined for how far upstream from the proposed expanded critical habitat consultation may occur. Section 1.3 describes how potential consultations for upstream activities are identified for this analysis.	

84. Although critical habitat designation is not expected to change conservation efforts implemented for the killer whales, the adverse modification analysis conducted as part of section 7 consultations (reflected in the incremental administrative costs of consultation) provides useful scientific information to build upon NMFS' understanding of the biological needs of, and threats to, the killer whales. While this scientific information is not the reason for the consultation process, it is an ancillary benefit of the consultations.

2.3 SALMON FISHERIES AND INCIDENTAL BYCATCH

85. Salmon fisheries present a relatively unique issue with respect to the proposed critical habitat expansion. Many of the projects and activities described in the previous section that may affect the essential features of expanded critical habitat occur outside of the habitat (i.e., in adjacent coastal areas or in inland, upstream waters). For the activities that are occurring directly within the proposed critical habitat expansion, the relationship between the activity and the prey abundance and water quality essential features are more apparent. That is, harvest of salmon, whether directly as a target species or indirectly as bycatch in other fisheries, is the activity that most directly affects an essential feature of critical habitat by specifically reducing salmon abundance.
86. The information regarding fisheries presented in this section, and the assessment of the activity levels across critical habitat units, do not reflect economic impacts of the expanded critical habitat designation. This information is provided as context regarding the relative value of the critical habitat units to the salmon fishery.

2.3.1 MANAGEMENT OF FISHERIES AND LEVEL OF ACTIVITY IN AREAS PROPOSED AS EXPANDED CRITICAL HABITAT FOR THE KILLER WHALES

87. The Pacific Coast salmon fishery is managed by the Pacific Fisheries Management Council (PFMC). The PFMC outlines salmon management objectives and regulations annually through the Pacific Coast Salmon Fishery Management Plan, which determines the total allowable harvest for each Pacific salmon species, and allocates this harvest among various participant groups (including commercial, recreational, and tribal fisheries). Depending on the abundance of salmon in any given year, the management plan may limit harvest through tools such as seasonal restrictions, area closures, catch quotas, fishing gear restrictions, and recreational daily bag limits. NMFS engages in section 7 consultation on the potential impacts of the management plan on the Southern Resident killer whales across the range of the whales (included in the proposed expanded critical habitat area), as well as regarding their existing critical habitat in inland waters of Washington.
88. The PFMC's most recent preseason report describes the proposed management measures for the 2017 season and includes an economic analysis of the potential impacts of these measures in each catch area.³³ For example, in the "U.S./Canada Border to Cape Falcon" catch area, the preseason report indicates that the 2018 commercial troll season will include harvest quotas of 27,500 Chinook and 5,600 Coho. As a result of this restriction, the report projects that ex-vessel troll revenues will decline by 21 percent in 2018 relative to 2017 in this catch area. However, due to increases in projected revenue in other catch areas, the report projects that total ex-vessel troll revenue across the West Coast will increase by 45 percent in 2018 relative to 2017. The preseason report also provides projections of recreational angler trips and coastal community income impacts in each catch area.
89. In addition to the fisheries directly targeting salmon, a number of valuable fisheries frequently capture salmon incidentally during the course of operations. In particular, because salmon are frequently associated with bottom topography, they are susceptible to incidental take in bottom trawl fisheries targeting groundfish (PFMC 2014).³⁴ Groundfish fisheries on the West Coast are managed by the PFMC under the Pacific Coast Groundfish Fishery Management Plan. The plan covers over 90 species of groundfish targeted or caught incidentally in these fisheries, including rockfish, flatfish (e.g., petrale sole, Dover sole), roundfish (e.g., Pacific cod, Pacific whiting), and sharks and skates. Fish are harvested using both bottom trawl and fixed gear (longlines and pot/trap gear). Groundfish fisheries are constrained by the need to rebuild many overfished species covered under the plan, and as a result, harvest has been significantly reduced from historical levels.³⁵ Harvest specifications are established biennially (except for whiting,

³³ PMFC. 2018. Preseason Report III: Council Adopted Management Measures and Environmental Assessment Part 3 for 2018 Ocean Salmon Fishery Regulations.

³⁴ PFMC. 2014. Identification and Description of Essential Fish Habitat, Adverse Impacts, and Recommended Conservation Measures for Salmon: Appendix A to the Pacific Coast Salmon Fishery Management Plan as modified by Amendment 18 to the Pacific Coast Salmon Plan. Accessed September 12, 2018 at: http://www.pcouncil.org/wp-content/uploads/Salmon_EFH_Appendix_A_FINAL_September-25.pdf

³⁵ PFMC. 2018. Groundfish: Background. Accessed September 12, 2018 at: <https://www.pcouncil.org/groundfish/background/>

which is done annually), and include thresholds for Chinook salmon bycatch over which a review of operation of the fishery, including consideration of closure, is triggered. Salmon are known to be incidentally caught in the Pacific whiting fishery either because they co-occur with whiting, or fishermen accidentally set trawl gear on the wrong species. Bycatch of Chinook salmon in the groundfish fishery as a whole has recently ranged from 2,000 to 12,000 Chinook salmon annually and between 2007 and 2009, 90 percent of that bycatch occurred in the whiting fishery.³⁶

Commercial Fishing

90. The Pacific Fisheries Information Network (PacFIN) Comprehensive Fish Ticket Table provides information on commercial salmon catch ex-vessel revenues. The database provides separate estimates of ex-vessel revenues by salmon species, gear type, participation group (i.e., non-tribal commercial or tribal commercial), and catch area. Based on the descriptions of the California catch areas and maps found on the Washington and Oregon Departments of Fish and Wildlife websites, it is possible to approximate the level of commercial salmon fishing activity by proposed critical habitat unit for the killer whales.^{37,38} This analysis assumes that all salmon caught in ocean catch areas are caught within the proposed critical habitat area. While some of these salmon may be caught farther offshore, the vast majority are likely to be caught in depths shallower than 200 meters, within the proposed critical habitat area.³⁹
91. Exhibit 2-2 presents the estimated average annual revenues from salmon catch in each critical habitat unit from 2006 to 2016. As the exhibit demonstrates, the majority of revenues (66 percent on average) are earned from the sale of salmon caught outside of the proposed additional critical habitat units, including Puget Sound, the Strait of Juan de Fuca, in bays and estuaries, and in rivers. Units 5 and 1/2 account for the greatest revenues associated with harvest of salmon within the proposed critical habitat expansion, accounting for 13 and nine percent of average annual salmon revenues respectively. Consultations on this fishery considering potential effects on killer whales are not limited to just the area overlapping the proposed expanded critical habitat area but rather consider more broadly the effects on prey quantity.

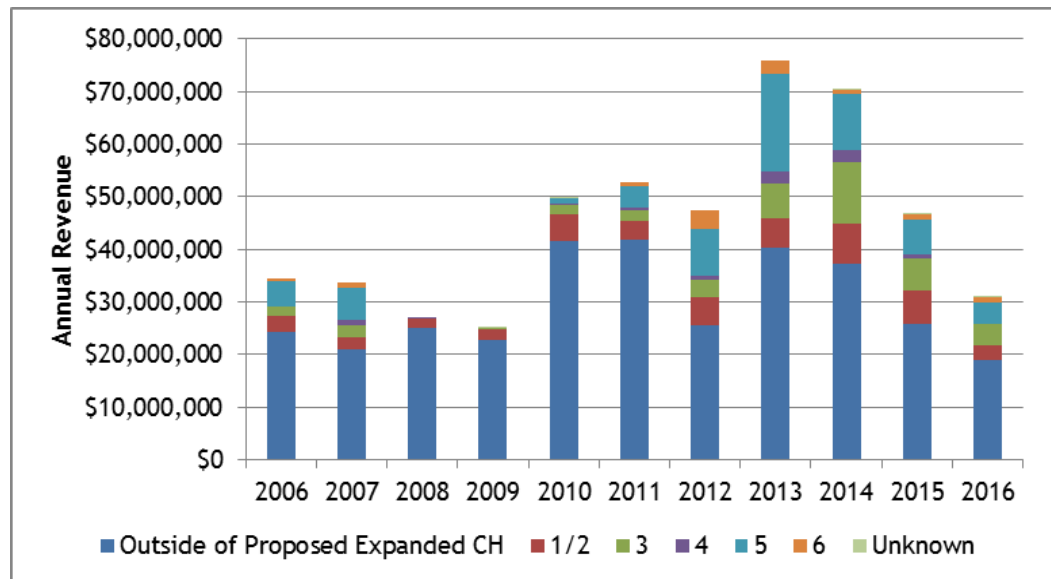
³⁶ NMFS. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Section 7(a)(2) "Not Likely to Adversely Affect" Determination: Continuing Operation of the Pacific Coast Groundfish Fishery. December 7, 2012.

³⁷ For catch areas that overlapped multiple critical habitat units, revenues are divided between each unit proportional to the area of the unit overlapping the catch area.

³⁸ We could not identify a map of the California catch areas. However, we were able to identify the critical habitat units associated with each catch area due to the spatially descriptive catch area titles in California (e.g. "36 00' N TO 40 30' N; Piedras Blancas to Cape Mendocino."

³⁹ PFMC. 2011. The West Coast Salmon Genetic Stock Identification Collaboration Annual Report. Accessed April 2107 at: http://www.pcouncil.org/wp-content/uploads/INFO_SUP_RPT5_GSI_COLLABORATION_APR2012BB.pdf

EXHIBIT 2-2. AVERAGE ANNUAL EX-VESSEL REVENUES BY CRITICAL HABITAT UNIT (2006 - 2016)

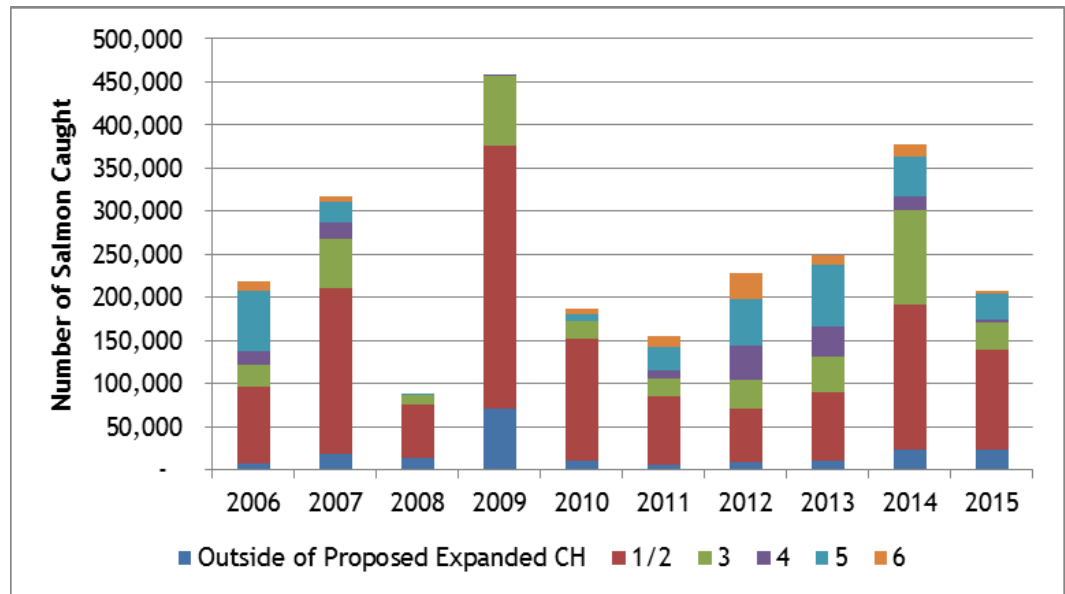


Recreational Fishing

92. The Recreational Fisheries Information Network (RecFIN) provides data on marine recreational fishing activity in Washington and Oregon. As the RecFIN database does not include complete catch data for California; this analysis relies on the PFMC's 2016 Stock Assessment and Fishery Evaluation (SAFE) report for that state. Similar to the PacFIN data, this analysis distributes harvest occurring within the catch areas provided in the RecFIN and SAFE datasets across the proposed critical habitat units. In two cases, a RecFIN catch area overlapped multiple critical habitat units. Without adequate spatial information to determine the proportions of each critical habitat unit that overlapped the catch areas, this analysis divides the catch equally between each unit in these cases.⁴⁰
93. Exhibit 2-3 summarizes the estimated recreational salmon harvest in numbers of fish by proposed critical habitat unit. While counts of salmon catch do not directly represent the economic value of recreational salmon fishing, they may provide an indication of the relative importance of each critical habitat unit to recreational fisheries.

⁴⁰ Additionally, the RecFIN dataset identifies whether salmon were caught in "Ocean areas" or "Inland marine areas." This analysis assumes that all salmon caught in "Ocean areas" were caught within the proposed critical habitat. However, given that relatively few salmon were caught within the "Inland marine areas" upstream of critical habitat, this analysis may overestimate the proportion of salmon caught in the proposed critical habitat units.

EXHIBIT 2-3. RECREATIONAL SALMON HARVEST BY CRITICAL HABITAT UNIT (2006 - 2015)



94. Salmon fisheries provide income and employment opportunities to the regional economy. The PFMC's 2016 SAFE report estimates that income impacts associated with commercial and recreation ocean salmon fisheries totaled \$48.6 million in 2016.⁴¹ The PFMC calculates income impacts using the Northwest Fishery Science Center's (NWFSC) IO-PAC model. The estimated impacts include the direct, indirect, and induced impacts of the personal income associated with commercial salmon harvesting and processing and the income associated with trip-related expenditures by recreational anglers.⁴² Exhibit 2-4 summarizes estimated income impacts of commercial and recreational fisheries in Washington, Oregon, and California over the past five years.

⁴¹ PFMC. 2017. Review of 2016 Ocean Salmon Fisheries: Stock Assessment and Fishery Evaluation Document for the Pacific Coast Salmon Fishery Management Plan.

⁴² Direct impacts include "personal income earned by those directly participating in the fishery (e.g. vessel owners, crew members, processing workers, and recreational charter operators)." Indirect impacts include income "earned by those providing inputs to harvesting, processing and recreational operations (e.g. fuel, gear, packaging, bait, and ice suppliers)." Induced impacts include "income earned by those who benefit when direct and indirect income is re-spent in the community (e.g. grocery store owners, car mechanics, and health professionals)."

EXHIBIT 2-4. INCOME IMPACTS OF COMMERCIAL AND RECREATIONAL FISHERIES

YEAR	WASHINGTON		OREGON		CALIFORNIA		TOTAL
	COMMERCIAL	RECREATION	COMMERCIAL	RECREATION	COMMERCIAL	RECREATION	
2012	\$2,812,000	\$16,596,000	\$7,942,000	\$6,924,000	\$25,032,000	\$33,947,000	\$93,253,000
2013	\$2,050,000	\$16,920,000	\$12,886,000	\$8,622,000	\$38,916,000	\$34,215,000	\$113,609,000
2014	\$1,828,000	\$24,436,000	\$24,587,000	\$12,975,000	\$20,199,000	\$28,496,000	\$112,521,000
2015	\$1,285,000	\$20,449,000	\$11,879,000	\$7,047,000	\$13,337,000	\$20,173,000	\$74,170,000
2016	\$2,185,000	\$10,117,000	\$6,929,000	\$3,749,000	\$8,358,000	\$16,968,000	\$48,306,000

2.3.2 BASELINE PROTECTIONS ASSOCIATED WITH THE ESA LISTING STATUS OF PREY SPECIES FOR THE SOUTHERN RESIDENT KILLER WHALES

95. One of the most significant protections benefitting the whales' habitat relative to the prey essential feature is that many of the salmonid ESUs targeted as prey by the whales are themselves listed under the ESA. Nine ESUs of Chinook salmon, the Southern Resident killer whales' preferred prey species, are presently protected under the ESA.⁴³ As such, substantial efforts have been made to identify and reduce the sources of threat to these ESUs (see text box, The Four H's of Salmon Recovery).
96. Section 7 consultations regarding the management of salmon fisheries regularly evaluate the potential for jeopardy to Southern Resident killer whales. As part of these consultations, NMFS has recommended conservation efforts specifically focused on conservation and recovery of the whales due to the ESA listing status of the species. For example, the 2009 Biological Opinion for the Pacific Coast Salmon Plan includes the following killer whale conservation recommendations:
- Monitor and report Southern Resident killer whales in the action area;
 - Support ongoing salmon recovery efforts to ensure an adequate food base for Southern Resident killer whale recovery;
 - Conduct research on the correlation between the whales' survival, birth rates, and various salmon species and stocks;
 - NMFS and the PFMC should cooperate with research partners to collect information on prey preference and biomass; and
 - Minimize the ecosystem effects of the salmon fishery management plan fisheries.⁴⁴

⁴³ Hanson, M.B., R.W. Baird, J.K.B. Ford, J. Hempelmann-Halos, et al. 2010. Species and stock identification of prey consumed by endangered Southern resident killer whale in their summer range. *Endangered Species Research* 11:69-82.

⁴⁴ NMFS. 2009. Endangered Species Act Section 7(a)(2) Consultation Biological Opinion: Effects of the Pacific Coast Salmon Plan on the Southern Resident Killer Whale (*Orcinus orca*) Distinct Population Segment.

THE FOUR H'S OF SALMON RECOVERY

The Washington State Recreation and Conservation Office identifies key anthropogenic activities that have contributed to declines in salmon populations. These threats are often summarized as “The Four H’s”.

Harvest - Over-fishing.

Hatcheries - Hatcheries produce fish that compete with wild salmon for limited resources.

Habitat - Loss, fragmentation, and destruction of salmon habitat, as well as land uses that pollute waterways and degrade habitat.

Hydropower - Construction of dams has created barriers to migration and reduced available habitat.

Source: Washington State Recreation and Conservation Office, "Salmon Recovery in Washington", viewed at http://www.rco.wa.gov/salmon_recovery/ on April 18, 2017.

97. NMFS also conducts Section 7 consultations to evaluate the potential for jeopardy to killer whales for fisheries with particularly high levels of bycatch of salmon species. For example, NMFS has conducted consultations on the continuing operations of the Pacific Groundfish Fishery, as well the catch sharing plan for Pacific halibut. Relative to halibut, NMFS concluded that the anticipated extent of salmon bycatch in the halibut fisheries was minimal, and not likely to adversely affect Southern Resident killer whales. Similarly, with regard to groundfish, NMFS concluded that the amount of anticipated salmon bycatch in the groundfish fishery represents only a small portion of the total quantity of Chinook salmon available throughout the whales’ range, and thus is not likely to adversely affect the species.

2.3.3 POTENTIAL IMPLICATIONS OF THE KILLER WHALE CRITICAL HABITAT EXPANSION ON SALMON FISHERIES AND INCIDENTAL BYCATCH

98. Although NMFS acknowledges that conservation recommendations (e.g., restrictions to the annual catch limits) in the proposed expanded critical habitat areas are theoretically possible, significant uncertainty exists regarding two key factors:
- a) What the conservation recommendations may be; and
 - b) Whether these recommendations would be made exclusively due to the presence of critical habitat or whether they would be made regardless of critical habitat in order to avoid jeopardy to the whales.
99. Regarding the first factor, a key piece of information required to determine how fisheries may be affected is a threshold level at which jeopardy or adverse modification for the whales and their habitat is a concern. NMFS does not current have sufficient information to establish a threshold level of prey abundance.

100. Regarding the second factor, as noted above, review of the available consultation history indicates that past consultations on salmon fisheries and fisheries in which salmon are incidentally caught already include conservation recommendations to support conservation and recovery of the killer whales. These conservation actions are related to the presence of the species rather than avoidance of habitat impacts. Personal communication with NMFS Protected Resources Division and Sustainable Fisheries Division indicated that the biologists and fisheries managers did not anticipate additional killer whale conservation recommendations associated with fisheries.⁴⁵
101. In addition, critical habitat has existed for the Southern Resident killer whales in the inland waters of Washington for over a decade. Recent consultations regarding the Puget Sound salmon fisheries provide insight regarding whether and how the presence of critical habitat affects NMFS' conservation recommendations for killer whales apart from the conservation recommendations made due to the ESA listing status. Specifically, a series of Biological Opinions on salmon fishing activities in Puget Sound considered the effects of these activities on the whales' existing critical habitat.⁴⁶
102. In analyzing the potential for the fisheries to adversely modify critical habitat, these Biological Opinions focus specifically on the prey availability essential feature, which they analyze in detail relative to the effect of the activity on the species itself (i.e., the potential for jeopardy). The analysis of the "Effects on Critical Habitat" then cites back to the discussion regarding the effects on the species. Consideration of critical habitat did not result in different or additional conservation recommendations beyond those related to jeopardy in the areas that include both the species and existing critical habitat.
103. For these reasons, while this analysis recognizes that there is some possibility that fishery management recommendations could change as a result of critical habitat, changes are not quantified because they are considered unlikely over the ten-year timeframe of this analysis.

⁴⁵ Personal communication with Susan Bishop and Peter Dygert, NMFS Sustainable Fisheries Division, April 20, 2017; Personal communication with Lynne Barre, NMFS Protected Resources Division, December 14, 2017.

⁴⁶ See, for example: NMFS. 2019. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Response: Impacts of the Role of the BIA Under its Authority to Assist with the Development of the 2019-2020 Puget Sound Chinook Harvest Plan, Salmon Fishing Activities Authorized by the U.S. Fish and Wildlife Service, and Fisheries Authorized by the U.S. Fraser Panel in 2019. NMFS Consultation Number: WCR-2019-00381; and NMFS. 2014. Endangered Species Act Biological Opinion and Magnuson-Stevens Act Essential Fish Habitat Consultation Impacts of Programs Administered by the Bureau of Indian Affairs that Support Puget Sound Tribal Salmon Fisheries, Salmon Fishing Activities Authorized by the U.S. Fish and Wildlife Service, and Fisheries Authorized by the U.S. Fraser Panel in 2014.

EVALUATING THE POTENTIAL EFFECTS OF SOUTHERN RESIDENT KILLER WHALE CRITICAL HABITAT EXPANSION ON SALMON FISHERIES

Southern Resident killer whales prey primarily on Chinook salmon within the coastal areas proposed for expanded critical habitat. One of the essential features of the expanded critical habitat is prey species of sufficient quantity, quality, and availability to support individual growth, reproduction and development, as well as overall population growth of the killer whales. As salmon fisheries result in direct removal of the killer whale prey from the critical habitat area, this analysis requires particular attention to the potential for the proposed critical habitat expansion to affect the management of the salmon fisheries.

Despite the direct relationship between salmon harvest and the prey essential feature of critical habitat, it is unlikely that the expanded critical habitat would have additional effects to the management of salmon fisheries for the following reasons:

- 1) *Chinook salmon are protected under the Federal Endangered Species Act:* Chinook salmon are themselves a listed species and therefore fisheries that directly harvest or result in bycatch of Chinook are managed according to the provisions of the ESA.
- 2) The Chinook salmon fisheries are managed cooperatively between Federal and state agencies and tribes to protect vulnerable salmon populations. The Pacific Fisheries Management Council (PFMC) makes recommendations to NMFS, adjusting allowable catch limits for salmon in Federal waters off the coasts of WA, OR, and CA on an annual basis to advance conservation of the salmon. The 2019 Final Rule establishing management measures for West Coast salmon fisheries limited the fisheries for all Chinook salmon due to conservation concerns (84 FR 19729). NMFS concluded that implementation of the 2019 harvest management measures was consistent with sections 7(a)(2) and 7(d) of the ESA, and would not jeopardize Southern Residents or adversely modify existing critical habitat in inland waters of Washington. NMFS has, however, reinitiated consultation on effects of the coastal salmon fisheries and the PFMC has created an Ad Hoc Working Group to reassess the effects of the Pacific Council-area ocean salmon fisheries on Southern Resident killer whales. This Working Group is exploring effects on the whales through impacts to their prey base.
- 3) *NMFS guidance directs biologists to base killer whales effects determinations for section 7 consultations on the effects of fisheries on Chinook salmon:* Due to the strong correlation between Chinook abundance and killer whale survival and fecundity, NMFS guidance describes that killer whale determinations are often contingent upon, and need to refer to, the effects determinations for salmon. Thus, the process for consultation requires sequential rather than concurrent effects determinations. The guidance identifies effects on prey quantity for killer whales as a key pathway to evaluate for potential effects, identifying that fisheries that cause a non-negligible reduction in Chinook are likely to adversely affect killer whales (NMFS 2013 Memorandum: Guidance on ESA Consultation for Southern Resident Killer Whales and Other Listed Marine Mammals). The guidance demonstrates the focus on killer whale prey availability as part of fisheries consultations even absent critical habitat.
- 4) *Consideration of adverse modification has not generated additional conservation recommendations for fisheries consultations in the existing killer whale critical habitat in inland waters of Washington:* Critical habitat has existed for the Southern Resident killer whales in the inland waters of Washington for over a decade. The Biological Opinions developed for these consultations (most recently in May 2019) consider the prey availability essential feature of killer whale critical habitat. The critical habitat effects determinations in these Biological Opinions cite the discussion regarding the jeopardy determination. Consideration of potential adverse modification has not resulted in different or additional conservation recommendations beyond those related to jeopardy, which include geographic area closures to protect Chinook salmon which are in primary whale feeding areas and benefit the whales. NMFS expects that consultations considering the expanded critical habitat in the coastal areas will reflect this same approach.

2.4 SALMON HATCHERIES

104. Although a potential threat to the recovery of ESA-listed salmonids, the fish produced by hatcheries represents additional biomass available as prey for the whales. Thus, it may seem that management objectives of hatchery operations in consideration of effects on wild salmon would be counter to management objectives of hatchery operations in consideration of the whales. However, improving populations of wild salmon is beneficial to the whales and, therefore, the effects of the hatcheries on the recovery of wild salmon populations is relevant to evaluating conservation and recovery of the killer whales.
105. Hatchery programs in Washington, Oregon, and California often receive Federal funding, creating a federal nexus that triggers section 7 consultations under the ESA. A review of the section 7 consultation history identified a single formal consultation related to hatcheries in the areas being proposed for critical habitat expansion in the past ten years. This consultation focused on funding through the Mitchell Act for Columbia River hatcheries. The 2017 Biological Opinion for this consultation specifically considered the impacts of Columbia River hatchery operations on the whales and found that the proposed reduction in hatchery releases may adversely affect the whales in the short term, particularly in the area just outside of the mouth of the Columbia River. It further noted, however, that the reduction in releases could be beneficial in the long term, if the hatchery program improves the status of ESA-listed Chinook salmon, as is the intent.⁴⁷
106. To reduce the potential impacts to the whales that were anticipated to result from the proposed action (i.e., a reduction in hatchery releases), NMFS requested that:
- Reductions in hatchery releases be phased in over time; and
 - Monitoring and research be done to evaluate how prey reductions affect the whales, and if those affects are concentrated in particular geographic locations.⁴⁸
107. NMFS does not anticipate that the expansion of critical habitat would result in additional killer whale conservation recommendations for hatchery operations beyond what is already recommended to avoid potential jeopardy to the whales.

2.5 OFFSHORE AQUACULTURE/MARICULTURE

108. The presence of aquaculture facilities within critical habitat would have the potential to adversely affect the water quality and passage essential features of proposed critical habitat for the killer whales. However, the vast majority of aquaculture activity in the northwest is limited to shellfish production in Puget Sound and in the coastal bays and

⁴⁷ NMFS. 2017. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation: NOAA's National Marine Fisheries Service's implementation of the Mitchell Act Final Environmental Impact Statement preferred alternative and administration of Mitchell Act hatchery funding.

⁴⁸ Personal communication with Lynne Barre, National Marine Fisheries Service, on February 7, 2017.

estuaries.⁴⁹ Similarly, shellfish aquaculture in California is limited to bays and estuaries, primarily in Humboldt Bay, and Tomales Bay, and offshore aquaculture activity is limited to the area south of Point Conception due to the relatively favorable oceanic conditions.⁵⁰ NMFS has not consulted on aquaculture facilities (on killer whales or other species) within the proposed expanded critical habitat area over the past ten years. Consequently, this analysis finds that it is unlikely that aquaculture facilities will occur within the proposed critical habitat areas for the killer whales over the timeframe of this analysis.

2.6 ALTERNATIVE ENERGY DEVELOPMENT

109. As described in NMFS' *Draft Biological Report*, development of renewable energy facilities has the potential to impede passage conditions suitable for migration, resting and foraging by presenting physical barriers to passage, as well as creating unfavorable environmental conditions including emission of electromagnetic fields. Additionally, facilities may diminish water quality, and result in localized reductions in prey availability.
110. The Federal Energy Regulatory Commission (FERC) oversees licensing for non-Federal hydroelectric projects, including marine hydrokinetic projects (i.e., tidal and wave energy), where the project occurs in a navigable waterway, or the resulting energy is connected to the grid.⁵¹ To date, a limited number of projects have been proposed in the area of potential critical habitat expansion.⁵² One project formerly under development by Ocean Power Technologies proposed to place an array of 100 buoys off the coast of Reedsport, OR. However, in February 2015 the developer surrendered its permit and the project is no longer being pursued.⁵³ In 2010, the U.S. Department of Energy (DOE) and Oregon State University's (OSU) Northwest National Marine Energy Research Center began the permitting process to establish an open ocean test center for wave energy conversion devices near Yaquina Head, OR. As an outgrowth of that project, the Pacific Marine Energy Center – South Energy Test Site (PMEC-SETS) Research Facility Project, proposed by Oregon State University, would place testing “berths” to demonstrate the viability of wave energy across 33 square miles of ocean approximately five nautical

⁴⁹ Personal communication with Laura Hoberect, NMFS Regional Aquaculture Coordinator for the Northwest on December 12, 2016.

⁵⁰ Personal communication with Diane Windham, NMFS Regional Aquaculture Coordinator for the Southwest on January 4, 2017.

⁵¹ In Federal waters, permitting authority for all renewable energy development, including wind, is also held by the Bureau of Ocean Energy Management.

⁵² Information in this section is based on personal communication with David Turner, FERC, on April 5, 2017 unless otherwise noted.

⁵³ Schwartz, David. “Wave Energy Developer Pulls Plug on Oregon Project.” Oregon Public Radio. Viewed at <http://www.opb.org/news/article/wave-energy-developer-pulls-plug-on-oregon-project/> on April 17, 2017.

miles offshore of Newport, Oregon.⁵⁴ This project is presently under development, and a draft license application was submitted in April 2018.⁵⁵ The draft license application includes a draft biological assessment which concludes that the action “may affect, and is likely to adversely affect” killer whales. The biological assessment also notes that potentially affected killer whales will be protected through an “Acoustics Monitoring Plan” and an “Organism Interactions Monitoring Plan” among other Protection, Mitigation and Enhancement Measures.⁵⁶

111. NMFS has written two Biological Opinions as part of section 7 consultations regarding wave and tidal energy projects that provide a baseline protection to the whales and their habitat. For the project proposed by Ocean Power Technologies off Reedsport, OR, in consultation with NMFS, the project developers incorporated conservation efforts into the proposed actions, requiring conduct of a Cetacean Study to develop a better understanding of: (1) the paths of migratory whales in the action area, (2) the background sound at the project site and acoustic emissions generated by the PowerBuoys and any potential for sound disturbance, and (3) how whales behave in the presence of the project (e.g., do they appear to detect and avoid the project’s buoy/cable systems).⁵⁷ The more recent consultation on the DOE/OSU wave energy test park includes plans to conduct both acoustic and electromagnetic field monitoring to evaluate effects on endangered species, including Southern Resident killer whales.⁵⁸
112. A third Biological Opinion on a tidal energy project in Admiralty Inlet, WA (within the existing critical habitat area) provides insight as to the nature of conservation efforts NMFS has recommended in a location with existing critical habitat for the whales. Included in this consultation is a detailed Monitoring and Mitigation Plan designated to address the question of whether the whales respond to “acoustic stressors or prey aggregations in the vicinity of the turbine through attraction, avoidance, or change in activity state.”⁵⁹ The similarity in conservation recommendations for projects both within and outside of existing critical habitat suggest that the designation of critical habitat has

⁵⁴ BOEM. Pacific Marine Energy Center - South Energy Test Site (PMEC-SETS) Research Facility Project. Accessed at <https://www.boem.gov/PMEC-SETS/> on December 22, 2016.

⁵⁵ U.S. Department of Energy. 2018. Important Licensing Milestone Reached for Oregon Wave Energy Test Site. Accessed at: <https://www.energy.gov/eere/water/articles/important-licensing-milestone-reached-oregon-wave-energy-test-site>

⁵⁶ Oregon State University. 2018. Pacific Marine Energy Center South Energy Test Site Draft Biological Assessment. FERC Project No. 14616.

⁵⁷ NMFS. 2012. Endangered Species Act Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Reedsport Ocean Power Technologies (OPT) 10-PowerBuoy Wave Park, 2.5 miles offshore of Reedsport, Oregon, in the Eastern Pacific Ocean (FERC Docket No. P-12713-002).

⁵⁸ NMFS. 2012. Endangered Species Act Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the for the Department of Energy’s Northwest National Marine Renewable Energy Center and Oregon State University Wave Energy Test Facility Project Funding and US Army Corps Engineers Nationwide Permit #5 for 20 12-2013 WET-NZ Wave Energy Test Project at the Northwest National Marine Renewable Energy Center Test Site.

⁵⁹ NMFS. 2013. National Marine Fisheries Service’s Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion and Section 7(a)(4) Conference Report, Section 7(a)(2) Letter of Concurrence with “Not Likely to Adversely Affect” Determination, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation for the Admiralty Inlet Pilot Tidal Project, FERC No. 12690.

not resulted in additional or more stringent conservation recommendations. Similarly, NMFS has indicated that it is unlikely that additional killer whale conservation efforts will be recommended as part of future consultations regarding renewable energy projects due to designation of expanded critical habitat. As no incremental conservation recommendations are expected for this activity type, costs of designation will be limited to the administrative cost of considering critical habitat in ongoing and new consultations anticipated over the next ten years.

113. As an emerging industry, it is difficult to predict the future locations, number, and timing of wave and tidal energy projects in the critical habitat expansion area. Although there is significant interest in the development of this industry, there are constraints that may limit the ability of the industry to expand significantly in the next ten years (e.g., limited funding for research, difficulty in connecting to the grid from offshore locations).
114. Interest in development of wind energy projects in Federal waters offshore of California have primarily focused on Morro Bay (south of the area being considered for critical habitat expansion), while additional potential exists for wind project development in Northern California north of the Greater Farallones National Marine Sanctuary. Renewable energy development in the Federal waters offshore of Washington has garnered little interest and seems unlikely in the next ten years. Representatives from FERC did not anticipate greater rates of activity in this arena over the next ten years. This analysis therefore finds that the future rate of activity will most likely be relatively consistent with what has occurred over the last ten years. A review of the NMFS consultation history identified three informal and two formal consultations on alternative energy development in the proposed critical habitat areas between 2006 and 2016.

2.7 OIL SPILLS AND RESPONSE

115. Oils spills and response activities have the potential to affect the water quality and prey essential features of the expanded critical habitat area for the killer whales. The Northwest Area Contingency Plan (NWACP) outlines the procedures that will be employed in the event of an oil spill.⁶⁰ Section 9310.10.2.4 of the NWACP's Northwest Wildlife Response Plan provides guidance on specific response activities that should be implemented to keep the whales away from the site of a spill.⁶¹ Response activities generally include hazing techniques such as helicopter fly-overs, banging pipes, and underwater firecrackers.⁶² Response activities additionally include assigning wildlife spotters and reducing vessel speeds when marine mammals are present. Generally, response activities are planned in advance and include these protocols to avoid adverse

⁶⁰ Region 10 Regional Response Team and the Northwest Area Committee. "NW Area Contingency Plan." Viewed at <http://www.rtt10nwac.com/NWACP/Default.aspx> on April 18, 2017.

⁶¹ Region 10 Regional Response Team and the Northwest Area Committee. 2017. Northwest Area Contingency Plan.

⁶² Barre, Lynne. 2016. "How do you keep killer whales away from an oil spill?" Guest post for NOAA's Office of Response and Restoration. Viewed at <http://response.restoration.noaa.gov/about/media/how-do-you-keep-killer-whales-away-oil-spill.html> on April 19, 2017.

effects on marine mammals, including the killer whales. It is therefore unlikely that the expanded critical habitat for the killer whales will change the outcome of consultations on oil spills or response planning.

116. Section 7 consultation on this activity generally occurs relative to contingency planning. Although the consultation history indicates that NMFS conducted a Section 7 consultation on this activity in 2003, and initiated another consultation in 2018, there were no consultations that occurred within the period used in the analysis to estimate future rates of consultation (2006-2016). Accordingly, this analysis assumes there will be no consultations on this activity within the next 10 years. To the extent that consultations on this activity do occur, the number of consultations is likely to be minimal, and the associated economic impacts would be limited to relatively minor administrative costs.

2.8 MILITARY ACTIVITIES

117. Naval military training activities occurring within or adjacent to the proposed expanded critical habitat may affect the essential features. The U.S. Navy conducts a variety of military training exercises and testing activities in the geographic area known as the Northwest Training and Testing (NWTT) Study Area, which overlaps areas within the proposed critical habitat expansion (see Exhibit 2-5). These activities are conducted to meet the requirements of the Navy's Fleet Response Training Plan and to maintain military readiness, and include aircraft, ship and submarine maneuvers, weapon discharges, and other activities that may affect the whales and their habitat. For example, certain training and testing activities that create high intensity underwater sound (such as sonar devices) or pressure waves (such as some explosives), may affect the quality, quantity, and availability of Southern Resident killer whales' prey, although there are many differences between sonar and explosions with respect to their anticipated impacts on prey species.
118. NMFS' Biological Opinion on the NWTT activities included several conservation measures that provide protection to the whales and their habitat, including:
- Monitor sighting, location, and stranding data for ESA-listed marine mammals and sea turtle species in the NWTT Action Area;
 - As practicable, develop procedures to aid any individuals of an ESA-listed marine mammals, sea turtles, and fish that have been impacted by NWTT activities and is in a condition requiring assistance to increase likelihood of survival;
 - Continue to model potential impacts to ESA-listed species using the Navy Acoustic Effects Model (NAEMO) and other relevant models; validate assumptions used in risk analyses; and seek new information and higher quality data for use in such effort; and

- Continue technical assistance/adaptive management efforts with NMFS to help inform future consultations on Navy training and testing in the NWTT Action Area.⁶³

119. In addition to NWTT activities, the Navy operates two installations near the proposed expanded critical habitat area. The Pacific Beach Annex of Naval Air Station Everett is in the town of Pacific Beach, WA, adjacent to proposed critical habitat Unit 1. Naval Support Activity Monterey, CA is located adjacent to proposed critical habitat Unit 6. Both installations have Integrated Natural Resource Management Plans (INRMPs) in place for land-based installation activities. The Pacific Beach Annex installation is an entirely upland property with no ownership or access rights to coastal or submerged lands, or facilities such as docks and piers. As such, the INRMP does not expressly address Southern Resident killer whales. However, upland management activities such as cleaning and inspection of storm drains and construction of swales to capture run-off are identified to improve the quality of adjacent marine waters.⁶⁴
120. Although Naval Support Activity Monterey does include coastal lands, much of this property is managed by the City of Monterey for recreation and dune restoration. The INRMP identifies conservation objectives for the habitat and wildlife resources of that area, and measures are in place regarding handling and reporting of sick, injured or dead marine mammals. Finally, standard Best Management Practices (BMPs) at both installations relative to construction and other uses of natural resources are intended to avoid and minimize impacts to the nearshore environment.⁶⁵
121. As a result of the measures already in place to protect the whales and their prey base from impacts due to military training and testing and activities on military installations, NMFS anticipates it is unlikely that additional conservation efforts will be recommended as a result of the critical habitat expansion.⁶⁶ This analysis anticipates that incremental impacts to these activities will be limited to administrative costs associated with including consideration of the expanded critical habitat in future section 7 consultations. This analysis assumes that two consultations on NWTT activities will occur over the next ten years. It further assumes that the frequency of other military activity over the next ten years will be similar to the rate of consultation in the past ten years. Due to the location and nature of activities conducted at the two identified installations, NMFS does not believe that an expansion of critical habitat will trigger additional consultations related to the INRMPs.

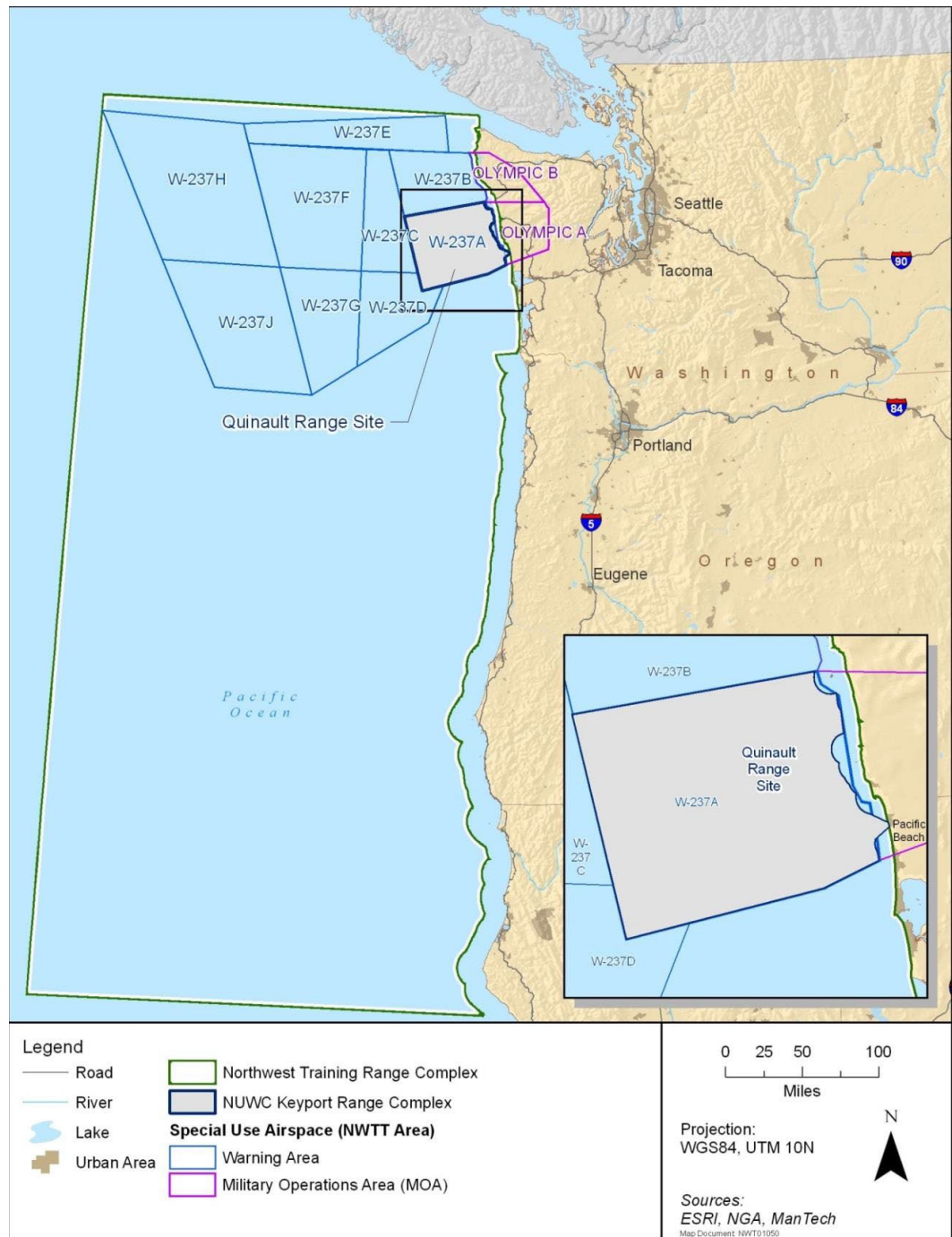
⁶³ NMFS. 2015. 2015 Biological Opinion and Conference Report on NWTT and related activities.

⁶⁴ Goodfellow, S.T. 2018. Letter to Chris Yates, Assistant Regional Administrator, Protected Resources Division, NMFS West Coast Region RE: Navy response to proposed revision to critical habitat for the endangered Southern resident killer whales. Dated August 24.

⁶⁵ *Ibid.*

⁶⁶ Personal communication with Lynne Barre, NMFS. February 7, 2017.

EXHIBIT 2-5. NORTHWEST TRAINING AND TEST ACTION AREA - OFFSHORE PORTION



Source: NMFS Biological Opinion on NWTT activities.

2.9 VESSEL TRAFFIC

123. Vessel traffic presents a threat to the passage conditions necessary for the whales' migration, resting, and foraging. High vessel traffic in an area can block whale passage and potentially cause whales to expend additional energy avoiding vessels, impacting resting and foraging behavior. Vessel traffic has a Federal nexus through the shipping lanes established by the U.S. Coast Guard (USCG) under the Ports and Waterways Safety Act. NMFS' section 7 consultation history identifies one Biological Opinion related to vessel traffic for the regulatory codification of Traffic Separation Schemes (TSS) near the ports of Los Angeles/Long Beach and San Francisco/Oakland.⁶⁷
124. The existing Biological Opinion noted that the whales may be located within the San Francisco TSS action area but determined that the TSS was not likely to adversely affect the species. However, the Biological Opinion suggested that an expansion of critical habitat may require re-initiation of consultation to the extent that NMFS identifies the San Francisco TSS area as an important foraging area for the whales. As with other activities potentially affecting the prey essential feature, NMFS does not anticipate the expanded critical habitat will generate additional conservation recommendations for killer whales associated with vessel traffic management.
125. Additionally, in spring 2019 the USCG consulted with NMFS regarding codification of TSS in the Strait of Juan de Fuca and Puget Sound. The geographic scope of the area covered by the consultation extended into ocean waters and therefore overlapped the areas being considered for expanded critical habitat for the killer whales, although the consultation was completed before the expansion was proposed. NMFS' informal consultation evaluated, among other things, impacts on the whales and their existing inland critical habitat. Based on the analysis in this consultation, NMFS does not believe that the expanded critical habitat would have resulted in any changes to the outcome of this consultation.

2.10 DREDGING AND DREDGE MATERIAL DISPOSAL

126. Dredging projects, including navigational dredging and dredging associated with in-water construction projects, may affect water quality and passage conditions for whale migration, resting, and foraging. The majority of in-water construction and dredging projects in the areas proposed for critical habitat designation are permitted or conducted by the U.S. Army Corps of Engineers (the Corps). The Corps conducts civil works projects (including navigational dredging/channel maintenance) and also provides permits to individuals, businesses, and non-Federal governments under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act for construction activities that involve dredge and fill. There are three Corps districts with jurisdiction over the areas

⁶⁷ NMFS. 2017. Endangered Species Act Section 7(a)(2) Biological Opinion, for the regulatory codification of Traffic Separation Schemes near the ports of Los Angeles/Long Beach and San Francisco/Oakland.

included in the proposed expansion of critical habitat: the Seattle District, Portland District, and San Francisco District.⁶⁸

Permitted Activities

127. The Corps permits activities in coastal areas that generally require section 7 consultation with NMFS, including pier and dock construction and replacement, bulkhead maintenance, and buoy and float installations. The Corps requires that individuals conducting these types of permitted activities implement a variety of BMPs that provide baseline protections to the whales and their habitat, even absent the critical habitat designation. For example, the Seattle district requires that individuals conducting pile driving reduce underwater noise impacts by limiting the activity to certain time windows and implementing “noise attenuation” BMPs.⁶⁹ Although NMFS’ Biological Opinion for the Standard Local Operating Procedures for Endangered Species implemented by the Portland district does not specifically consider the whales, the Biological Opinion does include in-water work windows, dredging BMPs, and pile-driving requirements to use a vibratory hammer where possible, use sound attenuators where an impact hammer is necessary, and limit the number of strikes per day. This baseline management of construction activities provides baseline protection to the whales and their critical habitat.⁷⁰ As a result, NMFS does not anticipate that additional killer whale conservation efforts will be recommended due to critical habitat expansion. Thus, the incremental costs of critical habitat designation relative to these activities are likely to be limited to administrative costs.
128. This analysis forecasts future consultations and associated administrative costs in Chapter 3 based on the permit history data from the Corps, which specifies the type, location, and frequency of Corps-permitted activities in the proposed critical habitat areas.⁷¹ Overall, the permit history includes 27 Corps-permitted projects between 2007 and 2016 located in the proposed critical habitat expansion areas. Interviews with the Seattle and Portland District offices of the Corps confirmed a low level of permitted activity in these areas.⁷²

⁶⁸ The NMFS consultation history does not identify that the San Francisco district of the Corps has previously consulted on killer whales. However, based on information on planned Civil Work activities and recent permitted projects, we do forecast future consultations for these activities in the district.

⁶⁹ NMFS. 2008. Programmatic Biological Evaluation for 10 Activities in the State of Washington for Species Listed or Proposed by National Marine Fisheries Service and U.S. Fish and Wildlife Service under the Endangered Species Act, viewed at <http://www.nws.usace.army.mil/Missions/Civil-Works/Regulatory/Permit-Guidebook/Endangered-Species/SPIFs/> on April 28, 2017.

⁷⁰ NMFS. 2012. Endangered Species Act Section 7 Formal Programmatic Opinion, Letter of Concurrence, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Revisions to Standard Local Operating Procedures for Endangered Species to Administer Actions Authorized or Carried Out by the U.S. Army Corps of Engineers in Oregon (SLOPES IV In-water Over-water Structures).

⁷¹ The Army Corps provided all permits located seaward of the mean high water line. However, the proposed critical habitat begins at the 6.1 meter (20 foot) water depth contour at extreme high water. As a result, the permit data provided by the Corps may be over inclusive.

⁷² Personal communication with Juliana Houghton, U.S. Army Corps of Engineers, Seattle District, on April 11, 2017.

⁷³ Additionally, neither District anticipated a substantial change in the rate of consultations over the next ten years.⁷⁴

Civil Works Activities

129. In addition to the Corps-permitted activities described above, the Corps itself provides a civil works function, which includes activities such as flood control, maintenance of navigation, and infrastructure support such as bridge construction and repair, among others.⁷⁵ The Southern Resident killer whales are regularly considered as part of consultation on Corps civil works activities in the Seattle and Portland districts. For instance, in 2011, NMFS completed an ESA consultation on three jetty projects at the mouth of the Columbia River. The proposed action was modified to ban pile driving before May 1 of each year to prevent potential acoustic effects on the whales that have been observed foraging in the area in March and April.⁷⁶ Previous consultations on dredging have considered the whales and concluded they were not likely to adversely affect the species. However, that conclusion appears to be more related to the whales' use of the area in question than due to protections that are already in place. For example, NMFS' Biological Opinion on coastal dredging activities in Oregon considered effects on the whales but concluded that dredging and disposal was not likely to adversely affect the species due to their presence being infrequent and transitory, the temporary nature of disturbance caused by vessels, and the insignificant nature of reductions in the local salmon resource.⁷⁷
130. A consultation on dredging activities associated with the move of the National Oceanic and Atmospheric Administration (NOAA) fleet to Oregon similarly found that because the whales' presence in the disposal area was likely to be infrequent and transitory, disturbance likely to be short-term and localized, and the effect on the salmon prey base so small, that the activity was not likely to adversely affect the whales.⁷⁸ Contacts in the Seattle District of the Corps indicated that consultations for civil works activities always consider the noise and turbidity effects on the whales, but generally conclude the activity is not likely to adversely affect them because they are further offshore than where the

⁷³ Personal communication with Shawn H. Zinszer, U.S. Army Corps of Engineers, Portland District, on April 6, 2017.

⁷⁴ Attempts to confirm the historical and potential future level of permitted activity with the San Francisco District of the Corps were unsuccessful.

⁷⁵ U.S. Army Corps of Engineers. Civil Works. Viewed at <http://www.usace.army.mil/Missions/Civil-Works/> on April 28, 2017.

⁷⁶ NMFS. 2011. Endangered Species Act Biological Opinion and Conference Report and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Major Rehabilitation of the Jetty System at the Mouth of the Columbia River.

⁷⁷ NMFS. 2010. Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Corps Maintenance Dredging Program for the Oregon Coastal Projects.

⁷⁸ NMFS. 2014. Endangered Species Act Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Port of Newport - International Terminal dredging expansion and riprap replacement, Yaquina River, Newport, Lincoln County, Oregon.

activity is occurring.⁷⁹ Despite the lack of specific measures to protect the whales, generally implemented BMPs such as limiting the amount of time dragheads and cutterheads are raised off the bottom and ceasing activity if a sheen or other indication of contamination is identified provide baseline protection to the species and its habitat by reducing potential impacts on salmon and water quality.⁸⁰

131. As a result of the baseline management of these activities, NMFS has indicated that it is unlikely that the expanded critical habitat will generate killer whale conservation recommendations.
132. The Portland District did express concern that the designation of critical habitat would result in a ban on construction and dredging activities during extended seasonal windows. The Portland District indicated that any seasonal restrictions more extensive than what has been required under the jeopardy standard and as protection for salmon could result in economic impacts.⁸¹ However, given the baseline management of these activities, NMFS does not anticipate additional seasonal restrictions would be recommended due to the designation of expanded critical habitat for the killer whales.
133. Of note, the Seattle district of the Corps identified one recurring activity, dredging of the Federal navigation channel into the Quileute River, on which NMFS does not currently consult. The Corps expects that the expansion of critical habitat will lead to a requirement for consultation with NMFS. In such a case, all administrative costs, as well as any conservation measures requested relative to the whales, would be incremental costs due to the critical habitat expansion. Given consultations completed on similar activities, such as coastal dredging in Oregon, and interviews with Corps representatives, the Corps' routine management of dredging projects generally results in avoiding potential effects on killer whales and their habitat. Accordingly, it is most likely that consideration of the whales and their critical habitat as part of future consultations on dredging activities in these areas will generate only limited administrative costs.

2.11 OIL AND GAS EXPLORATION AND PRODUCTION

134. There is presently no oil and gas production activity occurring within the boundary of the potential critical habitat designation for the whales.⁸² Additionally, the current five-year leasing program does not include lease sales in the Pacific Region (i.e., off the coasts of

⁷⁹ Personal communication with Fred Goetz and Nancy Gleason, U.S. Army Corps of Engineers on April 19, 2012.

⁸⁰ NMFS. 2010. Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Corps Maintenance Dredging Program for the Oregon Coastal Projects.

⁸¹ Personal communication with Jerry Otto and Rob Waldman, U.S. Army Corps of Engineers, Portland District, on December 14, 2016.

⁸² Information provided in this section is based on personal communication with Greg Sanders, BOEM on December 19, 2016 unless otherwise noted.

Washington, Oregon, or California).⁸³ It is therefore unlikely that new activity will occur within the next five years (2017-2022).

135. In January 2018, however, the Bureau of Ocean Energy Management (BOEM) published a Draft Proposed Program for 2019-2024 which includes seven lease sales in the Pacific Region.⁸⁴ If approved, this program would supersede the current 2017-2022 Program and coordination with BOEM would be required to evaluate the potential for impacts to the proposed expansion to Southern Resident killer whale critical habitat. Although this new Draft Proposed Program may be approved, associated changes in regional offshore oil and gas development are significantly uncertain. Given this, attempts to forecast future oil and gas development activity in this region over the timeframe of the analysis would be speculative. As a result, this analysis does not forecast any incremental costs associated with oil and gas exploration and production as a result of the revision to the whales' critical habitat.
136. While future activity levels are uncertain, NMFS anticipates that the expanded critical habitat designation for the killer whales is unlikely to change conservation recommendations associated with future section 7 consultations due to the baseline need to avoid jeopardy.

2.12 GEOLOGIC SURVEYS (INCLUDING SEISMIC SURVEYS)

137. Seismic surveys have the potential to change marine mammal behavior and cause auditory injury. Related to the essential features of critical habitat, seismic surveys have the potential to impede passage conditions suitable for migration, resting, and foraging. In addition to the physical barrier created by the seismic vessel and associated streamers, killer whales may avoid the broader areas surrounding vessels while surveys are in progress.⁸⁵ Killer whale prey may also be subject to these impacts, presenting a further potential threat to the species and critical habitat essential features.⁸⁶
138. Seismic survey activities on the Pacific coast are permitted and managed by several agencies.⁸⁷ BOEM generally oversees "high energy" seismic surveys, which are used in oil and gas exploration, within Federal waters. However, BOEM only exercises authority over permitting of these activities if they are included as part of a lease plan. High energy seismic surveys conducted outside of a lease plan may involve permits from the Corps, as

⁸³ Bureau of Ocean Energy Management (BOEM). 2016. 2017-2022 Outer Continental Shelf Oil and Gas Leasing Proposed Program. March.

⁸⁴ Bureau of Ocean Energy Management (BOEM). 2018. 2019-2024 National Outer Continental Shelf Oil and Gas Leasing Draft Proposed Program. January.

⁸⁵ Stone, C. J., & Tasker, M. L. (2006). The effects of seismic air guns on cetaceans in UK waters. *Journal of Cetacean Research and Management*, 8(3), 255.

⁸⁶ National Marine Fisheries Service. (2012). Endangered Species Act Section 7 Consultation regarding Cascadia Thrust Zone Marine Geophysical Study in the Northeast Pacific Ocean.

⁸⁷ Details of permitting authorities and potential future activities are based on personal communication with Greg Sanders, BOEM, on December 19, 2016.

well as NMFS, which must authorize “incidental harassment” under the MMPA. Within state waters, individual states may also exercise permitting authority, those Corps and NMFS Incidental Harassment permits may still be required.

139. The jeopardy standard and the MMPA provide baseline protection to the whales from seismic survey activities. For instance, the 2012 Biological Opinion on the 2012 Lamont-Doherty Earth Observatory seismic survey, conducted for NMFS’ Incidental Harassment Authorization under the MMPA, includes several mitigation and monitoring requirements to avoid harassment to the whales and other marine mammals. These requirements include:
 - Use of two Protected Species Observers (PSOs) to visually watch for marine mammals near the seismic vessel;
 - Use of a Passive Acoustic Monitoring (PAM) system, to the maximum extent practicable, to further aid in detection of marine mammals; and
 - Shutdown of the air gun array if the whales are visually sighted or acoustically detected.⁸⁸
140. The 2012 Lamont-Doherty Earth Observatory research project is the only seismic survey identified in the NMFS consultation history in the past ten years. Because these types of research activities are difficult to project with any certainty, this analysis relies on the consultation history and assumes the past rate of consultation for this activity is reflective of the future rate of consultation. According to BOEM, the last BOEM-permitted seismic survey conducted as part of an oil and gas lease plan occurred in 1995. However, if the BOEM 2019-2024 Draft Proposed Program is approved, there may be new seismic surveys related to oil and gas activity in the whales’ expanded critical habitat area in the future. Given the uncertainty surrounding future oil and gas activity, forecasting associated seismic surveys would be speculative.
141. NMFS does not anticipate that the need to consider potential adverse modification of critical habitat will generate additional conservation measure recommendations, above and beyond these baseline protections. Thus, the incremental costs of critical habitat designation associated with consultations on seismic survey activities will be limited to administrative costs.

2.13 UPSTREAM ACTIVITIES

142. A number of activities occurring in rivers upstream of the proposed critical habitat expansion may affect the essential features of the whales’ critical habitat. Although they do not occur within the proposed critical habitat expansion, future section 7 consultations on these projects and activities will require consideration of the potential for adverse

⁸⁸ NMFS. 2012. Endangered Species Act Section 7 Consultation: Cascadia Thrust Zone Marine Geophysical Study in the Northeast Pacific Ocean and Issuance of an Incidental Harassment Authorization Pursuant to Section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA) for the “Taking” of Marine Mammals Incidental to the Conduct of a Marine Geophysical Study in the Northeast Pacific Ocean.

modification of the whales' critical habitat. In general, because the salmon prey and water quality essential features are also important considerations with respect to potential for projects to jeopardize Southern Resident killer whales, these activities have historically considered the whales as part of section 7 consultations since the species was listed in 2005. Based on NMFS' consultation history, the activities occurring upstream for which section 7 consultations have included evaluation of potential effects on the whales include:

- Activities contributing to water pollution (agricultural pesticide application, National Pollutant Discharge Elimination System (NPDES) permitting)
- Liquefied natural gas terminals
- Desalinization plants
- Mineral mining
- Power plant operations

143. These activities are characterized by their potential to adversely affect salmon or their freshwater critical habitat. They constitute two of the Four H's (habitat) previously described. As such, consultations on these activities require consideration of conservation efforts not only to avoid jeopardy to the whales, but also to avoid adverse effects on salmon (an essential feature of the whales' critical habitat).

144. A 2014 Biological Opinion on the Corps' Mud Mountain Dam Project found that the project—which included operation and maintenance of the White River diversion dam, replacement of the diversion dam, and operation and maintenance of a fish trap—would jeopardize the continued existence of the whales and adversely modify its inland waters critical habitat. The Biological Opinion also concluded the project, as proposed, would jeopardize Puget Sound Chinook salmon and steelhead and adversely modify their critical habitat.⁸⁹ The Reasonable and Prudent Alternative (RPA) recommended by NMFS focused on measures to improve upstream and downstream passage of salmon and steelhead. Improving passage survival as described would avoid jeopardy and adverse modification of critical habitat for the Puget Sound Chinook and steelhead and would also improve the prey base component of the whales' critical habitat. Although this Biological Opinion did find adverse modification of the whales' critical habitat, the resulting RPA and associated terms and conditions on fish passage (to avoid jeopardy to Puget Sound Chinook and adverse modification of whale critical habitat), would likely have been the same regardless of whether critical habitat for Southern Resident killer whales was present (i.e., the conservation measures would have been the same had the focus been solely on avoiding jeopardy to Puget Sound Chinook salmon). That is, ultimately, the need to consider potential adverse modification of the whales' critical habitat did not change the outcome of this consultation.

⁸⁹ NMFS. 2014. Endangered Species Act Section 7(a)(2) Biological Opinion, Conference Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Mud Mountain Dam Operations, and Maintenance, White River, HUC 17110014 Pierce and King Counties, Washington (NWR-2013-10095).

145. The added need to consider critical habitat for the whales is unlikely to generate additional conservation recommendations with respect to consultations on upstream activities. As a result, this analysis expects the expanded critical habitat rule will generate only minor additional administrative effort as part of future consultation on these activities. Given the limited effect of critical habitat on the upstream activities, this analysis does not include a detailed forecast of their spatial and temporal distribution.
146. As described in Section 1.3, no distance threshold exists or can readily be predetermined for how far upstream from the proposed expanded critical habitat consultation may occur. However, the historical consultation activity describes the area over which action agencies have previously identified a potential connection between a planned project or activity and the whales (generally due to potential effects on the prey species). This analysis therefore relies on the consultation history as the best available information to indicate where action agencies may also determine that projects or activities may affect the critical habitat for the whales. Based on the historical consultation, we anticipate 86 consultations that consider Southern Resident killer whales on activities upstream of the proposed critical habitat designation over the next ten years. Administrative impacts associated with future consultations on upstream activities are quantified in Chapter 3.

2.14 CONCLUSION

147. The findings of the activity-specific evaluations in this chapter are summarized in Exhibit 2-1. Overall, NMFS has not identified any particular projects or activities for which it is reasonably foreseeable that the expanded critical habitat designation will generate additional conservation recommendations and associated economic impacts. For seven categories of activities, however, this analysis finds that future section 7 consultations within or upstream of the proposed expanded critical habitat area are likely to experience additional administrative costs associated with the need to conduct an analysis of the potential for adverse modification. These activities are: salmon fisheries, salmon hatcheries, alternative energy developments, military activities, vessel traffic management, dredge and disposal activities, and upstream activities. Chapter 3 assesses the expected scope and scale of these activities across the critical habitat units over the next ten years and quantifies the associated incremental administrative costs due to the expanded critical habitat for the killer whales.

CHAPTER 3 | INCREMENTAL ECONOMIC IMPACTS OF EXPANDED CRITICAL HABITAT

148. This chapter quantifies incremental economic impacts associated with considering adverse modification of the expanded killer whale critical habitat as part of future section 7 consultations. To inform the consideration of impacts under Section 4(b)(2), the analysis projects the spatial distribution of activities and, where possible, disaggregates impacts to particular geographic areas.

3.1 FORECAST OF SECTION 7 CONSULTATIONS

149. Ideally, this analysis would rely on management plans and planning documents to determine the locations and frequencies of future projects and activities that may require section 7 consultation considering the expanded critical habitat for the killer whales. This information is generally not available for the key economic activities described in Chapter 2. Given this, this analysis projects the expected scope and scale of economic activities potentially subject to section 7 consultation regarding the expanded critical habitat for the Southern Resident killer whales relying on two key sources as the best available indicators of future activity levels:
- a. U.S. Army Corps of Engineers permit and project data for forecasting expected locations and numbers of Corps permitted and civil works projects (including alternative energy developments, dredge and disposal activities, in-water construction, geophysical surveys, and outfalls).
 - b. NMFS' section 7 consultation history for (2006-2016) to forecast all other activities (consultations on salmon fisheries and fisheries that take salmon as bycatch, salmon hatcheries, military activities, vessel traffic management, and upstream activities).
150. Interviews with Federal action agencies (as described in the remainder of this chapter) provided additional support that these data sources are the best available information on expected future activity levels and represented a reasonable approximation on the future levels and locations of key economic activities.⁹⁰

⁹⁰ As a result of recent litigation, the U.S. Coast Guard is expected to consult with NMFS regarding the codification of the Vessel Traffic Separation Schemes (TSS) in the Strait of Juan de Fuca and Puget Sound. This geographic area covered by this consultation will extend into the Pacific Ocean in the areas proposed for expanded critical habitat. This analysis does not include this consultation in the forecast. However, this consultation will consider potential effects on the whales and their inland critical habitat regardless of the proposed expansion. Expanded critical habitat for the whales is not expected to affect the outcome of this consultation.

151. For Corps activities, the analysis employs multiple sources of future consultation information. For civil works projects conducted by the Corps within the proposed critical habitat expansion, the project forecast is based on interviews with contacts at the Corps civil works branches in Seattle and Portland and historical information from the Corps Navigation Data Center's Dredging Information System for the San Francisco district.⁹¹ For projects permitted by the Corps within the proposed critical habitat expansion, this analysis bases the forecast of projects and activities on the historical rate of activities observed in the Corps permit database.
152. The geographic scope of the upstream activities that may affect the proposed expanded critical habitat area is uncertain. Existing data do not define a specific distance from the critical habitat that particular activities may affect the essential features of critical habitat and therefore require consultation to consider potential for adverse modification. However, the upstream activities that may affect critical habitat are most likely to also require consultation to consider the potential for adverse effects on the whales themselves (i.e., jeopardy). Accordingly, this analysis estimates the frequency of consultation on upstream activities based on the past rate of section 7 consultations in upstream areas that have considered potential effects on killer whales.

3.1.1 NMFS CONSULTATION HISTORY

153. To inform the forecast of project and activities requiring consultation, NMFS provided a historical record of all consultations that considered impacts to the whales between 2006 and 2016. The consultation history did not identify any clear trends in consultation activity levels over time or space (either by activity or in the aggregate). This analysis therefore estimates the average annual historical consultation rate in each critical habitat unit and for each activity type. Generally, economic activities that will require section 7 consultation to consider adverse modification of the expanded critical habitat area have historically required consultation to consider potential for jeopardy to the killer whales. Given this, it is unlikely that the critical habitat designation would expand the suite of projects and activities subject to section 7 consultation. Consequently, this forecast assumes that the frequency and locations of section 7 consultations over the next ten years will be similar to the frequency and locations of historical section 7 consultations over the past eleven years and applies the average annual rate of consultations by activity and critical habitat unit to forecast future consultation levels.
154. To isolate the consultations located in the areas proposed for critical habitat expansion, this analysis excludes consultations focused on activities within the existing Southern

⁹¹ U.S. Army Corps of Engineers. Navigation Data Center, Dredging Information System. Accessed November 2016 at: <http://www.navigationdatacenter.us/data/datadrgsel.htm>. The Dredging Information System includes information on all dredging projects performed or contracted by the USACE from 1995 to the present. The database includes information on USACE district, name of dredging location, geographic coordinates, year, cost, dredge type, disposal type, and quantity of material dredged, among other categories. Some of this information, such as geographic coordinates, is not listed for many of the historical dredging projects.

Resident killer whale critical habitat in inland waters of Washington.⁹² The remaining consultations were then assigned to critical habitat units based on the availability information on the locations of the various economic activities. Consultations located upstream of the critical habitat units and consultations with unknown locations are categorized separately.⁹³ Of note, the consultation history includes consultations on killer whales for activities outside of the key activities described in Chapter 2, including scientific research permits, habitat restoration plans, transportation projects, and development of water quality standards, among others. This analysis includes consultations on these activities as part of the “Other” category.

3.1.2 ARMY CORPS CIVIL WORKS CONSULTATIONS

155. The future of Corps civil works projects within the critical habitat expansion is based on interviews with the Corps’ Civil Works Divisions in the Seattle and Portland Districts. The Portland District identified future channel dredging and jetty maintenance projects have the potential to be located within the proposed critical habitat expansion, including 12 coastal harbors in Oregon with jetties and channel entrances that extend into the Pacific Ocean. The Portland District indicated that the Corps conducts periodic maintenance on these jetties and channels. Based on this interview, this analysis estimates that the Corps would need to consult on one project at each of these locations over the next ten years.
156. The Seattle district identified three types of activities within the critical habitat expansion area that are subject to consultation with NMFS.⁹⁴ These activities include dredging of navigation channels, including port entrances, maintenance of jetties, and “flood fights,” which are emergency actions such as rip-rap placement designed to reduce flood risk to coastal communities, such as Shoalwater Bay. Corps representatives estimate that 16 Federal navigation channel dredging and jetty maintenance events would occur in the Seattle District area over the next ten years, resulting in five consultations.⁹⁵ One of these consultations, for dredging at the mouth of the Quileute River, would be a new consultation triggered specifically by the critical habitat expansion. In addition to those consultations, one existing consultation for a multi-year action at Grays Harbor would likely require re-initiation. Although difficult to predict with certainty, the Corps

⁹² Consultations on activities located in inland waters were identified based on the information provided in the consultation title, the NMFS branch team that completed the consultation, and the “Activity Location” field. If it was not possible to determine if a consultation was located within inland waters based on these fields, we referenced the Public Consultation Tracking System (PCTS) for biological opinions or other documents that contained more detailed geographic information.

⁹³ Consultations with “Unknown units” include consultations on activities such as scientific research permits and habitat restoration plans for which we are unable to forecast future locations with precision.

⁹⁴ Information on civil works projects in the Seattle district is based on personal communication with Fred Goetz and Nancy Gleason, U.S. Army Corps of Engineers on April 19, 2017.

⁹⁵ Contacts indicated that several routine dredging activities, such as those at the entrance to Gray’s Harbor and the Quileute River include up to five years of activity in a single “compliance package.”

additionally estimated that four coastal emergency actions may occur, requiring consultation.

157. Absent more specific information from the San Francisco District regarding future civil works activities, this analysis references historical information from the Corps Navigation Data Center's Dredging Information System to forecast civil works projects in the San Francisco District.⁹⁶ The Dredging Information System includes 88 projects conducted by or for the San Francisco District from 2007 to 2016. Based on the geographic coordinates associated with these projects, eight were located within the areas proposed for critical habitat expansion, and are included in the analysis as being most likely to be subject to future consultation.⁹⁷ The remaining 80 projects have not previously been subject to consultation, and are not included as upstream activities in the analysis for reasons described in section 1.3.

3.1.3 ARMY CORPS PERMIT DATABASE

158. The Corps provided a historical record of permits issued from 2007 to 2016 along the coasts of Washington, Oregon, and California that involved section 7 consultation.⁹⁸ The majority of permits included in the historical record were associated with projects located in bays and upstream areas, including Puget Sound. For the purposes of forecasting future Army Corps consultations, permits for projects outside of the areas proposed for critical habitat expansion were excluded (as noted above, this analysis relies on NMFS' section 7 consultation history to forecast frequency of consultations on upstream activities). Overall, the permit data identifies 18 historical permits located within the proposed critical habitat, corresponding to two permits per year on average. More than half of these permits were located within critical habitat Unit 3.

3.1.4 CONSULTATION FORECAST

159. Based on the information sources discussed above, Exhibits 3-1 and 3-2 present the forecast of section 7 consultations by critical habitat unit over the next ten years. Exhibit 3-1 summarizes the future consultations by consultation type, and Exhibit 3-2 summarizes the consultations by activity.

⁹⁶ U.S. Army Corps of Engineers. Navigation Data Center, Dredging Information System. Accessed November 2016 at: <http://www.navigationdatacenter.us/data/datadrgsel.htm>. The Dredging Information System includes information on all dredging projects performed or contracted by the USACE from 1995 to the present. The database includes information on Corps district, name of dredging location, geographic coordinates, year, cost, dredge type, disposal type, and quantity of material dredged, among other categories. Some of this information, such as geographic coordinates, is not listed for many of the historical dredging projects.

⁹⁷ The consultation history indicates that these project may not previously have been subject to section 7 consultation. However, this analysis assumes they may be subject to future section 7 consultation and quantifies the administrative costs associated with consideration of adverse modification as part of those consultations.

⁹⁸ While the permit data includes section 7 consultations with the U.S. Fish and Wildlife Service, this analysis relies only on section 7 consultations with NMFS.

EXHIBIT 3-1. SECTION 7 CONSULTATION FORECAST BY CONSULTATION TYPE (2019 - 2028)

CRITICAL HABITAT UNIT(S)	PROGRAMMATIC	FORMAL	INFORMAL
1/2	0	14	5
3	0	18	9
4	0	4	3
5	0	3	1
6	0	1	4
1/2, 3	N/A	5	1
1/2, 3, 4, 5	N/A	2	N/A
4, 5, 6	N/A	3	3
All units	2	12	5
Unknown units	3	10	1
Upstream (outside CH)	10	40	36
Total	15	112	68
Note: 1. A “N/A” indicates “not applicable” because the activity does not result in consultations at the spatial scale of the groupings of units described in the first column. This is different than a “0” entry, which simply indicates that no consultations for the activity are associated with the specified unit.			

EXHIBIT 3-2. SECTION 7 CONSULTATION FORECAST BY ACTIVITY TYPE (2019 - 2028)

CRITICAL HABITAT UNIT(S)	FISHERIES	RENEWABLE ENERGY DEVELOPMENT	MILITARY	DREDGING AND IN-WATER CONSTRUCTION	HATCHERY OPERATIONS	SEISMIC SURVEYING	OTHER
1/2	1	1	0	13	0	0	4
3	0	3	1	18	0	1	5
4	0	0	0	7	0	0	0
5	0	0	0	4	0	0	0
6	0	1	0	4	0	0	0
1/2, 3	N/A	N/A	N/A	N/A	N/A	N/A	6
1/2, 3, 4, 5	N/A	N/A	2	N/A	N/A	N/A	0
4, 5, 6	4	N/A	N/A	N/A	N/A	N/A	2
All units	11	N/A	N/A	N/A	N/A	N/A	8
Unknown units	3	N/A	N/A	N/A	N/A	N/A	11
Upstream (outside CH)	0	0	0	43	1	0	43
Total	18	5	3	89	1	1	78
Notes: 1. The “Other” category includes consultations on activities such as scientific research, resource management plans, transportation projects, and water quality standards. 2. A “N/A” indicates “not applicable” because the activity does not result in consultations at the spatial scale of the groupings of units described in the first column. This is different than a “0” entry, which simply indicates that no consultations for the activity are associated with the specified unit.							

3.2 ESTIMATED INCREMENTAL ADMINISTRATIVE COSTS

160. As discussed previously, economic impacts of the expanded critical habitat are most likely to be limited to additional administrative effort to consider critical habitat as part of future section 7 consultations. This analysis calculates the incremental administrative costs by combining the forecast of section 7 consultations by the estimated average administrative costs per consultation presented in Exhibit 1-3.
161. Administrative costs of consultations on upstream activities are not assigned to a particular critical habitat unit as this would require information relating the particular locations of upstream activities with the downstream effects on particular critical habitat units. Accordingly, the incremental economic impacts associated with consultations on upstream activities do not reflect the benefits of exclusion of any given unit but rather the expanded critical habitat as a whole. In other words, if NMFS does not designate a particular unit of critical habitat, this analysis is not able to provide information regarding whether or how much of the incremental impacts associated with upstream activities may be avoided.
162. Overall, this analysis finds that the proposed expansion of critical habitat may increase administrative costs of consultation regarding killer whales by \$600,000 over the next ten years (\$68,000 annualized) assuming a seven percent discount rate. Exhibit 3-3 presents the total present value and annualized administrative costs associated with the proposed expansion of critical habitat by critical habitat unit. The greatest portion of these impacts associated with consultations on activities occurring upstream of critical habitat. Additionally, Exhibit 3-4 displays the expected present value economic impacts by activity type. Dredging and in-water construction activities represent the largest share of estimated costs (45 percent), while 42 percent of costs are associated with uncategorized activities, and nine percent is associated with consultations on fisheries.
163. All impacts are presented assuming a seven percent discount rate. Undiscounted impacts are presented in Appendix A and Appendix B provides additional information on present value and annualized impacts applying an alternative discount rate assumption of three percent for comparison.

EXHIBIT 3-3. TOTAL PRESENT VALUE AND ANNUALIZED ECONOMIC IMPACTS (2017 DOLLARS, 7% DISCOUNT RATE)

CRITICAL HABITAT UNIT(S)	PRESENT VALUE IMPACTS (7% DISCOUNT RATE)	ANNUALIZED IMPACTS
1/2	\$77,000	\$8,800
3	\$73,000	\$8,400
4	\$18,000	\$2,100
5	\$12,000	\$1,300
6	\$9,700	\$1,100
1/2, 3	\$20,000	\$2,300
1/2, 3, 4, 5	\$6,100	\$700
4, 5, 6	\$14,000	\$1,500
All units	\$60,000	\$6,800
Unknown units	\$52,000	\$5,900
Upstream (outside CH)	\$250,000	\$29,000
Total	\$600,000	\$68,000
Notes: <ol style="list-style-type: none"> Exhibit 1-2 provides a map of the critical habitat units referenced in column 1 of this table. Due to the difficulty in determining precise locations of future consultations occurring in Units 1 and 2, this analysis presents economic impacts collectively for these two units. Additionally, some consultations cover projects or activities that span multiple units or all units; thus, this table includes rows for groupings of units that collectively trigger the consultations associated with the estimated costs. Estimates are rounded to two significant digits. 		

EXHIBIT 3-4. TOTAL PRESENT VALUE ECONOMIC IMPACTS BY ACTIVITY TYPE (2017 DOLLARS, 7% DISCOUNT RATE)

CRITICAL HABITAT UNIT(S)	FISHERIES	RENEWABLE ENERGY DEVELOPMENT	MILITARY	DREDGING AND IN-WATER CONSTRUCTION	HATCHERY OPERATIONS	SEISMIC SURVEYING	OTHER
1/2	\$1,500	\$1,500	\$0	\$67,000	\$0	\$0	\$7,500
3	\$0	\$7,600	\$1,500	\$48,000	\$0	\$3,100	\$14,000
4	\$0	\$0	\$0	\$18,000	\$0	\$0	\$0
5	\$0	\$0	\$0	\$12,000	\$0	\$0	\$0
6	\$0	\$1,500	\$0	\$8,200	\$0	\$0	\$0
1/2, 3	N/A	N/A	N/A	N/A	N/A	N/A	\$20,000
1/2, 3, 4, 5	N/A	N/A	\$6,100	N/A	N/A	N/A	N/A
4, 5, 6	\$11,000	N/A	N/A	N/A	N/A	N/A	\$2,900
All units	\$34,000	N/A	N/A	N/A	N/A	N/A	\$26,000
Unknown units	\$9,200	N/A	N/A	N/A	N/A	N/A	\$43,000
Upstream (outside CH)	\$0	\$0	\$0	\$110,000	\$3,100	\$0	\$140,000
Total	\$55,000	\$11,000	\$7,600	\$270,000	\$3,100	\$3,100	\$250,000

Notes:

- Exhibit 1-2 provides a map of the critical habitat units referenced in column 1 of this table.
- Due to the difficulty in determining precise locations of future consultations occurring in Units 1 and 2, this analysis presents economic impacts collectively for these two units. Additionally, some consultations cover projects or activities that span multiple units or all units; thus, this table includes rows for groupings of units that collectively trigger the consultations associated with the estimated costs.
- A "N/A" indicates "not applicable" because the activity does not result in consultations at the spatial scale of the groupings of units described in the first column. This is different than a "\$0" entry, which simply indicates that no costs for the activity are associated with the specified unit.
- The "Other" category includes consultations on activities such as scientific research, resource management plans, transportation projects, and water quality standards.
- All estimates are rounded to two significant digits.

3.3 INDIRECT EFFECTS

- As described in Section 1.3.3, the designation of critical habitat may, under certain circumstances, affect actions that do not have a Federal nexus and thus are not subject to consultation under section 7 under the ESA. Indirect impacts reflect changes in economic behavior that may occur outside of the ESA, through other Federal, state, or local actions, and that are caused by the designation of critical habitat.
- Under certain circumstances, critical habitat designation may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other state or local laws. In cases where these impacts would not have been triggered absent critical habitat designation, they are considered indirect, incremental impacts of the designation.

167. Interviews with representatives of relevant state agencies indicated that decisions made at the state level relative to permitting and approval of certain activities in the potential critical habitat area do have the potential to result in additional indirect project costs (e.g., due to recommendations for conservation efforts, or changes to time or location of the activities). However, these impacts are theoretical in nature, and no specific examples of these types of effects were identified. Furthermore, previous designations of critical habitat for the whales (in inland waters of Washington) and for species such as green sturgeon on the outer coast do not appear to have resulted in these types of indirect economic impacts.

3.3.1 WASHINGTON

168. This analysis considers the extent to which the expansion of critical habitat may trigger additional state or local policies and laws in Washington that could result in indirect impacts related to certain activities. Initial discussions with the Washington Department of Ecology identified the need to consider consistency of the critical habitat expansion with the State's Coastal Zone Management Act. The Department also identified a potential for implications on the State Department of Fish and Wildlife permitting of hydraulic projects. Finally, Washington Department of Ecology indicated that the critical habitat will need to be made available to resource managers and stakeholders as part of the ongoing marine spatial planning efforts. Adding these areas to the maps does not have direct implications on activities allowed or restricted; however, it is possible that the additional information could result in project proponents relocating or revising plans (e.g., for scoping renewable energy projects).⁹⁹
169. Despite the theoretical potential for conservation efforts identified during interviews, there is no indication from these initial communications that the existence of critical habitat for the killer whales in inland waters has driven changes in State programs, projects, or policies. Thus, this analysis finds that it is unlikely that the critical habitat designation of the outer coastal waters will change the level or management of economic activities in these areas.

3.3.2 OREGON

170. Representatives from the State of Oregon described the extensive planning process that the State has undertaken to consider and manage the multiple uses of its territorial sea.¹⁰⁰ Specifically, the State has considered extensively how to balance its development with the health of the State's marine resources and habitats. Oregon's Statewide Planning Goals and Guidelines include Goal 19: Ocean Resources, "to conserve marine resources and ecological functions for the purpose of providing long-term ecological, economic, and social value and benefits to future generations."¹⁰¹ Sections 2, 4, and 5 of Oregon's

⁹⁹ Personal communication with Jennifer Hennessey and Terry Swanson, Washington Department of Ecology, April 27, 2017.

¹⁰⁰ Information in this section is based on personal communication and subsequent email communication with Elizabeth Ruther, Oregon Dept. of Land Conservation and Development, in April 2017 and January 2018.

¹⁰¹ Oregon's Statewide Planning Goals & Guidelines, Goal 19: Ocean Resources (OAR 660-015-0010(4)).

Territorial Sea Plan, which implements Goal 19, establish standards against which applications for all proposed actions (including renewable energy specifically) will be reviewed, and which will provide the basis for the regulating agency to develop specific measures for environmental protection and mitigation. For all ocean uses, these standards include a directive that they not adversely affect “critical marine habitats,” which are defined to include federally designated critical habitat. For example, the ecological resources of concern on which renewable energy facilities “shall have no significant adverse effect include “critical marine habitats” (including those defined as such by the ESA).¹⁰² Additionally, Important, Sensitive, or Unique (ISU) Areas,” including estuary and river mouths (particularly those that support salmon) are provided the “highest level of protection from the effects of renewable energy development.”

171. Given the high degree of scrutiny to which activities in Oregon’s territorial sea are subject, and the emphasis on protecting “critical marine habitat” from negative effects, it is possible that the designation of ESA-defined critical habitat may result in additional conservation measures being requested by the State to protect that habitat. Interviewees were not able to predict with certainty to what extent this might occur, or what type of conservation efforts may be requested, but noted that it would depend upon several things including the nature of the project, and whether the proposed project location was in a marine zone in which strict conservation protections are already in place.¹⁰³
172. To further evaluate the potential scope and scale of indirect effects, it is worth considering that much of the area in Oregon’s offshore marine waters proposed as critical habitat for the whales is already designated as critical habitat for green sturgeon. Thus, whether that designation has triggered specific conservation efforts or requirements in the past offers some evidence of the potential impacts of the whales’ critical habitat designation (as well as whether any future conservation efforts can be solely attributed to the whales’ critical habitat). To date, no projects have been proposed in the area that have posed a threat to the essential features of green sturgeon habitat, and thus critical habitat designation has not resulted in additional project costs. Yet, it is possible that future proposed projects may present different threats or threats in different locations that could result in a different outcome. It is additionally worth noting, however, that the time of year when the whales’ prey base is present and staging outside of river mouths (winter), the essential feature most likely to be threatened by in-water activities does not align with the times of year when in-water work typically occurs. As a result, it appears unlikely that designation of the expanded critical habitat will result in measurable indirect effects. To the extent that designation of critical habitat for Southern Resident killer whale may trigger specific conservation efforts in Oregon’s coastal waters, this analysis may underestimate the total cost of designation.

¹⁰² Oregon Territorial Sea Plan Part 5: Use of the Territorial Sea for the Development of Renewable Energy Facilities or Other Related Structures, Equipment or Facilities (B)(4)(g)(3)(a)(v).

¹⁰³ Email communication with Elizabeth Ruther, Oregon Dept. of Land Conservation and Development, on April 12, 2017.

3.3.3 CALIFORNIA

173. The California Environmental Quality Act (CEQA) requires that state and local agencies responsible for project approval consider the environmental effects of proposed projects that are considered discretionary in nature and not categorically or statutorily exempt. In some instances, critical habitat designation may trigger CEQA-related requirements. This is most likely to occur in areas where the critical habitat designation provides clearer information on the importance of particular areas as habitat for a listed species. In addition, applicants who were “categorically exempt” from preparing an Environmental Impact Report (EIR) under CEQA may no longer be exempt once critical habitat is designated. In cases where the designation triggers the CEQA significance test or results in a reduction of categorically exempt activities, any additional administrative or conservation requirements would be indirect, incremental effects of the designation.
174. In accordance with the Marine Life Protection Act (MLPA), California established the Marine Life Protection Program, which resulted in a coordinated and deliberate process to establish a cohesive, extensive network of Marine Protected Areas (MPAs) within its state waters. Among the goals of the Marine Life Protection Program is “to protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems.” Given the focus on protection of the ecosystems as a whole, including the habitat itself, this analysis considers the possibility that the identification of habitat that is considered critical to the recovery of an endangered species may result in indirect costs in the form of the addition of new MPAs, or changes to the boundaries or nature of existing MPAs. Presently, the MPA network does not wholly incorporate already-designated critical habitat in California State waters suggesting that designation as critical habitat alone is not an automatic trigger for inclusion within an MPA. Further, the selection of MPA sites, as well as designation of the type of MPA to be designated, was the result of a multi-year, stakeholder-driven process considering numerous criteria extending beyond the ecological value of the habitat. Finally, changes or additions to the MPA network are driven by petition, rather than being specifically tied to an event such as Federal designation of critical habitat. As such, it is unlikely that the expansion of critical habitat for Southern Resident killer whale would necessarily trigger specific changes in the extent and nature of the existing MPA network.

CHAPTER 4 | ECONOMIC BENEFITS

175. The previous chapters of this report evaluate the expected economic costs that may be generated by the expanded critical habitat for the Southern Resident killer whales. The primary goal of critical habitat is to support the long-term conservation and recovery of the whales. The economics literature demonstrates that conservation and recovery of the whales would generate economic benefits both associated with the use values people hold for the whales (e.g., for wildlife viewing), as well as non-use values (i.e., people's preference for the continued existence of the whales regardless of any direct or indirect use of the animals). The intent of this section is to provide context and evidence that there are economic benefits associated with the existence of Southern Resident killer whales. However, for reasons described below, it does not attempt to quantify the economic benefits specific to the designation of critical habitat.
176. This section introduces economic methods employed to quantify benefits of species and habitat conservation, and discusses the existing literature focused on killer whales. Of note, the economic benefits described in this section more generally reflect benefits of killer whale populations. Absent a means to quantify the specific role of critical habitat in contributing to the conservation and recovery of the species—apart from the various other protections afforded the species due to its ESA listing status—this analysis is not able to quantify the incremental economic benefits associated specifically with the proposed critical habitat expansion.

KEY FINDINGS

- The primary goal of critical habitat designation is to support long-term conservation and recovery of the whales. Conservation and recovery of the species may result in benefits, including use benefits (e.g., wildlife-viewing), non-use benefits (e.g., existence values), and ancillary ecosystem service benefits (e.g., water quality improvements and enhanced habitat conditions for other marine and coastal species).
- The existing economics literature finds that people value Southern Resident killer whales in terms of the utility gained from whale watching experiences. In both Washington and California, killer whales are a target species for whale watchers. Whale watch participants targeting killer whales in Washington generate tens of millions in economic activity and hundreds of jobs annually.
- Recent research regarding the public's value for the recovery of the killer whales identifies that populations across the broader U.S. are willing-to-pay (WTP) for the recovery of the species. The study identified an average WTP per household in Washington, Oregon, and California of \$97 (2018 dollars) per year for ten years for the recovery of the killer whales, as compared with \$91 for the broader U.S.
- Absent information on the incremental change in killer whale populations or recovery potential associated with these conservation measures, this analysis is unable to apply the available literature to quantify or monetize associated incremental use and non-use economic benefits. This literature demonstrates, however, that the killer whales have value to people nationally and serve as an economic engine regionally.

4.1 ECONOMIC BENEFITS OF KILLER WHALES

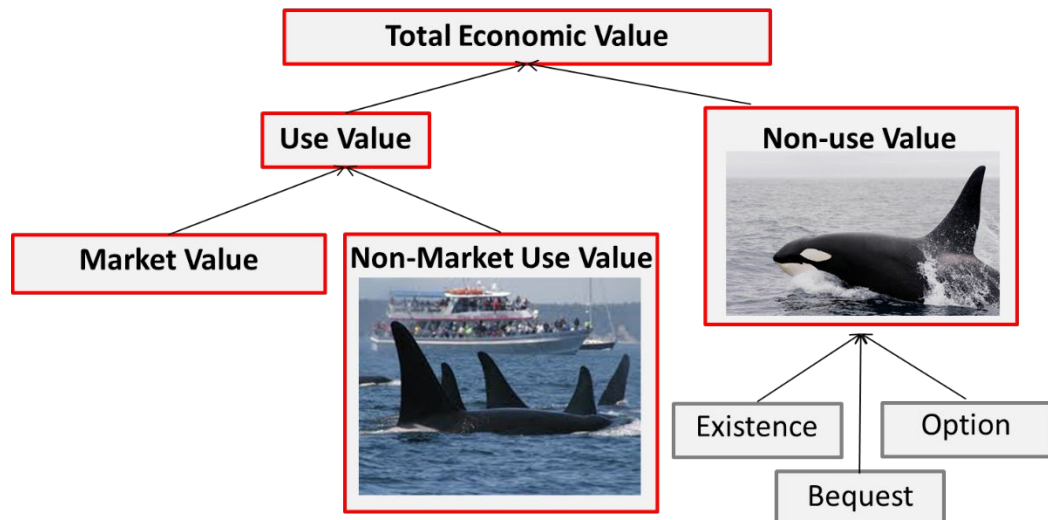
177. The primary intended benefit of critical habitat is to support the conservation and recovery of threatened and endangered species, such as the Southern Resident killer whales.¹⁰⁴ Critical habitat rules contribute to conservation and recovery by focusing on protecting the physical and biological features of habitat that are essential to the conservation of the species. The economic benefits of the proposed critical habitat expansion may theoretically be measured in terms of the value people hold for the conservation benefits to the killer whales resulting from the rule.
178. From an economic perspective, the “value” of an animal or species reflects the full range of contributions the species makes to people’s well-being. Value is frequently measured in terms of the public’s willingness to pay (WTP) for the species, inclusive of all use and non-use services, such as the following:
- a) **Market value:** This is relevant to species, such as salmon, that are bought and sold in commercial markets. This type of value is generally quantifiable based on market data but is irrelevant to the Southern Resident killer whales.
 - b) **Non-market use value:** Non-market use values are associated with uses of a given resource outside of markets, including for recreational purposes such as hunting or fishing. For example, whale watching for killer whales provides a non-market use value.¹⁰⁵ The value people hold for this activity is measured by the utility they derive from the activity above and beyond what they pay for it.
 - c) **Non-use value:** The concept of non-use values recognizes that people may have a positive preference for a good or service beyond any current or even expected future use. Non-use values are thought to reflect an environmental ethic and are a measure of the utility that people derive from indicators of improved ecological health or functioning. Economists generally see these values as motivated by three key factors:
 - Existence value, defined as the benefit gained simply from knowing the resource exists;
 - Option value, allowing for potential use of the resource in the future; and/or
 - Bequest value, reflecting a desire to ensure continued existence of the resource for future generations.

¹⁰⁴ Under the Endangered Species Act, the term “conservation” means “...the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary.” (16 U.S.C. 1532)

¹⁰⁵ While commercial whale watch operations are market actors, the animals themselves are not bought and sold. People’s WTP for wildlife viewing, above and beyond what they do pay for the activity, is considered a nonmarket value. The regional economic activity generated by whale watching in the region is a separate measure of economic benefits (i.e., regional economic impact as opposed to economic value) associated with the killer whales.

- d) **Ecological value:** Perhaps more indirectly, ecological value may contribute to people's WTP for the species, for example as a predator or prey species, or in supporting a healthy, stable, resilient ecosystem. The ecological function of a species may contribute to the total economic value of other resources (e.g., species interconnected by the food chain) or to the broader ecosystem.
179. In addition to the economic values associated with a species, some species, including Southern Resident killer whales, have significant spiritual and cultural value to communities, such as tribes. Such values are generally not considered economic values, however, and are not typically expressed in monetary terms.
180. Exhibit 4-1 demonstrates components of the total economic value of a species. Changes in the quality or availability of a species may affect any or all the components of its total economic value.

EXHIBIT 4-1. COMPONENTS OF TOTAL ECONOMIC VALUE OF A SPECIES



181. Quantification and monetization of species conservation benefits in terms of the change in total economic value requires two primary pieces of information:
- Data on the incremental change in the population of the Southern Resident killer whales or in the probability of recovery that is expected to result specifically from the rule; and
 - Information on the public's WTP for this incremental change for any relevant use or non-use values. For example, information would be required regarding how an increased population of killer whales would contribute to WTP for whale watching or to the non-use value that a population holds for the species.
182. With respect to the first piece of information, determining the incremental effect of the expanded critical habitat on killer whale conservation and recovery is complicated. Such an evaluation would require the ability to isolate and quantify the effect of the critical

habitat expansion separately from all other ongoing or planned conservation efforts for the species, such as the protections afforded the killer whales due to the listing status, the implementation of the MMPA, the implementation of Recovery Plan, and existing protections for the listed salmon that are an essential feature of the proposed critical habitat expansion.

183. As described in Chapter 2 of this analysis, in most cases, critical habitat is not expected to change how a project or activity is implemented. NMFS has not identified a particular project or activity for which it is likely that section 7 consultation with expanded critical habitat for the killer whales will result in different conservation recommendations than section 7 consultation without the expanded critical habitat. The reason for this is that protection of the essential features of critical habitat (water quality, prey, and passage) is generally important to the conservation and recovery of the whales themselves, even outside of the need to consider adverse modification of critical habitat.
184. Although expanded critical habitat is not expected to change NMFS' conservation recommendations for the whales, the adverse modification analysis conducted as part of section 7 consultations provides useful scientific information to build upon NMFS' understanding of the biological needs of, and threats to, the killer whales. While this scientific information is not the reason for the consultation process, it is an ancillary benefit of the consultations.
185. The remainder of this section discusses existing information related to the second piece of information described above: information on the public's WTP for killer whales. Specifically, we provide a more detailed description of the economic methods that economists employ to monetize these types of benefits and provide an overview of the existing literature specifically related to killer whales. These studies provide evidence that the public holds a positive value for efforts that increase killer whale populations or the probability of recovery for the species. However, for the reasons described above, these studies cannot be applied to quantify the incremental economic benefits resulting from the expanded critical habitat for the killer whale.

4.2 ECONOMIC VALUATION METHODS FOR SPECIES AND HABITAT CONSERVATION

186. Various economic benefits, measured in terms of social welfare values or regional economic productivity, may result from conservation efforts for listed species. Economists apply a variety of methodological approaches to estimate use and non-use values for species and for habitat improvements.
187. Revealed preference techniques examine individuals' behavior in markets in response to changes in environmental or other amenities (i.e., people "reveal" their value through their behavior). For example, travel cost models are frequently applied to value access to recreational opportunities, as well as to value changes in the quality and characteristics of these opportunities. Basic travel cost models are rooted in the idea that the value of a recreational resource can be estimated by analyzing the travel and time costs incurred by individuals visiting the site. Another revealed preference technique is hedonic analysis,

which is often employed to determine the effect of site-specific characteristics on property values.

188. Because non-use values reflect a preference for the continued existence of a resource beyond any direct or indirect use of it, non-use values cannot be measured by observing how they affect people's choices or behaviors. Thus, revealed preference methods do not apply to non-use values. Economists therefore employ stated preference methods to elicit information on non-use values (or on total economic values for species, inclusive of use and non-use value). Stated preference methods include such tools as contingent valuation, contingent behavior, and choice experiments. In simplest terms, these survey-based methods elicit information from respondents in order to estimate what their WTP for a given resource or service (e.g., a species population), or for programs designed to protect that resource or service. A substantial body of literature has developed that describes the application of this technique to the valuation of natural resource assets.¹⁰⁶ Numerous published studies estimate individuals' willingness to pay to protect endangered species.¹⁰⁷
189. In addition to economic *values*, economists employ models of economic activity levels in commercial markets in order to estimate the regional economic *impacts* generated by a policy or activity. Regional economic impacts refer to changes in regional economic activity levels and may be measured, for example, in terms of changes in revenues, value-added, employment, wages and tax receipts. Regional economic impacts may also be associated with changes in non-market activities, such as recreation. For example, whale watching trips generate tourism related expenditures and increased activity in interrelated economic sectors.
190. An ideal study for use in quantifying the social welfare values of the expanded critical habitat designation for the killer whales would be specific both to the species and to the policy question at hand (expanding the critical habitat area for the whales). Absent primary research specific to the policy question, the following section describes existing studies focused on killer whales to provide perspective on these social welfare values, as well as regional economic impacts, associated with Southern Resident killer whales. This summary is limited to the available information describing values and the regional economic contributions of killer whales within the United States.

4.3 WHALE WATCHING VALUES AND IMPACTS

191. The Southern Resident killer whales are a popular species for whale watching along the West Coast and, in particular within the inland waters of Washington. Whale watching activities contribute to the well-being of participants, as well as generating economic activity for recreation and tourism, and interrelated economic sectors.

¹⁰⁶ See, for example, Phaneuf, Daniel and Till Requate. *A Course in Environmental Economics: Theory, Policy, and Practice*. Cambridge University Press, 2016.

¹⁰⁷ See, for example, Lew. November 2015. Willingness to Pay for Threatened and Endangered Marine Species: A Review of the Literature and Prospects for Policy Use. *Frontiers in Marine Science* Vol. 2(96).

192. A 2006 synthesis of the literature focused on whale watching describes social welfare values (WTP) for whale watching (not specific to killer whales) of between approximately \$42 and \$56 per person per trip (2018 dollars) based on studies conducted in the U.S.¹⁰⁸ According to this literature, the author estimates the non-market economic value of whale watching in California in 2005 to have been on the order of \$53 million for boat-based whale watchers.¹⁰⁹ As noted, this estimated value is not specific to the Southern Resident killer whales but covers all whale watching across the state. Multiple site- and trip-specific attributes contribute to WTP for individual whale watching trips, such as the number of whales and variety of species viewed.
193. With respect to the regional economic contribution of whale watching, a 2009 study by the International Fund for Animal Welfare estimated participation in whale watching by state in the U.S. and in other regions around the world. Based on surveys of tourism operators, government tourism offices, academic researchers and organization, and available literature, the findings of this study relevant to the West Coast states as summarized in Exhibit 4-2. Note that these estimates are inclusive of, but not specific to, whale watching for killer whales.

EXHIBIT 4-2. WHALE WATCHING STATISTICS AS OF 2008

STATE	NUMBER OF WHALE WATCHERS	REGIONAL EXPENDITURES (2018\$)	PERCENT INCREASE IN EXPENDITURES BETWEEN 1998 AND 2008
California	1.37 million	\$99 million	30% increase
Oregon	376,618	\$35.6 million	360% increase
Washington	425,000	\$73 million	350% increase
Source: O'Connor, S., R. Campbell, H. Cortez, and T. Knowles. 2009. <i>Whale Watching Worldwide: Tourism Numbers, Expenditures, and Expanding Economic Benefits: A Special Report from the International Fund for Animal Welfare</i> . Yarmouth, MA, USA.			

194. In Washington in particular, whale watching activity is concentrated in the Haro Strait and adjacent Strait of Juan de Fuca, which accounted for approximately 95 percent of whale watchers in the state in 2008. Whale watching in these areas is focused on killer whales. Killer whales are also described as a target species for whale watching in California, particularly in Monterey Bay.¹¹⁰

¹⁰⁸ All values in this discussion adjusted from the dollar years presented in the original studies to 2018 dollars using the CPI to adjust for inflation.

¹⁰⁹ Pendleton, Linwood. 2006. *Understanding the Potential Economic Impact of Marine Wildlife Viewing and Whale Watching in California*. Developed for the National Ocean Economics Program.

¹¹⁰ O'Connor, S., R. Campbell, H. Cortez, and T. Knowles. 2009. *Whale Watching Worldwide: Tourism Numbers, Expenditures, and Expanding Economic Benefits: A Special Report from the International Fund for Animal Welfare*. Yarmouth, MA, USA.

195. IEc conducted a regional economic contribution study of killer whale-based whale watching in Washington State for NMFS in 2015. This analysis employed the regional input-output model IMPLAN and multiplier data based on coastal counties in Washington State to evaluate how regional spending on whale watching trips (e.g., on trip-related expenses such as food, transportation, lodging, and tickets) resonated through interrelated economic sectors. The study focused in particular on spending by individuals participating in motorized boat-based commercial whale watch excursions departing from U.S. ports throughout the inland waters (i.e., land-based viewers and kayakers were not included in this analysis). This study found that expenditures on whale watching may contribute on the order of an annual \$18 million to \$63 million (2018 dollars) and hundreds of jobs to the economy of the 12 Washington State counties surrounding the inland waters. Expenditures in San Juan County may contribute between \$4.0 million and \$14 million (2018 dollars) and tens to hundreds of jobs just within that county. The broad range in these estimates reflects the uncertainty regarding the number of annual whale watching participants and their average trip-related expenditures. Nonetheless, these results identify a substantial regional economic contribution of the whale watching industry focused on Southern Resident killer whales.¹¹¹

4.4 VALUES FOR RECOVERY OF THE KILLER WHALES

196. A stated preference study conducted in 2010 evaluated people's WTP for recovery of multiple West Coast species, including the Southern Resident killer whales.¹¹² The study identified an average WTP per household in Washington, Oregon, and California of \$97 (2018 dollars) per year for ten years for the recovery of the killer whales. The study additionally estimated an average WTP per household across the broader U.S. of \$91 (2018 dollars) per year for ten years. The WTP from the national sample identified values close to the WTP of West Coast households, suggesting that the value the public holds for the whales is not tied to proximity to the resource. In fact, an additional study employing the data from the same 2010 survey identified that the region with the highest WTP value for recovering the Southern Resident killer whales was New England (\$130 per household per year for ten years when converted to 2018 dollars).¹¹³

.2 ANCILLARY BENEFITS

197. As previously described, NMFS has not identified additional conservation recommendations it expects to make specifically to avoid destruction or adverse modification of critical habitat in the expanded critical habitat area. The adverse modification analysis completed as part of future section 7 consultations, however,

¹¹¹ Industrial Economics, Inc. "Regional Economic Benefits of Whale Watching in Puget Sound." Memorandum to the National Marine Fisheries Service. March 2015.

¹¹² Wallmo, Kristy and Daniel K. Lew. 2015. Public Preferences for Endangered Species recovery: An Examination of Geospatial Scale and Non-Market Values. *Frontiers in Marine Science*. Vol. 2 (96).

¹¹³ Wallmo, Kristy and Daniel K. Lew. 2016. A Comparison of Regional and National Values for Recovering Threatened and Endangered Marine Species in the United States. *Journal of Environmental Management* 179: 38-46.

provides useful information on the biological needs of the species and the quality of and threats to the essential features of its critical habitat. In this way, the expanded critical habitat not only plays a role in the conservation and recovery of the species, but also in understanding water quality issues and the status of listed salmonids (prey species) across the proposed expansion to critical habitat. Increased understanding of the status of these habitat features may therefore contribute to improvements in broader ecosystem health in the future.

CHAPTER 5 | INITIAL REGULATORY FLEXIBILITY ANALYSIS AND ENERGY IMPACTS ANALYSIS

198. This analysis considers the extent to which the potential economic impacts associated with the expansion of critical habitat for the Southern Resident killer whale could be borne by small entities (Section 5.1) and the energy sector (Section 5.2). The Initial Regulatory Flexibility Analysis (IRFA) is conducted pursuant to the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Act (SBREFA) of 1996. The energy analysis in Section 5.2 is conducted pursuant to Executive Order No. 13211.
199. The analyses of impacts to small entities and the energy industry rely on the estimated incremental impacts resulting from the proposed critical habitat expansion. Incremental impacts are detailed in Chapter 3 of this report.

5.1 INITIAL REGULATORY FLEXIBILITY ANALYSIS (IRFA)

200. This IRFA uses the best available information to identify the potential impacts of critical habitat on small entities. However, there are uncertainties that complicate quantification of these impacts, particularly with respect to the extent to which the quantified impacts may be borne by small entities. As a result, this IRFA employs a conservative approach (i.e., more likely to overestimate than underestimate impacts to small entities) in assuming that the quantified costs that are not borne by the Federal government are generally borne by small entities.

5.1.1 SUMMARY OF FINDINGS

201. Estimated impacts to small entities are summarized in Exhibit 5-1. As described in Chapters 2 and 3 of this analysis, the quantified costs associated with the proposed critical habitat expansion for the Southern Resident killer whales reflect administrative effort to consider potential for adverse modification as part of future section 7 consultations. Primarily, consultations are between NMFS and Federal action agencies to evaluate the potential for projects and activities to result in adverse modification of critical habitat. Therefore, most incremental impacts are borne by NMFS and other Federal agencies and not by private entities or small governmental jurisdictions.
202. However, some consultations may include third parties (e.g., project proponents or landowners) that may be small entities. These third parties may bear some portion of the administrative consultation costs. This analysis first identifies which consultations are likely to include third parties and then identifies the types of small entities (i.e., which economic sectors) that may participate in these consultations.

203. This analysis finds that consultations on dredging and in-water construction, renewable energy development, and seismic surveying may generate costs borne by small entities. As described in Chapter 3, this analysis anticipates approximately six consultations on in-water and coastal construction activities per year, 0.5 consultations on renewable energy development, and 0.1 consultations on seismic surveys. While the activity forecast includes less than one consultation annually on renewable energy development and seismic surveying, this IRFA evaluates the impacts associated with one consultation on each of these activities to reflect a high-end estimate for a single year.
204. Exhibit 5-1 summarizes the number of potentially affected small entities, as well as the potential per-entity impact of the rule, according to two scenarios. Of note, the identified consultations involving third parties do not necessarily involve small entities. Absent information on the likelihood that the third parties participating in consultation are small, this analysis presents the total number of affected third parties. In fact, some subset or none of these consultations may involve small entities.
205. The scenarios are intended to reflect the range of uncertainty regarding the number of small entities that may be affected by the designation and the potential impacts of critical habitat designation on their annual revenues. Under Scenario 1, this analysis identifies the maximum number of future consultations involving small entities and assumes that each consultation involves one unique small entity. Our estimate for the maximum number of future consultations (and accordingly, number of potentially affected entities), eight, represents the total number of annual consultations that occur across all critical habitat units involved with in-water construction, renewable energy development, and seismic surveying.
206. Scenario 1 accordingly estimates a high-end estimate of the number of potentially affected small entities and a low-end estimate of the potential effect in terms of the economic effects (i.e., percent of annual revenues) for each entity. This scenario may overstate the number of small entities likely to be affected by the rule and may understate the potential revenue effect. Specifically, under Scenario 1, we estimate that eight small entities have the potential to bear an impact of \$890 to \$1,600 per entity.
207. Under Scenario 2, this analysis assumes all future costs to an industry are borne by a single small entity within that industry. This method may understate the number of small entities affected and overstate the per-entity impacts. As such, this method arrives at a low-end estimate of potentially affected entities and a high-end estimate of potential economic effects. Under this scenario, one small entity in the in-water construction industry would bear costs of \$5,200.
208. Because this analysis assumes a maximum of one consultation on both renewable energy development and seismic surveying in a single year, the cost estimates for these activities are identical under both scenarios. However, for in-water construction and dredging, these scenarios reflect a range of potentially affected entities and associated revenue effects. The actual number of small in-water construction entities affected, and the per-entity revenue effects are likely to be somewhere in the middle. In other words, some

subset greater than one and less than six of the in-water construction small entities may participate in the section 7 consultations and bear the associated impacts.

209. NMFS does not track whether third parties involved in previous consultations were small entities. Even though we cannot determine relative numbers of small and large entities that may be affected by the designation of critical habitat, based on available data, the agency believes there is no indication that affected project applicants would be limited to, nor disproportionately comprised of, small entities. Incremental economic impacts due to the expanded critical habitat are minimal overall, with up to eight private entities per year (which may or may not be small) experiencing a total annualized impact of \$7,800. However, based on the small entity impact analysis below and given the limited costs spread broadly across the proposed expanded critical habitat area, this analysis does not anticipate significant economic impacts to small entities.

EXHIBIT 5-1. SUMMARY OF QUANTIFIED IMPACTS TO SMALL ENTITIES BY ACTIVITY

		RENEWABLE ENERGY DEVELOPMENT	DREDGING AND IN-WATER CONSTRUCTION	SEISMIC SURVEYS
[A]	Total Annualized Impacts to Small Entities ¹	\$1,100	\$5,200	\$1,600
Scenario 1: Assumes All Small Entities Potentially Affected by Proposed Critical Habitat Share Incremental Costs Equally				
[B]	Maximum Number of Consultations in Proposed Critical Habitat Areas ²	1	5.9	1
[C]	Estimated Impact per Small Entity ([A]/[B])	\$1,100	\$890	\$1,600
Scenario 2: Assumes All Consultations Involve the Same Individual Small Entity				
[D]	Estimated Number of Small Entities Expected to Undergo Consultation	1	1	1
[E]	Estimated Impact per Small Entity ([A]/[D])	\$1,100	\$5,200	\$1,600
Notes: 1. These values represent total administrative costs expected to be borne by third parties in each industry. 2. The estimated maximum number of small entities subject to consultation annually reflects the total number of consultations forecasted to occur annually within each industry. This assumes that each consultation within an industry is conducted by a unique small entity.				

5.1.2 IRFA REQUIREMENTS

210. First enacted in 1980, the RFA was designed to ensure that Federal agencies consider the potential for their regulations to unduly inhibit the ability of small entities to compete. The goals of the RFA include increasing the government's awareness of the impact of regulations on small entities and to encourage agencies to exercise flexibility in their rulemakings to provide regulatory relief to small entities.
211. When a Federal agency proposes regulations, the RFA requires the agency to prepare and make available for public comment an analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).¹¹⁴ For this rulemaking, this analysis takes the form of an IRFA. Under 5 U.S.C., Section 603(b) of the RFA, an IRFA is required to contain:
- a) "a description of the reasons why action by the agency is being considered
 - b) a succinct statement of the need for, and objectives of, the rule;
 - c) a description of and an estimate of the number of small entities to which the rule will apply or an explanation of why no such estimate is available;
 - d) a description of the projected reporting, recordkeeping and other compliance requirements of the rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record; and
 - e) an identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap or conflict with the proposed rule."

5.1.3 NEEDS AND OBJECTIVES OF THE RULE

Why Action by the Agency is Being Considered

212. NMFS listed the Southern Resident killer whale Distinct Population Segment as "endangered" under the ESA on November 18, 2005. Additionally, NMFS issued a final rule designating critical habitat for the whales on November 29, 2006 (71 FR 69054). NMFS is now proposing to expand the critical habitat area by adding waters along the Pacific Coast between Cape Flattery, Washington and Point Sur, California.

Objectives of, and Legal Basis for, the Proposed Rule

213. The objective of the rule is to utilize the best scientific and commercial information available to expand critical habitat for the Southern Resident killer whale to best meet the conservation needs of the species in order to meet recovery goals. Section 4(b)(ii) of the ESA allows NMFS to revise designations to critical habitat as appropriate and is the legal basis for this rule. Section 4(b)(2) of the ESA requires NMFS to designate critical habitat for threatened and endangered species "on the basis of the best scientific data available

¹¹⁴ 5 U.S.C. 601 et seq.

and after taking into consideration the economic impact, impact on national security, and any other relevant impact, of specifying any particular area as critical habitat.” The ESA defines critical habitat under Section 3(5)(A) as:

214. “(i) the specific areas within the geographical area occupied by the species, at the time it is listed..., on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
215. (ii) specific areas outside the geographical area occupied by the species at the time it is listed... upon a determination by the Secretary that such areas are essential for the conservation of the species.”

5.1.4 DESCRIPTION AND ESTIMATE OF THE NUMBER OF SMALL ENTITIES TO WHICH THE RULE APPLIES

216. Three types of small entities are defined in the RFA:
 - **Small Business** - Section 601(3) of the RFA defines a small business as having the same meaning as small business concern under section 3 of the Small Business Act. This includes any firm that is independently owned and operated and is not dominant in its field of operation. The SBA has developed size standards to carry out the purposes of the Small Business Act, and those size standards can be found in 13 CFR 121.201. The size standards are matched to North American Industry Classification System (NAICS) industries. The SBA definition of a small business applies to a firm’s parent company and all affiliates as a single entity.
 - **Small Governmental Jurisdiction** - Section 601(5) defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000. Special districts may include those servicing irrigation, ports, parks and recreation, sanitation, drainage, soil and water conservation, road assessment, etc. When counties have populations greater than 50,000, those municipalities of fewer than 50,000 can be identified using population reports. Other types of small government entities are not as easily identified under this standard, as they are not typically classified by population.
 - **Small Organization** - Section 601(4) defines a small organization as any not-for-profit enterprise that is independently owned and operated and not dominant in its field. Small organizations may include private hospitals, educational institutions, irrigation districts, public utilities, agricultural co-ops, etc.
217. The courts have held that the RFA/SBREFA requires Federal agencies to perform a regulatory flexibility analysis of forecast impacts to small entities that are directly regulated. In the case of *Mid-Tex Electric Cooperative, Inc., v. Federal Energy Regulatory Commission*, FERC proposed regulations affecting the way generating utilities incorporated construction work in progress in their rates. The generating utilities that expected to be regulated were large businesses; however, their customers --

transmitting utilities such as electric cooperatives -- included numerous small entities. In this case, the court agreed that FERC simply authorized large electric generators to pass these costs through to their transmitting and retail utility customers, and FERC could therefore certify that small entities were not directly impacted within the definition of the RFA.¹¹⁵

218. Similarly, *American Trucking Associations, Inc. v. Environmental Protection Agency* (EPA) addressed a rulemaking in which EPA established a primary national ambient air quality standard for ozone and particulate matter.¹¹⁶ The basis of EPA's RFA/SBREFA certification was that this standard did not directly regulate small entities; instead, small entities were indirectly regulated through the implementation of state plans that incorporated the standards. The court found that, while EPA imposed regulation on states, it did not have authority under this rule to impose regulations directly on small entities and therefore small entities were not directly impacted within the definition of the RFA.
219. The Small Business Administration (SBA) in its guidance on how to comply with the RFA recognizes that consideration of indirectly affected small entities is not required by the RFA, but encourages agencies to perform a regulatory flexibility analysis even when the impacts of its regulation are indirect.¹¹⁷ "If an agency can accomplish its statutory mission in a more cost-effective manner, the Office of Advocacy [of the SBA] believes that it is good public policy to do so. The only way an agency can determine this is if it does not certify regulations that it knows will have a significant impact on small entities even if the small entities are regulated by a delegation of authority from the Federal agency to some other governing body."¹¹⁸
220. The regulatory mechanism through which critical habitat protections are enforced is section 7 of the ESA, which directly regulates only those activities carried out, funded, or permitted by a Federal agency. By definition, Federal agencies are not considered small entities, although the activities that Federal agencies may fund or permit may be proposed or carried out by small entities. Given the SBA guidance described above, this analysis considers the extent to which this designation could potentially affect small entities, regardless of whether these entities would be directly regulated by the NMFS through the proposed rule or by a delegation of impact from the directly regulated entity.

¹¹⁵ 773 F. 2d 327 (D.C. Cir. 1985).

¹¹⁶ 175 F. 3d 1027, 1044 (D.C. Cir. 1999).

¹¹⁷ Small Business Administration, Office of Advocacy. May 2003. A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act, pg. 20.

¹¹⁸ Small Business Administration, Office of Advocacy. May 2003. A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act, pg. 21.

Description of Economic Activities for Which Impacts Are Most Likely

221. This IRFA focuses on small entities that may bear the incremental impacts of this rulemaking quantified in Chapter 3 of this economic analysis. Small entities participate in section 7 consultation as a third party (the primary consulting parties being NMFS and the Federal action agency). Therefore, it is possible that the small entities may spend additional time considering critical habitat during a section 7 consultation.
222. Of the activities analyzed, fisheries, military activities, and hatchery operations are not expected to impact third parties, and therefore, are not expected to affect small entities. Potentially affected activities (i.e., those that may involve a small entity) include the following. The relevant North American Industry Classification System (NAICS) codes and small business thresholds are included.
- **Renewable Energy Development:** NAICS 221118 (Other Electric Power Generation), small business threshold of 250 employees. While data are not available to identify the average annual revenues of businesses with fewer than 250 employees within this industry classification, average annual revenues for businesses with fewer than 100 employees are approximately \$9.5 million.¹¹⁹
 - **Dredging and In-Water Construction:** NAICS 237310 (Highway, Street, and Bridge Construction) and 237990 (Other Heavy and Civil Engineering Construction), small business threshold of \$36.5 million in annual revenue. Average annual revenues are approximately \$3.8 million (for NAICS 237310) and \$1.9 million (for NAICS 237990).¹²⁰
 - **Seismic Surveying:** NAICS 211 (Oil and Gas Extraction), small business threshold of 1,250 employees. While data are not available to identify the average annual revenues of businesses with fewer than 1,250 employees within this industry classification, average annual revenues for businesses with fewer than 500 employees are approximately \$4.7 million.¹²¹

¹¹⁹ The Census Bureau Statistics of U.S. Businesses (SUSB) data provide average business revenues by NAICS code and employment size class. However, the included size classes do not exactly line up with the 250-employee small business threshold for NAICS 221118 (this threshold falls within the 100-499 employee size class). For businesses with fewer than 100 employees, the SUSB data indicate that average annual revenues are approximately \$9.5 million. This value is likely to underestimate average annual small business revenues for NAICS 221118 (and thus overestimate impacts as a percentage of revenues) as it excludes firms with 100 to 250 employees. Source: Census Bureau. 2015. Statistics of U.S. Businesses Employment and Payroll Summary: 2012. Accessed at: <https://www.census.gov/data/tables/2012/econ/susb/2012-susb-annual.html>.

¹²⁰ Average annual small business revenues for NAICS 237310 and 237990 are estimated based on businesses with less than \$35 million in revenues (the closest size class cutoff to the \$36.5 million threshold). This approach results in a slight underestimate of average annual revenues (and thus an overestimate of impacts as a percentage of revenues).

Source: Census Bureau. 2015. Statistics of U.S. Businesses Employment and Payroll Summary: 2012. Accessed at: <https://www.census.gov/data/tables/2012/econ/susb/2012-susb-annual.html>.

¹²¹ However, the included size classes do not exactly line up with the 1,250-employee small business threshold for NAICS 211 (this threshold falls within the 500+ employee size class). For businesses with fewer than 500 employees, the SUSB data indicate that average annual revenues are approximately \$4.7 million. This value is likely to underestimate average annual

223. Along with private businesses, there also may be consultations for which small governmental jurisdictions (i.e., jurisdictions with populations of less than 50,000 people) are the third parties participating in the consultations as opposed to businesses. Exhibit 5-2 presents small government jurisdictions adjacent to critical habitat units that may be involved in future consultations.
224. As described above and detailed in Chapters 2 and 3 of this report, incremental impacts associated with this rulemaking are expected to be limited to administrative costs associated with section 7 consultations. This analysis relies on the best available information on the rate of future consultations and the average cost per consultation borne by third parties (i.e., not borne by Federal agencies).
225. Ultimately, up to eight small entities per year may bear costs associated with participation in consultation regarding the proposed expansion of critical habitat for Southern Resident killer whale. The total annualized administrative costs that may be borne by these small entities (businesses or governments) is \$7,800 (discounted at seven percent). On a per-entity basis, these administrative costs represent less than 0.5 percent of average annual revenues for small businesses across all relevant industries, as follows:
- **Renewable Energy Development:** The estimated annualized administrative costs of \$1,100 (Exhibit 5-1) would be less than 0.01 percent of the estimated average annual revenues for small businesses.
 - **Dredging and In-Water Construction:** The estimated annualized administrative costs of \$890 to \$5,200 (Exhibit 5-1) represent 0.02 to 0.27 percent of estimated average annual revenues for small businesses.
 - **Seismic Surveying:** The estimated annualized administrative costs of \$1,600 (Exhibit 5-1) would be less than 0.03 percent of the estimated average annual revenues for small businesses

small business revenues for NAICS 211 (and thus overestimate impacts as a percentage of revenues) since it excludes firms with 500 to 1,250 employees. Source: Census Bureau. 2015. Statistics of U.S. Businesses Employment and Payroll Summary: 2012. Accessed at: <https://www.census.gov/data/tables/2012/econ/susb/2012-susb-annual.html>.

EXHIBIT 5-2. SMALL COMMUNITIES ADJACENT TO THE CRITICAL HABITAT UNITS

COUNTY NAME1	STATE	POPULATION	ADJACENT CRITICAL HABITAT UNITS
Del Norte County	CA	27,442	4
Clatsop County	OR	38,021	3
Curry County	OR	22,377	3
Lincoln County	OR	47,307	3
Tillamook County	OR	25,840	3
Jefferson County	WA	30,524	1, 2
Pacific County	WA	20,940	1, 2
Source: American Community Survey 2017			

5.1.5 DESCRIPTION OF REPORTING AND RECORDKEEPING EFFORTS

226. The critical habitat rule will require that Federal agencies insure their actions do not destroy or adversely modify critical habitat through a section 7 consultation. During formal section 7 consultation under the ESA, NMFS, the Federal action agency, and a third-party participant applying for Federal funding or permitting, may communicate in efforts to minimize potential adverse impacts to the habitat and/or the essential features. Communication may include written letters, phone calls, and/or meetings. Project variables such as the type of consultation, the location, impacted essential features, and activity of concern, may in turn dictate the complexity of these interactions. Third party costs may include administrative work, such as cost of time and materials to prepare for letters, calls, or meetings. The cost of analyses related to the activity and associated reports may be included in these administrative costs. In addition, following the section 7 consultation process, entities may be required to monitor progress during the said activity to ensure that impacts to the habitat and features have been minimized. The rule does not directly mandate “reporting” or “record keeping” within the meaning of the Paperwork Reduction Act (PRA). The rule does not impose record keeping or reporting requirements on small entities.

5.1.6 A DESCRIPTION OF ALTERNATIVES TO THE PROPOSED RULE WHICH ACCOMPLISH THE OBJECTIVES AND WHICH MINIMIZE IMPACTS ON SMALL ENTITIES

227. In accordance with the requirements of the RFA (as amended by SBREFA, 1996) this analysis considered various alternatives to the critical habitat expansion for the Southern Resident killer whale.

Alternative 1: Without Critical Habitat

228. The alternative of not expanding critical habitat for the Southern Resident killer whale is considered because it would impose no additional economic, national security or other relevant impacts. Under this alternative, the Southern Resident killer whale would continue to receive protection provided under the ESA, the existing critical habitat, as well as other Federal, state, and local laws. NMFS rejected this alternative because it determined that the proposed expanded critical habitat for Southern resident killer whales is prudent and determinable, and the ESA requires critical habitat designation in that circumstance.

Alternative 2: Designating All Specific Areas

229. The alternative of designating all specific areas (i.e., no area excluded) was considered. The results presented in Exhibit 5-1 reflect this alternative. NMFS has not chosen this alternative for the proposed rule due to the decision to consider potential impacts to national security, as described in NMFS’ 4(b)(2) report.¹²²

¹²² NMFS. Proposed Revision of the Critical Habitat Designation for Southern Resident Killer Whales: Draft ESA Section 4(b)(2) Report (to accompany the Proposed Rule).

Alternative 3: Designating a Subset of Areas

230. An alternative to expanding critical habitat within all the areas considered for designation is the expansion of critical habitat within a subset of those areas. Under section 4(b)(2) of the ESA, NMFS must consider the economic impacts, impacts to national security, and other relevant impacts of designating any particular area as critical habitat. NMFS has the discretion to exclude an area from designation as critical habitat if the benefits of exclusion (i.e. the impacts that would be avoided if an area was excluded from the designation) outweigh the benefits of designation (i.e., the conservation benefits to the Southern Resident killer whale if an area was designated), so long as exclusion of the area will not result in extinction of the species. Exclusion under section 4(b)(2) of the ESA of one or more of the areas considered for expansion would reduce the total impacts of expansion. This alternative would result in a critical habitat expansion that provides for the conservation of the species while potentially reducing the economic, national security and other relevant impacts on entities. Analysis of this alternative is presented in NMFS' draft ESA Section 4(b)(2) report, which will be published with the proposed rule.¹²³

5.2 POTENTIAL IMPACTS TO THE ENERGY INDUSTRY

231. Pursuant to Executive Order No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, Federal agencies must prepare and submit a "Statement of Energy Effects" for all "significant energy actions." The purpose of this requirement is to ensure that all Federal agencies "appropriately weigh and consider the effects of the Federal Government's regulations on the supply, distribution, and use of energy."¹²⁴
232. OMB provides guidance for implementing this Executive Order, outlining nine outcomes that may constitute "a significant adverse effect" when compared with the regulatory action under consideration:
- Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
 - Reductions in fuel production in excess of 4,000 barrels per day;
 - Reductions in coal production in excess of 5 million tons per year;
 - Reductions in natural gas production in excess of 25 million Mcf per year;
 - Reductions in electricity production in excess of 1 billion kilowatts-hours per year or in excess of 500 megawatts of installed capacity;
 - Increases in energy use required by the regulatory action that exceed the thresholds above;

¹²³ NMFS. Proposed Revision of the Critical Habitat Designation for Southern Resident Killer Whales: Draft ESA Section 4(b)(2) Report (to accompany the Proposed Rule).

¹²⁴ Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, <https://georgewbush-whitehouse.archives.gov/omb/memoranda/m01-27.html>

- Increases in the cost of energy production in excess of one percent;
- Increases in the cost of energy distribution in excess of one percent; or
- Other similarly adverse outcomes.¹²⁵

233. Due to the extensive requirements of proposed energy projects to consider environmental impacts, including impacts on marine life, even absent critical habitat expansion for the Southern Resident killer whale, this analysis anticipates that it is unlikely that critical habitat will change conservation measures recommended during section 7 consultation for these projects. Consequently, it is unlikely that energy projects will be affected by the designation of expanded critical habitat beyond the quantified administrative impacts. Therefore, the proposed critical habitat expansion is not expected to impact the level of energy production along the west coast and it is unlikely that any impacts to the industry that remain unquantified will result in a change in production above the 1 billion kilowatt-hour threshold identified in the Executive Order. Therefore, it is unlikely that the energy industry will experience “a significant adverse effect” as a result of the critical habitat expansion for the Southern Resident killer whale.

¹²⁵ Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, <https://georgewbush-whitehouse.archives.gov/omb/memoranda/m01-27.html>

CHAPTER 6 | ASSUMPTIONS AND UNCERTAINTIES

234. This section reviews the key assumptions that underlie the analysis and the likely significance of these assumptions with respect to estimated impacts. The largest sources of uncertainty in this analysis stem from the possibility that the expanded critical habitat will trigger additional conservation recommendations for a particular future project or activity. This analysis relies on the best available information from NMFS describing the likelihood of incremental conservation recommendations for each activity. At this time, NMFS has not been able to identify a circumstance in which the rule would generate additional conservation recommendations. All other assumptions and sources of uncertainty associated with this analysis are likely to have minor effects on the findings. Exhibit 6-1 summarizes each key assumption, the direction of the potential bias introduced, and the likely significance with respect to estimated impacts.

EXHIBIT 6-1. ASSUMPTIONS AND UNCERTAINTIES

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
Proposed expansion to critical habitat designation is unlikely to change the killer whale conservation recommendations resulting from future section 7 consultations.	May result in an underestimate of costs.	Potentially major. Given presently available information, NMFS anticipates that it is unlikely that the proposed expansion to critical habitat designation will generate additional or different recommendations for conservation efforts for the killer whale and its habitat. However, NMFS will review each individual project or activity at the time of consultation to determine whether additional conservation is needed to avoid adverse modification of critical habitat.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
Proposed expansion to critical habitat designation is unlikely to change fishery management recommendations.	May result in an underestimate of costs.	Potentially major. This analysis recognizes that there is some possibility that fishery management recommendations could change as a result of the proposed expansion to critical habitat. However, changes are considered unlikely over the ten-year timeframe of this analysis because NMFS already considers prey as part of consultations that consider jeopardy to killer whales. Additionally, many of the salmonid evolutionarily significant units (ESUs) targeted as prey by the whales are themselves listed under the ESA, and substantial efforts have been made to identify and reduce the sources of threat to these ESUs. However, in the case that NMFS does recommend changes to fisheries as a result of this rule, there may be major implications on the findings of the analysis.
For offshore aquaculture and oil spill and response activities, this analysis relies on patterns of consultation within the past eleven years (2006 to 2016) to forecast future <i>rates</i> of consultation activity. This analysis assumes that past consultations provide a good indication of future activity. For these activities, the consultation history indicates that no consultations on this activity are likely to occur in the next ten years.	May result in an underestimate of costs.	Likely minor. Data are not available to determine whether activity rates are likely to change over time. To the extent that these activities increase over the next ten years, our analysis underestimates the potential incremental administrative burden of the proposed expansion to critical habitat for the killer whales. The estimated incremental impacts per consultation are, however, relatively minor and we accordingly do not anticipate variations in consultation rates to significantly change the findings of our analysis.
For vessel traffic and upstream activities, this analysis relies on patterns of consultation within the past eleven years (2006 to 2016) to forecast future <i>rates</i> of consultation activity. This analysis assumes that past consultations provide a good indication of future activity.	Unknown. May overestimate or underestimate incremental impacts.	Likely minor. Data are not available to determine whether activity rates are likely to change over time. To the extent that these activities increase over the next ten years, our analysis underestimates the potential incremental administrative burden of the proposed expansion to critical habitat for the killer whales. The estimated incremental impacts per consultation are, however, relatively minor and we accordingly do not anticipate variations in consultation rates to significantly change the findings of our analysis.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
For all non-Army Corps activities, this analysis relies on patterns of consultation within the past eleven years (2006 to 2016) to forecast future <i>locations</i> of consultation activity.	Unknown. May overestimate or underestimate incremental impacts in a given area.	Likely minor. Although the expected rate of consultation is not likely to vary much from year to year, the location of these consultations may change. As a result, relying on the approximate location of past consultation activity may underestimate impacts in certain locations while overestimating impacts in others. Generally, given the nature of these activities being focused in more populated areas, we expect the consultations will continue to be concentrated where they have been in the recent past.
This analysis relies on historical Army Corps permit data (2007 to 2016) to forecast future consultations related to Army Corps-permitted dredging and in-water construction projects	Unknown. May overestimate or underestimate incremental impacts.	Likely minor. Data are not available to determine whether Army Corps permit rates are likely to change over time. To the extent that permitting increases over the next ten years, our analysis underestimates the potential incremental administrative burden of the proposed expansion to critical habitat for killer whales. The estimated incremental impacts per consultation are, however, relatively minor and we accordingly do not anticipate variations in consultation rates to significantly change the findings of our analysis.
This analysis assumes that all forecasted civil works consultations will be formal.	May result in an overestimate of costs.	Likely minor. Some civil works projects may require informal consultation and some projects may be covered by programmatic Biological Opinions and not require future individual consultations. However, this analysis conservatively assumes that all forecasted civil works consultations will be formal.
This analysis assumes that if consultations on activities historically did not consider impacts to killer whales, consultations on those activities following critical habitat designation also will not consider killer whales.	May result in an underestimate of costs.	Likely minor. Critical habitat is only being designated in occupied areas. It is expected that projects that would require consultation to consider the expanded critical habitat would also require consultation to consider jeopardy to the species.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
This analysis does not forecast any incremental costs associated with oil and gas exploration and production.	May result in an underestimate of costs.	Likely minor. If the Bureau of Ocean Energy Management (BOEM) 2019-2024 Draft Proposed Program is approved, BOEM would be required to evaluate the potential for impacts to the proposed expansion to killer whale critical habitat. However, associated changes in regional offshore oil and gas development are significantly uncertain. Furthermore, NMFS has not identified an instance in which critical habitat for the killer whales would change the nature of the conservation recommendations made for killer whales as part of future consultations on these activities. Thus, any underestimate of costs associated with this uncertainty would most likely be relatively minor administrative costs of consultation.
The frequency of new seismic survey consultations is constant and is comparable to the average rate of consultations in recent years.	May result in an underestimate of costs.	Likely minor. If the BOEM 2019-2024 Draft Proposed Program is approved, there may be new seismic surveys related to oil and gas activity in the whales' expanded critical habitat area in the future. Furthermore, NMFS has not identified an instance in which critical habitat for the killer whales would change the nature of the conservation recommendations made for killer whales as part of future consultations on these activities. Thus, any underestimate of costs associated with this uncertainty would most likely be relatively minor administrative costs of consultation.
All third parties involved in alternative energy development, geologic surveys, and dredging and in-water construction-related projects are small entities.	May result in an overestimate of small entity costs.	Likely minor. For consultations that may involve third parties, whether the third parties bearing administrative costs are likely to be large or small entities is not known. This analysis therefore conservatively assumes all third parties involved in these consultations are small entities. This assumption may overestimate the cost to small entities, but not the total cost to all entities.
All third parties involved in alternative energy development, geologic surveys, and dredging and in-water construction-related projects pay for the development of a Biological Assessment.	May result in an overestimate of small entity costs.	Likely minor. For these projects, the action agency could pay part. This assumption may overestimate the cost to small entities, but not the total cost to all entities.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
Economic benefits are not quantified, since the specific role of the critical habitat in contributing to the conservation and recovery of the killer whales is not quantifiable.	Economic benefits are not quantified but described qualitatively.	The primary benefits of the designation stem from its contribution to the conservation and recovery of the killer whales via protection of the essential habitat features. Determining the incremental effect of the expanded critical habitat on killer whale conservation and recovery - apart from all other ongoing or planned conservation efforts for the species and its essential features - is complex. Chapter 4 accordingly provides perspectives on the types of economic values associated with killer whales but is not able to quantify these values.

REFERENCES

2 U.S.C. § 1501, et seq.

5 U.S.C. §§ 601 et seq.

16 U.S.C. § 1532.

16 U.S.C. § 1533(b)(2).

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APPENDIX A | UNDISCOUNTED ECONOMIC IMPACTS BY YEAR

EXHIBIT A-1. UNDISCOUNTED ADMINISTRATIVE COSTS BY YEAR (2018 DOLLARS)

YEAR	CRITICAL HABITAT UNIT											TOTAL
	1/2	3	4	5	6	1/2, 3	1/2, 3, 4, 5	4, 5, 6	ALL UNITS	UNKNOWN UNITS	UPSTREAM (OUTSIDE CH)	
2019	\$48,000	\$7,000	\$2,800	\$1,800	\$1,500	\$3,000	\$930	\$2,100	\$9,100	\$7,900	\$39,000	\$120,000
2020	\$6,700	\$7,000	\$2,800	\$1,800	\$1,500	\$3,000	\$930	\$2,100	\$9,100	\$7,900	\$39,000	\$82,000
2021	\$6,700	\$7,000	\$2,800	\$1,800	\$1,500	\$3,000	\$930	\$2,100	\$9,100	\$7,900	\$39,000	\$82,000
2022	\$12,000	\$12,000	\$2,800	\$1,800	\$1,500	\$3,000	\$930	\$2,100	\$9,100	\$7,900	\$39,000	\$92,000
2023	\$1,600	\$17,000	\$2,800	\$1,800	\$1,500	\$3,000	\$930	\$2,100	\$9,100	\$7,900	\$39,000	\$87,000
2024	\$1,600	\$17,000	\$2,800	\$1,800	\$1,500	\$3,000	\$930	\$2,100	\$9,100	\$7,900	\$39,000	\$87,000
2025	\$12,000	\$12,000	\$2,800	\$1,800	\$1,500	\$3,000	\$930	\$2,100	\$9,100	\$7,900	\$39,000	\$92,000
2026	\$1,600	\$12,000	\$2,800	\$1,800	\$1,500	\$3,000	\$930	\$2,100	\$9,100	\$7,900	\$39,000	\$82,000
2027	\$1,600	\$12,000	\$2,800	\$1,800	\$1,500	\$3,000	\$930	\$2,100	\$9,100	\$7,900	\$39,000	\$82,000
2028	\$12,000	\$12,000	\$2,800	\$1,800	\$1,500	\$3,000	\$930	\$2,100	\$9,100	\$7,900	\$39,000	\$92,000

APPENDIX B | ECONOMIC IMPACTS APPLYING A 3% DISCOUNT RATE

EXHIBIT B-1. TOTAL PRESENT VALUE AND ANNUALIZED ADMINISTRATIVE COSTS (2018 DOLLARS, 3 PERCENT DISCOUNT RATE)

CRITICAL HABITAT UNIT(S)	PRESENT VALUE IMPACTS	ANNUALIZED IMPACTS
1/2	\$90,000	\$10,000
3	\$94,000	\$11,000
4	\$23,000	\$2,600
5	\$15,000	\$1,700
6	\$12,000	\$1,400
1/2, 3	\$25,000	\$2,800
1/2, 3, 4, 5	\$7,700	\$880
4, 5, 6	\$17,000	\$2,000
All units	\$75,000	\$8,600
Unknown units	\$65,000	\$7,400
Upstream (outside CH)	\$320,000	\$37,000
Total	\$750,000	\$85,000
Notes: <ol style="list-style-type: none"> Exhibit 1-2 provides a map of the critical habitat units referenced in column 1 of this table. Due to the difficulty in determining precise locations of future consultations occurring in Units 1 and 2, this analysis presents economic impacts collectively for these two units. Additionally, some consultations cover projects or activities that span multiple units or all units; thus, this table includes rows for groupings of units that collectively trigger the consultations associated with the estimated costs. Estimates are rounded to two significant digits. 		

**EXHIBIT B-2. TOTAL PRESENT VALUE ADMINISTRATIVE COSTS BY ACTIVITY TYPE (2018
DOLLARS, 3 PERCENT DISCOUNT RATE)**

CRITICAL HABITAT UNIT(S)	FISHERIES	RENEWABLE ENERGY DEVELOPMENT	MILITARY	DREDGING AND IN-WATER CONSTRUCTION	HATCHERY OPERATIONS	SEISMIC SURVEYING	OTHER
1/2	\$1,900	\$1,900	\$0	\$77,000	\$0	\$0	\$9,400
3	\$0	\$9,600	\$1,900	\$62,000	\$0	\$3,900	\$17,000
4	\$0	\$0	\$0	\$23,000	\$0	\$0	\$0
5	\$0	\$0	\$0	\$15,000	\$0	\$0	\$0
6	\$0	\$1,900	\$0	\$10,000	\$0	\$0	\$0
1/2, 3	N/A	N/A	N/A	N/A	N/A	N/A	\$25,000
1/2, 3, 4, 5	N/A	N/A	\$7,700	N/A	N/A	N/A	N/A
4, 5, 6	\$13,000	N/A	N/A	N/A	N/A	N/A	\$3,700
All units	\$42,000	N/A	N/A	N/A	N/A	N/A	\$33,000
Unknown units	\$12,000	N/A	N/A	N/A	N/A	N/A	\$54,000
Upstream (outside CH)	\$0	\$0	\$0	\$140,000	\$3,900	\$0	\$170,000
Total	\$69,000	\$13,000	\$9,600	\$330,000	\$3,900	\$3,900	\$320,000
Notes: <ol style="list-style-type: none"> Exhibit 1-2 provides a map of the critical habitat units referenced in column 1 of this table. Due to the difficulty in determining precise locations of future consultations occurring in Units 1 and 2, this analysis presents economic impacts collectively for these two units. Additionally, some consultations cover projects or activities that span multiple units or all units; thus, this table includes rows for groupings of units that collectively trigger the consultations associated with the estimated costs. A "N/A" indicates "not applicable" because the activity does not result in consultations at the spatial scale of the groupings of units described in the first column. This is different than a "\$0" entry, which simply indicates that no costs for the activity are associated with the specified unit. The "Other" category includes consultations on activities such as scientific research, resource management plans, transportation projects, and water quality standards. All estimates are rounded to two significant digits. 							