

4.5 Summary and Conclusions

4.5.1 Comparison of Effects of the Alternatives for Describing and Identifying EFH

The alternatives for describing and identifying EFH comprise a range of options that use different methodologies and result in different geographic areas being identified as EFH for each of the species managed under the Council's FMPs. Section 4.1 discusses the effects of each alternative on habitat, target species, federally managed fisheries, other fisheries and fishery resources, protected species, ecosystems and biodiversity, and non-fishing activities. The effect ratings (E-, Ø, E+, or U) for each issue evaluated are summarized in Table 4.5-1.

The effect ratings alone do not provide a basis for distinguishing among some of the alternatives. The ratings characterize effects as positive or negative, but do not convey their magnitude or intensity. The accompanying text in Section 4.1 explains the anticipated effects for each alternative, but makes few direct comparisons among them. The following sections, therefore, summarize the most pertinent effects comparatively to highlight relevant issues and provide a clearer basis for choice among the alternatives.

4.5.1.1 Comparative Summary of Effects

As discussed in Section 4.1, description and identification of EFH does not in and of itself have any direct environmental or socioeconomic impacts, but can lead to indirect impacts because EFH description and identification triggers requirements to minimize adverse effects of fishing and to consider the effects of non-fishing actions. Those indirect effects are summarized below.

4.5.1.1.1 Effects on Habitat

Description and identification of EFH, regardless of the alternative selected, generally would have a positive effect on habitat because the purpose of the designation is to identify important fish habitats that would be subject to potential measures to protect, conserve, and enhance them. The broader the area identified as EFH, the more habitat that would be subject to such measures. From the standpoint of effects on habitat, therefore, the most relevant considerations for distinguishing among the alternatives are the habitat types and areas that would or would not be included within designated EFH.

What types and areas of habitat would or would not be included within designated EFH under each alternative?

Alternative 1: No habitat types or areas would be designated as EFH.

Alternative 2: Under the status quo alternative, the existing EFH description and identification would remain unchanged. EFH would include those habitats found within areas representing the general distribution of the managed species. The specific areas are described in detail in Chapter 2 and Appendix D.

Alternative 3: (Preferred Alternative) EFH description and identification would be revised, and the geographic extent of individual EFH designations would be smaller than under Alternative 2 in some cases. As a result, fewer species might have EFH designated in any given location, but the total aggregated area of EFH description and identification for all managed species would be identical under Alternatives 2, 3, and 4. The specific areas are described in detail in Chapter 2 and Appendix D.

Alternative 4: EFH description and identification would be revised, and the geographic extent of individual EFH designations would be smaller than under Alternatives 2 or 3 in many cases. As a result, fewer species might have EFH designated in any given location, but the total aggregated area of EFH designations for all managed species would be identical under Alternatives 2, 3, and 4. The specific areas are described in detail in Chapter 2 and Appendix D.

Alternative 5: EFH description and identification would encompass eight ecoregions (freshwater, nearshore and estuarine, inner and middle shelf, outer shelf, upper slope, middle slope, lower slope, and basin). A larger area and additional types of habitat (basin habitats in deeper waters) would be included under this alternative than in the other alternatives.

Alternative 6: EFH description and identification in the EEZ would be identical to Alternative 3. No habitat types or areas would be designated as EFH in state waters.

4.5.1.1.2 Effects on Target Species

EFH description and identification would have the following mixed effects on target species:

- Potential positive effects on productivity, prey availability, and growth to maturity
- Potential negative effects on the spatial/temporal concentration of catch (which could have effects on genetic diversity)
- A neutral effect on fishing mortality

From the standpoint of effects on target species, therefore, the most relevant consideration for distinguishing among the alternatives is the degree to which populations of the target species would benefit from protective measures that might result from EFH description and identification.

How would each alternative affect the potential for target species to benefit from measures implemented to conserve or protect EFH?

Alternative 1: The existing EFH description and identification would be rescinded, so any benefits for target species would be lost.

Alternative 2: Under the status quo alternative, target species could continue to benefit from measures the Council and NMFS implement to minimize the adverse effects of fishing on EFH, as well as from measures various action agencies implement to minimize the effects of non-fishing activities on EFH.

Alternative 3: (Preferred Alternative) Target species could benefit from measures the Council and NMFS implement to minimize the adverse effects of fishing on EFH and from measures various action agencies implement to minimize the effects of non-fishing activities on EFH. To the extent that EFH designations for some species would be reduced in geographic scope to describe essential habitats more precisely, as compared to Alternative 2, there could be a slightly greater potential for target species to benefit from measures implemented to conserve or protect EFH. Smaller EFH designations may be beneficial if they reflect the habitats that are most important for managed species, because conservation efforts could focus on those more discrete areas to avoid habitat loss or degradation.

- Alternative 4: Target species could benefit from measures the Council and NMFS implement to minimize the adverse effects of fishing on EFH, and from measures various action agencies implement to minimize the effects of non-fishing activities on EFH. To the extent that EFH designations for many species would be reduced in geographic scope to describe essential habitats even more precisely, as compared to Alternatives 2 and 3, there could be a greater potential for target species to benefit from measures implemented to conserve or protect EFH. Smaller EFH designations may be beneficial if they reflect the habitats that are most important for managed species, because conservation efforts could focus on those more discrete areas to avoid habitat loss or degradation.
- Alternative 5: Target species could benefit from measures the Council and NMFS implement to minimize the adverse effects of fishing on EFH and from measures various action agencies implement to minimize the effects of non-fishing activities on EFH. Under this alternative, however, it might be more difficult to focus habitat conservation efforts on specific species, because EFH would be designated for entire complexes of species rather than separately for each species.
- Alternative 6: In the EEZ, target species could benefit from measures the Council and NMFS implement to minimize the adverse effects of fishing on EFH and from measures various action agencies implement to minimize the effects of non-fishing activities on EFH. Any such benefits for target species in state waters would be lost because there would be no EFH description and identification in those habitats.

4.5.1.1.3 Effects on Economic and Socioeconomic Aspects of Federally Managed Fisheries

EFH description and identification by itself does not enact any specific management measures, and thus it creates potential rather than actual effects. EFH description and identification may have mixed indirect effects on federally managed fisheries. Potential costs could result from implementation of measures to minimize the adverse effects of fishing on EFH. Indirect long-term benefits could occur if EFH description and identification prompts conservation measures that lead to higher production rates of target species. From the standpoint of effects on federally managed fisheries, therefore, the most relevant consideration for distinguishing among the alternatives is how different EFH designations may potentially affect economic costs and benefits. The assumption here is that the size of EFH would be correlated with the amount of costs and benefits.

How would each alternative affect the potential for economic costs and benefits for federally managed fisheries?

- Alternative 1: The existing EFH description and identification would be rescinded, so any costs associated with management measures to protect EFH would be avoided, and any benefits to fisheries from conserving productive habitats would be lost.
- Alternative 2: The status quo alternative would not change the potential for economic costs and benefits for fisheries.
- Alternative 3: (Preferred Alternative) To the extent that EFH description and identification for some species would be reduced in geographic scope to describe essential habitats more

precisely, as compared to Alternative 2, there may be a slightly lower potential for economic costs of management measures implemented to conserve or protect EFH.

Alternative 4: To the extent that EFH description and identification for many species would be reduced in geographic scope to describe essential habitats more precisely, as compared to Alternatives 2 and 3, there may be a slightly lower potential for economic costs of management measures implemented to conserve or protect EFH and a slightly greater potential for benefits from such measures. Relative to Alternative 2, these differences presumably would be greater for Alternative 4 than for Alternative 3.

Alternative 5: Compared to all of the other alternatives, EFH description and identification based on the ecoregion approach might result in an increased potential for economic costs of management measures implemented to conserve or protect EFH and a slightly reduced potential for benefits from such measures. The total size of EFH designations would be largest under Alternative 5, making it more difficult to focus on protecting the habitats that are most important or vulnerable.

Alternative 6: In the EEZ, there may be a slightly lower potential for economic costs of management measures implemented to conserve or protect EFH and a slightly greater potential for benefit from such measures to the extent that EFH designations for some species would be reduced in geographic scope to describe essential habitats more precisely, as compared to Alternative 2. In state waters, existing EFH designations would be rescinded, so any costs associated with management measures to protect EFH there would be avoided, and any benefits to fisheries from conserving productive habitats would be lost.

4.5.1.1.4 Effects on Other Fisheries and Fishery Resources

EFH description and identification would have mixed effects on other fisheries and fishery resources. Many of the species targeted by these fisheries use the same habitats as Magnuson-Stevens Act managed species, and thus could benefit indirectly from EFH protective measures. However, there could be some negative effects on these fisheries if EFH description and identification lead to restrictions on harvesting. From the standpoint of effects on other fisheries and fishery resources, therefore, the most relevant consideration for distinguishing among the alternatives is the degree to which populations of the target species for those fisheries would benefit from protective measures that might result from EFH description and identification.

How would each alternative affect the potential for target species for other fisheries to benefit from measures implemented to conserve or protect EFH?

Alternative 1: The existing EFH description and identification would be rescinded, so any costs associated with management measures to protect EFH would be avoided, and any benefits to fisheries or target species from conserving productive habitats would be lost.

Alternative 2: The status quo alternative would not change the potential for target species for other fisheries to benefit from measures implemented to conserve or protect EFH.

Alternative 3: (Preferred Alternative) To the extent that EFH designations for some species would be reduced in geographic scope to describe essential habitats more precisely, as compared to

Alternative 2, there may be a slightly lower potential for target species for other fisheries to benefit from measures implemented to conserve or protect EFH (if smaller EFH designations exclude important habitats for these species). On the other hand, there could be a slightly greater potential for target species to benefit from measures implemented to conserve or protect EFH to the extent that EFH designations for some species would be reduced in geographic scope to more accurately describe EFH, as compared to Alternative 2. Smaller EFH designations may be beneficial if they reflect the habitats that are most important for managed species, because conservation efforts could focus on those more discrete areas to avoid habitat loss or degradation.

- Alternative 4: To the extent that EFH designations for many species would be reduced in geographic scope to describe essential habitats more precisely, as compared to Alternatives 2 and 3, there may be a lower potential for target species for other fisheries to benefit from measures implemented to conserve or protect EFH (if smaller EFH designations exclude important habitats for these species).
- Alternative 5: Compared to all of the other alternatives, EFH description and identification based on the ecoregion approach might result in a slightly increased potential for target species for other fisheries to benefit from measures implemented to conserve or protect EFH (if larger EFH designations include important habitats for these species).
- Alternative 6: In the EEZ, to the extent that EFH designations for some species would be reduced in geographic scope to describe essential habitats more precisely, as compared to Alternative 2, there may be a slightly lower potential for target species for other fisheries to benefit from measures implemented to conserve or protect EFH (if smaller EFH designations exclude important habitats for these species). In state waters, target species for other fisheries would lose the potential benefits of measures intended to conserve EFH.

4.5.1.1.5 Effects on Protected Species

EFH description and identification may have a positive effect on protected species of salmon, marine mammals, and seabirds, should measures be taken to protect, conserve, and enhance EFH, because many of these species use the same habitats as Magnuson-Stevens Act managed species. From the standpoint of effects on protected species, therefore, the most relevant consideration for distinguishing among the alternatives is the degree to which populations of protected species would benefit from protective measures that might result from EFH description and identification.

How would each alternative affect the potential for protected species to benefit from measures implemented to conserve or protect EFH?

- Alternative 1: The existing EFH description and identification would be rescinded, so any benefits to protected species from conserving productive habitats would be lost.
- Alternative 2: The status quo alternative would not change the potential for protected species to benefit from measures implemented to conserve or protect EFH.
- Alternative 3: (Preferred Alternative) To the extent that EFH designation for some species would be reduced in geographic scope to describe essential habitats more precisely, as compared to

Alternative 2, there may be a slightly lower potential for protected species to benefit from measures implemented to conserve or protect EFH (if smaller EFH designations exclude important habitats for these species).

Alternative 4: To the extent that EFH designations for many species would be reduced in geographic scope to describe essential habitats more precisely, as compared to Alternatives 2 and 3, there may be a lower potential for protected species to benefit from measures implemented to conserve or protect EFH (if smaller EFH designations exclude important habitats for these species).

Alternative 5: Compared to all of the other alternatives, EFH description and identification based on the ecoregion approach might result in a slightly increased potential for protected species to benefit from measures implemented to conserve or protect EFH (if larger EFH designations include important habitats for these species).

Alternative 6: In the EEZ, there may be a slightly lower potential for protected species to benefit from measures implemented to conserve or protect EFH (if smaller EFH designations exclude important habitats for these species) to the extent that EFH designations for some species would be reduced in geographic scope to describe essential habitats more precisely, as compared to Alternative 2. In state waters, protected species would lose the potential benefits of measures intended to conserve EFH.

4.5.1.1.6 Effects on Ecosystems and Biodiversity

EFH description and identification would have neutral or unknown effects on predator-prey relationships, energy flow and balance, and biodiversity. From the standpoint of effects on ecosystems and biodiversity, therefore, there are no clear differences among the alternatives for EFH description and identification. Nevertheless, if EFH description and identification leads to actions that conserve, protect, or enhance habitat, there may be some ecosystem benefits from those actions.

4.5.1.1.7 Effects on Non-fishing Activities

EFH description and identification could have indirect negative effects on costs to federal and state agencies that authorize, fund, or undertake actions that may adversely affect habitats identified as EFH and to non-fishing industries or other proponents of such activities. From the standpoint of effects on non-fishing activities, therefore, the most relevant consideration for distinguishing among the alternatives is the geographic scope. The broader the geographic scope of EFH description and identification, the greater the number of non-fishing activities that may trigger the Magnuson-Stevens Act requirements for EFH consultations and conservation recommendations.

What are the differences in the geographic scope of EFH description and identification under the alternatives?

Alternative 1: There would be no EFH description and identification at all. Existing EFH designations would be rescinded, and no attributable costs would be imposed on non-fishing uses or users.

Alternative 2: Under the status quo alternative, the existing EFH designations would remain in effect, suggesting no change in cost to non-fishing users. The current EFH designations are

relatively broad in scope, encompassing the general distribution areas that comprise approximately 95 percent of the population of each managed species, based on information available in 1998.

- Alternative 3: (Preferred Alternative) EFH description and identification would be updated by applying the same basic methodology used for the existing designations in 1998, but using revised regulatory guidance from the EFH final rule, more recent scientific information regarding distribution of the managed species, new analytical tools, and improved mapping. The EFH designations would be smaller for some life stages of some species. However, the total aggregated area of EFH designations for all managed species would be identical under Alternatives 2, 3, and 4, suggesting no substantial change in cost to non-fishing users.
- Alternative 4: EFH description and identification would be updated using a more narrow interpretation of the best available science, resulting in smaller EFH designations for species for which sufficient information exists to identify possible areas of higher habitat function. Alternative 4 would result in smaller EFH designations for many species as compared to Alternatives 2 and 3, although the total aggregated area of EFH designations for all managed species would be identical under Alternatives 2, 3, and 4, suggesting no substantial change in cost to non-fishing users.
- Alternative 5: Using ecoregions, rather than distribution or relative abundance data, to identify EFH would result in larger areas being designated as EFH for many species. Alternative 5 would result in the largest EFH designations of any of the alternatives, suggesting potentially increased costs to non-fishing users.
- Alternative 6: In the EEZ, EFH description and identification would be updated as per Alternative 3, yielding smaller designations for some life stages of some species, although the total aggregated area of EFH designations for all managed species would be identical to the EEZ portions of Alternatives 2, 3, and 4. In state waters, there would be no EFH designations at all. Therefore, any changes in cost to non-fishing users would depend on the specific location of the proposed activity.

4.5.1.2 Adverse Effects that Cannot be Avoided When Describing and Identifying EFH

EFH description and identification under any of the alternatives (except for the no action Alternative 1) will inevitably affect a variety of fishing and non-fishing activities. EFH designation triggers the Magnuson-Stevens Act requirements to minimize to the extent practicable the adverse effects of fishing on EFH and to consider the effects of non-fishing activities on EFH. These requirements are likely to prompt the Council, NMFS, and other agencies to take actions to protect fish habitat that they might not have taken absent the description and identification of EFH. The environmental consequences of those potential actions are discussed in Sections 4.1 and 4.5.1 of this EIS.

Conservation measures resulting from EFH designations will not avoid all adverse effects to EFH or to fish habitat in general. A variety of fishing and non-fishing activities will continue to occur and will continue to result in environmental impacts, including the degradation and loss of EFH. EFH description and identification may lead to actions that will minimize those effects, but will not avoid further habitat damage entirely.

4.5.1.3 Conclusions

The alternatives for describing and identifying EFH use different methodologies and result in different areas being designated as EFH for managed species. Differences in the environmental consequences of the alternatives are directly related to the areas and habitats encompassed by the resulting EFH designations. Different size designations may increase or decrease the efficacy of EFH conservation measures and the effects on other components of the environment.

Table 4.5-1 summarizes the effect ratings (E-, Ø, E+, or U) for each issue evaluated in Section 4.1. These ratings describe the effects of each alternative on habitat, target species, federally managed fisheries, other fisheries and fishery resources, protected species, ecosystems and biodiversity, and non-fishing activities.

In summary, Alternative 1 would eliminate the existing EFH description and identification, resulting in the loss of potential benefits of EFH protective measures for habitat, target species, federally managed fisheries, other fisheries and fishery resources, protected species, and ecosystems. Alternative 1 may have benefits for non-fishing activities because EFH consultations would no longer be required, eliminating an existing procedural step in the review of many proposed actions. It also could result in reduced operating costs for fishermen, at least in the short run, although potential benefits for fishermen (from conserving habitats that produce fish they harvest) would be lost. Alternative 2 would retain the status quo EFH description and identification and associated effects. Alternative 3 (preferred alternative) would refine the existing EFH description and identification, but would not lead to substantial changes in environmental effects because the areas identified would not be substantially reduced in size. To the extent that EFH designations for some species would be reduced in geographic scope to reflect essential habitats more precisely, there may be a slightly increased potential for benefits to target species, because conservation efforts could focus on those more discrete areas to avoid habitat loss or degradation. Alternative 4 would revise the existing EFH description and identification and result in smaller EFH designations for many species. As with Alternative 3, there may be an increased potential for benefits for target species because smaller EFH designations that reflect the most important habitats would allow conservation efforts to be focused more effectively. Alternative 5 would change the EFH description and identification to use an ecoregion approach, resulting in larger EFH designations and perhaps a greater potential for indirect benefits for resources such as protected species and ecosystems. This approach may, however, be less beneficial for target species and federally managed fisheries because it would be harder to distinguish EFH from all potential habitats. In other words, Alternative 5 would provide less information about EFH for particular species than Alternatives 2 through 4. Alternative 6 would refine the existing EFH description and identification in the EEZ as in Alternative 3, but would eliminate the EFH designations in state waters.

In addition to comparing the environmental consequences of the alternatives, it is relevant to consider the degree to which the different alternatives are consistent with the requirements of the Magnuson-Stevens Act and the EFH regulations at 50 CFR 600.815(a)(1). Alternatives 1 and 6 are not consistent with the Magnuson-Stevens Act or the EFH regulations because they would not describe and identify any habitats (Alternative 1) or all habitats (Alternative 6) necessary to managed species for spawning, breeding, feeding, and growth to maturity. Alternative 2 is not consistent with the Magnuson-Stevens Act or the EFH regulations because it does not reflect the best (most recent) scientific information available, as required by national standard 2 (16 U.S.C. 1851[a][2]) and 50 CFR 600.815(a)(1)(ii)(B). Alternatives 3 through 5 are consistent with the Magnuson-Stevens Act and the EFH regulations. Those alternatives take different approaches that influence their overall efficacy and allow decision makers to compare relative costs and benefits. Table 4.5-2 provides a comparison of the alternatives in terms of three

summary factors: relative size of EFH designations, consistency with the Magnuson-Stevens Act and the EFH regulations, and overall efficacy and relative merits.

4.5.2 Comparison of Effects of the Alternative Approaches for Identifying HAPCs

The alternatives for identifying HAPCs are a range of different methodological approaches, rather than different specific types or areas of habitat. As discussed in Section 2.3.2, the Council decided to identify an approach to HAPC designation first, and then subsequently to identify specific HAPCs. Therefore, the likely effects of HAPC designation cannot be evaluated with specificity in this EIS. Section 4.2 discusses the effects of each alternative on habitat, target species, federally managed fisheries, other fisheries and fishery resources, protected species, ecosystems and biodiversity, and non-fishing activities. The effect ratings (E-, Ø, E+, or U) for each topic evaluated are summarized in Table 4.5-3.

The effect ratings alone do not provide a basis for distinguishing among the alternatives. The ratings characterize effects as positive or negative, but do not convey their magnitude or intensity. The accompanying text in Section 4.2 explains the anticipated effects for each alternative, but makes few direct comparisons among them. The following sections, therefore, summarize the most pertinent effects comparatively to highlight relevant issues and provide a clearer basis for choice among the alternatives.

4.5.2.1 Comparative Summary of Effects

As discussed in Section 4.2, identification of HAPCs, like the description and identification of EFH, does not in and of itself have any direct environmental or socioeconomic impacts, but could lead to indirect impacts. The identification of HAPCs provides a means for the Council and NMFS to highlight priority areas within EFH for more focused conservation and management. The indirect effects of the different approaches for identifying HAPCs are summarized below.

4.5.2.1.1 Effects on Habitat

Identification of HAPCs, regardless of the alternative selected, generally would have a positive effect on habitat, because the purpose of the designation is to identify particularly valuable and/or vulnerable subsets of EFH that may then be subject to increased scrutiny to consider potential protective measures. From the standpoint of effects on habitat, therefore, the most relevant consideration for distinguishing among the alternatives is the degree to which a particular approach would facilitate identification of subsets of EFH that exhibit one or more of the four considerations for HAPCs in the regulations (50 CFR 600.815[a][8]): ecological importance, sensitivity to environmental degradation, susceptibility to stress from development, and rarity.

How well would the alternative facilitate identification of especially important, sensitive, stressed, and/or rare habitats within EFH?

Alternative 1: No habitat types or areas would be designated as HAPCs.

Alternative 2: Under the status quo alternative, the existing HAPC designations would remain unchanged. HAPCs would include living substrates in shallow waters, living substrates in deep waters, and freshwater areas used by anadromous salmon.

Alternative 3: (Preferred Alternative) The existing HAPC designations would be rescinded, and the Council would adopt an approach allowing specific sites within EFH, selected to address

a particular problem, to be identified as HAPCs in the future. Alternative 3 would limit HAPC identification to cases involving site-specific information, rather than permitting HAPCs for general types of habitat wherever they may be found.

Alternative 4: The existing HAPC designations would be rescinded, and the Council would adopt an approach that would allow specific sites selected within given habitat types within EFH to be identified as HAPCs in the future. Alternative 4 is similar to Alternative 3, except that the Council would first specify types of habitat that might warrant HAPC designation and then would identify specific sites within those habitat types as HAPCs, perhaps resulting in a more structured process for identifying HAPCs that address specified goals.

Alternative 5: The existing HAPC designations would be rescinded, and the Council would adopt an approach that would allow areas within EFH to be identified as HAPCs in the future based on productivity of the habitat for individual species. Resulting HAPC identification would be species-specific and would rely on information about habitat functions for the target species. However, such information is not readily available for most species.

4.5.2.1.2 Effects on Target Species

HAPC identification would have positive effects on target species because the habitats identified presumably would receive increased protection from activities that could reduce productivity, prey availability, and growth to maturity for target species. From the standpoint of effects on target species, therefore, the most relevant consideration for distinguishing among the alternatives is the degree to which populations of the target species would benefit from protective measures that might result from HAPC identification.

How would each alternative affect the potential for target species to benefit from measures implemented to conserve or protect HAPCs?

Alternative 1: The Council would no longer have HAPC designations, so any benefits for target species would be lost.

Alternative 2: Under the status quo alternative, living substrates and freshwater areas used by anadromous fish would continue to be designated as HAPCs, so target species may benefit from any resulting conservation measures. However, the broad and general nature of these HAPC designations may limit their efficacy.

Alternative 3: (Preferred Alternative) Depending on the specific sites selected as HAPCs, Alternative 3 could encourage protective measures that would be tailored explicitly to benefit target species.

Alternative 4: Depending on the types of habitat used to focus HAPC identification and the specific sites selected as HAPCs, Alternative 4 could encourage protective measures that would be tailored explicitly to benefit target species. Alternative 4 may offer more potential benefits for target species than Alternative 3 because the stepwise process of selecting habitat types and then specific sites could yield a more rational and structured effort to

ensure that HAPCs would focus on the habitats that are most valuable and/or vulnerable within EFH.

Alternative 5: HAPC identification would be species-specific and reliant on information about habitat functions for individual target species. Alternative 5 would therefore have the potential to benefit target species more directly than the other alternatives, although scarce scientific information about habitat requirements of individual species could limit the effectiveness of this approach.

4.5.2.1.3 Effects on Economic and Socioeconomic Aspects of Federally Managed Fisheries

HAPC identification would have mixed effects on federally managed fisheries. Potential costs may arise from measures to minimize adverse effects of fishing on HAPCs. Indirect long-term benefits could occur if protective measures based on HAPC identification lead to higher production rates of target species. From the standpoint of effects on federally managed fisheries, therefore, the most relevant consideration for distinguishing among the alternatives is how different approaches for HAPC identification might affect economic costs and benefits.

How would each alternative affect the potential for economic costs and benefits for federally managed fisheries?

- Alternative 1: The Council would no longer have HAPC designations, so any costs associated with management measures to protect HAPCs would be avoided, and any benefits to fisheries from identifying and conserving discrete subsets of EFH would be lost.
- Alternative 2: The status quo alternative would not change the potential for economic costs and benefits for fisheries. However, the broad and general nature of the existing HAPC designations may limit their efficacy.
- Alternative 3: (Preferred Alternative) Depending on the specific sites selected as HAPCs, adoption of this alternative could encourage protective measures that would impose costs on federally managed fisheries, but that would be designed to boost productivity of target species over the long term, thereby yielding potential economic benefits.
- Alternative 4: Depending on the types of habitat used to focus HAPC designations and the specific sites selected as HAPCs, Alternative 4 could encourage protective measures that would impose costs on federally managed fisheries but that would be designed to boost productivity of target species over the long term, thereby yielding potential economic benefits.
- Alternative 5: Depending on the core areas selected as HAPCs for individual species, Alternative 5 could encourage protective measures that would impose costs on federally managed fisheries but that would be designed to boost productivity of target species over the long term, thereby yielding potential economic benefits. Alternatives 3 and 5 would have comparable potential for economic costs and benefits for federally managed fisheries.

4.5.2.1.4 Effects on Other Fisheries and Fishery Resources

HAPC identification would have mixed effects on other fisheries and fishery resources. Many of the species targeted by these fisheries use the same habitats as species managed under the Magnuson-Stevens Act, and thus could benefit from protective measures that may stem from HAPC identification. However, there could be some negative effects on these fisheries if HAPC designations lead to restrictions on harvesting and a displacement of fishing effort. From the standpoint of effects on other fisheries and fishery resources, therefore, the most relevant consideration for distinguishing among the alternatives is the degree to which populations of the target species for those fisheries would benefit from protective measures that might result from HAPC designations.

How would each alternative affect the potential for target species for other fisheries to benefit from measures implemented to conserve or protect HAPCs, and how would the fleet be impacted?

- Alternative 1: The Council would no longer have HAPC designations, so any indirect benefits for target species for other fisheries would be lost, although the fleet would avoid potential future costs from restrictions on fishing in HAPCs.
- Alternative 2: The status quo alternative would not change the potential for target species for other fisheries to benefit from measures implemented to conserve or protect HAPCs. Living substrates and freshwater areas used by anadromous fish would continue to be designated as HAPCs, so target species for other fisheries may benefit indirectly from any resulting conservation measures. There would be no change in costs to fleets that target these other fishery resources.
- Alternative 3: (Preferred Alternative) Depending on the specific sites selected as HAPCs, Alternative 3 could yield indirect habitat benefits for target species for other fisheries. Such potential benefits are comparable for Alternatives 3, 4, and 5. Any management measures resulting from HAPC designations could impose costs to fisheries ranging from minimal to substantial. Such costs would be evaluated before being implemented.
- Alternative 4: Depending on the types of habitat used to focus HAPC designations and the specific sites selected as HAPCs, Alternative 4 could yield indirect habitat benefits for target species for other fisheries. Any management measures resulting from HAPC designations could impose costs to fisheries ranging from minimal to substantial. Such costs would be evaluated before being implemented.
- Alternative 5: Depending on the core areas selected as HAPCs for individual species, Alternative 5 could yield indirect habitat benefits for target species for other fisheries. Any management measures resulting from HAPC designations could impose costs to fisheries ranging from minimal to substantial. Such costs would be evaluated before being implemented.

4.5.2.1.5 Effects on Protected Species

HAPC identification could have a positive effect on protected species of salmon, marine mammals, and seabirds because many of these species use the same habitats as species managed under the Magnuson-Stevens Act, and thus could benefit from protective measures that may stem from HAPC identification. From the standpoint of effects on protected species, therefore, the most relevant consideration for

distinguishing among the alternatives is the degree to which populations of protected species would benefit from protective measures that might result from HAPC identification.

How would each alternative affect the potential for protected species to benefit from measures implemented to conserve or protect HAPCs?

- Alternative 1: The Council would no longer have HAPC designations, so any indirect benefits for protected species would be lost.
- Alternative 2: The status quo alternative would not change the potential for protected species to benefit from measures implemented to conserve or protect HAPCs. Living substrates and freshwater areas used by anadromous fish would continue to be designated as HAPCs, so protected species may benefit indirectly from any resulting conservation measures.
- Alternative 3: (Preferred Alternative) Depending on the specific sites selected as HAPCs, this alternative could yield indirect habitat benefits for protected species. Such potential benefits are comparable for Alternatives 3, 4, and 5.
- Alternative 4: Depending on the types of habitat used to focus HAPC designations and the specific sites selected as HAPCs, this alternative could yield indirect habitat benefits for protected species.
- Alternative 5: Depending on the core areas selected as HAPCs for individual species, this alternative could yield indirect habitat benefits for protected species.

4.5.2.1.6 Effects on Ecosystems and Biodiversity

HAPC identification could have positive effects on overall ecosystem health and stability. From the standpoint of effects on ecosystems and biodiversity, therefore, the most relevant consideration for distinguishing among the alternatives is the degree to which ecosystem health might potentially benefit from protective measures that may result from HAPC identification.

How would each alternative affect the potential for ecosystems and biodiversity to benefit from measures implemented to conserve or protect HAPCs?

- Alternative 1: The Council would no longer have HAPC designations, so any indirect benefits for ecosystems would be lost.
- Alternative 2: The status quo alternative would not change the potential for ecosystems to benefit from measures implemented to conserve or protect HAPCs. Living substrates and freshwater areas used by anadromous fish would continue to be designated as HAPCs, so those ecosystems may benefit indirectly from any resulting conservation measures.
- Alternative 3: (Preferred Alternative) Depending on the specific sites selected as HAPCs, this alternative could yield indirect benefits for ecosystems. Such potential benefits are comparable for Alternatives 3, 4, and 5.
- Alternative 4: Depending on the types of habitat used to focus HAPC designations and the specific sites selected as HAPCs, this alternative could yield indirect benefits for ecosystems.

Alternative 5: Depending on the core areas selected as HAPCs for individual species, this alternative could yield indirect benefits for ecosystems.

4.5.2.1.7 Effects on Non-fishing Activities

HAPC identification could have negative indirect effects on costs to federal and state agencies that authorize, fund, or undertake actions that may adversely affect habitats identified as HAPCs, and to non-fishing industries or other proponents of such activities. From the standpoint of effects on non-fishing activities, therefore, the most relevant consideration for distinguishing among the alternatives is the geographic scope. The broader the geographic scope of HAPC designations, the greater the number of non-fishing activities that might face associated conservation recommendations.

What are the differences in the geographic scope of HAPC identification under the alternatives?

Alternative 1: No habitat types or areas would be designated as HAPCs.

Alternative 2: Under the status quo alternative, the existing HAPC designations would remain unchanged. HAPCs would include living substrates in shallow waters, living substrates in deep waters, and freshwater areas used by anadromous salmon.

Alternative 3: (Preferred Alternative) The existing HAPC designations would be rescinded, and the Council would adopt an approach that would allow specific sites within EFH, selected to address an identified problem, to be designated as HAPCs in the future. The geographic scope of HAPCs would depend upon the number and size of HAPCs adopted by the Council in the future.

Alternative 4: The existing HAPC designations would be rescinded, and the Council would adopt an approach that would allow specific sites selected within identified habitat types within EFH to be identified as HAPCs in the future. Alternative 4 is similar to Alternative 3, except that the Council would first specify types of habitat that may warrant HAPC identification, and then identify specific sites within those habitat types as HAPCs. The geographic scope of HAPCs would depend upon the number and size of HAPCs adopted by the Council in the future.

Alternative 5: The existing HAPC designations would be rescinded, and the Council would adopt an approach that would allow areas within EFH to be identified as HAPCs in the future based on productivity of the habitat for individual species. Resulting HAPC designations would, therefore, be species-specific and would rely on information about habitat functions for the target species. The geographic scope of HAPCs would depend upon the number and size of HAPCs adopted by the Council in the future.

4.5.2.2 Adverse Effects that Cannot be Avoided When Establishing an HAPC Approach

Establishing an approach for the identification of HAPCs may lead to future actions to identify specific HAPCs, which may affect a variety of fishing and non-fishing activities, as discussed in Sections 4.2 and 4.5.2 of this EIS. Selecting an approach for identifying HAPCs will have no direct environmental consequences, but will provide policy direction for future HAPC actions by the Council, and will shape future HAPC proposals brought before the Council. Nevertheless, the Council may or may not adopt specific HAPCs in the future. Selecting an approach for identifying HAPCs does not obligate the

Council to identify HAPCs, and HAPC identification is not required by the Magnuson-Stevens Act or the EFH regulations.

If and when the Council identifies specific HAPCs, accompanying analyses will evaluate associated direct and indirect costs and benefits for fishing and non-fishing activities. Conservation measures resulting from HAPC designation probably will not avoid all adverse effects to HAPCs. A variety of fishing and non-fishing activities will continue to occur and will continue to result in environmental impacts, including potential degradation and loss of HAPCs. HAPC identification may lead to actions that will minimize those effects, but probably will not avoid further habitat damage entirely.

4.5.2.3 Conclusions

The alternatives for HAPC identification in this EIS are a range of different methodological approaches, rather than different specific types or areas of habitat. Differences in the environmental consequences of the alternatives are therefore related to the type of approach that would be used to identify HAPCs and the anticipated effects of HAPCs that would be designated under each approach.

Table 4.5-3 summarizes the effect ratings (E-, Ø, E+, or U) for each topic evaluated in Section 4.2 to describe the effects of each alternative on habitat, target species, federally managed fisheries, other fisheries and fishery resources, protected species, ecosystems and biodiversity, and non-fishing activities. In summary, HAPC identification could have benefits for habitat, target species, federally managed fisheries, other fisheries and fishery resources, protected species, and ecosystems. Alternative 1 would eliminate HAPC designations, resulting in the loss of potential benefits from the designations and any resulting protective measures. Alternative 1 may have benefits for both non-fishing activities and fisheries targeting non-FMP species, insofar as no particular areas within EFH would be highlighted for direct fishing restrictions or review during interagency EFH consultations for development activities. Alternative 2 would retain the status quo HAPC designations and associated effects. However, the broad and general nature of the existing HAPC designations may limit their efficacy. Alternatives 3 (preferred alternative) through 5 would rescind the existing HAPC designations in favor of other approaches that would allow HAPC identification in the future. The resulting indirect effects would depend upon the specific HAPC designations implemented in future Council and NMFS actions. Alternatives 3 through 5 would have comparable potential effects on habitat, federally managed fisheries, other fisheries and fishery resources, protected species, ecosystems, and non-fishing activities. Alternative 4 may offer more potential benefits for target species than the other alternatives because the stepwise process of selecting habitat types and then specific sites could yield a more rational and structured effort to ensure that HAPCs would focus on the habitats within EFH that are most valuable and/or vulnerable.

Table 4.5-4 provides a comparison of the alternatives in terms of three summary factors: relative size of HAPC designations, consistency with the EFH regulations, and overall efficacy and relative merits.

4.5.3 Comparison of the Alternatives for Minimizing the Effects of Fishing on EFH

The alternatives for minimizing the adverse effects of fishing on EFH are a range of specific management options. The alternatives all start with the status quo fishery management regime that includes a variety of measures that help to reduce the potential effects of fishing on habitat. Alternatives 2 through 6 would add progressively more restrictive management measures. Section 4.3 discusses the effects of each alternative on habitat, target species, federally managed fisheries, other fisheries and fishery resources, protected species, and ecosystems and biodiversity. The effect ratings (E-, Ø, E+, or U) for each issue evaluated are summarized in Table 4.5-5.

The effect ratings alone do not provide a basis for distinguishing among the alternatives. The ratings characterize effects as positive or negative, but do not convey the magnitude or intensity of effects. The accompanying text in Section 4.3 explains the anticipated effects for each alternative, but makes few direct comparisons among alternatives. For a quick comparison across alternatives, see Table 4.5-6. The following sections, therefore, summarize the most pertinent effects comparatively to highlight relevant issues and provide a clearer basis for choice among the alternatives.

4.5.3.1 Comparative Summary of Effects

The short-term economic and socioeconomic effects of the alternatives to minimize the effects of fishing on EFH are relatively easy to describe: fishery management measures impose costs. Their measurement and analysis are more complex. It is possible to hypothesize some economic relationships that can be quantitatively approximated, for example, by revenue at risk, product output values, or other empirical statistics. The ecological effects of the alternatives are more difficult to assess, because existing scientific information does not provide a clear picture to link habitat conservation measures with specific quantifiable gains in the productivity, survival, and recruitment of managed fish species. Likewise, available information and empirical experience are insufficient to allow a concrete measure of the long-term economic and socioeconomic benefits that may result from future changes in fish production possibly attributable to today's habitat conservation decisions. Nevertheless, the effects of the EFH fishing impact minimization alternatives are summarized below using the best information available.

This section also contrasts each of the alternatives with a pre-status quo condition suggested by the Council to provide additional context. The Council has implemented numerous measures to protect habitat over the roughly 29 years since establishment of the U.S. EEZ. The pre-status quo condition reflects a hypothetical scenario with today's environment, stock size, etc., absent all area closures, effort reduction, gear measures, and rationalization programs. By contrasting each of the alternatives with pre-status quo conditions, the comparative summary illustrates that all seven of the alternatives start with a common suite of existing conservation and management measures that provide a substantial degree of habitat protection.

The status quo alternative (Alternative 1) includes only existing management measures, whereas all of the other alternatives include the existing management measures plus additional measures. All of the alternatives as well as the pre-status quo condition are compared here (and in Section 4.3) to the status quo.

4.5.3.1.1 Effects on Habitat

The analysis indicated that current fishing activities affect EFH in a manner that is minimal and temporary in nature (Appendix B). However, additional measures to reduce the effects of fishing on habitat would, by design, have positive effects on EFH. Measures considered in the alternatives include new area closures to bottom trawling (all alternatives), gear restrictions (Alternatives 4, 5A, 5B, 5C), TAC reductions (Alternative 5B, Options 1 and 2), bycatch limits for bryozoans/corals and sponges (Alternative 5B, Options 1 and 2), and area closures to all bottom tending gear types (Alternative 6). From the standpoint of effects on habitat, the most relevant factor for distinguishing among the alternatives is the additional amount of area closed to bottom tending gear, and especially trawling, year-round.

How would each alternative provide for protection, conservation, or enhancement of habitat, particularly EFH?

Pre-status quo conditions:

Without any measures to control the effects of fisheries on benthic habitat, EFH would likely be adversely affected. No area would be closed to bottom trawling. Trawling and scallop dredging would occur in areas essential for king crab settlement and survival, especially in the Bristol Bay, Pribilof Islands, Cook Inlet, and Kodiak areas. The effects on habitat in Southeast Alaska would increase without trawl restrictions. Trawl fishing effort, particularly for pollock and flatfish, would be substantially higher (30 percent or more) in the absence of Council-imposed OY limits and PSC closures. Fisheries would become more temporally concentrated as effort increased due to higher catch limits, roe stripping of pollock, lack of permit limitation or rationalization programs, and absence of bycatch closures. Without IR/IU limitations for pollock and Pacific cod, wasteful underutilization of these economically important resources would occur, with substantially greater discharges of offal and economic discards. As was the case with roe stripping, this practice could result in eutrophication of EFH in some areas. Fewer areas would remain unaffected and unexploited. Without gear restrictions, more bottom contact would occur in the pollock trawl fisheries.

- Alternative 1: Under the status quo alternative, existing fishery management measures that control the effects of fishing on habitat (trawl closure areas, effort limits and rationalization programs, catch limits, and gear restrictions) would remain unchanged. Fisheries would continue to affect fish habitat, but not in a manner that has substantial impact on EFH, prey species, habitat complexity, or habitat biodiversity. The long-term effects would remain low overall across available habitat types and features, although effects would not be evenly distributed.
- Alternative 2: The GOA slope rockfish closures would provide insignificant marginal benefits for EFH. Bottom trawling would still occur in these areas for deepwater flatfish and other species, and the rockfish effort would shift to other areas of the slope, intensifying any associated fishing effects on those areas.
- Alternative 3: The closure of the entire GOA slope to rockfish trawling would reduce the effects on epibenthic structures and coral that may occur on the slope area. Trawl effort for rockfish would likely shift to the gullies on the shelf, but the effect indices are relatively low in those areas.
- Alternative 4: Closures in the AI area would provide substantially more protection of coral in that management area. In addition, gear modifications required for EBS bottom trawl fisheries may substantially reduce effects on habitat complexity. The relatively small closures in the EBS and GOA would provide insignificant benefits to habitat in those regions.
- Alternative 5A: Closures to all bottom trawling on the GOA slope would provide substantial benefits to epibenthic structures and coral. As with Alternatives 4 and 5B, the trawl gear modifications would provide positive effects for habitat complexity in the EBS. The trawl closure areas in the Aleutians would provide substantially improved protection of coral in that region, thus providing positive benefits to habitat biodiversity. In the EBS,

the large closure areas proposed under this alternative would not substantially reduce the effects of fishing on benthic habitat, due to the limited fishing effort that has occurred.

Alternative 5B: The effects of Alternative 5B would be the same as those for Alternative 5A for the GOA and EBS. For the AI, the large trawl closures would be expected to result in substantial increases in protection of coral in this area. The closures would be largest under Option 2, slightly smaller under Option 1, and smaller yet under Option 3.

Alternative 5C: (Preferred Alternative) The closure of ten areas on the GOA slope to all bottom trawling would protect epibenthic structures and coral in those areas. Large trawl closures in the AI would result in substantial new protection for coral and other habitat features. Closures to all bottom contact fishing would protect six AI coral garden sites from disturbance.

Alternative 6: When added to existing trawl closure areas, the bottom tending gear closure areas comprising 20 percent of each area would provide moderately positive effects on habitat complexity and biodiversity.

4.5.3.1.2 Effects on Target Species

Measures to reduce the effects of fishing on habitat may also affect target species. From the standpoint of effect on target species, the most relevant factors for distinguishing among the alternatives are the location of the alternative areas closed to trawling (and in the case of Alternative 6, all bottom-tending gear types) and the relative dependence of the species upon those habitat areas for spawning/breeding, feeding, and growth to maturity. The effects on biomass and spatial and temporal concentration of the catch are also relevant factors.

How would each alternative affect target species?

Pre-status quo

conditions: Target species may be adversely affected in the absence of measures to control the effects of fisheries on benthic habitat. Opening areas essential for king crab settlement to trawling and scallop dredging may reduce the overall productivity of red and blue king crab populations in Bristol Bay, Pribilof Islands, Cook Inlet, and Kodiak areas. In the absence of OY limits, significantly more pollock and flatfish would be caught, although catch limits would still be set within acceptable biological limits.

Alternative 1: Under the status quo alternative, target species, with the exception of three BSAI crab stocks, are all considered to be at healthy population sizes and are not overfished. Overfishing is not allowed under existing catch limits. For those species where enough information is available for evaluation, Alternative 1 was judged to have no substantial effect on target stocks as measured by effects on stock biomass, spatial/temporal concentration of the catch, spawning/breeding, feeding, and growth to maturity.

Alternative 2: The small closures to rockfish fishing would not affect target stocks because the areas are very small relative to available habitats and are closed only to directed rockfish fishing with bottom trawls.

Alternative 3: The closure of the slope to rockfish fishing would provide some potential positive effects for slope rockfish growth to maturity. However, these benefits may be offset by increases in catch with pelagic trawl gear or movement of the fleet onto the shelf or in gullies.

Alternative 4: The trawl closures in the northwest area of the EBS, combined with the trawl gear roller size requirements, were judged to have positive effects on the growth to maturity of snow crabs. Otherwise, no direct effects on target species are anticipated.

Alternative 5A: The effects would be similar to those under Alternative 4.

Alternative 5B: The effects would be similar to those under Alternative 4.

Alternative 5C: (Preferred Alternative) No direct effects on target species are anticipated, although indirect benefits may result from protecting large areas of relatively undisturbed habitat.

Alternative 6: For some species and stocks with limited distribution (some crab stocks and scallop populations), the closure areas would overlap substantially with the effort distribution of the fishery, resulting in reduced catches or more spatial/temporal concentration of effort. Otherwise the effects of this alternative would be neutral with respect to target stocks.

4.5.3.1.3 Effects on Economic and Socioeconomic Aspects of Federally Managed Fisheries

Measures to reduce the effects of fishing on habitat would also have economic and socioeconomic effects. The effects on federally managed fisheries were evaluated on the basis of passive-use values, gross revenues, operating costs, costs to consumers, impacts on crew and vessel safety, impacts to related fisheries, effects on support industries, socioeconomic effects on fishing communities, and management and enforcement costs.

How would each alternative affect federally managed fisheries?

Pre-status quo conditions:

Without the current management regime, the costs to the fishing fleets to prosecute these fisheries would be substantially reduced, at least in the short term. Trawl and dredge fisheries could operate wherever they could maximize their net revenues, but this would reduce passive-use values for undisturbed places. Significantly more pollock and flatfish would be caught in the absence of OY limits and PSC closures. Without effort controls or rationalization programs and other regulations, roe-stripping would likely be practiced by persons participating in an Olympic-style pollock fishery. Safety would be reduced as groundfish fishery seasons would be limited to weeks, days, or even hours as occurred in the halibut fishery prior to IFQ management. All these effects would impose costs on secondary users and, ultimately, on the final consumers of products derived from these fisheries. Initially, supplies would tend to spike, as catches expanded due to unregulated effort. This would tend to drive ex-vessel prices down, as would ultimately be the case at all levels of the market. The 'race for fish' would simultaneously put pressure on processors to move greater quantities of raw fish through their facilities, as the quantities increased and pace of deliveries quickened. Recovery rates would decline, resulting in more fish being diverted to meal plants, or grinders and discharge chutes. Accelerated rates of catching and processing imply temporally and spatially compressed fisheries.

Under these circumstances, product quality tends to decline, some product forms may become less readily available, and less fresh product and more frozen product would have to be supplied to the marketplace, with associated reductions in product value. All these attributable effects would tend to reduce the net value to the nation derived from these living marine resources.

- Alternative 1: Under the status quo, the fishing industry continues to be vibrant in Alaska. However, some communities and fisheries have experienced impacts of low salmon prices and changes due to stock sizes and regulations (e.g., sea lion protection measures). The status quo provides the effective regulatory baseline and a balance of passive-use values, gross revenues, operating costs, costs to consumers, safety, impacts to related fisheries, effects on support industries, socioeconomic effects on fishing communities, and management and enforcement costs.
- Alternative 2: Alternative 2 was judged to have slightly positive effects on passive-use values, due to establishment of GOA slope rockfish closure areas. The alternative would have no substantial effects on gross revenue, as the projected maximum gross revenue at risk was less than \$1 million, annually. Alternative 2 was judged to have slightly negative effects on operating costs, costs to consumers, safety, and impacts to related fisheries. No effects on shoreside support industries or fishing communities would be anticipated. Additional on-water enforcement, a VMS system, or 100 percent observer coverage may be required to ensure compliance with closure areas established under this alternative. These measures would add to the operating costs of participants.
- Alternative 3: Like the other alternatives to the status quo, additional closures are assumed to result in increased passive-use values. The alternative would have negative effects on gross revenue, as the projected gross revenue at risk is \$2.65 million, some of which may not be recovered. Alternative 3 was judged to have negative effects on operating costs, costs to consumers, safety, and impacts to related fisheries. No effects on shoreside support industries or fishing communities would be anticipated. Like other alternatives to the status quo, additional monitoring and enforcement efforts (and associated costs) may be required.
- Alternative 4: Additional closures might result in even more positive effects on passive-use values. Alternative 4 would have negative effects on gross revenue, as the projected gross revenue at risk was at least \$3.53 million, some of which may not be recovered. Alternative 4 was judged to have negative effects on operating costs, costs to consumers, safety, and impacts to related fisheries. No substantial effects on shoreside support industries or fishing communities would be anticipated. Like other alternatives to the status quo, additional monitoring and enforcement efforts (and associated costs) may be required.
- Alternative 5A: This alternative has positive effects on passive-use values, at about the same level as Alternative 4. Alternative 5A would have negative effects on gross revenue, as the projected gross revenue at risk is at least \$7.92 million, some of which may not be recovered. Alternative 5A was judged to have negative effects on operating costs, costs to consumers, safety, and impacts to related fisheries. No substantial effects on shoreside support industries or in most fishing communities (except Western GOA)

would be anticipated. Like other alternatives to the status quo, additional monitoring and enforcement efforts (and associated costs) may be required.

Alternative 5B: This alternative has additional effects compared with Alternative 5A. Under any of the Alternative 5B options, revenue at risk due to the GOA measures would be \$3.6 million, which is identical to the GOA portion of Alternative 5A. For Alternative 5B, Option 1, the TAC reductions for cod, mackerel, and rockfish would result in a \$15.16 million loss of revenue in addition to gross BSAI revenue at risk of \$9.34 million, for a total of \$24.50 million. For Option 2, the TAC reductions for mackerel and rockfish would result in a \$3.83 million loss of revenue in addition to gross BSAI revenue at risk of \$5.62 million, for a total of \$9.45 million, and the AI coral garden area closure to bottom contact gear would place an additional \$234,000 of groundfish revenue at risk, up to 4.4 percent of AI halibut catch at risk and 0.3 percent of AI king and Tanner crab pot catch at risk. For Option 3, BSAI revenue at risk would be \$3.86 million. Alternative 5B would have additional negative effects on operating costs, costs to consumers, safety, and impacts to related fisheries. There could be negative effects on shoreside support industries in those communities where inshore processors are involved in the at-risk fisheries, and those fisheries for which TAC is reduced under Options 1 and 2. Negative socioeconomic effects would be anticipated in western GOA communities. This alternative specifies that additional monitoring and enforcement efforts (and associated costs) would be required. Passive-use values may be higher due to additional habitat protection afforded under this alternative.

Alternative 5C: (Preferred Alternative) Alternative 5C would have positive passive use values. Gross revenue at risk from bottom trawl closures in the GOA and AI would be \$2.39 million. The AI coral garden area closure to bottom contact gear would place an additional \$234,000 of groundfish revenue at risk, up to 4.4 percent of AI halibut catch at risk and 0.3 percent of AI king and Tanner crab pot catch at risk. Increased costs and reduction in safety would be expected. In particular, monitoring and enforcement costs would increase.

Alternative 6: Alternative 6 would have additional positive passive-use values. Alternative 6 would have very substantial negative effects on gross revenue, as the projected gross revenue at risk is more than \$163 million for groundfish, \$38 million for halibut, \$34 million for crab, and approximately \$1 million for scallops. Alternative 6 was judged to have additional negative effects on operating costs, costs to consumers, safety, and impacts to related fisheries. There would be negative effects on shoreside support industries in those communities where inshore processors are involved in the at-risk fisheries. Negative socioeconomic effects would be anticipated to occur in coastal communities dependent upon fishing. Additional monitoring and enforcement efforts (and associated costs) may be required.

4.5.3.1.4 Effects on Other Fisheries and Fishery Resources

Fisheries and fishery resources not managed under a federal FMP may also be affected by proposed measures to reduce the effects of fishing on habitat. From the standpoint of effect on other fisheries, the relevant factors for distinguishing among the alternatives include the location of the areas closed to trawling (and in the case of Alternative 6, all bottom-tending gear) and the types of fisheries prohibited from these areas.

How would each alternative affect other fisheries and fishery resources?

Pre-status quo conditions:

Without regulations, the halibut fishery would operate in an open-access mode, and consequently would have shorter seasons, more fishing effort, lower ex-vessel prices, and reduced overall product quality, with the loss of fresh markets and most fish being frozen for later delivery and distribution. Crew and vessel safety would also suffer. State-managed fisheries, including the herring fishery, may not be substantially affected.

Alternative 1: The status quo alternative would have no substantial effect on other fisheries, including state-managed groundfish fisheries, state-managed crab and invertebrate fisheries, herring fisheries, and halibut fisheries.

Alternative 2: The GOA slope closures to rockfish fishing may provide some slight benefit for deepwater Tanner crabs and golden king crabs and their fisheries.

Alternative 3: Closure of the GOA slope to rockfish fishing may provide some benefit for deepwater Tanner crabs and golden king crabs and their fisheries.

Alternative 4: Alternative 4 would likely have effects similar to Alternative 2.

Alternative 5A: Alternative 5A would likely have effects similar to Alternative 3.

Alternative 5B: Alternative 5B would likely have effects similar to Alternative 3.

Alternative 5C: (Preferred Alternative) Alternative 5C would likely have effects similar to Alternative 2.

Alternative 6: The closure areas designated would prohibit the use of all bottom-tending gear, including gear used by non-FMP fisheries such as halibut. Consequently, this alternative would have negative effects on state-managed groundfish fisheries, state-managed crab and invertebrate fisheries, and halibut fisheries due to displacement of effort and potential reductions in catch and revenue. No effects on herring fisheries would be anticipated.

4.5.3.1.5 Effects on Protected Species

Marine mammals, seabirds, and ESA-listed salmon may also be affected by proposed measures to reduce the effects of fishing on habitat. From the standpoint of effects on protected species, the relevant factors for distinguishing among the alternatives include the location of the areas closed to trawling (and in the case of Alternative 6, all bottom-tending gear) and the localized harvest of important prey species.

How would each alternative affect protected species?

Pre-status quo conditions:

Without regulatory measures such as area closures and OY limits, it is likely that the fisheries would have adverse effects on marine mammals and seabirds. It is possible that these effects could result in a conclusion that some fisheries jeopardize the continued existence and/or adversely modify the critical habitat of ESA-listed species (e.g., Steller sea lions, short-tailed albatross, North Pacific right whale).

- Alternative 1: Under the status quo alternative, the existing suite of regulations developed in compliance with the Magnuson-Stevens Act and ESA attempt to minimize the effects of fishing on protected species, including ESA-listed marine mammals, other marine mammals, ESA-listed Pacific salmon, ESA-listed seabirds, and other seabirds, to the extent practicable.
- Alternative 2: Alternative 2 would have no substantial effect on protected species.
- Alternative 3: Alternative 3 would have no substantial effect on protected species.
- Alternative 4: Alternative 4 would have no substantial effect on protected species.
- Alternative 5A: Alternative 5A would have no substantial effect on protected species.
- Alternative 5B: Alternative 5B could affect ESA-listed marine mammals. Steller sea lions in the AI may be impacted by spatial and temporal concentrations of fishing effort in localized nearshore areas not fully offset by TAC reductions under Options 1 and 2. No substantial effects are anticipated for marine mammals, ESA-listed Pacific salmon, ESA-listed seabirds, or other seabirds.
- Alternative 5C: (Preferred Alternative) Alternative 5C would have effects similar to those of Alternative 5B, Option 3, for the AI and GOA. Through consultation under Section 7 of the ESA, NMFS determined that Alternative 5C is not likely to adversely affect ESA-listed species.
- Alternative 6: Alternative 6 would have negative effects on ESA-listed marine mammals. Steller sea lions and ESA-listed whales in the western GOA and AI may be impacted by displacement of the Atka mackerel fishery, in particular. No substantial effects are anticipated for other marine mammals, ESA-listed Pacific salmon, ESA-listed seabirds, or other seabirds.

4.5.3.1.6 Effects on Ecosystems

Actions taken to minimize the effects of fishing on habitat could have positive effects on overall ecosystem health and stability, as measured by effects on predator-prey relationships, energy flow and balance, and biological diversity. From the standpoint of effects on ecosystems (particularly biodiversity), the most relevant consideration for distinguishing among the alternatives is the degree to which ecosystem health would benefit from area closures. Area closures can provide for increased functional diversity, especially in the case of structural habitat organisms, as well as increased genetic diversity if exploitation is reduced on localized spawning aggregations or on older, more heterozygous, individuals.

How would each alternative affect ecosystem health and stability?

Pre-status quo conditions:

The baseline conditions would allow for increased exploitation rates in the absence of an OY cap and PSC closures, which, in turn, could affect predator-prey relationships and biodiversity. Energy flow and balance could be affected by allowing roe-stripping of pollock and allowing for open access of the fisheries and the consequent changes in discarding incentives. An absence of area closures would reduce functional and genetic biodiversity.

Alternative 1: The status quo alternative would have no substantial effect on the ecosystem, as measured by the effects on predator-prey relationships, energy flow and balance, and biological diversity.

Alternative 2: The small rockfish closures on the GOA slope would have no substantial effects on ecosystems.

Alternative 3: The closure of the entire GOA slope to rockfish fishing may have positive effects on species diversity and genetic diversity by protecting living substrate and allowing some rockfish to remain nearly unexploited.

Alternative 4: Closures in the GOA, EBS, and AI may have positive effects on species diversity and genetic diversity. The large trawl closures would provide protection against extinction of sensitive sessile organisms within the closed area. Additionally, genetic diversity of less mobile fish species may be enhanced by allowing for some local areas to remain nearly unexploited.

Alternative 5A: The larger closure areas would provide additional beneficial effects on diversity.

Alternative 5B: The effects would be similar to Alternative 5A, but more pronounced benefits may accrue to diversity in the AI area due to much larger area closures. The closures would be largest under Option 2, slightly smaller under Option 1, and smaller yet under Option 3.

Alternative 5C: (Preferred Alternative) The effects would be comparable to Alternative 5B, Option 3, for the AI and GOA.

Alternative 6: Alternative 6 may also have positive effects on species diversity and genetic diversity due to implementation of numerous closures to bottom-tending gear across all habitat types.

4.5.3.2 Summary of Cumulative Effects by Criterion for Alternatives to Minimize the Adverse Effects of Fishing on EFH

Historically, GOA, EBS, and AI fish habitat was influenced by an active foreign trawl fishery. The subsequent domestic trawl fishery also had a negative effect on habitat. More recent management actions have sought to reverse that trend, and planned future actions are meant to do the same. In that respect, the alternatives to minimize the effects of fishing on EFH fit in with other current and future management plans in seeking to protect habitat from damage. Alternative 1 (preliminary preferred alternative) would

maintain the status quo. Alternative 2, while providing some level of protection, would not have any substantial positive impact. Alternatives 3 through 6 would provide progressively more habitat protection, working cumulatively with other current and planned future management actions to reverse the negative effects that earlier fisheries had on habitat.

Past effects on factors affecting target species (fishing mortality, spatial/temporal concentration of catch, productivity, prey availability, and growth to maturity) have been judged as neutral or negative. The tangible evidence for this is that populations of groundfish species, salmon, most species of crab, and scallops are stable. However, there are a few stocks of crab, such as the St. Matthew blue king crab, Pribilof Islands blue king crab, and EBS Tanner crab, that are considered overfished. More recent management actions have sought to maintain the stable populations and provide for additional conservation for target species. Planned future actions are meant to do the same. The alternatives to minimize the effects of fishing on EFH would have neutral to positive effects, in line with other current and planned future management actions. In particular, Alternatives 4, 5A, and 5B could have positive effects for opilio crabs. For the most part, however, the alternatives are expected to have a neutral influence with respect to cumulative effects on target species.

The criteria used to evaluate effects on federally managed species offer a mixed set of cumulative effects. In terms of passive-use values, the past trend was negative, while current and planned future management actions, as well as the alternatives to minimize the effects of fishing on EFH, would be positive. One factor, safety, has had a positive trend that is expected to continue, although the alternatives to minimize the effects of fishing on EFH could push some smaller fishing vessels farther from shore in search of fish. Most of the other factors used to evaluate federally managed fisheries are in a downward trend that would be accentuated by current and future management plans, including the minimization alternatives. These negative trends include decreasing harvests, decreasing gross revenue for fishermen, increased operating costs for fishermen, increased costs to consumers, adverse socioeconomic effects on fishing-related businesses and their communities, and increased costs for regulatory and enforcement programs.

The criteria associated with other fisheries and fishery resources offer another mixed set of positive, negative, and neutral cumulative effects. With respect to the state-managed groundfish fishery, the past trend is relatively unknown, current and planned future management actions are expected to have both positive (conservation) and negative (closures, increased costs) effects, and most of the alternatives to minimize the effects of fishing on EFH would have no influence. The exception is Alternative 6, where federal closures to bottom-contact gear could prompt similar state actions with associated positive and negative effects.

The state-managed crab fishery, on the other hand, has clearly been negatively affected by past trends. Like the situation with groundfish, current and planned future management actions are expected to have both positive (conservation) and negative (closures, increased costs) effects. The alternatives to minimize the effects of fishing on EFH would add cumulatively to the effects of other management actions.

The herring and halibut fisheries both appear to be healthy, with herring rebounding from earlier declines and halibut at near-record catch levels. None of the measures to minimize the effects of fishing on EFH, or other planned future management actions, is expected to have any substantial effects on herring or halibut stocks. However, the halibut fisheries, especially around the Pribilof Islands, may be negatively effected by Alternative 6.

The past trend has generally been negative for ESA-listed mammals, salmon, and seabirds, as well as other marine mammals and seabirds. In terms of cumulative effects, several potential future management actions may increase protection of these species, including TAC reductions for non-target species, closure areas, and effort reductions. Most of the alternatives to minimize the effects of fishing on EFH are expected to have a neutral effect in this regard. The exceptions are Alternatives 5B, 5C, and 6, which could increase localized concentrations of fishing vessels in key listed marine mammal habitat, especially Steller sea lion habitat in the AI, increasing the cumulative potential for interactions between fisheries and marine mammals.

The effects of past trends have generally been neutral or unknown with respect to the criteria considered in the evaluation of effects on ecosystems (predator-prey relationships, energy flow and balance, and biodiversity). Potential future management actions, including changes in the harvest of rockfish, crabs, and non-target species, as well as various marine closures, would be expected to have neutral to positive effects. The alternatives to minimize the effects of fishing on EFH would act with other management actions in having neutral or cumulatively positive effects. In particular, Alternatives 3 through 6 are expected to have positive effects on biodiversity.

The result of past trends in environmental regulation of all types has generally been to increase the costs of federal and state regulatory agencies and to increase the cost of doing business for non-fishing industries, such as timber, mining, and other forms of development. These increased costs have come in the form of agencies making and enforcing rules, adhering to environmental restrictions on the part of industry, and, for both parties, performing environmental studies and preparing environmental documentation. Future trends are not known, and they depend for the most part on whether the future brings a higher level of regulation and/or more economic activity, or a lower level of regulation and/or less economic activity. Regardless of the future trends affecting non-fishing activities, the alternatives to minimize the effects of fishing on EFH are not expected to have any cumulative effect.

4.5.3.3 Practicability Analysis for the Alternatives to Minimize the Effects of Fishing on EFH

Section 303(a)(7) of the Magnuson-Stevens Act requires that FMPs minimize to the extent practicable the adverse effects of fishing on EFH. The EFH regulations at 50 CFR 600.815(a)(2)(iii) provide the following guidance to Councils on evaluating the practicability of potential management measures:

In determining whether it is practicable to minimize an adverse effect from fishing, Councils should consider the nature and extent of the adverse effects on EFH and the long and short-term costs and benefits of potential management measures to EFH, associated fisheries, and the nation, consistent with national standard 7. In determining whether management measures are practicable, Councils are not required to perform a formal cost/benefit analysis.

The evaluation of practicability should consider the economic and ecological costs and benefits of the identified management measures. NMFS has not identified a preferred methodology as national guidance for conducting the practicability analysis. This EIS uses a variety of quantitative and qualitative information to assess the practicability of the alternatives to minimize the effects of fishing on EFH.

Appendix B contains an evaluation of the effects of fishing on EFH and discusses the nature and extent of potential adverse effects to the habitat as well as the target species. Economic costs of the alternatives to minimize adverse effects of fishing on EFH are evaluated in Appendix C. Ecological costs and benefits are more difficult to evaluate. Limited information is available to describe the effects of habitat

alteration on the survival and productivity of managed species. Likewise, there are no proven techniques for quantifying the benefits to target species that may accrue as a result of adopting any of the alternatives for minimizing the effects of fishing on EFH, although many studies worldwide have documented the results of implementing various closed areas.

The analysis in Section 4.3 and Appendix B indicates that there are long-term effects of fishing, particularly bottom trawling, on benthic habitat features off Alaska. Considerable scientific uncertainty remains regarding the consequences of such habitat changes for the sustained productivity of managed species. If the current pattern of fishing intensity and distribution continues into the future, living habitat features that provide managed species with structure for refuge would be reduced by 0 to 11 percent in each habitat area, with the greatest reduction occurring on soft substrates of the Aleutian slope area. Hard corals would be reduced by 0 to 16 percent, with the greatest reduction occurring on hard substrates of the Aleutian shallow water area. There would be almost no reduction (0 to 3 percent) in infauna and epifauna prey for managed species. Viewed another way, habitat loss due to fishing off Alaska is relatively small overall, with most of the available habitats unaffected by fishing (infaunal prey are 97 to 100 percent unaffected; epifaunal prey are 97 to 100 percent unaffected; living structure is 89 to 100 percent unaffected; and hard corals are 84 to 98 percent unaffected).

The evaluation of the effects of fishing on EFH (Appendix B) concludes that despite persistent disturbance to certain habitats, the effects on EFH are minimal because the analysis finds no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. The analysis concludes that no Council-managed fishing activities have more than minimal and temporary adverse effects on EFH for any FMP species, which is the regulatory standard requiring action to minimize adverse effects under the Magnuson-Stevens Act (50 CFR 600.815(a)(2)(ii)). Additionally, the analysis indicates that all fishing activities combined have minimal, but not necessarily temporary, effects on EFH. These findings suggest that no additional actions are required pursuant to the EFH regulations. However, the analysis has many limitations, and the effects of fishing on EFH for some managed species are unknown. Even though the available information does not identify adverse effects of fishing that are more than minimal and temporary in nature, that finding does not necessarily mean that no such effects exist. Thus, appropriate precautionary measures may be warranted.

To assist in determining whether additional management measures are practicable, the long- and short-term costs and benefits of the potential management measures to EFH, associated fisheries, and the nation, consistent with national standard 7, are evaluated in this EIS. A summary of the relative benefits to habitat conservation and the relative costs associated with each alternative is provided in Table 4.5-7, which allows for a quick comparison across alternatives. Given the apparent limited adverse effects on EFH, and the costs and benefits of the alternatives, most alternatives would be practicable to implement, with the exception of Alternative 6, which would have substantially greater adverse effects on fishermen, communities, and associated industries than attributable benefits. Further discussion of the practicability of the alternatives is provided below.

In regard to habitat conservation, Alternatives 2 and 3 would provide very little benefit relative to the status quo Alternative 1 because the closure areas would only reduce the effects of fishing slightly and only on the GOA slope area. Alternative 4 would provide some degree of additional habitat conservation for all three regions (EBS, AI, and GOA) through the use of bottom trawl closures in portions of each region (in the GOA, closures are for slope rockfish trawling only), as well as bottom trawl gear regulations for vessels fishing in the EBS. Alternative 5A would increase the amount of protection offered by Alternative 4 by expanding the size of the bottom trawl closures in the EBS and AI, and

closing areas of the GOA slope to all bottom trawling. Alternative 5B would further minimize the effects of fishing by closing additional areas in the AI (including areas with high incidental catch rates of corals and sponges) and, under Options 1 and 2, reducing catch and setting bycatch limits for bryozoans/corals and sponges to control incidental removals. Alternative 5C would protect substantial areas of habitat in the AI, including all of the areas that would be closed to bottom trawling under Alternative 5B, Option 3, plus the coral garden areas that would be closed to bottom contact fishing gear under Alternative 5B, Option 2. Alternative 5C would also close 10 of the 11 areas identified along the GOA slope in Alternatives 2 and 4 to bottom trawling. Alternative 6 would reduce the effects of fishing activities because approximately 20 percent of the available habitats would be left virtually undisturbed by fishing, and thus would be allowed to recover to an unfished state. However, the large amount of effort could be redistributed from areas of effort concentration to previously unfished or lightly fished areas, negating some potential benefits of this alternative.

There are also economic and socioeconomic costs associated with the alternatives to minimize the effects of fishing on habitat. Alternative 2 would have relatively minimal costs (gross revenue at risk \$900,000). Alternatives 3, 4, 5A, and 5C would involve moderate costs to the fishing fleets (gross revenue at risk \$2.4 million to \$7.9 million). Alternative 5B would involve higher costs to the fleet (gross revenue at risk of \$7.5 million to \$28.1 million depending on which AI management option is selected), as well as negative effects on shoreside support industries and western GOA communities. Alternative 6 would have very high relative costs to the fleet (gross revenue at risk of \$237 million) and would have negative effects on shoreside support industries and coastal fishing communities.

From a practicability standpoint, alternative closure areas differ in the habitat types closed and the resulting amount of habitat conservation, as well as the economic and social effects. Some areas considered for bottom trawl closures would provide habitat conservation benefits at almost no additional cost. For example, the closure area on the lower slope and basin would restrict future fisheries, but would not have direct economic costs to the current fishing industry. Likewise, limiting fishing to areas where it has occurred historically, and closing areas that are relatively undisturbed, as in the EBS and AI portions of Alternative 5B, would protect habitats from potential future disturbance without incurring significant short-term costs.

The closures to bottom trawling of deepwater habitats (more than 1,000 m) under Alternatives 4, 5A, and 5B are examples of precautionary measures, since actions taken to conserve the habitat would be proactive. To date, very little fishing effort has occurred in these habitats, but with improved technology and an ever-increasing human population, these areas could be explored and exploited. Commercially valuable species live in these habitats. Already, some small amount of trawling and longlining has been prosecuted on the lower slope (1,000 m to 3,000 m) for turbot, thornyhead rockfish, grenadiers, and sablefish (Fritz et al. 1998), as well as pot fishing for scarlet king crabs. In addition, hagfish and shrimp (as well as grenadiers and sablefish) have been photographed in Pacific coast deep basin areas down to 4,000 m (Isaacs and Schwartzlose 1975). Sablefish caught in the nearshore areas of Alaska use the basin area to some extent, as ascertained from movements of fish tagged on seamounts and later recovered in coastal areas (Maloney 2002). Clearly, the potential exists for significantly larger fisheries and fishing effort to occur on deepwater benthic habitats used by these species. Alternative 5B, and to a lesser extent Alternatives 4, 5A, and 5C, would prevent potential adverse effects on deepwater benthic habitats due to bottom trawling by taking action in a proactive manner. Moreover, these closures would provide habitat benefits with almost no short-term costs.

4.5.3.4 Adverse Effects that Cannot be Avoided When Minimizing Effects of Fishing on EFH

Any new measures to reduce the effects of fishing on EFH will inevitably impose costs on the fishing industry and have other environmental consequences. The only ways to minimize the effects of fishing beyond status quo measures are to reduce fishing effort, shift effort to other areas, and/or change the methods and gear used to harvest fish, all of which have economic costs as well as indirect effects on other components of the environment. The environmental consequences of the alternatives evaluated in this EIS for minimizing the effects of fishing on EFH are discussed in Sections 4.3 and 4.5.3. These alternatives constitute a reasonable range of options for minimizing the effects of fishing on EFH. Other alternatives are possible, but the options evaluated in this EIS illustrate a variety of different measures, employing different degrees of precaution and resulting in different types of effects on the human environment.

Many different activities would continue to have negative effects on EFH and fish habitat in general, regardless of what actions the Council and NMFS take to minimize the effects of fishing on EFH. The alternatives considered in this EIS would reduce adverse effects on habitat. However, fishing inevitably has environmental impacts, and would be expected to continue to affect habitat negatively to some degree. Fishing activities would also continue to have negative effects on certain other aspects of the environment, as described for the status quo conditions throughout Chapter 4. In addition, non-fishing activities would continue to have negative effects on fish habitats (see Appendix G).

4.5.3.5 Conclusions

The analyses in Section 4.3 and Appendix B indicate that fishing has long-term effects on benthic habitat features off Alaska and acknowledges that considerable scientific uncertainty remains regarding the consequences of such habitat changes for the sustained productivity of managed species. Nevertheless, this EIS concludes that the effects on EFH are minimal because the analysis finds no indication that continued fishing activities at the current rate and intensity would alter the capacity of EFH to support healthy populations of managed species over the long term. The analysis concludes that no Council-managed fishing activities have more than minimal and temporary adverse effects on EFH, which is the regulatory standard requiring action to minimize adverse effects under the Magnuson-Stevens Act. These findings suggest that no additional actions are required to minimize the adverse effects of fishing on EFH pursuant to the Magnuson-Stevens Act and the EFH regulations (50 CFR part 600, Subpart J). However, the analysis has many limitations, and the effects of fishing on EFH for some managed species are unknown. Even though the available information does not identify adverse effects of fishing that are more than minimal and temporary in nature, that finding does not necessarily mean that no such effects exist. Thus, appropriate precautionary measures may be warranted.

The analysis indicates that additional practicable measures could be taken to protect, conserve, and enhance EFH. Section 4.5.3.3 concludes that most of the alternatives are practicable, with the exception of Alternative 6, which would have substantially greater adverse effects on fishermen, communities, and associated industries than any of the other alternatives, well in excess of any potential offsetting benefits. As noted in the practicability analysis, certain precautionary management measures could provide habitat benefits with little or no short-term costs.

4.5.4 Relationship of Findings to the Programmatic Groundfish SEIS

NMFS recently prepared a programmatic supplemental EIS (PSEIS) for the groundfish fisheries, which examines alternative policies for conservation and fishery management (NMFS 2004). Part of that

analysis examines the effects of the status quo management regime on habitat. This section provides information on how the approach used for analyzing habitat effects in the revised PSEIS, as well as its conclusions, may differ from this EFH EIS.

In the PSEIS, the potential effects of the groundfish fisheries on habitat were evaluated using criteria on the mortality of and damage to living habitat, changes to benthic community diversity, and changes to the geographic diversity of impacts and protection. Specific impacts are difficult to predict. Evaluation of effects requires detailed information on the distribution and abundance of habitat types, the ecology of living habitat, habitat recovery rates, and the natural disturbance regime, and such information is incomplete.

The PSEIS made qualitative judgments as to the significance of effects after considering information on the following:

- (1) Bycatch of living habitat derived from the multi-species projection model
- (2) The results of a habitat impacts model for estimates of the equilibrium levels of living habitat in fishable and currently fished areas
- (3) Estimates of the amount of area by habitat type and geographic zone closed year round to bottom trawling for all species
- (4) Evaluation of the spatial distribution of bottom trawl closures relative to fishing intensity and habitat types

Significance determination in the PSEIS differs from the more commonly used approach in scientific research. Typically, the null hypothesis of no effect is tested rigorously and only rejected if there is a very low probability of its being true (Type I error). Scientists are trained to minimize the chance of a Type I error. In the PSEIS analysis, however, rigorous tests of available data to reject the hypothesis of no fishing effects were not relied upon to determine significance, for two reasons. First, very few data were available to detect fishing effects, so rigorous statistical testing for a Type I error could not be performed. Second, NMFS determined that a more appropriate approach for the PSEIS was to decrease the likelihood of making a Type II error (accepting a hypothesis of no effect to habitat that may, in fact, be false).

During the course of preparing the PSEIS, comments and questions were raised about the differing purpose and scope of the PSEIS and the EFH EIS. In response to these questions and to clarify the purpose and approach of the two EISs, the following summary compares the two analyses.

The Programmatic Groundfish SEIS and Its Relationship to the EFH EIS

The PSEIS and the EFH EIS have different scopes and areas of focus.

PSEIS: The analyses consider adverse effects of fishing on benthic marine habitat from the perspective of ecosystem structure and function, as well as managed fish species. As such, the scope of this work is broader than a consideration of the effects on commercially important and functionally dependent fish species.

EFH EIS: The analyses consider adverse effects of fishing on benthic marine habitat from the perspective of managed fish species that are dependent on certain qualities and features of that habitat. As such, the scope of this work is narrower than a consideration of these changes on the scale of entire marine ecosystems (as pursued in the PSEIS, for example).

These differences are reflected in the issues, criteria and assessments made in each document. To a lesser extent, the information available to each was somewhat different, because the PSEIS was developed on an earlier schedule than the EFH EIS, and some of the analytical techniques that were developed for the EFH EIS were not available to use in the PSEIS.

The purpose and need of the two documents differ as do their respective scopes and alternatives. The principal differences between these EISs are illustrated in Table 4.5-8.

The differences between the analyses used to assess the effects of fishing on habitat are illustrated below. While the PSEIS looked only at bottom trawl impact, bottom trawl fisheries were the predominant source of habitat impacts in the EFH EIS, which also examined trawl, pot, and longline gear. Another difference was that the PSEIS usually cited results using the slower recovery value for disturbed habitats (15 years, higher effects), while the EFH analysis cited a central value (5.5 years). Significant impact to the benthic habitat, however, occurs in those areas of high fishing intensity regardless of either recovery rate assumed in the analysis. The same quantitative model relating fishing effort to habitat impact was used for both analyses, and the results were highly comparable with only slight differences (Table 4.5-9).

Analyses of the Effects of Fishing on Habitat

The PSEIS baseline evaluation and the EFH effects of fishing evaluation had different purposes that reflected their respective emphases on ecosystem/community concerns and welfare of managed species. The PSEIS baseline evaluation identified 8,000 nm² of the EBS with high-impact values for living substrates. The analysis also considered the high fishing effort as an indication that those areas represent a unique habitat for managed fish species as determined by geography and oceanography, and were not equivalent to all other habitat in the same classification. The analysis also indicated that, coupled with historical impacts, impacts to long-lived, slow-growing species (i.e., coral) could cause long-term damage and possibly irreversible loss of living habitat, especially in the AI. The baseline impact to benthic habitat was therefore rated in the PSEIS as “conditionally significant adverse.” The PSEIS analysis evaluated impacts to the habitat itself, focusing on habitat features that might provide functions to managed species and speculating that linkages to productivity of fish stocks exist. Considering the lack of information on habitat function for managed species at different life stages, and the broader scope of the PSEIS, the PSEIS analysis did not depend on specifically demonstrating such linkages. The PSEIS used this approach because, for purposes of making policy decisions, any potential significant adverse effects, even if conditional, must be presented to decision-makers and the public so that consideration can be given to these effects when developing management measures in the future.

The EFH effects of fishing evaluation (Appendix B) described the same areas of high effect identified in the PSEIS, as well as broader areas of lesser effects to habitat features. Aggregate reduction values were computed by habitat areas and species EFH areas. The evaluation then considered the expected effects of all such reductions on the welfare of each managed species. Species-level evaluations included areas occupied by each species, available information on their use of the habitat, and the stock status of each species. The EFH analysis examined the likelihood of significant linkages between habitat effects and the welfare of each managed species.

While the PSEIS baseline evaluation identified areas of concern regarding the current state of habitat effects from fishing, the EFH EIS was designed to address specific criteria in the EFH regulations. While identifying areas of concern was one step in the EFH EIS, the purpose of the analysis was to evaluate whether fishing had negative effects on EFH of managed species that were more than minimal and temporary. The specific meanings of these terms are discussed in Appendix B.

Comparisons of the Alternatives

The approach and methodology used to assess the impacts on target groundfish species associated with each alternative in the PSEIS and EFH EIS were similar. For each species in each EIS, a knowledgeable scientist was designated to evaluate whether the alternatives affected the welfare of the species relative to a number of key issues. In the PSEIS, the key issues were as follows:

- (1) Fishing mortality
- (2) Change in biomass level
- (3) Spatial/temporal concentration of the catch
- (4) Prey availability
- (5) Habitat suitability

The key issues analyzed in the EFH EIS were as follows:

- (1) Stock biomass
- (2) Spatial/temporal concentration of the catch
- (3) Spawning/breeding
- (4) Feeding
- (5) Growth to maturity

These issues were evaluated relative to the status quo fishery as well as the alternatives developed under each EIS. Criteria were established for each issue to assist the analysts in making their evaluations. The primary consideration in these evaluations revolved around the ability of the stock to maintain its health and support a sustainable fishery.

In the National Standard Guidelines to the Magnuson-Stevens Act, sustainability is defined relative to a minimum stock size threshold (MSST), where stocks that fall below the MSST require an appropriate rate of rebuilding. This concept of sustainability was used in the PSEIS and EFH EIS to maintain consistency with the National Standard Guidelines. For fish stocks where information is available to estimate recruitment (Tiers 1, 2, and 3), recruitments from the late 1970s to the present were used in defining MSST proxies. These estimated recruitments thus cover a range of recent history when impacts to the stock from fishing practices would be expected. As part of the PSEIS, 10-year projections were made to assess whether the stocks would be likely to fall below their MSST levels under the status quo harvesting policy and each of the alternative policies. In the EFH EIS, projections were not available for the non-status quo mitigation alternatives. Because each of the EFH EIS alternatives to minimize the effects of fishing represents a more conservative management policy than the PSEIS status quo alternative, however, one can reasonably expect that the stock status of managed species would continue to remain above MSST under all of the EFH EIS alternatives. Also, in addition to considering effects on stock status relative to MSST, the final EFH EIS incorporates a broader evaluation of whether stock status and trends indicate any potential influence on habitat disturbance due to fishing. Specifically, Appendix B to the final EFH EIS assesses whether the temporal or spatial pattern of habitat disturbance

on stock abundance is sufficient to adversely affect the ability of the stock to produce its maximum sustainable yield over the long term.

Stock status was not the only metric used for the evaluation in the EFH EIS. For most groundfish stocks, some information about habitat associations and how these may be impacted under various harvesting regimes is available, both from previous studies and the results from the EFH EIS application of the habitat impact model (Appendix B). This material is presented in the EFH EIS due to the more focused look at the links between habitat impacts and sustainability. Additionally, for stocks in Tiers 4 to 6, MSSTs are not available, and an evaluation is based, instead, on professional judgement using the best available scientific information and evidence.

Methodology for Cumulative Effects Analysis

As described earlier in this section, the purpose and scope of the PSEIS and the EFH EIS are different, which led to some differences in approach to the analyses. The PSEIS, as a programmatic document, has a much broader scope than the EFH EIS, and, as stated earlier, is focused on avoiding Type II error. The habitat and ecosystem sections of the cumulative effects analysis provide an example of how this focus leads to differences between the PSEIS and the EFH EIS. The SEIS took a conservative approach with respect to the effects of external factors such as climate and historic fishing practices. When NMFS analyzed cumulative effects on habitat in the PSEIS, the cumulative effects rating generally was conditionally significant adverse (CS-) if the adverse effects of all other actions were not offset by the alternative. Conversely, the EFH EIS notes an adverse cumulative effect on habitat and ecosystems only if the effect of an alternative would be additive to an existing adverse trend or cause an adverse trend. If the action would contribute to allowing natural recovery or reversal of the trend, the analysis indicated that there was no adverse cumulative effect.

For other criteria, the approach and methodologies used to analyze the cumulative effects in the PSEIS and the EFH EIS were similar. For criteria on groundfish, crab, salmon, herring, and halibut, the general approach used and the conclusions were similar. For economic analyses, different criteria were selected for each document, but the general approach to the analyses was the same. Due to differences in criteria and approaches for evaluating effects, the PSEIS and the EFH EIS contain some different conclusions for cumulative and economic effects.