

4.10 Analysis of Alternatives at the Policy Level

As presented in Chapter 2 of this document, there are four policy-level alternatives and a preferred alternative (PA) analyzed in this Programmatic SEIS. Alternative 1 represents the status quo and consists of the explicit policy statements included in the current BSAI and GOA FMPs and the refined management policy embodied in the NPFMC actions and FMP amendments taken since the FMP policy statements were developed. Three alternatives to the status quo are also considered, and a PA has been identified.

In this section, we analyze the impacts on the human environment of the management policy approaches, goals, and objectives of each alternative.

4.10.1 Summary of Framework Analyses

In order to assist in the analysis of the policy alternatives, a two-dimensional analytical framework has been developed that defines a range of implementing management measures for each alternative. This framework consists of a set of FMP components (i.e., TAC-setting Process, Bycatch and Incidental Catch Restrictions, etc.) and a set of example FMPs that include management measures addressing each FMP component. Each alternative, except for Alternative 1, contains a pair of example FMP “bookends” that illustrate and frame the range of that alternative’s management measures (see Section 4.2 for further details). Alternative 1, representing status quo, contains just one FMP: the existing management regime in place for the BSAI and GOA, including NPFMC-approved (but not necessarily implemented in regulation yet) measures through June 2002. The intention is that the FMP framework structure will represent a range of management measures that address each FMP component and that are representative of the management measures likely to be implemented under a chosen alternative.

Each of the two dimensions of the framework (the FMP components and the example FMPs) has been analyzed, either qualitatively or quantitatively. Section 4.3 provides a summary of the qualitative analysis papers written for each FMP component. Each paper provides background on the choice of management measures used to address that FMP component and describes the range of management measures that are implemented under each alternative. Additionally, the papers provide a preliminary assessment of the potential impacts of implementing the management measures in a static environment; cumulative impacts between FMP components are not analyzed in these papers. (For the full text of the papers, see Appendix F.)

Sections 4.5 through 4.9 examine the example FMPs in their entirety. The cumulative impacts of implementing all the management measures in an example FMP are analyzed and discussed for each alternative. These analyses incorporate results from the multi-species model developed for this Programmatic SEIS (see Section 4.1.5) as well as other relevant data.

Included in the sections that follow is a summary of relevant conclusions from the framework analyses as they relate to the overall management policy approaches, goals, and objectives of each alternative.

4.10.1.1 FMP Components – Qualitative Analysis

As stated above, Section 4.3 presents a summary of the FMP component qualitative analysis assessment papers, the full text of which can be found in Appendix F. For the purposes of the detailed framework-level analysis of the alternatives, the implications of certain aspects of the framework, particularly those that initiate or define a process rather than implement an action (e.g., development of criteria to set TAC in space and time as opposed to actually setting the TAC), are exclusively dealt with in the qualitative analysis papers. Table 4.10-1 lists those elements of the analytical framework that are dealt with in the qualitative analysis papers but not included in the example FMP analyses.

4.10.1.2 Example FMPs

The example FMPs were each analyzed against a baseline condition, referred to as the comparative baseline, which is described in Chapter 3 and summarized in Section 4.4. A detailed summary of the example FMP analysis for each alternative can be found in the various summary sections, Section 4.5.11 for Alternative 1, Section 4.6.11 for Alternative 2, Section 4.7.11 for Alternative 3, Section 4.8.11 for Alternative 4, and Tables 4.9-1 through 4.9-7 for the PA. A more global summary of the example FMP analysis is found in Tables 4.10-2a and 4.10-2b. For each of the major resource categories that are analyzed in Sections 4.5 to 4.9, the table contains a series of summary statements comparing impacts across the alternatives.

4.10.2 Analysis of Alternative 1

Alternative 1 consists of two policy statements. The first contains the policy statements explicitly stated within the BSAI FMP, dating from 1981, and the GOA FMP, dating from 1979 and as amended in 1985 (identified as Alternative 1(a) in Chapter 2). Although the specific policy language differs between the GOA and BSAI FMPs, the intent in terms of a management policy is very similar. The second is an updated policy (identified as Alternative 1(b) in Chapter 2) that represents the current management policy of the NPFMC and NOAA Fisheries whether as explicitly stated within the FMPs or as evidenced by the management measures that have been adopted by the NPFMC and NOAA Fisheries since the policy statements were included in the FMPs.

Alternative 1(a)

The 1979 BSAI policy statement consists of a set of broad goals that are supported by a number of secondary objectives. The essential management policy for the BSAI is to promote conservation while providing for the optimum yield of the region's groundfish resource. The following additional guidelines are given:

- Conservation and management measures have taken into account the unpredictable characteristics of future resource availability and socioeconomic factors influencing the viability of the industry.
- These goals are intended to meet the requirements of the NPFMC constituency, the resources, and Fishery Conservation Management Act (the original Magnuson-Stevens Fishery Conservation and Management Act).

The 1985 GOA policy statement consists of a set of goals including a principal management goal and a number of objectives. The fundamental management policy for the GOA is to manage the groundfish resources of the GOA to maximize positive economic benefits to the United States, consistent with resource stewardship responsibilities. Fishery management is also required to conform to the National Standards and to the NPFMC Comprehensive Fishery Management Goals.

The existing FMP policy statements date from a period of North Pacific groundfish management history when the principal goal was to develop domestic groundfish fisheries in order to fully utilize the groundfish resources. The FMPs were trying to encourage domestic groundfish exploitation, and therefore the focus of the management policy was to facilitate economic benefit in order to provide incentives to expand the domestic fleet. The environmental issues of bycatch, seabird and marine mammal interaction, habitat degradation, and ecosystem interactions were generally captured under the objective to avoid irreversible or long-term adverse impact to the environment. These problems were not as pressing at the time the existing policy statements were written, due to the smaller size of the domestic fleet, as well as the comparative lack of information on the impact of the fisheries, which twenty years of fishery monitoring data has altered.

Alternative 1(b)

Since the FMP policy statements were adopted, the NPFMC and NOAA Fisheries have implemented management measures that indicate changes in the management policy. The policy statements themselves have not been updated to reflect these changes. In order to incorporate these modifications into this programmatic analysis, an updated policy statement for Alternative 1 (Alternative 1(b)) has been developed. This updated policy statement represents the current policies of the NPFMC and NOAA Fisheries whether as explicitly stated within the FMPs or as evidenced by the management measures that have been adopted.

The updated management approach statement underscores the policy objective that fishery impacts to the environment are mitigated as scientific evidence indicates that the fishery is adversely impacting the ecosystem. The management approach statement is summarized in Table 4.10-3. This policy is based on the assumption that fishing does produce some adverse impact on the environment and, that as these impacts become known, mitigation measures are developed and FMP amendments are implemented.

The updated management approach statement recognizes that the NPFMC management process:

- Is adaptive to new information and reactive to new environmental issues.
- Works towards goals through existing institutions and processes.
- Uses National Standards and other applicable law as its guide in practicing adaptive management, responsible decision-making to consistently amend FMPs accordingly.
- Addresses issues as they are identified through NPFMC staff tasking and research priorities.

The updated management approach statement is fully consistent with the FMP policy statements and the NPFMC and NOAA Fisheries implementation of those policies since they were adopted. The updated policy statement also facilitates a comparison of Alternative 1 to the other alternatives.

Because the current wording of the policy statements in the FMPs differs from the actual implementation of those policies by the NPFMC and NOAA Fisheries, a distinction between Alternative 1(a) and Alternative 1(b) is necessary in order to accurately describe the status quo. If the NPFMC identifies Alternative 1 as its preferred alternative, it will also have to choose whether or not to continue using the current FMP policy statements (Alternative 1(a)) or to amend the FMPs to incorporate the updated policy statements (Alternative 1(b)). However, for analytical purposes, no distinction is necessary because the updated policy statements contained in Alternative 1(b) represent the NPFMC and NOAA Fisheries' interpretation of the policy statements contained in the FMPs. Therefore, the policy-level analysis of Alternative 1 will be representative of both Alternatives 1(a) and 1(b).

A summary of the impacts of Alternative 1 follows below in Section 4.10.2.1. In the remainder of Section 4.10.2, the impacts of the alternative are analyzed in relation to eight policy subheadings: prevent overfishing; preserve food web; reduce and avoid bycatch; avoid impacts to seabirds and marine mammals; reduce and avoid impacts to habitat; allocation issues; increase Alaska Native consultation; and data quality, monitoring, and enforcement. For each subheading, the impacts of the relevant goals and objectives from the management approach are analyzed using the range of implementing management measures for Alternative 1 as a guideline. These guidelines are identified in Section 4.2 and analyzed in Section 4.5.

4.10.2.1 Summary of Alternative 1

The key policy elements that predominantly influence the impacts under Alternative 1 are: the current harvest strategy that incorporates automatic stock rebuilding (ensuring the sustainability of target stocks); incidental catch and bycatch controls; the existing system of closure areas (to protect a variety of species from groundfish fishery interactions); the objective to reduce the adverse effects of the race-for-fish (resulting in gradual implementation of rationalization); and reporting and monitoring requirements (increasing the accuracy of catch accounting).

Alternative 1 is successful at preventing overfishing of target stocks and thus meeting the goal of ensuring the sustainability of the fisheries. Alternative 1 also includes automatic stock rebuilding provisions which have proven to be effective. A weakness of this alternative is that there is no incentive to research fishery impacts on Tier 4-6 stocks in order to change their management status. It is also possible under this alternative to overharvest a vulnerable member of a stock complex.

This alternative is partially successful in achieving the goal of preserving the food web through its protection measures for dominant target species, forage species, and ESA-listed species. However, it will likely make slow, incremental progress in protecting other food web components. This policy is likely effective in protecting food web components that are more well-studied than others and those that are at critical population thresholds, but it is uncertain whether sufficient protection is provided to other food web components for which less complete information is available.

The bycatch management program under Alternative 1 is effective at limiting incidental catch of non-target species and reducing bycatch through incentive programs and monitoring. The weaknesses of the alternative are that bycatch is often reported as a complex rather than as individual species, and that observers are not present to monitor catch on vessels less than 60 ft LOA, which may result in inaccurate estimates of bycatch. This alternative may therefore not provide adequate protection for non-target species.

Alternative 1 is effective at providing protection to listed seabirds and marine mammals as a result of its explicit objectives for ESA-listed species. Although not an explicit policy goal, some protection may also be provided to non-listed seabirds through reduced incidental take as a result of implementing additional seabird protection measures.

This alternative emphasizes incremental implementation of habitat protection measures as scientific information becomes available. As a result, impacts to habitat may be alleviated, albeit slowly. This strategy is likely to be effective in protecting habitat components that are more well-studied than others, but it is uncertain whether sufficient protection will be provided to habitat components for which there is less complete information. Cumulatively, continued adverse impacts result from historical impacts that have potentially caused long-term and possibly irreversible loss of living habitat, especially to long-lived, slow-growing species that are slow to recover.

Alternative 1 is expected to continue to provide economic and community stability within the current management system while adapting management programs when the need arises. The alternative could eliminate the race-for-fish and, by doing so, would increase net-revenues to producers and provide benefits to consumers. However, fewer, although possibly higher paying, fishery related jobs would be created. Non-market, recreation, and tourism values could decrease in the short-run before the transition to rights-based systems is completed.

The goals and policies for Alaska Native consultation and participation in fishery management would continue at the current levels and comply with relevant EOs and other federal law. Traditional knowledge in fishery management would continue to be incorporated in environmental documents as available and appropriate. Subsistence uses would continue consistent with federal law.

This policy will result in a data collection program that will continue to meet minimum acceptable standards for scientific management of the fisheries. Although aspects of the catch collection program could be improved, such as non-random coverage in the 30 percent component of the fleet, current practices do provide useful data for fishery management while remaining mindful of the cost burden on industry of the monitoring program.

4.10.2.2 Prevent Overfishing

Alternative 1 for the BSAI and GOA represents the policy statement currently implemented in the BSAI and GOA. The alternative seeks to prevent overfishing by adopting conservative harvest levels for single species fisheries and specification of OY range. Alternative 1 promotes conservation by avoiding irreversible or long-term adverse effects on fishery resources, and ensures the availability of a multiplicity of options with respect to the future use of groundfish resources. Alternative 1 also sets objectives to meet these goals by promoting rebuilding when stocks have declined below a level capable of producing MSY. The alternative maintains a margin of safety between ABC and OFL to prevent overfishing when the quality of information concerning the resource and ecosystem is questionable.

The Alternative 1 policy is illustrated through FMP 1, which contains a number of management measures that pertain to the sustainability of fisheries and fishery resources. FMP 1 defines four management categories for which catch is constrained by various regulatory mechanisms: target species, prohibited species, other species, and forage fish species. Stocks can be moved from one management category into another only by FMP amendment. There is a fifth category of non-specified species that encompasses all species that may be caught in commercial fisheries but the catch of which is not constrained. Within the target species category, stocks are managed either individually or as part of a stock complex. Stocks within the target species category can be added to or removed from a stock complex within the same category as part of the TAC-setting process (i.e., without an FMP amendment).

Goals, Objectives	Corresponding Management Measures	
<p><u>Goals</u></p> <ul style="list-style-type: none"> • Maintain sustainable fisheries • Manage the groundfish fisheries through the current risk-averse conservation and management program that is based on a conservative harvest strategy • Incorporate and apply ecosystem-based management principles <p><u>Objectives</u></p> <ul style="list-style-type: none"> • Adopt conservative harvest levels for single species fisheries and specify OY • Continue to use existing OY cap for BSAI and GOA fisheries • Provide for adaptive management by continuing to specify OY as a range 	<p>TAC_≤ABC_≤OFL Automatic Rebuilding</p>	<p>Quota management based on a tier system. F_{ABC} set below F_{OFL} except at very low stock sizes protecting the stock from unintentional overfishing. The ABC can be set anywhere between zero and the maximum permissible ABC under the Tier system. In practice ABCs are often set below the maximum permissible ABC to address uncertainty in the stock assessment (e.g. BSAI pollock, GOA pollock, BSAI and GOA cod). For Tier 3 stocks, F_{ABC} is decreased linearly with biomass whenever biomass falls below a tier-specific reference level.</p>
	<p>Time/Area</p>	<p>For several species, fishing quotas are distributed across time and area in proportion to the expected underlying biomass of fish in the region at that time. These policies reduce the possibility of spatial temporal concentration of the catch.</p>
	<p>Gear restrictions</p>	<p>For walleye pollock, Pacific cod, and sablefish, gear allocations partition catch to specific gear groups. Differences in gear selectivity are addressed in the stock assessment models and quotas reflect the expected age distribution of the catch by gear.</p>
	<p>OY caps</p>	<p>Optimum Yield restrictions cap the aggregated groundfish catch in the GOA and BSAI. These caps limit the expansion of fisheries (particularly in the BSAI).</p>
	<p>Inseason Multi-species TAC and ABC monitoring</p>	<p>The catch of a given target species is limited by prohibited species bycatch caps and the TACs for other groundfish. The halibut bycatch caps serve as a constraint to BSAI and GOA flatfish expansion.</p>

Impacts of Policy

An illustration of the harvest constraints imposed by Alternative 1 is provided by FMP 1, the current 2002 management regime for the BSAI and GOA. This FMP addresses the impact of fishing mortality by constraining catch. FMP 1 adopts precautionary measures that build sustainable fisheries and promote rebuilding of overfished stocks. The recommended fishing mortality under FMP 1 would not exceed the OFL for any target stock; however, should any stock decline below a level capable of producing MSY, NOAA Fisheries would develop a rebuilding plan to be put in place that would rebuild the stock within ten years or the specified time period for rebuilding plus one generation time. The objective to include a margin of safety when the quality of information is questionable is accommodated by the buffer between F_{ABC} and F_{OFL} , which would reduce the chance of unintentionally overfishing a stock. Irreversible or long-term adverse effects on fishery resources are avoided through harvest rates that prevent overfishing. This policy implements in-season multi-species catch monitoring to ensure that catch does not exceed the OFLs. In the EBS, the upper limit of the OY range (2 million mt) curtails the expansion of some groundfish fisheries. Relative to the baseline, the expected fishing mortality under FMP 1 would have no significant impact on any of the target groundfish stocks.

Under FMP 1, none of the 19 stocks managed in Tiers 1-3 would be expected to become overfished (Table 4.10-2a). The policy promotes healthy spawning stocks by reducing fishing mortality whenever the stock falls below $B_{40\%}$. Relative to the baseline, no significant impacts due to changes in spawning biomass are expected for stocks managed in Tiers 1-3. For stocks or stock complexes managed in Tiers 4-6, the impacts on spawning biomass are unknown because the status of the stock relative to its MSST is unknown for these stocks (Table 4.10-2a). The impacts of Alternative 1 on fishing mortality of GOA Atka mackerel are unknown. Consideration of cumulative impacts does not change the expectations for direct or indirect impacts of this alternative on fishing mortality.

FMP 1 includes numerous spatial/temporal restrictions on catch that should reduce impacts resulting from concentration of the catch. Under this policy, commercial fishing is not expected to have significant impacts on the genetic makeup or the reproductive success of the stocks managed in Tiers 1-3 (Table 4.10-2a). The impact of commercial fishing on the genetic make-up or reproductive success of stocks managed in Tiers 4-6 is unknown because the status of such stocks relative to their respective MSST is unknown (Table 4.10-2a). Consideration of cumulative impacts does not change the expectations for direct or indirect impacts of this alternative on fishing mortality.

Harvest restrictions and spatial temporal partitions diffuse the impacts of commercial fishing on prey availability and predation mortality. Impacts of commercial fishing on prey availability for the 19 stocks managed in Tiers 1-3 are expected to be insignificant relative to the baseline (Table 4.10-2a). Impacts of commercial fishing on prey availability of stocks or stock complexes that are managed in Tiers 4-6 are unknown because the status of such stocks relative to their respective MSST is unknown (Table 4.10-2a). Consideration of cumulative impacts does not change the expectations for direct or indirect impacts of this alternative on fishing mortality.

Harvest restrictions, spatial temporal constraints and gear allocations all serve to mitigate the impact of commercial fishing on fish habitat. The existing closure system in the BSAI and GOA sets aside approximately 11 percent of the EEZ to some form of MPA and designates 0.1 percent of the EEZ as a no-take reserve (Figure 4.2-1). For the fishable area (depth to 1,000 m) of the EEZ, FMP 1 would designate approximately 28 percent of the fishable area as some form of MPA, of which 0.3 percent is designated as a no-take reserve. Relative to the baseline, the impacts on target species resulting from habitat disturbance are considered insignificant for all stocks managed in Tiers 1-3 (Table 4.10-2a). The impacts are unknown for stocks or stock complexes managed in Tiers 4-6.

When taken in aggregate, Alternative 1 is expected to achieve the goals of promoting conservation by avoiding irreversible or long-term adverse effects on fishery resources, and to ensure the availability of multiple options with respect to the future use of groundfish resources. The Alternative 1 policy is consistent with NOAA Fisheries’ goal of building and maintaining sustainable fisheries. This policy is also consistent with ecosystem principles that call for in-season multi-species catch monitoring to ensure that catch does not exceed the OFLs. This catch monitoring is facilitated by at-sea observers, port samplers, weekly production reports, and fish ticket information (Appendix F-10). A strength of Alternative 1 is that it encourages automatic rebuilding by linearly reducing F_{ABC} when the stock falls below $B_{40\%}$. This feature may mitigate the lack of a formal declaration of a method for annually assessing the status of stocks relative to the MSST in the FMP. The National Standard Guidelines require FMPs to specify MSST whenever possible (Appendix F-1). Alternative 1 is the only alternative that has an observed track record. This track record shows that none of the stocks managed in Tiers 1-3 is overfished. The track record also shows that the harvest policy is effective at rebuilding depleted stocks (e.g., Aleutian Islands and GOA rockfish stocks). A weakness of Alternative 1 is that there is no incentive to reduce the number of stocks where the status relative to an overfished condition is unknown. While harvest policies may build and maintain the species complex, it is still possible to overharvest a vulnerable member of the complex. Alternative 1 does not require formal examination of the status of groundfish stocks relative to MSST. In practice, this is a technical omission because NOAA Fisheries conducts annual status reviews for the stocks managed in Tiers 1-3. These status reviews are included in the SAFE chapters that are presented to the NPFMC for their use in setting annual TACs.

4.10.2.3 Preserve Food Web

The Alternative 1 policy sets goals and objectives to preserve the food web, as well as specifying management measures that would allow implementation of this policy.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> Incorporate and apply ecosystem-based management principles Consider the impact of fishing on predator-prey and other important ecological relationships <u>Objectives</u> <ul style="list-style-type: none"> Incorporate ecosystem considerations into fishery management decisions Continue to protect the integrity of the food web through limits on the harvest of forage species Develop a conceptual model of the food web 	TAC-setting Process	prohibit directed fishery for forage fish precautionary adjustments to ABCs, incorporate uncertainty only in Tier 1 develop ecosystem indicators for future use in TAC-setting

Impacts of Policy

Impacts to food webs of the BSAI and GOA are mitigated through many of the goals and objectives and the related management measures of this FMP. Alternative 1 objectives specifically incorporate ecosystem considerations into fisheries management decisions, prohibit directed fisheries for forage fish (which often form a central position in channeling energy through the food web), and require precautionary adjustments to ABCs made to Tier 1 stocks. Alternative 1 policies and goals also seek to prevent overfishing, reduce and avoid bycatch, avoid impacts to seabirds and marine mammals, reduce and avoid impacts to habitat, and improve data quality, monitoring, and enforcement, all of which are critical to protection of food web components. These components include target and non-specified species, PSC species, HAPC biota, and marine mammals and seabirds. Various management measures provide protection to important food web components: conservative harvest levels for target species and OY cap (Section 4.10.3.2); accounting for bycatch mortality and PSC limits for prohibited species (Section 4.10.3.4); SSL prey species low biomass rules; spatial/temporal distribution of TAC; closure areas to protect walrus and Steller sea lions, gear modifications to protect seabirds, and short-tailed albatross take restrictions (Section 4.10.3.5), existing closed areas and efforts to identify and designate EFH and HAPC (Section 4.10.3.6); the Observer Program, VMS for Steller sea lion prey species, and scales (Section 4.10.3.9). See the policy analysis in those sections for details on the level of protection provided by Alternative 1 to these individual components.

This alternative specifically attempts to incorporate ecosystem considerations into fishery management decisions through development of ecosystem indicators, conceptual models of the food webs, and prohibition of directed fisheries for forage fish, which often form a central position in channeling energy through the food web. Analysis of the ecosystem effects of FMP 1 involved selection of indicators that would show changes in key members or ecosystem characteristics that are important to the structure and function of marine food webs. Changes in pelagic forage species, top predators, spatial/temporal availability of prey, exotic species introductions, energy removal and redirection through fishery catch removals, discarding, and offal production, and various measures of diversity were evaluated with respect to the potential of fishing to cause changes sufficient to bring these attributes below population, community, or ecosystem thresholds, if such thresholds could be defined. Most of these indicators show an insignificant impact on these ecosystem attributes. However, there were unknown effects on some top predator species and on species diversity due to our lack of knowledge of abundance levels and life history characteristics of species such as skates, sharks, and grenadiers. The continued possibility of adverse impacts was described due to introductions of non-native species from fishing vessel ballast water, such non-native species have the potential to drastically change food webs. Other adverse impacts are possible due to the possible loss of functional diversity through the lack of protection of sensitive, structural habitat organisms such as corals that are very slow growing and remained unchanged relative to the baseline. Qualitative analysis of the alternative with respect to ecosystem effects of the TAC-setting process (Appendix F-1) showed that this alternative has the potential to be considerate of ecosystem needs but would need a more formalized decision-making system to explicitly implement.

Through its protection measures for dominant target species, forage species, and ESA-listed species, when considered as a whole this alternative is partially successful in achieving the goal of preserving the food web. However, it will likely make slow, incremental progress in protecting other food web components. The emphasis in this alternative is on incremental improvements to the fishery management regime as more information becomes available and on protection measures devised in response to requirements for protecting ESA-listed species. This strategy is likely effective in protecting food web components that are more well-

studied than others and those that are at critical population thresholds, but it is uncertain whether sufficient protection is provided to others for which we have less complete information.

4.10.2.4 Reduce and Avoid Bycatch

Alternative 1 represents the current management policy in the BSAI and GOA. The alternative seeks to reduce bycatch by implementing gear restrictions, time area restrictions, and in-season bycatch monitoring by deploying domestic observers, port samplers, and requirements for weekly production reports. Bycatch is defined as species that are caught and discarded at sea. A detailed description of the regulations impacting bycatch can be found in the Bycatch qualitative analysis paper (Appendix F-5).

Gear restrictions and time/area restrictions to reduce bycatch in groundfish fisheries are implemented under FMP 1. The FMP prohibits directed fishing for pollock with non-pelagic trawl gear in the BSAI. Directed fishing for sablefish is restricted to longline gear in the GOA. This restriction may reduce the bycatch of species captured in trawl fisheries but may increase the bycatch of sharks and selected rockfish commonly caught in longline fisheries. Non-pelagic trawling is prohibited in the Bristol Bay Red King Crab Savings Area in the BSAI, and in the Cook Inlet in the GOA. Additionally, various areas around Kodiak Island are closed to non-pelagic trawling either year-round or seasonally to protect crab stocks (see Figure 4.2-1).

Groundfish fisheries in the BSAI and GOA are required to discard any incidental catch of halibut, salmon, crab, herring, or Steelhead trout, known collectively as prohibited species. The FMPs currently set catch limits on many of the prohibited species, with penalties ranging from closure of a particular zone or whole management area to closure of a directed fishery or fisheries for a specified season or for the rest of the year. In the BSAI FMP, stair step limits for trawl bycatch within specified zones are set for red king crab and *C. bairdi* crab. The catch limit varies based on stock abundance. The BSAI FMP also specifies an absolute trawl catch limit for chinook salmon and other salmon within specified zones. Once the apportioned PSC limit for a trawl fishery is reached within a zone, the fishery is prohibited from fishing within that zone. The BSAI FMP specifies a trawl catch limit for herring in the BSAI at one percent of annual biomass. Catch limits on *C. opilio* crab and halibut bycatch in the BSAI are established in regulation. The *C. opilio* catch limit applies to a specified zone, and is based on an adjusted percentage of biomass that must fall within a certain range. The halibut catch limit is a BSAI-wide metric ton limit and is based on halibut mortality. Catch limits on halibut bycatch in the GOA are authorized in the FMP, and are set by the NPFMC as part of the annual procedure for setting groundfish harvest levels. There are no other prohibited species catch limits set in the GOA.

Other bycatch reduction measures are required under FMP 1 as well. Full retention by vessels fishing for groundfish of all pollock and Pacific cod fit for human consumption is required under IR/IU regulations. A minimum utilization standard of 15 percent for other groundfish species is also set for all processors. Additional measures that would reduce bycatch of other groundfish are also under consideration. For example, the NPFMC is considering an amendment to require full retention of DSR by hook-and-line and jig vessels in southeast Outside. A Vessel Incentive Program encourages bycatch reduction by setting bycatch reduction standards biannually. If a vessel fails to meet these standards, it can be penalized. In-season bycatch management measures establish fishing seasons for bycatch management and give the NOAA Fisheries Regional Administrator the authority to close areas with high bycatch.

Impacts of Policy

Alternative 1 is expected to encourage the development of practical measures that reduce bycatch and incidental catch of prohibited species, target groundfish, other species, forage fish, and non-specified species. Relative to the baseline, the direct and indirect impacts of Alternative 1 on prohibited species, other species, forage fish, and non-specified species are insignificant (Tables 4.10-2a and 4.10-2b). These rankings do not imply that current harvest practices are safe for all species within the categories noted above. The rankings do imply that adopting Alternative 1 would not represent a significant change relative to the baseline. Two issues are of particular concern. Some prohibited species are currently in a depressed (BSAI chinook) or overfished condition (*C. bairdi* crab, *C. opilio* crab, BSAI red king crab, and BSAI blue king crab). Although the fishing mortality of depressed or overfished non-target species is minor, the additional mortality resulting from groundfish fisheries is not beneficial to these stocks. When cumulative effects are considered, conditionally significant adverse impacts due to fishing mortality are expected for depressed and overfished species. Conditionally significant adverse impacts are also expected for crab species due to change in biomass.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p><u>Goals</u></p> <ul style="list-style-type: none"> Encourage the development of practical measures that minimize bycatch Protect threatened and endangered species <p><u>Objectives</u></p> <ul style="list-style-type: none"> Continue current incidental catch and bycatch management program Continue to manage incidental catch and bycatch through seasonal distribution of TAC and geographical gear restrictions Continue to account for bycatch mortality in monitoring annual TACs Control the bycatch of prohibited species through PSC limits Continue program to require full utilization of target species Continue to respond to evidence of population declines by closing areas and implementing gear and seasonal restrictions in affected areas 	Bycatch and Incidental Catch Restrictions	Quota management is based on a tier system. F_{ABC} set below F_{OFL} except at very low stock sizes protecting the stock from unintentional overfishing. The ABC can be set anywhere between zero and the maximum permissible ABC under the Tier system. In practice ABCs are often set below the maximum permissible ABC to address uncertainty in the stock assessment (e.g. BSAI pollock, GOA pollock, BSAI and GOA cod). For Tier 3 stocks, F_{ABC} is decreased linearly with biomass whenever biomass falls below a tier-specific reference level.
	Gear Restrictions and Allocations	Directed harvest of walleye pollock in the BSAI is restricted to pelagic gear.
	Spatial/ Temporal Management of TAC	For several species, fishing quotas are distributed across time and area in proportion to the expected underlying biomass of fish in the region at that time. These policies reduce the possibility of spatial/temporal concentration of the catch.

Alternative 1 is effective at limiting the incidental catch of target and non-target species and reducing bycatch. Bycatch monitoring programs are consistent with ecosystem principles that call for in-season multi-species catch monitoring to ensure that catch does not exceed the OFLs. Implementation of at-sea catch monitoring has proved to be beneficial to reducing bycatch of prohibited species. The track record shows that some bycatch reduction incentives coupled with catch monitoring have been effective in reducing the bycatch of prohibited species in groundfish fisheries. A weakness of Alternative 1 is that bycatch is often reported as a complex rather than by species. The absence of at-sea catch monitoring for vessels less than 60 ft LOA may result in less than adequate protection of non-target species. Implementation of IR/IU coupled with AFA has been effective at reducing the bycatch in pollock and Pacific cod fisheries. However, AFA had the negative impact of mandating head and gut vessels to discard pollock when catches exceed 20 percent of the retained catch in the flatfish fisheries.

4.10.2.5 Avoid Impacts to Seabirds and Marine Mammals

The Alternative 1 policy sets goals and objectives to avoid impacts to seabirds and marine mammals, as well as specifying management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> Protect threatened and endangered species <u>Objectives</u> <ul style="list-style-type: none"> Continue to cooperate with USFWS to protect ESA-listed and other seabird species Maintain current protection measures to avoid jeopardy to ESA-listed Steller sea lions 	TAC-setting Process, Steller sea lion Measures	Steller sea lion prey species low biomass rules
	TAC-setting Process	prohibit directed fishery for forage fish
	Spatial/ Temporal Management of TAC	spatial/temporal distribution of TAC
	MPAs and EFH/ Steller sea lion Measures/ Gear Restrictions and Allocations	seasonal, gear/fishery specific, and total closure areas identified to protect walrus and Steller sea lions
	Seabird Measures	short-tailed albatross take restrictions
		gear modifications to protect seabirds

Impacts of Policy

Impacts to seabirds and marine mammals are mitigated in Alternative 1 through the stated goal of protecting threatened and endangered species. The objectives of this alternative are to continue to cooperate with USFWS to protect ESA-listed and other seabird species and to maintain current protection measures to avoid jeopardy to ESA-listed Steller sea lions. Management measures that provide protection to seabirds and marine mammals in this alternative include: Steller sea lion prey species low biomass rules, prohibition of directed fishery for forage fish, spatial/temporal distribution of TAC, a variety of time/area/gear/fishery closures, fishery closures to protect walrus and Steller sea lions, short-tailed albatross take restrictions, and gear modifications to protect seabirds. Impacts of the alternative with respect to seabirds were evaluated with respect to the potential for fisheries to cause direct mortality through fishing gear and vessel strikes, changes in prey availability (including offal), and changes in benthic habitat that might affect certain prey species of seabirds. Impacts for marine mammals were evaluated with respect to the potential for fishery incidental take or entanglement in marine debris, harvest of prey species, spatial/temporal concentration of fishing on prey, and fishing vessel disturbance.

This alternative is successful at meeting its objective of protection of threatened and endangered species. Impact indicators showed that Alternative 1 impacts to seabirds were minimal. Incidental take of surface-feeding seabirds was substantially reduced from the baseline due to the new mitigation measures in the longline fleet. The risk of exceeding ESA-thresholds for mortality of short-tailed albatross was reduced from the baseline level. The qualitative analysis of seabird protection measures (Appendix F-6) noted the importance of the Observer Program in both monitoring the levels of incidental take and in researching the effectiveness of different seabird avoidance techniques. The groundfish fishery in this alternative is not expected to have population level effects on any seabird species through mortality, changes in food availability, or impacts on benthic habitat. Although some piscivorous bird species such as glaucous-winged gulls might be gaining food subsidies in the baseline, other piscivorous birds would be negatively impacted by competitive interactions with gulls, thus offsetting any changes for the piscivorous bird group as a whole.

Qualitative analysis of the impacts of this alternative on Steller sea lions (Appendix F-4) and the quantitative analysis of impacts on marine mammals showed that impacts were insignificant with respect to all the indicators relative to the baseline. However, the spatial shift in fisheries from closed areas increases the possibility of fishery competitive interaction with other species such as northern fur seals.

This alternative, through its explicit retention of measures for protecting ESA-listed species, is effective at providing protection to listed seabirds and marine mammals. Although some protection is afforded to non-listed seabirds through the implementation of the 2001 seabird protection measures, this is not an explicit part of its policy goal.

4.10.2.6 Reduce and Avoid Impacts to Habitat

The Alternative 1 policy sets goals and objectives to reduce and avoid impacts to habitat, as well as specifying management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
Goals <ul style="list-style-type: none"> Protect, conserve and restore living marine resource habitat Consider the impact of fishing on habitat Encourage the development of practical measures that minimize adverse effects on essential fishing habitat Objectives <ul style="list-style-type: none"> Respond to new scientific information regarding areas of critical habitat by closing those regions to all fishing (i.e., no-take marine reserves such as Sitka Pinnacles) Evaluate the impacts of trawl gear on habitat through the stepwise implementation of a comprehensive research plan, to determine appropriate habitat protection measures Continue to evaluate candidate areas for MPAs 	MPAs and EFH, Bycatch and Incidental Catch Restrictions, Gear Restrictions and Allocations	Existing system of closed areas including Sitka Pinnacles
	MPAs and EFH	EO 13158 description and evaluation of potential MPA areas
		Identify and designate EFH and HAPC

Impacts of Policy

Alternative 1 addresses impacts to habitat by having specific goals and objectives that focus on living marine habitat. Implementation of this policy is expected to result in a gradual reduction and avoidance of impacts to habitat. This reduction in impacts will occur over the long-term in response to new scientific information. Such scientific information will be obtained through a stepwise implementation of a research plan that focuses on the impacts of trawl gear on habitat. Evaluation of areas as potential MPAs and identification and designation of EFH and HAPC are specific management measures. Given that this policy relies on responsiveness to new scientific information and implementation of a research program, it is expected that adverse impacts to habitat will continue in the short-term. This policy will likely be effective for habitat components that are well studied, but it is uncertain whether sufficient protection is provided to components with less complete information.

In addition to the objectives specifically designed for habitat, Alternative 1 policies to prevent overfishing, reduce and avoid bycatch, incorporate ecosystem considerations, and data quality and enforcement goals are important ancillary objectives that could provide reduced impacts to habitat. Management measures such as conservative harvest levels for target species and PSC limits can reduce impacts to habitat because fishing effort may be reduced. Closures for marine mammal protection, especially if they are year-round for all target species, can also provide protection to specific habitat types.

Analysis of FMP 1 involved assessing effects to mortality, damage, and diversity of living marine habitat. In addition, an assessment of effects on the diversity of impacts was performed with the assertion that within fished areas spatially diverse or patchy fishing impacts are preferable to uniformly distributed impacts. These effects are expected to cause insignificant change relative to the baseline. However, adverse impacts could occur because continued mortality and damage to living habitat coupled with historical impacts may cause long-term and possible irreversible loss of living habitat, especially long-lived, slow-growing species which are slow to recover. There are expanses of fished areas where adverse impacts could result from Alternative 1. In these fished areas, continued fishing at Alternative 1 levels may result in habitat levels substantially below unfished levels. In addition, the geographic and habitat type distribution of closures is not expected to provide a diversity of impacts within fished areas. Most areas that are closed to bottom trawling year-round to all species are nearshore areas, or of one habitat type, with the exception of the southeast Alaska trawl exclusion zone. This configuration of closures may change as the goals and objectives of this policy are implemented.

From a cumulative impacts perspective, the baseline condition is adversely impacted due to historical impacts that have potentially caused long-term and possibly irreversible loss of living habitat, especially to long-lived, slow-growing species that are slow to recover. The cumulative impact for this alternative is conditionally significant adverse due to the adverse state of the baseline condition coupled with continued damage and mortality to living habitat.

Overall this alternative emphasizes incremental implementation of habitat protection measures as scientific information becomes available. As a result, impacts to habitat may be alleviated, albeit slowly. This strategy is likely to be effective in protecting habitat components that are more well studied than others but it is uncertain whether sufficient protection will be provided to habitat components for which we have less complete information.

4.10.2.7 Address Allocation Issues

Management measures under Alternative 1 implement a conservative and risk-averse policy that balances sustainability of the resource and the environment with socioeconomic benefits. This policy emphasizes allocation issues and equitable access to the resources among fishery participants and fishing communities. It also includes an explicit recognition of broader ecosystem concerns.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
Goals <ul style="list-style-type: none"> Maintain statutorily mandated programs to reduce excess capacity and the race-for-fish 	Gear Restrictions and Allocations	Allocate by gear for certain directed fisheries
Objectives <ul style="list-style-type: none"> Continue to reduce excess fishing capacity, overcapitalization and the adverse effects of the race-for-fish Provide economic and community stability by maintaining current allocation percentages to harvesting and processing sectors 	Overcapacity	LLP program for groundfish fisheries
		Rights-based management programs for certain directed fisheries, and community quota programs

Impacts of Policy

Alternative 1 explicitly recognizes the adverse effects of the race-for-fish and promotes actions that alleviate those problems while providing for economic and community stability. This policy is evolutionary and adaptive in nature as it responds to management issues. The alternative also recognizes the importance of ecosystem health and the broad range of benefits that the BSAI and GOA marine ecosystems and associated species provide to the American public.

As the race-for-fish is eliminated, in what could be an extended process, the alternative could result in beneficial effects in terms of producer net revenue, consumer benefits, and participant health and safety (see Appendix F-8). The policy provides economic stability to fishery participants and communities by maintaining current allocation percentages to sectors. However, the elimination of the race-for-fish will likely result in a decrease in overall participation levels. In the long-run, communities are likely to see fewer persons employed in jobs related to the fishing industry (fishing, processing, or support sectors), but the jobs that remain could result in longer periods of work and higher pay.

Because elimination of the race-for-fish is expected to be gradual in nature and unlikely to be completed in the near-term, it is likely that the adverse effects of the race-for-fish will continue in the short-term. For this reason, the alternative could result in decreased non-market, recreational, and tourism values attributed to the ecosystem. In the long-run, however, with completion of the transition away from the race-for-fish, non-market ecosystem values may increase due to reductions in bycatch and greater harvesting efficiency that are anticipated with rights-based management.

4.10.2.8 Increase Alaska Native Consultation

The Alternative 1 policy sets goals and objectives to increase Alaska Native consultation, as well as specifying management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Objectives</u> <ul style="list-style-type: none"> Continue to incorporate Traditional Knowledge in fishery management Continue current levels of Alaska Native participation and consultation in fishery management 	Alaska Native Issues	Incorporate Traditional Knowledge in fisheries management through existing literature, on-staff anthropologist
		Advisory Panel and NPFMC representation
		Allow for subsistence uses consistent with Federal law

Impacts of Policy

Alaska Native consultation in the management of Alaska groundfish fisheries is currently accomplished through a number of measures. These mechanisms include 1) executing Government-to-Government Consultation with federally recognized tribes in accordance with EO 13175; 2) identifying sources of pertinent Traditional Knowledge and incorporating it into NEPA compliance and fishery management activities; 3) representation of Alaska Native groups on the NPFMC and its Advisory Panel; 4) addressing issues related to Alaska Natives during NEPA compliance (effects on Alaska Natives participating in commercial fisheries, effects on Alaska Native communities, effects on subsistence, and Environmental Justice impacts); and 5) allowing for subsistence harvest of fish and wildlife in accordance with federal law.

Under Alternative 1, current management policies and measures used by NOAA Fisheries and the NPFMC regarding Alaska Native consultation would be continued. Through the resources of NOAA Fisheries staff anthropologists, the collection of existing Traditional Knowledge, expansion of an in-house Traditional Knowledge database, and informal consultation with individuals in Alaska Native communities would continue. Formal consultation with federally recognized tribal governments during NEPA compliance under EO 13175 would also continue at current levels during NEPA scoping activities and public comment periods on draft NEPA documents. Similarly, opportunities for Alaska Native participation in NEPA compliance and NPFMC deliberations would continue to be available during NEPA scoping, comment on draft NEPA documents, review of NPFMC documents, and at NPFMC meetings.

Alaska Native representation on the NPFMC and its Advisory Panel would remain the same. Currently one NPFMC seat and two Advisory Panel seats are held by Alaska Native representatives.

Alaska Native participation in groundfish fisheries through individual catcher vessels and CDQ groups would continue at current levels, resulting in benefits to those participants. Similarly, benefits to affected Alaska Native communities would also continue. Primary benefits include: generation of local employment, generation of secondary economic activities that support of the fishing industry, and of community revenue through fish taxes and service fees. Steller sea lion protection measures would remain in effect and subsistence harvest of sea lions are expected to stay at current levels. Direct and indirect effects of groundfish fishing on subsistence resulting from salmon bycatch would be insignificant, although BSAI salmon stocks

in Western Alaska are depressed and remain a concern to Alaska Natives. Alternative 1 would not result in adverse Environmental Justice effects on Alaska Natives (see Alaska Native issues qualitative analysis paper in Appendix F-9).

Under Alternative 1, subsistence uses would continue consistent with federal law. Joint-production of subsistence resources, where Alaska Natives who participate in groundfish fishing take advantage of their commercial fishing efforts to harvest subsistence resources, would continue at current levels.

4.10.2.9 Improve Data Quality, Monitoring, and Enforcement

The Alternative 1 policy sets goals and objectives to address data quality, monitoring and enforcement, as well as specifying management measures that would implement these objectives.

Impacts of Policy

Alternative 1 emphasizes the importance of accurate data to guide management decisions pertaining to the groundfish fisheries. In pursuit of this goal, the alternative identifies a number of objectives: to continue monitoring of catch through industry reporting and the Observer Program; to improve community and regional economic impact assessments; and to utilize advances in technology, such as at-sea scales and VMS, to improve monitoring data. These objectives are discussed in further detail below. A related topic is addressed in Chapter 5, which contains a description of ongoing and proposed North Pacific research efforts and identified data gaps.

The Alternative 1 objectives for catch monitoring and economic impacts assessments are implemented primarily through the FMP 1 requirements for industry participants to submit logbook data at regulated intervals, and through the North Pacific Groundfish Observer Program. These programs are described in detail in Appendix F-10 Observer Program and Appendix F-11 Data and Reporting Requirements.

The Data and Reporting Requirements paper describes the requirements under FMP 1 in detail. Fishing and production logbooks submitted on a daily or weekly basis, and State of Alaska fish tickets, supply data such as the groundfish and prohibited species catch weight (or number of animals), species composition, haul location, discard weight and disposition information, and price paid/received. While the biological information on target species catch composition is thorough under the existing system, the economic data collected is very limited (only revenue and prices are collected systematically under mandatory programs). Other efforts, as described in the Data and Reporting Requirements paper, are underway to improve the ability of fishery managers to assess the economic impacts of management decisions, but have so far had mixed success. The paper also identifies the lack of observer coverage on smaller fishing vessels as a weakness of the current system, as well as the low precision level in estimates of discarded fish. The costs to industry and the federal government of collecting and processing the data are rated as insignificant.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> • Management decisions will use the best available scientific information • Management process will be adaptive to new information and reactive to new environmental issues • Draw upon federal, state and academic capabilities in carrying out research, administration, management and enforcement • Consider the effects of fishing <u>Objectives</u> <ul style="list-style-type: none"> • Continue the existing reporting requirements and Observer Program to provide catch estimates and biological information • Continue ongoing effort to improve community and regional economic impact assessments • Increase the quality of monitoring data through improved technological means 	Observer Program	Fixed 0/30/100% Observer Program coverage; 100/200% for A.A. and CDQ
		Third party, pay-as-you-go service delivery model
	Data and Reporting Requirements	Require economic data from industry participants
		Require appropriate scales
		Require VMS for Steller sea lion prey species

The elements of and issues related to the Observer Program are discussed in the Observer Program qualitative analysis paper in Appendix F-10. Developed in 1990, the third party pay-as-you-go system is a service delivery model where industry contracts for observer coverage with a third party provider, whose observers are trained by NOAA Fisheries. The agency is responsible for managing the data, which includes biological data on incidental catch of marine mammals and endangered seabirds, fishing effort information, and species composition data. The level of species identification recorded by observers is minimally to the level of the management categories. At the request of NOAA Fisheries stock assessment scientists or others, the Observer Program continues to break out more species for identification; however, many non-target species and some species that are managed within a stock complex are not individually identified at the current time. This program was meant as an interim program, and has been and continues to be improved and changed. A continuing area of controversy is the appearance of conflict of interest that arises from the direct financial relationship between the observer's employer and industry. Additionally, for the component of the fleet with only 30 percent coverage (vessels between 60 ft and 125 ft LOA), observer deployment is non-random and may not be a representative sample of the catch.

Data collected under FMP 1 through industry reporting, the Observer Program, and NOAA Fisheries independent resource surveys (described in Appendix B), are combined into a system that is widely regarded as one of the most comprehensive fishery data collection systems in the world (Appendix F-11). The existing system provides sufficient information to assess the current stock condition of target species and accurately estimate the biomass levels used to set appropriate catch quotas.

The Alternative 1 objective to improve the quality of monitoring data through improved technological means is implemented under FMP 1 through the requirement of certified scales for observer sampling in certain fisheries, and the use of VMS on vessels targeting Steller sea lion prey species. A description of the requirements for certified scales, including motion-compensated scales, in the rationalized AFA and CDQ fisheries, is included in the Data and Reporting Requirements paper in Appendix F-11. The requirements for certified scales in these fisheries has improved the accuracy of observer data.

The introduction of mandatory VMS as a management measure is an example of fishery management reacting to new environmental issues. The rapid decline in the abundance of the western stock of Steller sea lions caused the NPFMC/NOAA Fisheries to implement a series of circular closure areas around rookeries and haulouts. Concentric circles around a point are more difficult to monitor and enforce than linear closures based on latitude and longitude, particularly when they overlap one another (NMFS 2001– Steller sea lion SEIS, Section 3.11). The use of VMS has allowed effective monitoring and enforcement of the Steller sea lion protection measures. For further description of the management implications of VMS, see Section 5.2. FMP 1 demonstrates that the use of new technology has successfully improved data quality in monitoring and enforcement activities.

The emphasis of Alternative 1 is to continue current efforts to improve the scientific understanding of the North Pacific environment and of the effects of fishing, and to use this understanding to manage the groundfish fisheries in a sustainable and conservative manner. The objectives to implement and improve data quality, monitoring, and enforcement will result in a data collection system that allows accurate assessment of managed species or species complexes so as to result in a low threat of overfishing in target fisheries. As the focus of data collection in these objectives is primarily centered on industry vessels (reporting requirements, observers), however, the policy will be most effective for target species and will return less data on those species or ages that are not targeted. This policy will result in a data collection program that will continue to meet minimum acceptable standards for scientific management of the fisheries. Although aspects of the catch collection program could be improved, current practices do provide useful data for fishery management while remaining mindful of the cost burden on industry of the monitoring program.

4.10.3 Analysis of Alternative 2

Alternative 2 consists of a management approach statement and a set of policy objectives. The management approach statement provides the key to the underlying rationale and assumptions for the policy, along with goals and additional guidelines.

The management approach statement for Alternative 2 identifies the goal of maximizing biological and economic yield from the resource by establishing a more aggressive harvest strategy. The management approach statement is summarized in Table 4.10-3. This policy is based on the assumption that fishing does not have an adverse impact on the environment except in specific cases as noted.

A summary of the impacts of Alternative 2 follows below in Section 4.10.3.1. In the remainder of Section 4.10.3, the impacts of the alternative are analyzed in detail, in relation to eight policy subheadings: prevent overfishing; preserve food web; reduce and avoid bycatch; avoid impacts to seabirds and marine mammals; reduce and avoid impacts to habitat; allocation issues; increase Alaska Native consultation; and data quality, monitoring and enforcement. For each subheading, the impacts of the relevant goals and objectives from the management approach are analyzed, using as a guideline the range of implementing management measures for Alternative 2, identified in Section 4.2, and analyzed in Section 4.6.

4.10.3.1 Summary of Alternative 2

The key policy elements that predominantly influence the impacts under Alternative 2 are: resetting of the OY cap to the sum of OFL or the sum of ABCs (resulting in increased yield); absence of an objective to eliminate the race-for-fish (resulting in increased effort); absence of objectives to maintain existing closure areas (resulting in potentially adverse impacts to areas that have been closed to fishing); and the consideration to repeal the Observer Program (resulting in less monitoring and research data.)

The impacts analysis of Alternative 2 is hampered to a certain extent by the fact that controls and restrictions on the fishery are removed under this alternative. It is more difficult to predict the impact of removing rather than imposing restrictions; consequently, the uncertainty about predicted reactions of the fishery and the environment could result in an increased risk to the human environment under this alternative.

Alternative 2 would maximize economic yield while preventing overfishing of target stocks, but it is not effective at preventing stocks from becoming overfished. The weaknesses of this alternative are that it increases the chance of unintentionally overfishing a stock, and catch estimates may be uncertain under this alternative if the Observer Program is repealed. Also, as in Alternative 1, there is no incentive to change the management status of stocks where the impact of fishing is unknown, and it is still possible to overharvest vulnerable members of a managed stock complex.

There is a high potential to create adverse food web impacts under Alternative 2 through its lack of precaution, which leaves no room for uncertainty. The possible lack of catch monitoring results in the potential for adverse food web impacts to go undetected until dramatic food web changes are seen. This alternative provides less precautionary management to many components of the food web.

Alternative 2, as illustrated in FMP 2.1, would not be consistent with the objective of monitoring prohibited species catch, as repeal of the Observer Program would negatively impact catch monitoring. Alternative 2 policies, as illustrated by FMP 2.2, would be less severe. As in Alternative 1, additional weaknesses of the alternative are that bycatch is often reported as a complex rather than as individual species, and the absence of observer monitoring of catch on vessels less than 60 ft LOA may result in inaccurate estimates of bycatch. Therefore Alternative 2 may not provide adequate protection for non-target species.

Alternative 2 retains seabird and marine mammal protection measures for ESA-listed species, but does not go beyond ESA-required protection measures. Additionally, other goals and objectives under this alternative remove management measures currently in place in the comparative baseline. The more aggressive harvesting policy, the relaxation of area closures, and the possible repeal of the Observer Program create a high potential to increase fishery interactions with seabirds and marine mammals that may result in adverse impacts to those species.

The alternative could result in increased impacts to habitat because of less precautionary management measures. Possible elimination of current closed areas and increases in TAC have the potential to result in adverse impacts to habitat that could be hard to reverse, especially for long-lived, slow-recovering living habitats. The policy goal of developing practical measures to minimize adverse effects to EFH could be difficult to achieve if such irreversible impacts occur.

Alternative 2 has the potential to increase allowable catches to maximum biological levels and could eliminate the cushion between ABC levels and levels that result in OFLs. This alternative is expected to significantly increase revenues but would also increase operating costs with the elimination of the LLP and IFQ programs. While fishery production is maximized, product quality and the health and safety of participants suffer. Of particular importance may be the amount of variability in harvests, which could increase significantly and therefore make it much more difficult to make long-term business and infrastructure decisions. Finally, non-market, recreation, and tourism values that accrue to the ecosystem could be reduced substantially.

As in Alternative 1, the goals and policies for Alaska Native consultation and participation in fishery management under Alternative 2 would continue at the current levels and comply with relevant EOs and other federal law. Traditional Knowledge in fishery management would continue to be incorporated in environmental documents as available and appropriate. Subsistence uses would continue consistent with federal law. Other goals and objectives in Alternative 2 would affect Alaska Natives by the increase in economic benefits accruing to participants in the fishery, particularly the CDQ pollock fishery. The increased fishing effort under this alternative may however result in increased salmon bycatch, which could have adverse effects on salmon fisheries particularly in the western Alaska Yukon-Kuskokwim river system.

Alternative 2 objectives maintain a minimum level of data collection to meet conservation requirements. The consideration to repeal the Observer Program may compromise management on the best science available as a result of reduced accuracy and breadth of fishery data. The presumed risk of adversely impacting the environment is assumed in this alternative to be low, however, the costs to industry of funding the Observer Program to gather fishery data may not be considered necessary.

4.10.3.2 Prevent Overfishing

The goals of Alternative 2 are to maximize biological and economic yield from the resource by establishing a more aggressive harvest strategy, while still preventing overfishing of the groundfish stocks. This management approach uses the best scientific information available while taking into account individual stock and ecosystem variability. Alternative 2 would encourage the NPFMC to continue to work with other agencies in protecting threatened and endangered species. A more aggressive harvest strategy would be implemented under Alternative 2. The alternative is based upon the concept that the present FMP is overly conservative and that higher harvests could be taken without threat of overfishing of the target groundfish stocks. This policy assumes that fishing at the recommended maximum harvest level would have no adverse impact on the environment, except in specific cases that are known and mitigated.

The Alternative 2 policy is illustrated through FMP 2.1 and FMP 2.2. Each FMP contains a number of management measures that pertain to the sustainability of fisheries and fishery resources. A full description of the actions imposed under FMP 2.1 and FMP 2.2 can be found in Section 4.2. The bookends represent a range of actions that relax constraints to fishery removals.

Goals, Objectives	Corresponding Management Measures	
<p><u>Goals</u></p> <ul style="list-style-type: none"> Maximize biological and economic yield from the resource while still preventing overfishing of the groundfish stocks. Prevent overfishing of target groundfish stocks. Take into account individual stock and ecosystem variability <p><u>Objectives</u></p> <ul style="list-style-type: none"> Set OY cap at sum of OFL (FMP 2.1) or the sum of ABCs (FMP 2.2) for each species. Provide for adaptive management by continuing to specify OY range. 	<p>Example Range: $F_{OFL} = F_{ABC}$ to no change from FMP 1</p>	<p>Quota management based on a tier system. Buffers between the target (F_{ABC}) and limit (F_{OFL}) fishing mortality levels may (FMP 2.1) or may not (FMP 2.2) be eliminated. The uncertainty corrections for GOA pollock, BSAI and GOA cod implemented under FMP 1 would be eliminated. For stocks managed in Tier 3, F_{ABC} may (FMP 2.2) or may not (FMP 2.1) be decreased linearly with biomass whenever biomass falls below a tier-specific reference level.</p>
	<p>Time/Area</p>	<p>With the exception of sea lion protection measures, time and area closures would be rescinded allowing open access to fishing grounds within the EEZ. These policies would increase the possibility of spatial temporal concentration of the catch and a race-for-fish. In the case of pollock fisheries the race-for-fish may be mitigated by the development of cooperatives and rationalized fisheries under AFA.</p>
	<p>Gear restrictions</p>	<p>Gear restrictions for walleye pollock, Pacific cod, and sablefish, gear allocations would be rescinded. However, the impact of these changes on the sustainability of the stock may be minor for stocks managed in Tiers 1-3 because stock assessment models account for gear selectivity.</p>
	<p>OY caps</p>	<p>Optimum Yield restrictions would be capped at the sum, by region, of the groundfish ABCs for the BSAI and GOA. In the BSAI this would allow an expansion of some fisheries.</p>
	<p>Inseason Multi-species TAC and ABC monitoring</p>	<p>Under FMP 2.1, the catch of target species would no longer be limited by prohibited species bycatch caps. This would allow the expansion of some groundfish fisheries. Monitoring bycatch would be difficult as a result of an 80% reduction in the number of observer days.</p>

FMP 2.1 adopts a more aggressive harvest strategy by removing the buffer between ABC and the OFL, allowing the maximum OY to float as the sum of the OFLs of the BSAI or GOA groundfish stocks respectively. Prohibited species bycatch limits and bycatch reduction incentive provisions currently imposed by IR/IU would be eliminated. Additionally, the precautionary decrease of F_{ABC} linearly with biomass when the biomass falls below a specific reference level is removed. FMP 2.1 also removes physical constraints from the fisheries by repealing several time/area closures currently in place. The fishery will be returned to an open access scenario, where time/area closures, gear restrictions, and prohibited species catch restrictions are repealed. The potential impact of the groundfish fisheries on Steller sea lions, however, means that the current suite of mitigating protection measures that constrain fishing around rookeries and haulouts and protect Steller sea lion prey species (pollock, Pacific cod and Atka mackerel) when at a low biomass, will remain in place (see Figure 4.2-2). This is necessary to avoid jeopardy and adverse modification, as required by the ESA. The same applies to the impact of groundfish fishing on short-tailed albatross, with the

consequent take limits remaining in effect. Additionally, the federally-mandated effort limitation program enacted under the AFA would remain in place, with its adjunct CDQ allocation, but all other effort limitation programs (such as the sablefish IFQ program and the multi-species CDQ program) would be repealed. Reporting requirements would remain in place, in order to keep track of the impact of the fisheries, but the Observer Program, except as federally mandated by the AFA, would be repealed, and VMS would not be required in the fisheries. This action would reduce the number of observer days by an estimated 80 percent (Observer qualitative analysis paper Appendix F-10).

A more moderate illustration of the Alternative 2 aggressive harvest strategy is provided by FMP 2.2. In this case, the mechanisms for setting ABC and TAC remain the same as Alternative 1 with the following notable exceptions. The uncertainty corrections imposed on BSAI and GOA Pacific cod and GOA walleye pollock would not apply under FMP 2.2. The current OY range that caps yield at 2 million mt in the BSAI and 800,000 mt in the GOA would be removed in favor of an annually varying maximum OY equaling the sum of the ABCs for groundfish stocks in the BSAI and GOA. Additionally, bycatch reduction incentives and bycatch restrictions would be repealed, other than those related to PSC limits or IR/IU. Under the assumption that fishing does not have an impact on the environment other than what is generally known and mitigated, the NPFMC's more stringent seabird avoidance measures enacted in 2001 would be repealed, leaving only the mitigation measures recommended by USFWS to avoid jeopardy for short-tailed albatross. Closure areas in FMP 2.2 mirror those in FMP 1 (see Figure 4.2-3).

Impacts of Policy

Alternative 2 for the BSAI and GOA limits the impact of fishing mortality by constraining catch to the OFL (FMP 2.1) or maximum permissible ABC (FMP 2.2). This alternative defines four management categories for which catch is constrained by various regulatory mechanisms: target species, other species, prohibited species, and forage fish species. Alternative 2 harvest policies are consistent with ecosystem principles that call for in-season multi-species catch monitoring to ensure that catch does not exceed the OFL of groundfish. Stocks can be moved from one management category into another only by FMP amendment. Within the target species category, stocks are managed either individually or as part of a stock complex. Stocks within the target species category can be added to or removed from a stock complex within the same category as part of the TAC-setting process (i.e., without an FMP amendment).

The bookends provide a range of potential impacts associated with this alternative. FMP 2.1 is more aggressive than FMP 2.2; thus, the potential impacts of this alternative represent the upper bound of potential impacts imposed by Alternative 2. This upper bound will serve as the reference for discussion of potential impacts of adoption of Alternative 2. Consideration of cumulative impacts did not change the significance ranking for the impacts of this alternative.

Alternative 2 adopts more aggressive harvest measures that continue to prevent overfishing. Several harvest polices allow for an increase in commercial catch. First, the ABC could be set equal to OFL under this alternative. This does not allow a margin of safety to address uncertainty in the recommended harvest level. Elimination of the buffer between F_{ABC} and F_{OFL} , would increase the chance of unintentionally overfishing a stock. Unintentional overfishing occurs when the harvest recommendation is based on a point estimate from the stock assessment that in retrospect proves to be in error. Second, in-season monitoring of catch and enforcement of quotas would be impeded by the repeal of the Observer Program and reductions in the number of observer sea days. Third, the quality of input data for stock assessments would be reduced due

to a reduction in the availability of demographic data typically collected by observers. Fourth, FMPs allows expansion of commercial fisheries. Fifth, in the BSAI, FMP 2.1 removes the prohibited species bycatch cap allowing some fisheries to expand. Overfishing did not occur in the stocks or stock complexes modeled under FMPs 2.1 or 2.2. With the exception of GOA DSR, the expected fishing mortality under Alternative 2 would have no significant impact on any of the target groundfish stocks (Table 4.10-2a). Significantly adverse impacts of fishing mortality are expected for GOA DSR (Table 4.10-2a).

Irreversible or long-term adverse effects on fishery resources are avoided by imposing rebuilding regulations when stocks fall below the level capable of producing MSY. However, the likelihood of a stock falling below the level where the stock is capable of producing MSY is higher under Alternative 2 because the linear reduction in fishing mortality when spawning stock falls below $B_{40\%}$ may (FMP 2.2) or may not (FMP 2.1) be imposed. Under FMP 2.1, seven stocks (BSAI and GOA Pacific cod, EBS pollock, BSAI Greenland turbot, AI Atka mackerel, sablefish, and GOA demersal shelf rockfish) would be expected to become overfished. This finding suggests that the impact of Alternative 2 on changes in biomass of target groundfish stocks would be significantly adverse for these stocks when compared to the baseline (Table 4.10-2a). With the exception of GOA Demersal shelf rockfish, the impacts of Alternative 2 on the change in biomass of stocks or stock complexes managed in Tiers 4-6 would be unknown (Table 4.10-2a). Significantly adverse (FMP 2.1) or conditionally significant adverse (FMP 2.2) impacts on the change in biomass of GOA Demersal shelf rockfish are expected under Alternative 2 (Table 4.10-2a).

Relative to the baseline, Alternative 2 relaxes several spatial/temporal restrictions on catch. With the exception of Steller sea lion protection measures, time and area closures would be removed, allowing open access to fishing grounds within the EEZ. These policies would increase the possibility of spatial temporal concentration of the catch and a race-for-fish. In the case of pollock fisheries the race-for-fish may be mitigated by the development of cooperatives and rationalized fisheries under AFA and CDQ. Under this policy, commercial fishing is expected to have unknown impacts on the genetic structure or the reproductive success of the four of 19 stocks managed in Tiers 1-3 (BSAI and GOA Pacific cod, AI Atka mackerel, and BSAI northern rockfish). With the exception of GOA Demersal shelf rockfish, the impact of commercial fishing on the genetic structure or reproductive success of stocks or stock complexes managed in Tiers 4-6 is unknown because the status of such stock relative to their respective MSST, is unknown. Conditionally significant adverse impacts on the genetic structure and reproductive success of GOA Demersal shelf rockfish are anticipated under Alternative 2 (Table 4.10-2a). Additionally, significantly adverse or insignificant impacts on the genetic structure and reproductive success of BSAI Greenland turbot are anticipated.

Relative to the baseline, Alternative 2 would relax restrictions on the spatial temporal partitioning of catch and could increase overall harvest. The impact of these changes on prey availability is expected to be insignificant for all stocks managed in Tiers 1-3. Impacts of commercial fishing on prey availability for all stocks or stock complexes managed in Tiers 4-6 are unknown.

Harvest restrictions, spatial temporal constraints, and gear allocations all serve to mitigate the impact of commercial fishing on fish habitat. With the exception of four stocks (BSAI and GOA Pacific cod, BSAI Atka mackerel, and sablefish), the impacts on target species resulting from habitat disturbance are considered insignificant for all stocks managed in Tier 1-3 (Table 4.10-2a). With the exception of GOA Demersal shelf rockfish, the impacts of Alternative 2 on habitat for stocks or stock complexes managed in Tiers 4-6 are

unknown (Table 4.10-2). Conditionally significant adverse impacts on habitat of GOA Demersal shelf rockfish are expected under Alternative 2 (Table 4.10-2a).

When taken in aggregate, Alternative 2 appears to achieve the goal of maximizing economic yield from the resource while still preventing overfishing of the groundfish stocks. Alternative 2 is not effective at preventing the stocks from falling into an overfished condition. Alternative 2 has several weaknesses. First, the buffer between ABC and OFL could be eliminated which would increase the chance of unintentionally overfishing a stock. Second, in-season catch estimates would be more uncertain due to the repeal of the Observer Program. Third, there is no incentive to reduce the number of stocks where stock status is unknown. While harvest policies may build and maintain the species complex, it is still possible to over-harvest a vulnerable member of the complex. Finally, Alternative 2 under FMP 2.1 could eliminate the linear reduction in fishing mortality when spawning biomass falls below $B_{40\%}$. This would allow fishing at the OFL to continue until the stock biomass fell into an overfished condition. As in Alternative 1, Alternative 2 does not require formal definition of MSST for stocks in Tiers 1-3. In practice, this is a technical omission because NOAA Fisheries conducts annual status reviews for the stocks managed in Tiers 1-3. These reviews are included in the SAFE chapters and provided to the NPFMC for use in annual TAC-setting.

The management actions adopted under Alternative 2 would not be consistent with the goal of taking into account individual stock and ecosystem variability. The ability to enforce quotas during the fishing season would be impeded by the repeal of the Observer Program. The repeal of the Observer Program would also lead to increased uncertainty in the stock assessment because of reductions in demographic information typically collected by observers.

4.10.3.3 Preserve Food Web

Impacts to food webs of the BSAI and GOA are not explicitly considered in the goals and objectives and the related management measures of this FMP. Alternative 2 has policies and goals to prevent overfishing, reduce and avoid bycatch, avoid impacts to marine mammals and birds, reduce and avoid impacts to habitat, and address data quality, monitoring and enforcement issues, all of which are important to protection of food web components that include target and non-specified species, PSC species, HAPC biota, and marine mammals and seabirds. However, the management measures proposed to implement these policies, particularly in the FMP 2.1, do not provide as much protection as in the baseline. Specifically, the less stringent OY formula and lack of precautionary adjustments in ABCs (Section 4.10.3.2), elimination of seasonal catch and PSC limits, repeal of IR/IU (Section 4.10.3.4), allowing a directed fishery for forage species (Section 4.10.3.5), repeal of closed areas (Section 4.10.3.6), repeal Observer Program coverage, and repeal of scales and VMS for Steller sea lion prey species (Section 4.10.3.9) provide less protection to a variety of important food web components. The policy analysis in those sections contain details on the level of protection provided by Alternative 2 to these individual components.

One bookend of this alternative (FMP 2.1) does not specifically attempt to incorporate ecosystem considerations into fishery management decisions and could potentially remove some of those that exist in the baseline such as development of ecosystem indicators, building of conceptual models of the food webs and prohibition of directed fisheries for forage fish (which often form a central position in channeling energy through the food web). Analysis of the ecosystem effects of the alternatives involved selection of indicators that would show changes in key members or ecosystem characteristics that are important to the structure and function of marine food webs. Changes in pelagic forage, top predators, spatial/temporal availability of prey,

exotic species introductions, energy removal and redirection through fishery catch removals, discarding and offal production, and various measures of diversity were evaluated with respect to the potential of fishing to cause changes sufficient to bring these attributes below population, community, or ecosystem thresholds when such thresholds could be defined.

This alternative showed large negative changes relative to the baseline in some ecosystem indicators such as energy removal and redirection. There were potential impacts to the pelagic forage of northern fur seals and seabirds and significantly adverse impacts to the pelagic forage availability for Steller sea lions and harbor seals, primarily due to the policy of fishing target species up to OFL and opening up the possibility of harvesting forage species. There were conditionally significant adverse impacts to spatial/temporal concentration of prey because this alternative proposes to open up many previously closed areas and may remove seasonal allocations of TAC. Top predators such as seabirds could experience conditionally significant adverse effects because the areas around the Pribilof Islands are opened to fishing. The possibility of introduction of exotic species via fishing vessel ballast water is largely increased relative to the baseline due to the increased levels of fishing vessel effort that might occur in this alternative. Species diversity would be significantly impacted because fishing levels bring some target species such as walleye pollock and Atka mackerel below minimum stock size thresholds. Other species are potentially adversely affected, such as corals and seabirds, while the effects on others, such as sharks, are unknown.

This alternative also has the potential to adversely affect trophic guild diversity by fishing more heavily on target species, such as walleye pollock and Atka mackerel, that tend to be dominant members of their trophic guilds. Structural habitat diversity is adversely affected because of the lack of closed areas to protect sensitive, slow-growing structural habitat members such as corals. Removing the sablefish IFQ program could increase the number of boats and fishing impacts in coral habitats. Qualitative analysis of Alternative 2 with respect to ecosystem effects of the TAC-setting process (Appendix F-1) showed that this alternative has a greater potential to alter community structure through higher harvest levels that would impact predators dependent on those species and through greater gear-related habitat impacts.

Through its assumption that there is no need to provide explicit protection to the food web, this alternative performs poorly at protecting most food web components, even those that are of the most importance economically. This alternative could provide less precautionary management to a whole spectrum of food web components including top predators, pelagic forage, and structural habitat species through its FMP 2.1 management measures. This more aggressive harvesting policy assumes that fishing does not affect the food web and assumes that fishery data collection efforts necessary to monitor fishery effects are mostly unnecessary. This policy has a high potential to create adverse food web impacts through its lack of precaution, which leaves no room for uncertainty, and its possible lack of fishery catch monitoring, which has the potential for adverse impacts to go undetected until dramatic food web changes are seen.

4.10.3.4 Reduce and Avoid Bycatch

Several policy changes adopted in Alternative 2 would impact the incidental catch of target and non-target species and bycatch. A more aggressive harvest strategy would be implemented as illustrated by an open access fishery with very few constraints under FMP 2.1 to a moderately constrained fishery as illustrated by FMP 2.2. Several time, area, or gear constraints to fishing are repealed under Alternative 2 (see Figures 4.2-2 and 4.2-3). With the exception of the AFA and CDQ fisheries, the Observer Program requirements would

be repealed in FMP 2.1. Bycatch reduction incentives and bycatch restrictions would be repealed under FMP 2.1, as would PSC limits and IR/IU.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> Encourage development of practical measures that minimize bycatch Work with state and federal agencies to protect threatened and endangered species <u>Objectives</u> <ul style="list-style-type: none"> Monitor prohibited species bycatch and adjust or eliminate PSC limits Manage incidental catch and bycatch through closure areas for selected gear types 	Spatial/ Temporal Management of TAC	Spatial/temporal distribution of TAC
	MPAs and EFH, Bycatch and Incidental Catch Restrictions, Gear Restrictions and Allocations	Eliminate/maintain seasonal, gear/fishery specific, and total closure areas identified to reduce bycatch
	Bycatch and Incidental Catch Restrictions	Eliminate/maintain bycatch limits for prohibited species
		Procedure to develop adjustable PSC limits based on a percentage of the annual stock status
Repeal/maintain retention standards for pollock and Pacific cod (IR/IU) and DSR		
	Repeal/maintain incentive programs (VIP) and bycatch restrictions (including in-season)	

Impacts of Policy

Alternative 2 as illustrated by FMP 2.1 and FMP 2.2 is expected to discourage the development of practical measures that reduce bycatch and incidental catch of prohibited species, target species, other species, forage fish and non-specified species. Relative to the comparative baseline, the direct, indirect, and cumulative impacts of mortality and change in biomass of crab stocks would be significantly adverse (FMP 2.1) or conditionally significant adverse (FMP 2.2) for prohibited species that are currently in a depressed or overfished condition (BSAI *C. bairdi* crab, *C. opilio* crab, BSAI and GOA red king crab, and BSAI blue king crab) (Table 4.10-2a). Impacts on GOA *C. bairdi* crab would be conditionally significant adverse (FMP 2.1) or unknown (FMP 2.2). For BSAI chinook and other salmon and GOA chinook salmon, conditionally significant adverse impacts of fishing mortality would be expected under this alternative, and impacts on GOA other salmon would be conditionally significant adverse under FMP 2.1. The expansion of groundfish fisheries, the repeal of the Observer Program, the elimination of prohibited species bycatch limits, and the removal of bycatch reduction incentives would all lead to increased bycatch and incidental catch of non-target species and target species. The development of target fisheries on forage species would be possible under Alternative 2. However, the impacts of new fisheries on forage species are considered insignificant as these fisheries would be restricted by harvest policies as mandated under Alternative 2.

Alternative 2 policies as illustrated by FMP 2.1 are also inconsistent with the objectives of monitoring prohibited species bycatch. Alternative 2 policies as illustrated by FMP 2.2 would be less severe. Repeal of the Observer Program would negatively impact the quality of catch monitoring. Bycatch is often reported as a complex rather than as a species in Alternative 2. The absence of at-sea catch monitoring for vessels less than 60 ft LOA and reduced at-sea catch monitoring due to the repeal of the Observer Program may result in less than adequate protection of non-target species.

4.10.3.5 Avoid Impacts to Seabirds and Marine Mammals

The Alternative 2 policy sets goals and objectives to avoid impacts to seabirds and marine mammals, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
Goals <ul style="list-style-type: none"> Work with state and federal agencies to protect threatened and endangered species Objectives <ul style="list-style-type: none"> Maintain current protection measures to protect ESA-listed seabird species Maintain current protection measures to avoid jeopardy to ESA-listed Steller sea lions 	TAC-setting Process, Steller sea lion Measures	Steller sea lion prey species low biomass rules
	TAC-setting Process	Allow/prohibit directed fishery for forage fish
	Spatial/ Temporal Management of TAC	Spatial/temporal distribution of TAC
	MPAs and EFH, Steller sea lion Measures, Gear Restrictions and Allocations	Seasonal, gear/fishery specific, and total closure areas identified to protect Steller sea lions; repeal/maintain walrus closures
	Seabird Measures	Short-tailed albatross take restrictions
		RPA-recommended gear modifications to protect seabirds

Impacts of Policy

Alternative 2 has a goal of working with state and federal agencies to protect threatened and endangered species by maintaining current protection measures for ESA-listed seabirds and those designed to avoid jeopardy to ESA-listed Steller sea lions. The management measures employed in this alternative include: Steller sea lion prey species low biomass rules, spatial/temporal distribution of TAC, a variety of time/area/gear/fishery closures, total closure areas for Steller sea lion protections, short-tailed albatross take restrictions, and RPA-recommended gear modifications to protect seabirds. This alternative has the potential to allow directed fisheries on forage species and repeal walrus closure areas. Impacts of the alternative with respect to seabirds were evaluated with respect to the potential for fisheries to cause direct mortality through fishing gear and vessel strikes, changes in prey availability (including offal), and changes in benthic habitat that might affect certain prey species of seabirds. Impacts for marine mammals were evaluated with respect to the potential for fishery incidental take or entanglement in marine debris, harvest of prey species, spatial/temporal concentration of fishing on prey, and fishing vessel disturbance.

These indicators showed that impacts of Alternative 2 on seabirds and marine mammals were increased relative to the baseline condition. The incidental take of short-tailed albatross on longline and trawl third-wire collisions may increase above baseline levels because of increased fishing effort. Removal of area closures around the Pribilof Islands may lead to disproportionate take of fulmars from that colony. Elimination of the sablefish IFQ program could also increase seabird incidental take by the increasing longline effort that would occur in that fishery. Potential development of directed forage fish fisheries could substantially alter prey availability and have population level effects on piscivorous seabirds. Although some piscivorous bird species such as glaucous-winged gulls might be gaining food subsidies from discards and offal in the baseline, other piscivorous birds would be negatively impacted by competitive interactions with gulls, thus offsetting any changes for the piscivorous bird group as a whole that might occur in this alternative. Qualitative analysis of the seabird protection measures (Appendix F-6) noted that the reduced emphasis or elimination of the Observer Program under this alternative would compromise the collection of data on seabird/fishery interactions.

Qualitative analysis of the impacts of this alternative with respect to Steller seal lions (Appendix F-4) showed that management measures repealed under this alternative result in large increases in impacts to some marine mammals even though the Steller sea lion-specific measures are retained. The increased catch of key groundfish prey species that would occur in this alternative results in a significantly adverse impact on Steller sea lions. Although the policy objective is to maintain minimum ESA-required protection measures for ESA-listed species, the analysis of FMP 2.1 indicated that the combination of management measures under this FMP may negate the ‘no jeopardy’ finding in the 2001 Biological Opinion. As a result, FMP 2.1 in its current form may not meet this objective or comply with Federal law. Also, increased catch of prey species may result in potentially adverse effects on other pinnipeds such as northern fur seal and harbor seals that use these prey. The potential repeal of some area closures may result in adverse impacts to groundfish consuming marine mammals through spatial/temporal prey availability and through increased disturbance.

This alternative does poorly at its goal of avoiding impacts to seabirds and marine mammals. It assumes that measures found in the baseline that are not explicitly for protecting marine mammals and seabirds are unnecessary. The potentially more aggressive harvesting policy, relaxation of area closures, possible repeal of the Observer Program and less stringent seabird protection measures do not provide as much certainty about protection to seabirds and marine mammals as in the baseline.

4.10.3.6 Reduce and Avoid Impacts to Habitat

The Alternative 2 policy sets a goal and objectives to reduce and avoid impacts to habitat, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
Goals <ul style="list-style-type: none"> Encourage development of practical measures that minimize the adverse effects of EFH 	MPAs and EFH, Bycatch and Incidental Catch Restrictions, Gear Restrictions and Allocations	Repeal/maintain existing system of closed areas including Sitka Pinnacles
Objectives <ul style="list-style-type: none"> Evaluate impacts of trawl gear on habitat through implementation of the existing research plan, identify EFH, and determine appropriate habitat protection measures Evaluate candidate areas for MPAs 	MPAs and EFH	EO 13158 description and evaluation of potential MPA areas
		Identify and designate EFH and HAPC

Impacts of Policy

Alternative 2 addresses impacts to habitat by specifying goals and objectives that focus on practical measures that minimize adverse effects to EFH. Evaluation of areas as potential MPAs and implementation of the existing research plan to evaluate trawl gear impacts and determine appropriate protection measures are objectives specifically designed for habitat. These goals and objectives could potentially reduce and avoid impacts to habitat in the long-term; however, the overriding objective of Alternative 2 is the maximization of biological and economic yield from the resource by adopting a more aggressive harvest policy for groundfish stocks. This policy is less precautionary than Alternative 1, and the maximization of fishery yield can potentially come at the expense of increased habitat impacts. In addition, the fishery could be returned to an open access regime, where closures, gear restrictions, and prohibited species catch limits are repealed.

Analysis of Alternative 2 involved assessing effects to mortality, damage and diversity of living marine habitat. An assessment of effects on diversity of impacts was performed with the assertion that within fished areas spatially diverse or patchy fishing impacts are preferable to uniformly distributed impacts. Increased TAC levels and repeal of existing closures are expected to cause increased mortality and damage to living habitat, decreased levels of diversity of living marine habitat, and decreased diversity of fishing impacts. Hence, for almost all effects these impacts are rated as significantly adverse or conditionally significant adverse relative to the comparative baseline. The only insignificant effect is diversity of impacts in the Aleutian Islands because under the baseline there are no notable reserves except for shallow areas near Steller sea lion rookeries which will remain closed in this alternative. Though not specifically analyzed, the relaxing of gear restrictions and returning to open access fishing will also increase impacts. For example, bottom trawl gear may replace pelagic trawl gear in some fisheries which will result in more impacts to benthic habitat.

Overall this policy could result in increased impacts to habitat because of less precautionary management measures. Potential elimination of current closed areas and increases in TAC have the potential to result in adverse impacts to habitat that could be hard to reverse, especially for long-lived, slow-recovering living habitats. The policy goal of developing practical measures to minimize adverse effects to EFH could be difficult to achieve if such irreversible impacts occur.

4.10.3.7 Address Allocation Issues

The Alternative 2 policy maximizes biological and economic yield from the resource while still preventing overfishing of the groundfish stocks. A more aggressive harvest strategy would be implemented based upon the concept that the present policy is overly conservative and that higher harvests could be taken without threat of overfishing. In general, Alternative 2 is based on the premise that fishing has minimal negative impacts on marine resources or the ecosystem and therefore places an increased emphasis on the extraction of commercial benefits. The alternative could remove many of the controls on the industry and considers reducing the burden placed on the industry to report its activities.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> Maintain statutorily-mandated programs to reduce excess capacity and the race-for-fish Involve and be responsive to the needs and interests of affected states and citizens 	Gear Restrictions and Allocations	Allocate by gear for certain directed fisheries
	Overcapacity	Statutorily-mandated rights-based management programs (AFA.)
		Could eliminate or maintain LLP, IFQ sablefish, multi-species CDQ, and community quota share
<u>Objectives</u> <ul style="list-style-type: none"> Maintain AFA. and CDQ program as authorized by MSA 		

Impacts of Policy

Alternative 2 has the potential to increase catches to the maximum levels allowable while remaining within OFLs. The alternative could eliminate the cushion between ABC levels and levels that result in OFLs. Because of the emphasis on higher harvests, the alternative is expected to significantly increase revenues that can be extracted from the marine resources. However, because harvests are expected to increase with no real change in biomass levels, it is likely that costs to harvest the additional fish will be higher.

The alternative implicitly presumes that additional restrictions on access to the groundfish fisheries are unnecessary, and in the extreme could result in the elimination of programs that are not mandated by Federal statute. Currently, the groundfish LLP, the sablefish IFQ program, AFA, and CDQ programs restrict access to the marine resources to a limited number of persons. If the alternative removes the LLP and IFQ programs (AFA and pollock CDQs are mandated by Federal statute), it is likely that a significant increase in the number of participants in the fisheries will occur (see Appendix F-8). If restricted access programs are eliminated the commercial benefits of the marine resource could be distributed to a broader base. However, even if access programs are not eliminated, the continuation of the race-for-fish will tend to increase overall costs to capture commercial benefits of the resource. Higher costs could be offset to some extent if the requirements of the Observer Program are relaxed. Currently the Observer Program is estimated to cost the industry approximately \$12 million per year (see Appendix F-10).

If access restrictions are relaxed, the greater number of participants and vessels in the fishery would also create additional demands for support industries, particularly in communities adjacent to fishing grounds (Hiatt et al. 2001). The emphasis on maximum production and the potential to revert to the race-for-fish is likely, however, to reduce product quality and the health and safety of participants. The alternative could also lead to increased bycatch and shorter seasons if the race-for-fish significantly increases. In addition, because

the BSAI pollock fishery remains rationalized with AFA and CDQs, those participants may be able to increase their industry dominance in the long-run.

Because of the more aggressive harvest strategy, the removal of many of the controls on the industry, and the potential reduction in fishery data from the Observer Program, there could be much more uncertainty in the industry (Appendix F). The lack of certainty reduces the ability of commercial interests to plan their business activities, and therefore is likely to reduce profit potential. Furthermore, the emphasis on commercial activity and the lack of controls is likely to result in significantly lower non-market, recreational and tourism values attributed to the ecosystem by the American public. For further information, see the non-market discussion in Section 3.9.8 and discussion on ecosystem values in Section 4.10.3.3.

4.10.3.8 Increase Alaska Native Consultation

The Alternative 2 policy sets objectives to increase Alaska Native consultation, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Objectives</u> <ul style="list-style-type: none"> Continue to incorporate Traditional Knowledge in fisheries management Continue current levels of Alaska Native participation and consultation in fishery management 	Alaska Native Issues	Incorporate Traditional Knowledge in fisheries management through existing literature, on-staff anthropologist
		Advisory Panel and NPFMC representation
		Allow for subsistence uses consistent with Federal law

Impacts of Policy

Under Alternative 2, current management policies and measures used by NOAA Fisheries and the NPFMC regarding Alaska Native consultation would be continued. Through the resources of NOAA Fisheries staff anthropologists, the collection of existing Traditional Knowledge, expansion of an in-house Traditional Knowledge database, and informal consultation with individuals in Alaska Native communities would continue. Formal consultation with federally recognized tribal governments during NEPA compliance under EO 13175 would also continue at current levels during NEPA scoping activities and public comment periods on draft NEPA documents. Similarly, opportunities for Alaska Native participation in NEPA compliance and NPFMC deliberations would continue to be available during NEPA scoping, comment on draft NEPA documents, review of NPFMC documents, and at NPFMC meetings.

Alaska Native representation on the NPFMC and its Advisory Panel would remain the same. Currently one NPFMC seat and two Advisory Panel seats are held by Alaska Native representatives. Under Alternative 2, the increased emphasis on harvest levels and removal of some existing controls on the fishery could overshadow consideration of Alaska Native issues related to subsistence.

Alaska Native participation in groundfish fisheries through individual catcher vessels and CDQ groups would generally increase, resulting in benefits to those participants. While the allocation of multi-species harvest to CDQ groups would be eliminated, an increase in the CDQ pollock allocation would increase benefits overall. Similarly, benefits to affected Alaska Native communities would also continue and likely increase, particularly to CDQ communities, generating local employment, secondary economic activities that support of the fishing industry, and community revenue through fish taxes and service fees. Steller sea lion protection measures would remain in effect and subsistence harvest of sea lions is expected to stay at current levels. However, the increase in harvest would result in some adverse effects on Steller sea lion, and cumulative effects on sea lions would remain adverse. Therefore, effects on subsistence harvest of Steller sea lions would be potentially adverse. Direct and indirect adverse effects of groundfish fishing on subsistence resulting from salmon bycatch would increase for BSAI salmon stocks in western Alaska, which are depressed and remain a concern to Alaska Natives. As a result, this alternative would result in potential adverse Environmental Justice effects on Alaska Natives related to adverse subsistence impacts (see the Alaska Native Issues qualitative analysis paper in Appendix F-9).

Under Alternative 2, subsistence uses would continue consistent with federal law. Joint production of subsistence resources, where Alaska Natives who participate in groundfish fishing take advantage of their commercial fishing efforts to harvest subsistence resources, would continue at current levels.

4.10.3.9 Improve Data Quality, Monitoring and Enforcement

Alternative 2 maximizes economic yield under the assumption that fishing has few adverse effects on the environment, and those that are adverse are known and mitigated. The policy sets goals and objectives to address data quality, monitoring and enforcement, as well as recommending a range of management measures that would implement these objectives.

Impacts of Policy

The goal of the alternative is to use the best scientific information available to manage the fisheries and consider the effects of fishing, and to use all available resources (federal, state, and academic) to assist in research, administration, management, and enforcement.

The objectives under Alternative 2 continue the existing industry reporting requirements to provide catch estimates and biological information, and the ongoing efforts to improve economic impact assessments. Additionally, the repeal of the Observer Program is considered.

The existing reporting regulations require vessel captains to provide estimates of total catch and discards, limited species composition data, and haul times and locations. For further information, see the Data and Reporting Requirements paper in Appendix F-11. Industry is not currently required to report cost or revenue data necessary to accurately assess the economic impact of fishing on regional or community economies. Ongoing efforts to elicit voluntary cooperation of industry in researching these data has met with mixed success.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> Management approach based on the best scientific information available Draw upon federal, state and academic capabilities in carrying out research, administration, management and enforcement Consider the effects of fishing <u>Objectives</u> <ul style="list-style-type: none"> Continue existing reporting requirements to provide catch estimates and biological information Continue ongoing effort to improve community and regional economic impact assessments Consider repealing the Observer Program 	Observer Program	Repeal/fixd 0/30/100% Observer Program coverage; 100/200% for AFA. and CDQ
		Repeal/third party, pay-as-you-go service delivery model
	Data and Reporting Requirements	Require economic data from industry participants
		Repeal except for AFA./require appropriate scales
		Repeal/require VMS for Steller sea lion prey species

Alternative 2 also has an objective to consider repealing the Observer Program. The repeal of the program would apply to all groundfish fisheries with the exception of AFA and CDQ pollock, thus representing an 80 percent cut in observer days (see the Observer Program paper in Appendix F-10). The implications of this repeal are also discussed in other policy sections under this alternative, relating to target species (Section 4.10.3.2), the food web (Section 4.10.3.3), bycatch (Section 4.10.3.4), and allocation issues (Section 4.10.3.7). Because the presumed risk of adversely impacting the environment is assumed in this alternative to be low, the costs to industry of funding the Observer Program to gather fishery data may not be considered necessary. However, observers provide additional information on commercial fishing harvests that may not be otherwise captured by survey vessels or vessel logbook information. Stock assessment data is collected by observers, such as age structures and stomach samples, and fishery scientists use the Observer Program as a platform from which to complete special projects. Also, interactions with marine mammals and endangered seabirds are recorded by observers. The repeal of the Observer Program would increase the reliance of fishery managers on industry data, which is less accurate in terms of total catch and discard estimates, and is not as precise in terms of species reporting. Although there would be less need for inseason management data under Alternative 2 through the repeal of groundfish and potentially PSC bycatch restrictions, accurate catch estimates are still required as part of the annual stock assessment process. As a result, stock assessment scientists may adapt to the lack of precision by generating more conservative catch limit estimates.

As a whole, the Alternative 2 policy emphasizes the maximization of economic yield. The specific goals and objectives require the collection of data to maintain a minimum level to meet conservation requirements. The goal to manage fisheries based on the best available science could potentially be compromised under this policy, as only the pollock fisheries would still be monitored for age-structuring of catch. However, because the presumed risk of adversely impacting the environment is low, the costs imposed on industry of additional monitoring efforts may not be worth the tradeoff in economic yield.

4.10.4 Analysis of Alternative 3

Alternative 3 consists of a management approach statement and a set of policy objectives. The management approach statement provides the key to the underlying rationale and assumptions for the policy, along with policy goals and additional guidelines for the policy.

The management approach statement for Alternative 3 represents the need to balance many competing uses of marine resources and different social and economic goals for fishery management. The management approach statement is summarized in Table 4.10-3. Under this approach, additional conservation and management measures will be taken as necessary to respond to social, economic or conservation needs, or if scientific evidence indicates that the fishery is negatively impacting the environment.

The Alternative 3 management approach statement also indicates that the NPFMC management process will:

- Utilize and improve upon existing processes to involve a broad range of the public in decision-making.
- Maintain the balanced goals of the National Standards Guidelines and other provisions of the MSA as well as the requirements of other applicable law.

A summary of the impacts of Alternative 3 follows below in Section 4.10.4.1. In the remainder of Section 4.10.4, the impacts of the alternative are analyzed in detail, in relation to eight policy subheadings: prevent overfishing, preserve food web, reduce and avoid bycatch, avoid impacts to seabirds and marine mammals, reduce and avoid impacts to habitat, allocation issues, increase Alaska Native consultation, and data quality, monitoring and enforcement. For each subheading, the impacts of the relevant goals and objectives from the management approach are analyzed, using as a guideline the range of implementing management measures for Alternative 3, identified in Section 4.2 and analyzed in Section 4.7.

4.10.4.1 Summary of Alternative 3

The key policy elements that predominantly influence the impacts under Alternative 3 are: the emphasis on rationalizing the fisheries (resulting in increased efficiency and flexibility); the incorporation of ecosystem considerations (increasing the uncertainty buffers in management accounting); and the likelihood of additional closure areas (which may result in a variety of impacts, depending how the closures are situated).

Predictions about the impacts under this alternative are difficult due to the uncertainty involved in defining ecosystem management and predicting the impacts of protecting areas. Increased emphasis on relatively less abundant species, through protection measures and increased monitoring, indicates a tendency towards ecosystem management but as the implications of such management are uncertain. The tendency is to manage cautiously while accelerating research and data-gathering. The large potential gain in flexibility from rationalization has the potential to create ecosystem benefits.

Alternative 3 prevents overfishing of target stocks and reduces the likelihood that stocks will become overfished, through precautionary harvest policies, and imposition of rebuilding regulations when stocks fall below the level capable of producing MSY. This alternative would formally define criteria for determining the status of stocks relative to an overfished condition in order to better satisfy the requirements of the National Standard 1 Guidelines. Efforts would be accelerated to identify methods for reducing the number of stocks where the status relative to an overfished condition is unknown.

This alternative is successful in making many improvements relative to the baseline in achieving the goal of preserving the food web. The emphasis of this alternative is not only on using the best scientific information available to determine catch levels but also on providing additional protection against uncertainty by designation of MPAs and reserves. If these improvements are implemented, this strategy is likely to provide protection to a broad range of food web components.

The bycatch and incidental catch reduction policies in Alternative 3 are consistent with accelerating precautionary management measures through additional bycatch constraints and monitoring. Bycatch reduction objectives and reductions in incidental catch are likely to be achieved without a major cost to industry due to the incentives for more efficient use of fishery resources under cooperatives, comprehensive rationalization of fisheries or other bycatch incentive programs implemented under this alternative.

The goal of minimizing human-caused threats to protected species is largely met in this alternative by actively adjusting protection measures, actively reviewing the status of marine mammal fishery interactions, and through research. This approach, which may provide additional conservation measures in response to scientific evidence, is likely to provide increased protection to marine mammals and seabirds.

This alternative has a potential to reduce and avoid impacts to habitat by careful placement of closures. Placement of closures in lightly fished or not fished areas could result in avoidance of future habitat impacts if fisheries were to move effort into surrounding areas. Placement of closures in heavily fished areas can mitigate impacts, reduce unintended consequences, and achieve overall benefits to habitat if closures do not encompass entire habitat types or areas of fishing intensity. In the short-term, information from the Observer Program could be used to locate such closures. In the long-term, scientific information gained from this policy can potentially lead to modification of the placement of MPAs and help meet the policy objective to assess the necessary and appropriate habitat protection measures. Cumulatively, the alternative results in a split impact rating, as the adverse condition of the baseline is coupled with continued damage and mortality to living habitat, however the alternative has strong potential to mitigate these adverse impacts.

Alternative 3 promotes increased social and economic benefits through the elimination of the race-for-fish while also emphasizing the long-term economic value of the fishery through the promotion of rights-based allocations to individuals, sectors, and communities. In addition, this alternative promotes ecosystem-based management and is likely to increase non-market, recreational, and tourism values assigned to the ecosystem. It is not possible to determine the long-term effect on overall ecosystem value (commercial and non-market values combined) because it is not known whether the fishing sectors, even with rights-based allocations, will be able to adapt to the changes resulting from the increased emphasis on ecosystem tools and, in particular, the additional number and significance of closed areas.

The goals and policies for Alaska Native consultation and participation in fishery management under Alternative 3 would increase current levels by expanding informal and formal consultation between the NPFMC/NOAA Fisheries and Alaska Native participants and tribal governments. Traditional knowledge would be more formally incorporated in fishery management and additional data would be collected. Other goals and objectives in Alternative 3, such as reductions in PSC limits, may benefit subsistence salmon use by reducing bycatch levels in the groundfish fisheries.

Through data collection measures that will result in reducing uncertainty, Alternative 3 is likely to be effective in achieving the goal of accelerating the use of precautionary management measures. The objectives to improve the Observer Program and observer data will increase the quality of fishery data by implementing increased flexibility of, and potentially expanding, observer coverage. Additionally, the expanded economic data and potential for independent verification would allow for more accurate and credible economic impact assessments. A funding source would, however, need to be identified to implement improvements to these programs.

4.10.4.2 Prevent Overfishing

Alternative 3 would seek to accelerate the existing precautionary management measures through community or rights-based management, ecosystem-based management principles, and, where appropriate and practicable, increased habitat protection and additional bycatch constraints. Under this approach, additional conservation and management measures would be taken as necessary to respond to social, economic, or conservation needs, or if scientific evidence indicated that the fishery was negatively impacting the environment. This policy recognizes the need to balance many competing uses of marine resources and different social and economic goals for fishery management. The Alternative 3 policy is illustrated by FMP 3.1 and FMP 3.2. Each FMP contains a number of management measures that pertain to the sustainability of fisheries and fishery resources. The bookends represent a range of actions that alter constraints to fishery removals.

A detailed description of FMP 3.1 appears in Section 4.2. Briefly, FMP 3.1 continues precautionary practices seen in Alternative 1 where TAC is less than or equal to the ABC, and the ABCs are less than the OFL. Uncertainty corrections applied under Alternative 1 to BSAI and GOA Pacific cod and GOA pollock would not apply. OY restrictions would be identical to Alternative 1, where the OY range for the BSAI and GOA is capped at 2 million mt and 800,000 mt for the BSAI and GOA, respectively. The 2 million mt cap in the BSAI would limit the expansion of fisheries. The FMP would formally specify MSSTs for Tiers 1-3 in accordance with National Standard Guidelines. Sharks and skates would be removed from the other species complex and given their own TACs, and criteria to do the same for other target stocks would be developed. Efforts to develop ecosystem indicators to be used in TAC-setting, as per ecosystem management principles, would be accelerated.

In order to balance the needs of social and economic stability with habitat protection and resource conservation, the NPFMC would conduct a review of the existing system of closure areas in the BSAI and the GOA (for closure areas under FMP 3.1, see Figure 4.2-4), and evaluate them against a developed MPA methodology.

FMP 3.1 recognizes that the anticipated community or rights-based management programs may address bycatch reduction objectives (a review of bycatch in existing programs is initiated), but in the meantime accelerated precaution counsels a moderate reduction of PSC limits as an intermediary step. Additionally, in the GOA the FMP would add PSC limits for crab, herring and salmon to its specifications for halibut. Effective monitoring and timely reaction to change in the environment and the fisheries would be enhanced through improvements in the Observer Program and third party verification of economic data.

Goals, Objectives	Corresponding Management Measures	
<p><u>Goals</u></p> <ul style="list-style-type: none"> Accelerate the existing precautionary management measures through community or rights-based management, ecosystem-based management principles Where appropriate and practicable, increase habitat protection and impose additional bycatch constraints Sound conservation of living marine resources <p><u>Objectives</u></p> <ul style="list-style-type: none"> Adopt conservative harvest levels for multi-species and single species fisheries Provide for adaptive management. Continue to specify OY as a range or a formula Initiate a scientific review of the adequacy of $F_{40\%}$ Continue to collect scientific information and improve upon MSSTs including obtaining biological information necessary to move Tier 4 species into Tiers 1-3 in order to obtain MSSTs 	<p>Example Range: $TAC \leq ABC \leq OFL$, formal adjustments for uncertainty, automatic rebuilding, specific harvest policies for rockfish</p>	<p>Quota management based on a tier system. F_{ABC} set below F_{OFL} except at very low stock sizes protecting the stock from unintentional overfishing. Additional adjustments for uncertainty are incorporated into F_{ABC} under FMP 3.2. For tier 3 stocks, F_{ABC} is decreased linearly with biomass whenever biomass falls below a tier-specific reference level. For example purposes only, F_{ABC} for Tier 3 rockfish stocks would be set at $F_{60\%}$.</p>
	<p>Time/Area</p>	<p>For several species, fishing quotas are distributed across time and area in proportion to the expected underlying biomass of fish in the region at that time. These policies reduce the possibility of spatial temporal concentration of the catch. Relative to FMP 1 and FMP 3.1, FMP 3.2 imposes additional marine reserves and marine protected areas.</p>
	<p>Gear restrictions</p>	<p>For walleye pollock, Pacific cod, and sablefish, gear allocations partition catch to specific gear groups. Differences in gear selectivity are addressed in the stock assessment models and quotas reflect the expected age distribution of the catch by gear.</p>
	<p>OY caps</p>	<p>Under FMP 3.1, OY restrictions cap the aggregated groundfish catch in the GOA and BSAI at 800,000 mt and 2 million mt, respectively. These caps limit the expansion of fisheries (particularly in the BSAI). These OY caps would be replaced with species specific OYs under FMP 3.2</p>
	<p>Inseason Multi-species TAC and ABC monitoring</p>	<p>The catch of a given target species is limited by prohibited species bycatch caps and the TACs for other groundfish. The halibut bycatch caps serve as a constraint to BSAI and GOA flatfish expansion. Reduced bycatch allowances would further constrain target fisheries. Sharks and skates would be moved from the other species management category.</p>

FMP 3.2 incorporates an uncertainty correction into the estimation of ABC for all species. This represents a significant acceleration of precautionary management. Additionally, OY would be specified separately for each stock or stock complex rather than for the groundfish complex as a whole (i.e., the 2 million mt OY cap would be eliminated), and would be set equal to the species-respective TAC. FMP 3.2 would also incorporate taxon-specific biological reference points in the tier system where scientifically justifiable. For example purposes, FMP 3.2 capped F_{ABC} at $F_{60\%}$ rather than $F_{40\%}$ for stocks managed in Tiers 1-3. In implementing this bookend, criteria would be developed for specifying MSSTs for Tiers 4-6, along with a list of priority candidate stocks; and a development of criteria for moving stocks from the other species and non-specified species categories would minimally result in sharks and skates being given their own TACs.

FMP 3.2 also reexamines the existing closure system in the BSAI and the GOA. The closures aim to provide protection for a wide range of species, from Steller sea lions to slope rockfish to prohibited species, as well as to respect traditional fishing grounds and maintain open area access for coastal communities. Additionally, the bookend would extend the existing bottom-trawl ban on pollock to the GOA.

To increase precaution regarding bycatch, PSC limits would be significantly reduced by the NPFMC (and set for all prohibited species in the GOA), but would not be expected to act as a proportionate restraint on the fisheries due to the incentives for bycatch reduction under cooperatives, or other bycatch incentive programs implemented as necessary under this bookend.

Impacts of Policy

Alternative 3 limits the impact of fishing mortality by setting an ABC less than the OFL. This alternative defines four management categories for which catch is constrained by various regulatory mechanisms: target species, other species, prohibited species and forage fish species. Alternative 3 harvest policies are consistent with ecosystem principles that call for in-season multi-species catch monitoring to ensure that catch does not exceed the OFL of groundfish. This catch monitoring is facilitated by at-sea observers, port samplers, weekly production reports and fish ticket information (Appendix F-10). Stocks can be moved from one management category into another only by FMP amendment. Within the target species category, stocks are managed either individually or as part of a stock complex. Stocks within the target species category can be added to or removed from a stock complex within the same category as part of the TAC-setting process (i.e., without an FMP amendment).

The bookends provide a range of potential impacts associated with this alternative. FMP 3.1 is similar to FMP 1 except that uncertainty corrections applied under Alternative 1 to BSAI and GOA Pacific cod and GOA pollock would not apply. FMP 3.2 imposes more constraints to fisheries removals and allows the OY caps for the GOA and BSAI to equal the sum of the ABCs of groundfish for the GOA and BSAI regions respectively.

Several measures associated with Alternative 3 could result in reductions in catch relative to baseline conditions. First, an uncertainty correction could be applied that would account for measurement and process error in the assessment (FMP 3.2). Second, the ABC for Tier 3 rockfish species could be set at $F_{60\%}$ (FMP 3.2). Third, a 0-10 percent (FMP 3.1) or 10-30 percent reduction (FMP 3.2) in bycatch would be imposed under this alternative. Finally, sharks and skates would be broken out of the other species complex. While the FMPs used to illustrate Alternative 3 demonstrate conservative harvest policies, it is important to note that the combinations of tools available under Alternative 3 could lead to a more aggressive harvest. For example,

if the quota system described in FMP 3.1 and the OY system described in FMP 3.2 were adopted, the BSAI pollock fisheries could be expanded during periods of high abundance. Direct and indirect impacts analyses revealed that overfishing did not occur in the stocks or stock complexes modeled under FMPs 3.1 or 3.2 (Table 4.7-1). Relative to the comparative baseline, the expected fishing mortality under Alternative 3 would have no significant impact on any of the target groundfish stocks. Consideration of cumulative impacts does not change the expectations for direct or indirect impacts of this alternative on fishing mortality.

Relative to the comparative baseline, the likelihood of a stock falling below the level where the stock is capable of producing MSY is reduced under Alternative 3. Under FMP 3.1 and FMP 3.2 none of the stocks managed in Tiers 1-3 would be expected to become overfished. The direct and indirect impact of Alternative 3 on changes in biomass of all of the Tier 1-3 target groundfish stocks would be insignificant relative to the baseline (Table 4.7-1). The direct and indirect impact of commercial fishing on the biomass of target groundfish stocks managed in Tiers 4-6 is unknown because the status of such stocks relative to their respective MSSTs is unknown (Table 4.7-1). Consideration of cumulative impacts does not change the expectations for direct or indirect impacts of this alternative on changes in biomass.

Relative to the comparative baseline, FMP 3.2 adds several spatial/temporal restrictions on catch. These restrictions would decrease the spatial/temporal concentration of the catch. Under this policy, commercial fishing is expected to have insignificant impacts on the genetic makeup or the reproductive success of the 19 stocks managed in Tiers 1-3. The direct and indirect impact of commercial fishing on the genetic makeup or reproductive success of stocks managed in Tiers 4-6 is unknown because the status of such stocks relative to their respective MSSTs is unknown. Alternative 3 would initiate research to define MSSTs for stocks managed in Tiers 4-6. Once the MSST definition is established, the significance of commercial harvest on Tiers 4-6 stocks could be evaluated. Consideration of cumulative impacts does not change the expectations for direct or indirect impacts of this alternative on fishing mortality.

Relative to the comparative baseline, Alternative 3 would increase restrictions on the spatial temporal partitioning of catch and could reduce overall harvest of target groundfish. The direct and indirect impact of these changes on prey availability is expected to be insignificant or unknown for all stocks managed in Tiers 1-3 (Table 4.7-1). Direct and indirect impacts of commercial fishing on prey availability of all stocks or stock complexes managed in Tiers 4-6 are unknown because the status of such stocks relative to MSST is unknown (Table 4.7-1). Consideration of cumulative impacts does not change the expectations for direct or indirect impacts of this alternative on fishing mortality.

Harvest restrictions, spatial temporal constraints, and gear allocations all serve to mitigate the impact of commercial fishing on fish habitat. The closure system described in the FMP 3.2 would close approximately 18 percent of the EEZ to some form of MPA and designates approximately 3.1 percent of the EEZ as a no-take reserve (Figure 4.2-5). For the fishable area (depth to 1,000 m) of the EEZ, FMP 3.2 would designate approximately 8 percent of the fishable area as a no-take reserve and about 40 percent of the fishable area as some form of MPA. Relative to the comparative baseline, the impacts on target species resulting from habitat disturbance are considered insignificant or unknown for all stocks managed in Tiers 1-3 (Table 4.10-2a). The impacts are unknown for stocks or stock complexes managed in Tiers 4-6.

When taken in aggregate, Alternative 3 appears to accelerate the existing precautionary management measures through community or rights-based management, ecosystem-based management principles and, where appropriate and practicable, increased habitat protection and additional bycatch constraints.

Irreversible or long-term adverse effects on fishery resources are avoided by precautionary harvest policies and imposition of rebuilding regulations when stocks fall below the level capable of producing MSY. Strengths of Alternative 3 are that the FMPs will adopt formal criteria for status determination, and research will be accelerated to develop ecosystem-based harvest policies. The community or rights-based management would reduce the race-for-fish under Alternative 3. Efforts would be accelerated to identify methods for reducing the number of stocks where the status relative to an overfished condition is unknown. Alternative 3 would establish formal specifications for MSST whenever possible. Another strength of this policy is that FMP 3.2 would develop a list of priority candidate stocks for moving stocks from the other species and non-specified species categories. The catch of these species would be monitored. Until this system is developed, harvest policies may build and maintain the species complex, but it is still possible to over harvest a vulnerable member of the complex.

4.10.4.3 Preserve Food Web

The Alternative 3 policy sets goals and objectives to preserve the food web, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> Accelerate precautionary management measures through ecosystem-based principles Promote sound conservation of living marine resources Incorporate ecosystem-based considerations into management decisions Take into account NAS Sustainable Fisheries policy recommendations <u>Objectives</u> <ul style="list-style-type: none"> Incorporate ecosystem-based considerations into fishery management decisions Develop indices of ecosystem health as targets for management Improve the procedure to adjust ABCs as necessary to account for uncertainty and ecosystem factors such as predator-prey relationships and regime shifts Initiate a research program to identify the habitat needs of different species that represent the significant food web 	TAC-setting Process	Prohibit directed fishery for forage fish
		Procedures to incorporate precaution and uncertainty into ABCs
		Procedure to develop and use key ecosystem indicators in TAC-setting

Impacts of Policy

Impacts to food webs of the BSAI and GOA are mitigated through many of the goals and objectives and related management measures of this alternative, some of which are improvements beyond those provided in the baseline. In addition to objectives specifically for incorporating ecosystem considerations into fisheries management decisions and prohibition of directed fisheries for forage fish (which often form a central position in channeling energy through the food web) and precautionary adjustments to ABCs made to Tier 1

stocks that were part of Alternative 1, this alternative provides for the possibility of developing explicit procedures for incorporating predator/prey relationships and regime shifts in ABC adjustments and initiates a research program to identify the different habitat needs of species that are significant food web components. Other policies of this alternative such as preventing overfishing, reducing bycatch, avoiding impacts to seabirds and marine mammals, reducing impacts to habitat, and improving data quality, monitoring, and enforcement are critical to protection of food web components, which include target and non-specified species, PSC species, HAPC biota, and marine mammals and seabirds. Management measures such as revised procedures for ABC, MSST setting, incorporating precaution, and space/time allocation for TAC (Section 4.10.4.2); additional bycatch reduction measures (Section 4.10.4.4); further gear modifications for seabird protection and possible extension of fishery closure areas and seasonal take for marine mammal protection (Section 4.10.4.5); procedures to identify MPAs and no-take marine reserves (Section 4.10.4.6) and improvements to the Observer Program coverage (Section 4.10.4.9) that are proposed as improvements beyond the baseline in Alternative 3 provide increased protection to a variety of food web components. See the policy analysis in those sections for details on the level of protection provided by Alternative 3 to these individual components.

This alternative specifically attempts to incorporate ecosystem considerations into fishery management decisions through advancements in how uncertainty and ecosystem factors such as predator/prey relationships and regime shifts are used in ABC adjustment. It will continue to prohibit directed fisheries for forage fish, develop ecosystem indicators, and develop conceptual models of the food web. Analysis of the ecosystem effects of Alternative 3 involved selection of indicators that would show changes in key members or ecosystem characteristics that are important to the structure and function of marine food webs. Changes in pelagic forage, top predators, spatial/temporal availability of prey, exotic species introductions, energy removal and redirection through fishery catch removals and discards/offal production, and various measures of diversity were evaluated with respect to the potential of fishing to cause changes sufficient to bring these attributes below population, community, or ecosystem thresholds, if such thresholds could be defined. Most of these indicators showed there were insignificant impacts of this alternative on these ecosystem attributes. There were unknown effects of this alternative on top predator species and species diversity due to our lack of knowledge of abundance levels and life history characteristics of species such as skates, sharks, and grenadiers, although breaking these species out of the other species group and giving each its own TAC would provide additional protection. The additional area closures proposed in the FMP 3.2 of this alternative would result in improvements relative to the comparative baseline in spatial/temporal availability of forage to marine mammals and birds and protection of corals. Qualitative analysis of this alternative with respect to the ecosystem effects of the TAC-setting process (Appendix F-1) showed that increased protection is provided in this alternative to stocks that need it most, such as slower-growing, long-lived species such as rockfish, skates, and sharks and would thus reduce the possibility of adverse impacts to those groups and to their role in the food webs of these ecosystems. Thus, if these improvements are implemented, this alternative has the potential to decrease ecosystem impacts relative to the comparative baseline.

As a whole, through its goal to accelerate precautionary management measures through ecosystem-based principles and objectives to develop indices of ecosystem health and take ecosystem factors into account in ABC setting, and to initiate a habitat research program, this alternative is successful in making many improvements beyond the status quo in achieving the goal of preserving the food web. The emphasis in this alternative is on using the best scientific information available to determine catch levels but also on providing additional protection against uncertainty by designation of MPAs and reserves. If these improvements are implemented, this strategy is likely to provide protection to a broad range of food web components.

4.10.4.4 Reduce and Avoid Bycatch

Several policy changes adopted in Alternative 3 would change the incidental catch of target and non-target species and bycatch. The expected incidental catch of target and non-target species under Alternative 3 is difficult to project. The expected TAC under Alternative 3 could increase substantially if management adopted Amendment 56 as described in FMP 3.1 but modified the OY range as described under FMP 3.2. On the other hand, expected TAC could decrease if the uncertainty correction and reduced rockfish F_{OFL} described by FMP 3.2 were adopted. Breaking sharks and skates from the other species complex would ensure that these species are not harvested at rates above the Maximum Fishing Mortality Threshold. Criteria for defining the membership within species complexes and the circumstances when species should be broken out of complexes would be developed.

Many precautionary conservation benefits would be realized in FMPs 3.1 and 3.2 through the comprehensive rationalization of all fisheries (except those already part of a cooperative or IFQ program). Community or rights-based management programs may address bycatch reduction objectives (a review of bycatch in existing programs is initiated), but in the meantime a moderate reduction of PSC limits would be adopted as an intermediary step. The NPFMC would also be addressing habitat and bycatch concerns by reducing concentrated effort in the fisheries.

Effective monitoring and timely reaction to change in the environment and the fisheries would be enhanced through increases in coverage and improvements to the Observer Program, as well as an increase in the use of VMS and the range of economic data collected from industry. Alternative 3 would require 100 percent observer coverage for boats over 60 ft LOA. Additional observer coverage would reduce uncertainty in catch composition and demographic information collected at sea by observers. Improved species identification of other species and forage fish would be achieved under Alternative 3.

Impacts of Policy

Alternative 3 is expected to encourage the development of practical measures that reduce bycatch and incidental catch of target and non-target species. Relative to the comparative baseline, the impacts of mortality and change in biomass associated with the Alternative 3 policy would be insignificant for prohibited species that are currently in a depressed or overfished condition (BSAI and GOA chinook salmon, *C. bairdi* crab, *C. opilio* crab, BSAI and GOA red king crab, and BSAI blue king crab [Table 4.10-2a]). While cumulative impacts are considered conditionally significant, adverse impacts due to mortality are still expected for the species noted above as well as for BSAI and GOA chinook salmon. Alternative 3 is expected to have an insignificant impact on forage fish. The impact of Alternative 3 on other species and non-specified groups is unknown.

Alternative 3 policies as illustrated by FMPs 3.1 and 3.2 are consistent with the goal of accelerating precautionary management measures through additional bycatch constraints where appropriate and practicable. Alternative 3 policies are also consistent with the objective of monitoring prohibited species bycatch. Increased precaution regarding bycatch would be achieved through reductions in PSC limits. Bycatch reduction objectives (0-10 percent for FMP 3.1 or 10-30 percent for FMP 3.2) and reductions in incidental catch are likely to be achieved due to the incentives for more efficient use of fisheries resources under cooperatives, comprehensive rationalization of fisheries, or other bycatch incentive programs implemented under this alternative.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> Accelerate precautionary management measures through additional bycatch constraints where appropriate and practicable Promote sound conservation of living marine resources Minimize human-cause threats to protected species <u>Objectives</u> <ul style="list-style-type: none"> Continue and improve current incidental catch and bycatch management program Develop incentive programs for incidental catch and bycatch reduction including the development of mechanisms to facilitate the formation of bycatch pools, vessel bycatch allowance, or other bycatch incentive systems Encourage research programs to evaluate current population estimates for non-target species with a view to setting appropriate bycatch limits as information becomes available Continue program to reduce discards by developing management measures that encourage the use of gear and fishing techniques that reduce discards 	Spatial/Temporal Management of TAC	Spatial/temporal distribution of TAC
	MPAs and EFH, Bycatch and Incidental Catch Restrictions, Gear Restrictions and Allocations	Seasonal, gear/fishery specific, and total closure areas identified to reduce bycatch; reviews to develop appropriate closure bycatch closure areas in the GOA
	Bycatch and Incidental Catch Restrictions	Reduce existing PSC limits for prohibited species, establish PSC limits for prohibited species other than halibut in the GOA
		Procedure to develop mortality rate-based approach to setting limits
		Retention standards for pollock and Pacific cod (IR/IU) and DSR
Review bycatch reduction incentive programs (repeal/maintain VIP)		
	Bycatch restrictions (including in-season)/repeal or modify MRBs and establish system of caps and quotas	

4.10.4.5 Avoid Impacts to Seabirds and Marine Mammals

The Alternative 3 policy sets goals and objectives to avoid impacts to seabirds and marine mammals, as well as recommending a range of management measures that would implement these objectives.

Impacts of Policy

This alternative seeks to provide conservation of living marine resources and minimize, to the extent practicable, human-caused threats to protected species. It will accomplish those goals through continued cooperation with USFWS to protect seabird species, initiation of a joint research program with USFWS to evaluate populations of seabirds that interact with groundfish fisheries, maintenance or possible adjustment of current protection measures for Steller sea lions to avoid jeopardy, and review of marine mammal/fishery interactions and development of appropriate fishery management measures for mitigation, if needed. Management measures that are improvements beyond those provided in the status quo include harvest control rules for Steller sea lion prey species, possible extension of seasonal/gear/fishery specific closures and total closure areas for walrus and Steller sea lion protection, and possible gear improvements to protect seabirds. Elimination of the race-for-fish in this alternative may also tend to decrease direct takes of marine mammals and seabirds. Impacts of the alternative with respect to seabirds were evaluated with respect to the potential for fisheries to cause direct mortality through fishing gear and vessel strikes, changes in prey availability

(including offal), and changes in benthic habitat that might affect certain prey species of seabirds. Impacts for marine mammals were evaluated with respect to the potential for fishery incidental take or entanglement in marine debris, harvest of prey species, spatial/temporal concentration of fishing on prey, and fishing vessel disturbance.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p><u>Goals</u></p> <ul style="list-style-type: none"> Promote sound conservation of living marine resources Minimize human-cause threats to protected species <p><u>Objectives</u></p> <ul style="list-style-type: none"> Continue to cooperate with USFWS to protect ESA-listed and other seabird species Initiate joint research program with USFWS to evaluate current population estimates for all seabirds species that interact with the groundfish fisheries Maintain or adjust current protection measures as appropriate to avoid jeopardy to ESA-listed Steller sea lions Encourage programs to review status of other marine mammals stocks and fishing interactions (right whales, sea otters, etc.) and develop fishery management measures as appropriate 	TAC-setting Process, Steller sea lion Measures	Steller sea lion prey species low biomass rules/ Steller sea lion prey species harvest control rule
	TAC-setting Process	Prohibit directed fishery for forage fish
	Spatial/ Temporal Management of TAC	Spatial/temporal distribution of TAC
	MPAs and EFH, Steller sea lion Measures, Gear Restrictions and Allocations	Maintain/extend as necessary seasonal, gear/fishery specific, and total closure areas identified to protect walrus and Steller sea lions
	Seabird Measures	Short-tailed albatross take restrictions
		Develop further gear modifications to protect seabirds

These indicators showed that Alternative 3 provides increased protection to seabirds and marine mammals relative to the comparative baseline. As in Alternative 1, incidental take of albatross, fulmars, shearwaters, and gulls is substantially reduced due to new mitigation measures in the longline fleet. In addition, mitigation measures for the trawl fleet are likely to reduce collisions with trawl third wires. The Seabird Protection Measures paper (Appendix F-6) noted that the Observer Program would be expanded under this alternative to improve the collection of seabird/fishery interaction data and to measure the effectiveness of mitigation measures. The groundfish fishery is not expected to have population level effects on any seabird species through mortality, changes in food availability, or benthic habitat. Although some piscivorous bird species such as glaucous-winged gulls might be gaining food subsidies from discards and offal in the baseline, other piscivorous birds would be negatively impacted by competitive interactions with gulls, thus offsetting any changes for the piscivorous bird group as a whole that might occur in this alternative.

Qualitative analysis of this alternative with respect to Steller sea lions (Appendix F-4) found that the additional proposed protection measures would function to further separate the groundfish fishery in space an time and would result in an additional buffer against uncertainty with respect to protection of Steller sea lions and some other marine mammals. Some improvements to marine mammal impacts are seen relative to the comparative baseline because of additional closures out to 15nm and designation of MPA under this alternative. Even though Alternative 1 showed no serious adverse impacts to marine mammals and seabirds, this alternative provides an additional buffer against uncertainty by providing additional protection.

The goal of minimizing human-caused threats to protected species is largely met in this alternative by actively adjusting protection measures, status review of marine mammal fishery interactions, and research. This approach, which may provide additional conservation measures in response to scientific evidence, is likely to provide increased protection to marine mammals and seabirds.

4.10.4.6 Reduce and Avoid Impacts to Habitat

The Alternative 3 policy sets goals and objectives to reduce and avoid impacts to habitat, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p>Goals</p> <ul style="list-style-type: none"> Accelerate precautionary management measures through increased habitat protection where appropriate and practicable Promote sound conservation of living resources Maintain a healthy marine resource habitat 	MPAs and EFH, Bycatch and Incidental Catch Restrictions, Gear Restrictions and Allocations	Existing system of closed areas including Sitka Pinnacles, modify based on MPA process
<p>Objectives</p> <ul style="list-style-type: none"> Develop goals, objectives and criteria to evaluate the efficacy of MPAs and no-take marine reserves as tools to maintain abundance, diversity, and productivity of marine organisms Consider implementation of MPAs if and where appropriate, giving due consideration to areas already closed to various types of fishing operations Develop a research program to identify regional baseline habitat information and mapping Evaluate the impacts of all gear on habitat through the implementation of a comprehensive research plan, to determine habitat protection measures as necessary and appropriate Identify and designate EFH and HAPC 	MPAs and EFH	Develop procedure to identify MPAs and no-take marine reserves
		Identify and designate EFH and HAPC, EFH mitigation measures part of MPA development process

Impacts of Policy

Alternative 3 addresses impacts to habitat by having specific goals and objectives that focus on living marine habitat. This policy accelerates habitat protection where appropriate and practicable and could result in a gradual-to-rapid reduction and avoidance of impacts to habitat depending on how quickly management measures are implemented. Development of a procedure to identify MPAs and no-take marine reserves and identification of EFH mitigative features are identified as specific management measures.

In addition to the objectives specifically designed to address habitat concerns, Alternative 3 policies are designed to prevent overfishing, reduce and avoid bycatch, incorporate ecosystem considerations, and improve data quality and enforcement. These goals are important ancillary objectives that could provide reduced impacts to habitat. Management measures such as revised procedures for ABCs that incorporate greater precaution can potentially reduce impacts to habitat if fishing effort is reduced. Closures for marine mammal protection, especially if they are year round for all target species, can also provide protection to

specific habitat types. Measures to avoid and reduce impacts could occur on a rapid time line, especially if precautionary measures are implemented before complete scientific information is available.

A composite of several different concepts for habitat protection and mitigation were qualitatively analyzed. After the concepts were analyzed, specific implementations of the concepts were analyzed and results compared to the comparative baseline. The basis for these conceptual closures is to illustrate how the effects of fishing on EFH can be mitigated by reducing the impacts caused by a particular fishery by closing specific areas. The conceptual strategies are:

- Reduce the impacts caused by a particular fishery by closing specific areas.
- Incorporate a "band-approach" where closures would be oriented perpendicular to depth contours from near shore to deep water assuring protection of a diversity of habitat types across a range of geographic areas.
- Develop a special conservation area in the Aleutian Islands to protect sensitive cold water coral communities.
- Create rotational closures.

All of these approaches are variations of MPAs. Concepts 1-3 have the most potential for benefits to habitat. However, careful placement of the MPAs is required to avoid unintended consequences. Displacement of effort to new areas with more sensitive habitat may be an unintended consequence. If closures are placed primarily in areas with high fish densities and displace effort into areas of low densities then increased effort in a given area could lead to more habitat impacts. For closures to be most effective they should be combined with some effort controls. Ancillary management measures associated with Alternative 3 that result in reduced effort could result in increased effectiveness of MPAs. However, closures alone, if they are strategically placed within historically fished areas, can provide benefits to habitat without necessarily requiring a reduction in TACs. Benefits to habitat could occur with closure areas strategically placed that do not encompass entire habitat types or clusters of fishing intensity. To be most effective, closure areas should include some portion of areas where high fishing intensity has occurred, but need not be so large that they encompass entire habitat types or clusters of fishing intensity. Placement of small closures within areas of high fishing intensity could also promote scientific understanding of the effectiveness of such management measures. The specific location of MPAs could have serious social and economic consequences. Determining where to locate MPAs for habitat goals should include consultation with the fishing industry and nearby communities.

Rotational closures could protect sea floor habitat while not permanently closing an area to fishing. However, rotational closures are not appropriate for highly structured sea floor habitats with long-lived species. For rotational closures to be effective, specific knowledge of indicator species' recovery times is required because if the rotation schedule is less than the recovery time then all areas may be maintained in a disturbed state with little benefits to habitat. If not carefully implemented, a more homogeneous distribution of fishing effort and habitat disturbance than in years prior to the closure could occur.

Analysis of specific management measures indicated mixed ratings relative to the comparative baseline for effects to mortality and damage to living habitat. These mixed ratings result from the specific location of bottom trawl closure MPAs and the uncertainty of how changes in TAC will interact with MPAs. For example, in the GOA many of the specific strategy (1) closed areas on the slope encompass high effort areas which would be expected to have higher target fish densities. This could result in a much higher effort to catch fish in lower density open areas. This higher effort could result in enough of an increase in habitat impacts to negate impact reduction in the closed areas. Whether decreased TACs for some species will offset this increase in habitat impacts is uncertain. This uncertainty in predicted impacts led to a insignificant or possibly significantly adverse change to mortality and damage to living habitat relative to the baseline in the GOA.

This policy could lead to improved benthic community diversity and geographic diversity of impacts. Analysis of specific management measures in the Bering Sea indicated some improvement in the geographic diversity of impacts. Large expanses of high fishing intensity could still remain open in the Bering Sea, but there is at least one closure area that covers a portion of a high fishing intensity area, providing some improvement in the geographic diversity of impacts. In the Aleutian Islands, some closure areas bisect apparent historic clusters of fishing patterns, thus providing a diversity of impacts for the habitat being fished. In the GOA, closures also often encompass clusters of historically high fishing intensity, leaving little diversity or contrast of fishing intensity and thus leading to no improvement over the baseline.

From a cumulative impacts perspective, the baseline condition is adversely impacted due to historical impacts that have potentially caused long-term and possibly irreversible loss of living habitat, especially to long-lived, slow-growing species which are slow to recover. Although some benefits accrue to habitat within the proposed MPAs in FMP 3.2, impacts from fishing are not totally eliminated, and TAC/effort is likely to remain high. While there is an incremental expansion of no-take MPAs, the closures analyzed under this FMP 3.2 are not refined and may not be effective at preventing mortality or protecting benthic community structure. However, if properly designed and located, future closures could provide successful mitigation of the effects of fishing and, over time, adversely impacted habitat could recover. The cumulative impact predicted for this alternative is a split rating of conditionally significant adverse/conditionally significant beneficial. The adverse state of the baseline condition particularly with regard to slow-growing species would continue the cumulative adverse impact, however the alternative has the potential to provide mitigative benefits to affected habitat.

Overall, this policy has the potential to reduce and avoid impacts to habitat by careful placement of closures. Placement of closures in lightly fished or not fished areas could result in avoidance of future habitat impacts, if effort expands to new or lightly fished areas. Placement of small closures within heavily fished areas can potentially mitigate impacts, reduce unintended consequences, and achieve overall benefits to habitat and meet policy goals and objectives. Strategic placement of small closures will also help meet the policy objective of evaluating the efficacy of MPAs and implementation of a research program to evaluate impacts of gear. In the long-term, scientific information gained from this policy can potentially lead to modification of the placement of MPAs and help meet the policy objective to assess the necessary and appropriate habitat protection measures.

4.10.4.7 Address Allocation Issues

This policy would seek to accelerate the existing precautionary management measures through community or rights-based management and ecosystem-based management principles. Under this approach, additional conservation and management measures would be taken as necessary to respond to social, economic or conservation needs, or if scientific evidence indicated that the fishery was negatively impacting the environment. This policy recognizes the need to balance many competing uses of marine resources and different social and economic goals for fishery management.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p><u>Goals</u></p> <ul style="list-style-type: none"> Accelerate precautionary management measures through community rights-based management Take into account NAS Sustainable Fisheries policy recommendations Provide socially and economically viable fisheries and fishing communities <p><u>Objectives</u></p> <ul style="list-style-type: none"> Provide economic and community stability to harvesting and processing sectors through fair allocation of fishery resources Maintain LLP program and further decrease excess fishing capacity and other adverse effects of the race-for-fish by eliminating latent licences and extending programs such as community or rights-based management to some or all groundfish fisheries Provide for adaptive management by periodically evaluating the effectiveness of rationalization programs and the allocation of property rights based on performance Extend the cost recovery program to all rationalized groundfish fisheries to support fishery management 	Gear Restrictions and Allocations	Allocate by gear for certain directed fisheries
	Overcapacity	LLP program for groundfish fisheries
		Procedures and development of rights-based management programs for the groundfish fisheries, to include community quota programs or other community protections

Impacts of Policy

Alternative 3 promotes increased social and economic benefits through the promotion of rights-based allocations to individuals, sectors and communities. In addition, this alternative promotes ecosystem-based management which could increase the specificity of the species reporting, could increase the areas in which fishing is restricted, and places additional emphasis on the reduction on bycatch. For that reason this policy alternative has the potential to increase non-market value and the benefits derived from recreational, subsistence and tourism activities related to the BSAI and GOA marine ecosystems. See Section 3.9.8 and Section 4.10.4.3 for additional information on ecosystem values.

As the race-for-fish is eliminated, the alternative could result in positive effects in terms of producer net revenue, consumer benefits, and participant health and safety. For additional information on the effects of the race-for-fish and rights-based management see the Overcapacity qualitative analysis paper in Appendix F-8. The policy provides economic stability to fishery participants and communities by maintaining current allocation percentages to sectors. However, the elimination of the race-for-fish will likely result in a decrease in overall participation levels. In the long-run, communities are likely to see fewer persons employed in jobs related to the fishing industry (fishing, processing, or support sectors), but the jobs that remain could be more stable and provide higher pay.

With an end to the race-for-fish and implementation of rights-based allocations, participants are expected to be better able to adapt to the additional restrictions placed on the fishery because of increased emphasis on ecosystem management. To the extent participants are able to adapt, the rights-based allocations within the alternative are expected to decrease the number of direct participants and activities of support industries. Remaining participants however, are likely to have increased stability and incomes. The alternative's promotion of rights-based allocations is also expected to increase consumer benefits and health and safety of participants. Additionally, because the disincentives for bycatch reduction inherent in the race-for-fish are reduced, the alternative could reduce bycatch, even if additional bycatch regulations are not imposed.

It is not possible to determine the long-term effect on overall ecosystem value because it is not known whether the fishing sectors, even with rights-based allocations, will be able to fully adapt to the changes resulting from the increased emphasis on ecosystem tools, in particular the additional number and significance of closed areas. If the fishing sectors are unable to fully adapt to the additional restrictions, it is likely that commercial benefits from the fishery could decrease and could offset expected gains in non-market values, and subsistence, recreational, and tourism benefits.

The alternative also promotes more adaptive management and would very likely provide additional economic data as well as additional management funding through a cost recovery program. The additional funding could help to offset increases in management costs that could occur with additional closed areas and data collection requirements and the monitoring and enforcement of rights-based management. The collection of additional economic data could be critical in the development and eventual acceptance of additional ecosystem regulations. Regulations such as bycatch restrictions and the creation of MPAs have the potential to have negative effects at least in the short-term on industry participants; if additional data can reduce the uncertainty of social and economics effects associated with these types of restrictions, then it may increase the probability that these regulations could be approved and implemented. See the Data and Reporting Requirements qualitative analysis paper in Appendix F-11 for additional information the benefits of additional socioeconomic data.

4.10.4.8 Increase Alaska Native Consultation

The Alternative 3 policy sets objectives to increase Alaska Native consultation, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Objectives</u> <ul style="list-style-type: none"> Continue to incorporate Traditional Knowledge in fishery management Consider ways to enhance collection of Traditional Knowledge from communities, and incorporate such knowledge in fishery management where appropriate Increase Alaska Native participation and consultation in fishery management 	Alaska Native Issues	Develop and implement procedures to incorporate Traditional Knowledge into fisheries management/ do Traditional Knowledge research
		Increase consultation with Alaska Natives
		Encourage increased participation/ representation of Alaska Natives in fishery management
		Allow for subsistence uses consistent with Federal law

Impacts of Policy

Under Alternative 3, there would be some changes to current management policies and measures used by NOAA Fisheries and the NPFMC regarding Alaska Native consultation. These changes increase efforts to collect Traditional Knowledge, and develop and implement measures to incorporate it into fishery management. NOAA Fisheries staff anthropologists would increase the collection of existing Traditional Knowledge, expand of an in-house Traditional Knowledge database, and continue informal consultation with individuals in Alaska Native communities. NOAA Fisheries and the NPFMC would work with Alaska Natives to evaluate and develop measures to incorporate Traditional Knowledge. Formal consultation with federally recognized tribal governments during NEPA compliance under EO 13175 would also continue at current levels during NEPA scoping activities and public comment periods on draft NEPA documents, but other forms of consultation would also be considered. Similarly, opportunities for Alaska Native participation in NEPA compliance and NPFMC deliberations would continue to be available during NEPA scoping, public comment periods on draft NEPA documents, review of NPFMC documents, and at NPFMC meetings. However, other forms of outreach and information exchange would be considered to increase participation.

Increased participation and representation of Alaska Natives in fishery management would be encouraged under Alternative 3. NOAA Fisheries and the NPFMC would work with Alaskan Natives to identify and develop measures that would increase participation and representation in fishery management.

Under Alternative 3, Alaskan Native participation in the fisheries will be affected by rationalization of fisheries and closure of areas to fishing. CDQ groups fishing in the BSAI would continue to benefit from rationalization. Non-CDQ Alaskan Native participants in the GOA would also benefit from rationalization of fisheries, although these benefits could be offset by closures of areas currently fished by smaller vessels. Benefits to Alaskan Native communities would be mixed, with CDQ communities receiving increased revenues, while on-CDQ Native communities could experience a reduction in employment and support services due to rationalization of fisheries.

Reduced levels of salmon bycatch and additional area closures could benefit subsistence harvest of Steller sea lion and salmon in western Alaska, although cumulative effects have a greater influence on the availability of both subsistence resources. The potential for Environmental Justice impacts as a result of this alternative would be limited to any adverse effects of rationalization on non-CDQ Alaskan Native communities.

Under Alternative 3, subsistence uses would continue consistent with federal law. Joint production of subsistence resources, where Alaska Natives who participate in groundfish fishing take advantage of their commercial fishing efforts to harvest subsistence resources, would continue at current levels, except where closure of fishing areas in the GOA could adversely affect joint production.

4.10.4.9 Improve Data Quality, Monitoring and Enforcement

Alternative 3 accelerates precautionary management of the groundfish fisheries. The policy sets goals and objectives to address data quality, monitoring, and enforcement, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p><u>Goals</u></p> <ul style="list-style-type: none"> Base management on the best scientific information available <p><u>Objectives</u></p> <ul style="list-style-type: none"> Increase the utility of groundfish fishery observer data for the conservation and management of living marine resources Improve Groundfish Observer Program, and consider ways to address the disproportionate costs associated with the current funding mechanism Improve community and regional economic impact assessments through increased data reporting requirements Increase the quality of monitoring data through improved technological means Establish a coordinated, long-term ecosystem monitoring program to collect baseline information and compile existing information from a variety of ongoing research initiatives Adopt the recommended research plan included in this document Cooperate with research institutions such as the NPRB in identifying research priorities to address pressing fishery issues 	Observer Program	Fixed 0/30/100% / 0/100/100% Observer Program coverage, scientifically based; 100/200% for AFA. and CDQ
		Address conflict of interest in funding
		Improve observer data, develop uncertainty estimates
	Data and Reporting Requirements	Require broader range of economic data from industry participants, verified through third party
		Require appropriate scales
		Require VMS for Steller sea lion prey species / Steller sea lion prey species and all vessels > 125 ft; modify to incorporate new technology and system providers

Impacts of Policy

The goal of Alternative 3, as with all the alternatives, is to base fishery management on the best scientific information available. The objectives specific to Alternative 3 are to increase the utility of observer data, and to improve the Observer Program; to improve economic impact assessments by changing data reporting requirements; to utilize advances in technology to improve the quality of monitoring data; to establish an ecosystem monitoring program; to adopt a plan for research priorities, and to work with research institutions to get these priorities addressed.

The Observer Program objective would be implemented through management measures that would either maintain or expand existing coverage but allow more flexible deployment of observers; improve observer data, including development of uncertainty estimates; and address the conflict of interest in funding. Building more flexibility into observer deployment, so that coverage can be adjusted rapidly to respond to monitoring needs for data or compliance, would be beneficial and was an original intent of the Research Plan that preceded the interim Service Delivery Model program currently in place (for further historical description, see the Observer Program paper in Appendix F-10). Merely expanding coverage from 30 percent to 100 percent on the 60 to 125 ft LOA component of the fleet, would provide more data on those vessels but would leave other issues, such as flexibility of observer placement and the lack of observer coverage on vessels less than 60 ft LOA, unaddressed.

Implementing improvements to observer data under Alternative 3 is accomplished through measures addressing observer sampling stations, the level of species identification in observer samples, and uncertainty estimates. Historically, observers have identified only fish that are managed to the species level; however, the Observer Program has responded to requests to further identify other organisms, most recently skates, sculpins, and some coral species. The program must maintain a balance in consideration of the amount of time to teach identification and to record these species in the field, so as not to sacrifice target species data. A pilot project to determine the recording time required in the field is currently underway, with the goal of understanding the cost-benefit relationships of increasing the specificity of identification. This program would be expanded under Alternative 3. Regarding the setting of uncertainty estimates, currently there are no established confidence intervals for observer data. A 1997 analysis has indicated, however, that while statistical procedures may be appropriate for the most abundant species in the catch, the statistical precision decreased for rarer species, and the adoption of statistical estimators may need to be paralleled with an increase in the current level of observer coverage and the amount of hauls sampled (for further discussion, see the Observer Program paper in Appendix F-10).

The Observer Program funding issue stems from the appearance of a conflict of interest arising from the direct financial relationship between the observer's employer and industry. Alternative 3 changes the funding mechanism in order to alleviate any taint on the credibility of observer data, and proposes a range of solutions that include full federal funding, industry fee-based funding and setting aside a portion of TAC (for further discussion, see the Observer Program paper in Appendix F-10).

The implementation of changes to the data and reporting requirements expands the range of economic data requested from industry participants, and potentially sets up a third party verification system for reported data. New information would include data on employment, variable harvesting and processing costs, and fixed/annual costs (see Appendix F-11, the Data and Reporting Requirements paper, for further discussion). This additional information would enhance the ability of analysts to provide accurate estimates of the costs and benefits of proposed regulatory actions. Additionally, third party data collectors would be able to verify revenue data currently submitted. While authenticated data would allow for more accurate and credible economic impact assessments, a funding source would need to be identified to support the independent verification system.

The use of available technology to improve monitoring data is implemented through the requirements for appropriate scales and for VMS requirements to be potentially extended to all vessels over 125 ft LOA. The requirement for scales would not create any immediate change; however, should VMS be required aboard vessels that are not already so equipped, this would impose a cost on those vessels in terms of installation, maintenance, and transmission costs. Additionally, new VMS technology and system providers will be explored, which may lead to a reduction in costs or improvements in technology and usage.

Establishing an effective ecosystem monitoring plan would accelerate precautionary management by providing an appropriate baseline against which to measure the impacts of fishing. Various ongoing research initiatives would contribute to this program, and new areas of research would be identified. The results would be compiled into a comprehensive monitoring plan. Funding for such a program would need to be identified, but the results would be a beneficial step in understanding the ecosystem impacts of fishery interactions.

Alternative 3 also adopts the recommended research plan included in Chapter 5 of this document, which identifies data gaps and research needs. Alternative 3 expands research efforts by seeking out partners, such as the North Pacific Research Board, to fund research on these data needs.

The Alternative 3 data quality, monitoring, and enforcement objectives conform with the overall policy intent of the alternative, namely to accelerate precautionary management in two ways: where appropriate, to take steps to incorporate uncertainty and ecosystem considerations into fishery management, and at the same time, to increase efforts to improve scientific understanding and diminish uncertainty. The objectives in Alternative 3 result in data collection on direct fishery impacts and interactions as well as on broader ecosystem relationships and indirect effects.

4.10.5 Analysis of Alternative 4

Alternative 4 consists of a management approach statement and a set of policy objectives. The management approach statement provides the key to the underlying rationale and assumptions for the policy, along with policy goals and additional guidelines for the policy.

The management approach statement for Alternative 4 represents an extremely precautionary approach to managing fisheries under scientific uncertainty, in which the burden of proof is shifted from a demonstration of adverse environmental impact to prohibit or proscribe a fishery to a demonstration of no adverse impact to authorize one. The management approach statement is summarized in Table 4.10-3. This policy is based on the assumption that fishing does produce adverse impacts on the environment but due to lack of information and uncertainty, we know little about these impacts.

The Alternative 4 management approach statement also provides further guidance about NPFMC management decisions:

- Management decisions assume that science cannot eliminate uncertainty and that action must be taken in the face of large uncertainties, guided by policy priorities and the strict interpretation of the precautionary principle.
- Management decisions will involve and be responsive to the public but decrease emphasis on industry and community concerns.

As well as the effects of the policy:

- The strategy will result in a number of significant changes to the FMPs that will significantly curtail the groundfish fisheries until more information is known about the frequency and intensity of fishery impacts upon the environment.
- Once more is known about fishery effects on the ecosystem, scientific information will be used to modify and relax the precautionary measures initially adopted.

A summary of the impacts of Alternative 4 follows below in Section 4.10.5.1. In the remainder of Section 4.10.5, the impacts of the alternative are analyzed in detail, in relation to eight policy subheadings: prevent overfishing, preserve food web, reduce and avoid bycatch, avoid impacts to seabirds and marine mammals, reduce and avoid impacts to habitat, allocation issues, increase Alaska Native consultation, and data quality, monitoring, and enforcement. For each subheading, the impacts of the relevant goals and objectives from the management approach are analyzed, using as a guideline the range of implementing management measures for Alternative 4, identified in Section 4.2, and analyzed in Section 4.7.

4.10.5.1 Summary of Alternative 4

The key policy element that influences impacts under Alternative 4 is the shift of the burden of proof to the user of the resource to demonstrate that the intended use will not have a detrimental effect on the environment, which raises the standard of justification required for fishery management actions. Key management objectives that implement this approach are: reduce the ABCs, and in turn the TACs, or consider temporarily suspending the fisheries, to account for uncertainty; institute extensive closure areas (resulting in the closure of traditional fishing areas and an increased emphasis on non-consumptive values); phase out fisheries with greater than 25 percent incidental catch and bycatch rates; develop a Fisheries Ecosystem Plan; and increase data collection and monitoring (in order to fill in data gaps and adjust restrictive measures as appropriate).

Predictions about the impacts under this alternative are difficult due to the uncertainty involved in defining ecosystem management and predicting the impacts of protecting areas. The emphasis is on instituting protective measures, particularly focusing on less abundant or economically valuable species, while at the same time imposing extensive monitoring and data-gathering to increase understanding of fishery impacts.

Alternative 4 establishes a very conservative harvest policy which is likely to prevent overfishing and reduce the chance that stocks would become overfished. Constraints to commercial harvest coupled with systems of closed areas would effectively reduce impacts from the race-for-fish and therefore from spatial/temporal concentration of catch. Catch monitoring would also increase under this alternative, resulting in more complete fisheries data. As with Alternative 3, this alternative would define criteria for determining the status of all managed stocks relative to an overfished condition in order to better satisfy the requirements of the National Standard 1 Guidelines. In the long-term, this alternative would protect the most vulnerable species of the complex, but the resulting management of many stocks with low biomass would be difficult to implement.

This alternative is very successful in meeting the goal of preserving the food web, by providing large buffers against scientific uncertainty about ecosystem impacts resulting from fishing. The assumption that the present level of scientific information is insufficient to manage fisheries without excessive risk to the ecosystem results in the implementation of highly precautionary measures. This strategy provides improvements over the baseline and achieves protection of virtually all food web components and thus ecosystem functions. Although the alternative is successful in producing a food web that is less influenced by fishing activity, predictions about the abundance changes of individual food web components that might result are uncertain due to the difficulty in accurately predicting predator-prey relationships.

The bycatch and incidental catch reduction policies under Alternative 4 are effective. Reduced bycatch and incidental catch would be achieved through extreme reductions in target groundfish catch and strong bycatch and incidental catch limits.

Alternative 4 is very successful at avoiding impacts to seabirds and marine mammals through its specific objectives to protect all seabirds from fishing interactions, and extending protection measures for Steller sea lion critical habitat and prey base. This largely increased level of protection provides a substantial buffer against uncertainty with regards to protection of marine mammals and seabirds.

The emphasis of the Alternative 4 policy on habitat provides large buffers against scientific uncertainty about the impacts of fishing on habitat. The combination of highly precautionary measures associated with increasing marine reserves and other closure areas will likely achieve protection and avoidance of impacts to habitat. Cumulatively, the alternative has a split rating, as the existing adverse condition of the baseline includes damage to slow-growing species unlikely to recover within the time period predicted in this analysis, however this alternative provides strong protection for habitat and potential for mitigation.

The Alternative 4 goals of incorporating and enhancing non-consumptive use values are met but at the expense of commercial value and potentially the continued viability of coastal communities. The precautionary policies in Alternative 4 could result in substantial reductions in allowable catches and could also result in the closure of large portions of traditional fishing areas. The alternative is likely to result in a substantial increase in the non-market values of the ecosystem, but is also likely to result in a substantial decrease in efficiency, net revenues, and the number of participants in the fisheries.

Alternative 4 would directly involve Alaska Natives in fishery management through the development of co-management or cooperative research programs. Consultation and participation objectives would focus on subsistence uses and cultural values of living marine resources. However, other goals and objectives in Alternative 4, that greatly reduce or eliminate commercial fishing, would adversely impact Native communities, including CDQ communities, through the loss of employment, economic activity, and community revenues.

Alternative 4 expands research and monitoring programs to obtain information necessary to fulfill the requirements of this alternative. The policy objectives are successful in increasing fisheries data by expanding the Observer Program to full coverage for vessels over 60 ft LOA, and instituting 30 percent coverage on smaller boats. Additionally, the requirements to improve the accuracy of data through technological means such as at-sea scales and VMS will improve monitoring and enforcement under this alternative.

4.10.5.2 Prevent Overfishing

This policy represents an extremely precautionary approach to managing fisheries under scientific uncertainty. It shifts the burden of proof to the user of the resource and the agency to demonstrate that the intended use would not have a detrimental effect on the environment. It would involve a strict interpretation of the precautionary principle. Management discussions would involve and be responsive to the public, but would decrease emphasis on industry and community concerns in favor of ecosystem processes and principles. This policy assumes that fishing does produce adverse impacts on the environment, but due to a lack of information and uncertainty, we know little about these impacts. The initial restrictive and precautionary conservation and management measures would be modified or relaxed when additional, reliable scientific information becomes available.

A detailed description of FMP 4.1 and FMP 4.2 appears in Section 4.2. FMP 4.1 illustrates a Fishery Management Plan where current levels of fishing are reduced and other precautionary restrictions are implemented until scientific research shows that the fisheries have no adverse effect on the resource and its environment. FMP 4.2 suspends all fishing until fisheries can be shown to have no adverse effect on the resource and its environment

Accordingly, FMP 4.1 would substantially reduce the impacts of the fishery. A modified TAC-setting process would create a more substantial buffer between ABC for selected species, and the OFL by setting the fishing mortality rate at $F_{75\%}$ for all Steller sea lion prey species (pollock, Pacific cod and Atka mackerel) and for rockfish (as long-lived, slow-growing species). Also, the $max F_{ABC}$ for each stock or stock complex in Tiers 1-5 would be adjusted downward as a function of uncertainty in the biomass survey estimate for that stock or stock complex.

Under FMP 4.1, OY would be specified separately for each stock or stock complex rather than for the groundfish complex as a whole, and would be set equal to the respective TAC. The current precautionary practice of setting TAC less than or equal to ABC would be formalized in the FMP. For species managed as members of a stock complex, rather than setting TAC as the aggregate of the individual members' ABCs, the max_{ABC} value for each component stock would be determined and the TAC set equal to the lowest value. Where sufficient biological information is available, such as with EBS pollock, TAC would be distributed on a smaller spatial scale. Minimum stock size thresholds would be determined for all tiers.

To further mitigate the possibility of detrimental biological and environmental impact, 20 to 50 percent of the management area would be designated as no-take marine reserves (i.e., no commercial fishing) covering the full range of marine habitats within the 1,000 m bathymetric line (see Figure 4.2-6). As part of this area in the Aleutian Islands, a Special Management Area would be established to protect coral and other live bottom habitats. This area would also include spawning reserve areas for intensively fished species. Comprehensive trawl exclusion zones would be set to protect all Steller sea lion critical habitat, and trawling itself would be restricted to only those fisheries that cannot be prosecuted with other gear types (i.e., the flatfish fisheries.)

In an effort to reduce waste and the risk of adverse impact to the environment, existing PSC limits would be reduced by half under this bookend, as would bycatch and discard rates. IR/IU would be extended to all target species. Stringent PSC limits would be set for salmon, crab and herring in the GOA, and as information becomes available, bycatch limits would be set for non-target species also. Protection measures would be set for all seabird species.

As this policy alternative necessitates greater research and data-gathering efforts, FMP 4.1 would expand observer coverage to 100 percent for all vessels over 60 ft LOA and require 30 percent observer coverage on vessels presently exempted from observer coverage (i.e., vessels under 60 ft LOA). VMS would be made mandatory for all groundfish vessels, as would motion-compensated scales for weighing all catches at sea or at shore-based processors. Cooperative research and data-gathering programs would be initiated as well to expand the use of Traditional Knowledge in fisheries management.

FMP 4.2 extrapolates the precautionary principles of Alternative 4 by suspending all fishing until the fisheries can be shown to have no adverse effect on the resource and its environment. The TAC for all species would be set at zero. All areas of the EEZ (3 to 200 nautical miles) would be closed to all fishing (e.g. commercial, recreational, and subsistence) (see Figure 4.2-7). Bycatch and incidental catch, as well as the take of seabirds and marine mammals, would then necessarily be reduced to zero. Scientific research and data-gathering efforts would continue. When a fishery can be shown to pose no significant threat of adverse biological and environmental impacts, or if adverse effects can be successfully mitigated through use of fishery-specific regulations, the measures illustrated by this FMP would be relaxed to allow fishing to resume.

Under the FMP 4.2 illustration, we have assumed that each groundfish fishery currently conducted within the EEZ in the BSAI and GOA would be individually reviewed by the NPFMC and NOAA Fisheries. Upon completion of this review (up to 2 years), the agency would certify those fisheries that are found to have no significantly adverse impacts on the environment and authorize fishing under a specific set of regulations. If a fishery is found by this review to produce significantly adverse environmental effects, and mitigation measures cannot be designed to mitigate those effects, that fishery would not be certified and would remain closed until more scientific information is known.

Impacts of Policy

The harvest policies in Alternative 4 as illustrated by FMP 4.1 are consistent with ecosystem principles that call for in-season multi-species catch monitoring to ensure that catch does not exceed the OFL of groundfish. This catch monitoring is facilitated by at-sea observers, port samplers, weekly production reports, and fish ticket information (Appendix F-10). For several stocks managed in Tiers 4-6, direct and indirect impacts analyses reflect a shift away from unknown to insignificant. This change is possible because Alternative 4 requires that status criteria be established for stocks managed in these tiers. Cumulative effects considerations do not change the impact rankings for target stocks.

Goals, Objectives	Corresponding Management Measures	
<p><u>Goals</u></p> <ul style="list-style-type: none"> Establish a fishery conservation and management program to maintain ecological relationships among exploited, dependent and related species as well as ecosystem processes that sustain them Adopt an extremely precautionary approach to managing fisheries under scientific uncertainty Shift the burden of proof to the user of the resource and the agency to demonstrate that the intended use would not have a detrimental effect on the environment <p><u>Objectives</u></p> <ul style="list-style-type: none"> Prevent overfishing by transitioning from single-species to ecosystem-oriented management of fishing activities Protect the productivity and genetic diversity of groundfish 	<p>Example Range: $TAC \leq ABC \leq OFL$, formal adjustments for uncertainty, automatic rebuilding, specific harvest policies for rockfish</p>	<p>Quota management based on a tier system. Revised procedures to set ABC, TAC including precautionary fishing mortality rates for individual species and species complexes. For example purposes only, F_{ABC} for Tier 3 rockfish stocks would be set at $F_{75\%}$, F_{ABC} for Atka mackerel, BSAI and GOA Pacific cod, and BSAI and GOA pollock would be set equal to $F_{75\%}$. Uncertainty corrections based on the lower 90% confidence limits of the survey biomass indices would be applied to F_{ABC}.</p>
	<p>Time/Area</p>	<p>Spatial/temporal distribution of TAC on a smaller scale. These policies reduce the possibility of spatial temporal concentration of the catch. FMPs 4.1, and 4.2 create large marine reserves and marine protected areas. FMP 4.1 closes 20-50% of known spawning areas of target species across the range of the stock.</p>
	<p>Gear restrictions</p>	<p>For walleye pollock, Pacific cod, and sablefish, gear allocations partition catch to specific gear groups. Differences in gear selectivity are addressed in the stock assessment models and quotas reflect the expected age distribution of the catch by gear.</p>
	<p>OY caps</p>	<p>Under FMPs 4.1 and 4.2 Optimum Yield caps for the GOA and BSAI would be set at the sum of the ABCs for the GOA and BSAI.</p>
	<p>Inseason Multi-species TAC and ABC monitoring</p>	<p>The catch of a given target species is limited by prohibited species bycatch caps and the TACs for other groundfish. The halibut bycatch caps serve as a constraint to BSAI and GOA flatfish expansion. Reduced bycatch allowances would further constrain target fisheries. Procedures to break-out species from existing managed categories would be phased in.</p>

The bookends provide a range of potential impacts associated with this alternative. Several management measures associated with FMP 4.2 would close all commercial fisheries in the short-term. Several constraints to commercial fisheries are imposed under FMP 4.1. First, an uncertainty correction would be applied that would account for measurement in the survey biomass estimates. Second, the F_{ABC} for Steller sea lion prey species and rockfish species would be set at $F_{75\%}$. Third, FMP 4.1 would impose a 30-60 percent reduction in bycatch. Fourth, FMP 4.2 would set the ABC for species managed as a complex equal to the lowest single species ABC for members of the complex. Finally, procedures for breaking species out of the other species complex would be established. Direct and indirect impacts analyses revealed that overfishing did not occur in the 38 stocks or stock complexes modeled under FMP 4.1 or FMP 4.2 (Table 4.10-2a). Relative to the comparative baseline, the expected fishing mortality under Alternative 4 would have no significant impact on any of the target groundfish stocks.

Relative to the comparative baseline, the likelihood of a stock falling below the level where the stock is capable of producing MSY is reduced under Alternative 4. Irreversible or long-term adverse effects on fishery resources are avoided by extremely precautionary harvest policies, and imposition of rebuilding regulations when stocks fall below the level capable of producing MSY. Under FMP 4.1 and FMP 4.2, none of the stocks managed in Tiers 1-3 would be expected to become overfished (Table 4.8-1). Adoption of FMP 4.1 would have a significantly beneficial impact on the ability of the stock to maintain itself above an overfished condition for BSAI Pacific cod, BSAI/GOA sablefish, BSAI Atka mackerel and BSAI Pacific ocean perch. Adoption of FMP 4.2 would have a significantly beneficial impact on the ability of the stock to maintain itself above an overfished condition for EBS pollock, BSAI and GOA Pacific cod, BSAI/GOA sablefish, BSAI Atka mackerel, and BSAI Pacific ocean perch. The direct and indirect impacts of Alternative 4 on Tiers 1-3 target groundfish stocks other than those mentioned above would be insignificant relative to the baseline (Table 4.8-1). With the exception of GOA Atka mackerel, the direct and indirect impacts of commercial fishing on the biomass of target groundfish stocks managed in Tiers 4-6 are considered insignificant because fisheries removals are constrained to very low levels (Table 4.8-1).

Relative to the comparative baseline, Alternative 4 adds several spatial/temporal restrictions on catch. These restrictions would decrease the spatial/temporal concentration of the catch. The direct and indirect impacts of spatial temporal concentration of the catch under Alternative 4 are unknown for GOA Atka mackerel. With the exception of GOA Atka mackerel, the direct and indirect impacts of commercial fishing on the genetic structure of the stock are considered insignificant (Table 4.8-1). Direct and indirect impacts of spatial temporal concentration of the catch on reproductive success are insignificant for most stocks or stock complexes. Significantly beneficial impacts of spatial temporal concentration of the catch on the reproductive success of BSAI Atka mackerel and BSAI Pacific ocean perch are expected.

Relative to the comparative baseline, Alternative 4 would increase restrictions on the spatial temporal partitioning of catch and could reduce overall harvest of target groundfish. The direct and indirect impacts of these changes on prey availability and predation mortality are expected to be insignificant for all stocks managed in Tiers 1-3 (Table 4.8-1). Direct and indirect impacts of commercial fishing on prey availability and predation mortality of all stocks or stock complexes managed in Tiers 4-6 are unknown because the status of the stock relative to MSST are unknown (Table 4.8-1).

Harvest restrictions, spatial temporal constraints, and gear allocations all serve to mitigate the impact of commercial fishing on fish habitat. The closure system described in the FMP 4.1 would close approximately 19 percent of the EEZ to some form of MPA and designates approximately 11 percent of the EEZ as a no-take reserve (Figure 4.2-6). For the fishable area (depth to 1,000 m) of the EEZ, FMP 4.1 would designate approximately 29 percent of the fishable area as a no-take reserve and about 51 percent of the fishable area as some form of MPA. FMP 4.2 assumes 100 percent of the EEZ would be designated as a no-take reserve (Figure 4.2-7). Relative to the comparative baseline, the impacts on target species resulting from habitat disturbance are considered insignificant for 37 of 38 stocks (Table 4.10-2a).

When taken in aggregate, Alternative 4 appears to impose an extremely precautionary approach to managing fisheries under scientific uncertainty. The policy establishes a fishery conservation and management program to maintain ecological relationships among exploited, dependent, and related species, as well as ecosystem processes that sustain them. Strengths of Alternative 4 are that the FMPs will adopt formal criteria for status determination. MSSTs would be formally specified in the FMPs whenever possible under Alternative 4 bringing this policy into compliance with NOAA Fisheries guidelines for National Standard 1. Status criteria

would be established for stocks managed in Tiers 4-6. The constraints to commercial harvest coupled with systems of closed areas would reduce the race-for-fish under Alternative 4 and would reduce the spatial temporal concentration of the catch. Setting ABCs for species managed in complexes at the lowest single species ABC for members of the complex would curtail the impact of fishing some target groundfish stocks managed in Tiers 4-6. A weakness of this policy is that treatment of species complexes for Alternative 4 could be administratively cumbersome and practically difficult to implement. A second weakness of this policy is that the increased closed areas envisioned under FMP 4.1 could restrict commercial harvests to a very limited region of the Aleutian Islands and GOA. A third weakness of Alternative 4 is that implementing requirements to establish status criteria for stocks managed in Tiers 4-6 would require a substantial increase in funds to support catch monitoring, enforcement, collection of and analysis of demographic information, and additional surveys.

4.10.5.3 Preserve Food Web

The Alternative 4 policy sets goals and objectives to preserve the food web, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p><u>Goals</u></p> <ul style="list-style-type: none"> Establish a fishery conservation and management program to maintain ecological relationships among exploited, dependent and related species as well as ecosystem processes that sustain them Incorporate and apply strict ecosystem principles Address the impact of fishing on predator-prey and other important ecological relationships in the marine environment <p><u>Objectives</u></p> <ul style="list-style-type: none"> Develop and implement a Fishery Ecosystem Plan through the modification or amendment of current FMPs Conserve native species and biological diversity at all relevant scales of genetic, species, and community interactions Reduce the ABC to account for uncertainty and ecological considerations for all exploited stocks, including genetic, life history, food web and habitat considerations Set fishing levels in a highly precautionary manner to preserve ecological relationships between exploited, dependent, and related species 	TAC-setting Process	Prohibit directed fishery for forage fish
		Set F_{75} for Steller sea lion prey species and for vulnerable (e.g., long-life, slow-growing) species
		Procedures to incorporate precaution, survey variance and uncertainty into ABCs
		Evaluate a range of ABCs using the lower bound of a confidence limit to address uncertainties in stock assessment advice

Impacts of Policy

Impacts to food webs of the BSAI and GOA are reduced through most of the goals and objectives and the related management measures of this FMP. In addition to the objectives of developing a Fisheries Ecosystem Plan, conserving native species and biological diversity at all scales, and implementing highly precautionary fishing levels to preserve ecological relationships are all viewed as positive benefits of this policy.

Alternative 4 goals and objectives, which include the prevention of overfishing, bycatch reduction, avoidance of impacts to seabirds, marine mammals, and habitat, and improvements in data quality and monitoring, are critical to the protection of all food web components, which include target and non-specified species, PSC species, HAPC biota, and marine mammals and seabirds. The following management measures in FMP 4.1 provide increased protection to a variety of important food web components, relative to the baseline: revised procedures to set ABC that include much more precautionary F rates than in the baseline, procedures to incorporate precaution into ABCs, and finer scale spatial temporal distribution of the TAC (Section 4.10.5.2); larger reductions in PSC limits and extension of IR/IU to all target species (Section 4.10.5.4); more precautionary F limits for Steller sea lion prey species and gear modifications and fishing methods to reduce incidental take of all ESA-listed seabirds or species of concern to levels approaching zero (Section 4.10.5.5); establishment of large amounts of no-take MPAs, special Aleutian Islands coral management area, and additional bottom trawling restrictions (Section 4.10.5.6); and expansion of the data quality and monitoring goals through expanded observer coverage, VMS for all groundfish vessels, and uncertainty estimate development for all stocks (Section 4.10.5.9). At the alternative's most stringent application in FMP 4.2, fisheries would not be prosecuted until scientific research could show there was no significant ecological impact. See the policy analysis in those sections for details on the level of protection provided by Alternative 4 to these individual components.

This alternative specifically incorporates ecosystem considerations into fishery management decisions through development of a Fisheries Ecosystem Plan and application of ecosystem principles by modification of ABC to take uncertainty and ecological factors into account. Analysis of the ecosystem effects of FMP 4.1 involved selection of alternatives that would show changes in key members or ecosystem characteristics that are important to the structure and function of marine food webs. Changes in pelagic forage, top predators, spatial/temporal availability of prey, exotic species introductions, energy removal and redirection through fishery catch removals and discarding and offal production, and various measures of diversity were evaluated with respect to the potential for fishing to cause changes sufficient to bring these attributes below population, community, or ecosystem thresholds, if such thresholds could be defined. Virtually all of these indicators showed a beneficial change relative to the comparative baseline, although the amount and direction of change that would actually occur is uncertain because of difficulties in accurately predicting predator/prey interactions. This alternative shows potential significant improvements in pelagic forage availability through its more precautionary F limits on walleye pollock and Atka mackerel and significant improvements in spatial/temporal availability of forage through the designation of areas open to fishing outside foraging areas of mammals. By its TAC rules based on the least abundant group member, this alternative removes the uncertainty about protection of sensitive species such as sharks and skates that are managed in groups. Qualitative analysis of the alternative with respect to the ecosystem effects of the TAC setting process (Appendix F-1) shows that its management measures have the potential to make large reductions in TACs of several species that are key food web members such as walleye pollock and Atka mackerel and protection of sensitive, slow growing species through least abundant member TAC rules. These provide protection to food webs that rely on these pelagic forage species and to species diversity.

This alternative is very successful in meeting the goal of preserving the food web through its objectives of reducing ABCs to take uncertainty and ecological considerations into account and to set fishing levels in a highly precautionary manner to preserve food web relationships. The emphasis in this alternative is on providing large buffers against scientific uncertainty about ecosystem impacts of fishing through much more stringent F levels for some species and closures of large amounts of areas to fishing. It assumes scientific information is not sufficient to manage fisheries without excessive risk to the ecosystem, and thus prescribes

these more highly precautionary measures. This strategy provides improvements, most significantly beneficial, from the comparative baseline and likely achieves protection of virtually all food web components and thus ecosystem function.

4.10.5.4 Reduce and Avoid Bycatch

Several policy changes adopted in Alternative 4 would impact the bycatch and incidental catch of target and non-target species. At the extreme, bycatch and incidental catch of target and non-target species would be zero under FMP 4.2. FMP 4.1 imposes several constraints to fishing that would reduce bycatch and the incidental catch of target and non-target species in groundfish fisheries. FMP 4.1 would substantially reduce the impacts of the fishery through a modified TAC-setting process. This FMP would also impose constraints to incidental catch of species managed as members of a stock complex by setting conservative TACs for the complex. FMP 4.1 creates no-take marine reserves (i.e., no commercial fishing) that would serve as a refuge for non-target species (see Figure 4.2-6). In an effort to reduce waste and the risk of adverse impact to the environment, existing PSC limits and bycatch rates would be cut in half. IR/IU would be extended to all target species. FMP 4.1 would expand observer coverage to 100 percent for all vessels over 60 ft LOA and require 30 percent observer coverage on vessels presently exempted from observer coverage (i.e., vessels under 60 ft LOA). VMS would be made mandatory for all groundfish vessels, as would motion-compensated scales for weighing all catches at sea or at shore-based processors. Cooperative research and data-gathering programs would be initiated as well to expand the use of Traditional Knowledge in fisheries management.

Impacts of Policy

Alternative 4 is expected to encourage the development of practical measures that reduce bycatch and incidental catch of prohibited species, target species, other species, forage fish and non-specified species. Relative to the comparative baseline, the impacts of mortality and change in biomass associated with the Alternative 4 policy would be conditionally significant beneficial impacts due to changes in fishing mortality for prohibited species that are currently in a depressed or overfished condition (BSAI and GOA chinook salmon and BSAI other salmon, *C. bairdi* crab, *C. opilio* crab, BSAI and GOA red king crab, and BSAI blue king crab [Table 4.10-2a]). In addition, conditionally significant beneficial impacts due to changes in fishing mortality are anticipated for GOA other salmon. Conditionally significant beneficial impacts due to changes in biomass and habitat are anticipated for crab stocks that are currently in a depressed or overfished condition. The impact of Alternative 4 on forage fish mortality is insignificant. The impact of Alternative 4 on all other non-target or unspecified groups is unknown.

Alternative 4 as illustrated by FMP 4.1 indicates that BSAI flatfish fisheries may expand relative to the comparative baseline. This expansion results from reductions in trawl fisheries for Pacific cod and rockfish. This expansion may be constrained by the policy objective of phasing out fisheries with >25 percent incidental catch and bycatch rates. However, in the short-term species typically caught in fisheries that target flatfish may experience higher rates of incidental fishing mortality.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p><u>Goals</u></p> <ul style="list-style-type: none"> Implement measures that avoid or minimize bycatch <p><u>Objectives</u></p> <ul style="list-style-type: none"> Include bycatch mortality in TAC accounting and improve the accuracy of mortality assessments for target, non-target and PSC bycatch, including unobserved mortality Reduce bycatch, incidental catch and PSC limits (e.g., by 10%/ year for five years) Phase out fisheries with >25% incidental catch and bycatch rates Establish PSC limits for salmon, crab and herring in the GOA Set stringent bycatch limits for vulnerable non-target species based on best available information Protect habitat and reduce bycatch, prohibit trawling in fisheries that can be prosecuted with more selective gear types and establish trawl closures areas 	MPAs and EFH, Bycatch and Incidental Catch Restrictions, Gear Restrictions and Allocations	Establish gear closure areas and marine reserves to reduce and avoid bycatch
	Bycatch and Incidental Catch Restrictions	Reduce existing PSC limits for prohibited species, establish PSC limits for prohibited species other than halibut in the GOA
		Procedure to develop mortality rate-based approach to setting limits
		Extend retention standards for pollock and Pacific cod (IR/IU) to all target species
	Vessel incentive programs (VIP) and bycatch restrictions (including in-season)	

Alternative 4 policies as illustrated by FMPs 4.1 and 4.2 are consistent with the goal of implementing measures that avoid or reduce bycatch. Alternative 4 policies are also consistent with the objectives of accounting for bycatch mortality in TAC accounting and improving the accuracy of mortality assessments for target, non-target and PSC bycatch, including unobserved mortality. Reduced bycatch and incidental catch would be achieved through extreme reductions in target groundfish catch and strong bycatch and incidental catch limits.

4.10.5.5 Avoid Impacts to Seabirds and Marine Mammals

The Alternative 4 policy sets objectives to avoid impacts to seabirds and marine mammals, as well as recommending a range of management measures that would implement these objectives.

Impacts of Policy

This alternative has objectives to set protection measures immediately for all seabird species; cooperate with USFWS to develop fishing methods that reduce seabird takes to levels approaching zero for all threatened, endangered, or USFWS species of management concern; initiate a joint research program with USFWS to evaluate populations of seabirds that interact with groundfish fisheries; and increase existing protection measures for Steller sea lions by further gear restrictions in critical habitat and more conservative harvest levels for key prey species. Management measures to accomplish these objectives include setting F_{75} for Steller sea lion prey species, continued prohibition of directed fishery for forage fish, comprehensive trawl exclusions zones to protect all designated Steller sea lion critical habitat, short-tailed albatross take restrictions, setting protection measures for all seabird species, and development of gear modifications and fishing methods to reduce incidental take of ESA-listed or seabird species of concern to levels approaching zero. Impacts of the alternative with respect to seabirds were evaluated with respect to the potential for

fisheries to cause direct mortality through fishing gear and vessel strikes, changes in prey availability (including offal), and changes in benthic habitat that might affect certain prey species of seabirds. Impacts for marine mammals were evaluated with respect to the potential for fishery incidental take or entanglement in marine debris, harvest of prey species, spatial/temporal concentration of fishing on prey, and fishing vessel disturbance.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Objectives</u> <ul style="list-style-type: none"> Set protection measures immediately for all seabird species and cooperate with USFWS to develop fishing methods that reduce incidental takes to levels approaching zero for all threatened or endangered species and for USFWS' list of species of management concern Initiate joint research program with USFWS to evaluate current population estimates for all seabird species that interact with the groundfish fisheries and modify protection measures based on research findings Increase existing protection measures for ESA-listed Steller sea lions by further restricting gear in critical habitat and setting more conservative harvest levels for prey base species 	TAC-setting Process, Steller sea lion Measures	Set F_{75} for Steller sea lion prey species
	TAC-setting Process	Prohibit directed fishery for forage fish
	MPAs and EFH, Steller sea lion Measures, Gear Restrictions and Allocations	Comprehensive trawl exclusion zones to protect all designated Steller sea lion critical habitat
	Seabird Measures	Short-tailed albatross take restrictions
		Set protection measures for all seabird species
	Develop gear modifications and fishing methods that reduce incidental take for all ESA-listed seabirds or other species of concern to levels approaching zero	

Qualitative analysis of the Steller sea lion protection measures and other policies of this alternative (Appendix F-4) found that the policies and measures provided large buffers against uncertainty and would provide substantially more certainty of marine mammal protection. Quantitative indicators showed that Alternative 4 provides significantly beneficial population level effects on Steller sea lions and potential improvements for northern fur seal and harbor seals due to increases in prey abundance and availability, although the amount and direction of change that would actually occur is uncertain because of difficulties in accurately predicting predator/prey interactions.

Although some piscivorous bird species such as glaucous-winged gulls might be gaining food subsidies from discards and offal in the baseline, other piscivorous birds would be negatively impacted by competitive interactions with gulls, thus offsetting any changes for the piscivorous bird group as a whole that might occur in this alternative. Incidental take of albatross, fulmars, shearwaters, and gulls would be greatly reduced from the baseline due to new mitigation measures and greatly reduced fishing effort for both the longline and trawl fleets. The risk of exceeding ESA-threshold mortality of short-tailed albatross would be greatly reduced from the baseline levels. The qualitative analysis paper entitled Seabird Protection Measures (Appendix F-6) noted that the Observer Program would be expanded under this alternative to cover all of the groundfish fleet and would play a vital role in seabird/fishery interaction research. As in Alternatives 1 and 3, this alternative is not expected to have any population level effects on seabird species through mortality, changes in food

availability, or benthic habitat. Thus, this alternative provides much more protection to seabirds and marine mammals relative to the baseline, even though baseline determinations showed no serious adverse impacts of the groundfish fishery on these populations.

This alternative is very successful at avoiding impacts to seabirds and marine mammals by setting protection measures immediately for all seabirds, implementing further gear restrictions in critical habitat of Steller sea lions and setting more conservative harvest levels for Steller sea lion prey. This largely increased level of protection provides a substantial buffer against uncertainty with respect to protection of marine mammals and seabirds.

4.10.5.6 Reduce and Avoid Impacts to Habitat

The Alternative 4 policy sets a goal and objectives to reduce and avoid impacts to habitat, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> Address the impacts of fishing on habitat <u>Objectives</u> <ul style="list-style-type: none"> Zone and delimit fishing gear use in the action area and establish no-take marine reserves (both pelagic and nearshore) encompassing 20-50% of management areas to conserve EFH, provide refuges from fishing, serve as experimental controls to test the effects of fisheries, protect genetic and biological diversity, and foster regeneration of depleted stocks in fished areas Protect habitat and reduce bycatch, prohibit trawling in fisheries that can be prosecuted with more selective gear types and establish trawl closures areas Manage fisheries in an explicitly adaptive manner to facilitate learning (including large no-take marine reserves that provide experimental controls) Protect marine habitats, including EFH, HAPC, ESA-designated critical habitats and other identified habitat types Commit to funding a comprehensive research plan in order to a provide baseline habitat atlas 	MPAs and EFH	Establish 20-50% of management area as no take MPAs covering the full range of marine habitats
		Establish Aleutian Islands Special Management Area to protect coral/live bottom habitat
		Identify and designate EFH and HAPC
	Gear Restrictions and Allocations	Restrict bottom trawling for flatfish to specific areas

Impacts of Policy

Alternative 4 represents a fundamental change in the management of fisheries by presuming that the current groundfish fisheries are producing large-scale adverse effects on the marine ecosystem including habitat. Current levels of fishing are reduced and 20 to 50 percent of the management area would be designated as no-take marine reserves (i.e., no commercial fishing) within the 1,000 m bathymetric line. A Special Management Area would be established in the Aleutian Islands to protect coral and living habitat. Bottom trawling would be restricted to only those fisheries that cannot be prosecuted with other gear types (i.e, the flatfish fisheries). Given these management goals and associated measures, impacts to habitat are expected to be significantly reduced and possibly eliminated relative to comparative baseline levels.

Alternative 4 addresses impacts to habitat by the presumption that current groundfish fisheries are producing adverse effects to habitat. The institution of large scale no-take marine reserves, restrictions to trawling, and reduced TACs should accelerate habitat protection and will cause rapid reduction and avoidance of impacts to habitat. For short-lived biota with fast recovery rates, recovery from past effects could occur quickly. For other species of living substrates such as long-lived corals and perhaps some sponges, increases over comparative baseline levels may not occur or may occur only after many years.

Implementation of this policy will result in large scale geographical shifts in fishing efforts or no fishing at all. At its most stringent application fisheries would not be prosecuted until scientific research shows there would be no significant impacts. At its less stringent application, reductions in target species catches should over-ride any negative impacts due to geographic shifts in fishing effort and result in less overall impacts and overall benefits to habitat. The reduction in TAC associated with this policy could even negate the need for closed areas. This policy also calls for a commitment to funding a comprehensive research plan which should enable meeting the policy goal of addressing impacts to habitat, adapting management to facilitate learning, and responding to new information.

From a cumulative impacts perspective, the baseline condition is adversely impacted due to historical impacts that have potentially caused long-term and possibly irreversible loss of living habitat, especially to long-lived, slow-growing species which are slow to recover. While benefits, in terms of decreased mortality and protection of community structure, accrue due to the extensive reductions in TACs and reduction in bottom trawling, it is uncertain whether these benefits will sufficiently mitigate the accumulated adverse impacts in the baseline. The cumulative rating is split between conditionally significant adverse, due to the fact that the baseline is already considered to be impacted and additional impacts both internal and external, cannot be eliminated, and conditionally significant beneficial as the alternative has the potential to provide significant mitigative benefits to affected habitat.

The emphasis of this policy is on providing large buffers against scientific uncertainty about impacts of fishing on habitat. Under this alternative, current scientific information is presumed to be insufficient to manage fisheries without excessive risk to habitat. Overall prescription of the highly precautionary measures associated with this policy will likely achieve protection of and avoidance of impacts to habitat.

4.10.5.7 Address Allocation Issues

This policy represents a highly precautionary approach to managing fisheries under scientific uncertainty. It shifts the burden of proof to the user of the resource and the agency to demonstrate that the intended use would not have a detrimental effect on the environment. Management discussions would involve and be responsive to the public, but would decrease emphasis on industry and community concerns in favor of ecosystem processes and principles. When fishing is allowed the policy could place additional controls on the fisheries through bycatch restrictions, gear restrictions, additional time and area closures or other traditional management measures.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> • Include the use of explicit allocative or cooperative programs to reduce excess capacity and allocate fish to particular gear types and fisheries • Identify and incorporate non-consumptive use values <u>Objectives</u> <ul style="list-style-type: none"> • Reduce excess fishing capacity and employ equitable allocative or cooperative programs to end the race-for-fish, reduce waste, increase safety, and promote long-term sustainability and benefits to fishing communities • Consider non-consumptive use values 	Gear Restrictions and Allocations	Allocate by gear for certain directed fisheries
	Overcapacity	LLP program for groundfish fisheries, additional procedures to reduce effort such as seasonal exclusive area registration
		Rights-based management programs for certain directed fisheries, and community quota programs
		Effort-limiting regulations, such as limits on trips, gear size, vessel size or horsepower

Impacts of Policy

The principle policy goals of the Alternative, namely the incorporation and the implied enhancement of non-consumptive ecosystem values appears to be largely met by the management measures. The achievement of this goal however, appears to be at the expense of commercial benefits to the fishing and processing industry, coastal communities dependent on fisheries, and seafood consumers.

The precautionary policies in Alternative 4 could result in substantial reductions in allowable catches and could also result in the closure of large portions of traditional fishing areas. In fisheries that are allowed to continue, the policy calls for imposition of additional bycatch and incidental catch restrictions, as well as additional time and area closures, and gear restrictions. Together these additional controls on effort could have a substantial negative consequence on efficiency and the ability of the industry to create profits. Overall, we are unable to determine the net effect of values generated from the ecosystem. The alternative is likely to result in a substantial decreases in the commercial value from the ecosystem, and in the extreme could affect the continued viability of fishing communities as well as fishing and processing sectors. At the same time the alternative would likely result in substantial increases in non-market values attributed to the ecosystem by the American public and could increase recreational and tourism values. Benefits to recreation and tourism, however, could also be negatively affected to extent that Alaskan coastal communities dependent on groundfish are also involved in recreation and tourism. Additional information on ecosystem values can be found in Section 3.9.8 and Section 4.10.5.7.

The alternative would likely increase the controls placed on the participants in terms of allowable gears, trip lengths, and fishing periods and allowable bycatch, and therefore would result in declines in harvesting and processing efficiency, and could substantially alter the current distribution of catches and processing among sectors and communities. This alternative could also substantially decrease the number of participants in the fishery, community revenues, monies to support industries. Health and safety factors of participants could worsen because of increased distance to open fishing area, but because of the reduction in participants overall numbers of injuries would likely decline. Management costs for this alternative could be higher than the comparative baseline for the fisheries that continue because of the increased number of regulations, but to the extent that fisheries are shut down, overall management costs could be reduced.

4.10.5.8 Increase Alaska Native Consultation

The Alternative 4 policy sets goals and objectives to increase Alaska Native consultation, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Objectives</u> <ul style="list-style-type: none"> Utilize Traditional Knowledge in fishery management, including monitoring and data-gathering capabilities, through co-management and cooperative research programs Increase participation of and consultation with Alaska Native subsistence users and explicitly address the direct, indirect and cumulative fishery impacts on traditional subsistence uses and cultural values of living marine resources 	Alaska Native Issues	Initiate cooperative research programs to enhance Traditional Knowledge in fishery management
		Increase consultation with and encourage participation of subsistence users (Native and non-Native)
		Provide for traditional Native subsistence uses within protected areas

Impacts of Policy

Under Alternative 4, Alaska Native participation and consultation in fishery management would increase. NOAA Fisheries and the NPFMC would utilize Traditional Knowledge in fishery management, including investigating Native involvement in monitoring and data-gathering capabilities. Opportunities for co-management and cooperative research would also be evaluated and implemented. Consultation with subsistence users would increase, and their participation in fishery management would be encouraged. Direct, indirect, and cumulative fishery impacts on subsistence would be explicitly addressed through consultation and co-management.

Increased participation and representation of Alaska Natives in fishery management would be encouraged under Alternative 4. NOAA Fisheries and the NPFMC would work with Alaska Natives to identify and develop measures that would increase participation and representation in fishery management.

Alaska Native participation in commercial fishing would be greatly reduced or suspended under Alternative 4. This would contribute further to adverse cumulative effects resulting in trends in salmon and crab fisheries. Benefits to Native communities would also be adversely affected through loss of employment, economic activity and community revenues, including CDQ communities. Combined with trends in other fisheries and state funding programs, cumulative effects on Alaska Native communities would be adverse. Potential adverse groundfish fishing effects on Steller sea lion and salmon resources would be reduced or removed, resulting in potential beneficial effects, although adverse cumulative effects on the availability of these resources are a greater factor than effects related to fishing. There would be Environmental Justice impacts on Alaska Natives due to the reduction or elimination of the groundfish fishery and reductions in community benefits.

While subsistence activities would be allowed in protected areas, the ability to harvest subsistence through joint production would be reduced or eliminated, resulting in adverse subsistence effects.

4.10.5.9 Improve Data Quality, Monitoring and Enforcement

Alternative 4 places the burden of proof on NPFMC/NOAA Fisheries to demonstrate that the prosecution of the fisheries does not have an adverse effect on the environment. Therefore, fishery managers are required to justify that their management actions have no adverse impact on resources. This will result in the imposition of restrictive measures on the fisheries, which may be lifted or modified once appropriate evidence can be produced to show that the fishery will have no adverse impact. The policy sets goals and objectives to address data quality, monitoring and enforcement, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p><u>Goals</u></p> <ul style="list-style-type: none"> • Modify restrictive conservation and management measures as additional reliable scientific information becomes available • Draw upon federal, state, academic and other capabilities in carrying out research, administration, management and enforcement • Expand research and monitoring programs will fill critical data gaps <p><u>Objectives</u></p> <ul style="list-style-type: none"> • Increase the precision of observer data through increased observer coverage and enhanced sampling protocols, and address the shortcomings of the current funding mechanism by implementing either a federally funded or equitable fee-based system for a revamped Observer Program Research Plan • Improve enforcement and in-season management through improved technological means • Establish a coordinated, long-term monitoring program to collect baseline information and better utilize existing research information to improve implementation of the Fishery Ecosystem Plan • Adopt the recommended research plan included in this document 	Observer Program	Expand observer coverage (30/100/100%), with 100% of hauls observed
		Address conflict of interest in funding
		Develop uncertainty estimates for all possible stocks
	Data and Reporting Requirements	Require economic data from industry participants
		Require motion-compensated scales
		Require VMS for all groundfish vessels

Impacts of Policy

The data quality, monitoring and enforcement goals for this policy are to expand research and monitoring programs to be able to fill data gaps and modify restrictive management measures as appropriate. Assistance in meeting these goals would be drawn from all areas, federal, state and academic. In order to further the Alternative 4 goals, several objectives are specified. The Observer Program would be reorganized to address current shortcomings of the funding mechanism, and the precision of observer data should be increased. Management would take advantage of the latest technology to assist inseason management and enforcement efforts. A coordinated effort to develop a baseline ecosystem monitoring plan should be developed, and the research priorities identified in Chapter 5 of this document should be pursued.

The Alternative 4 objectives for the Observer Program are implemented through expanded observer coverage; the development of uncertainty estimates for all possible stocks; and measures to address the conflict of interest in funding. The Observer Program paper in Appendix F-10 contains a detailed discussion of the changes under Alternative 4. Observer coverage would be increased to 100 percent on vessels greater than 60 ft LOA, and all hauls retrieved while the observer is aboard would be sampled for species composition. Vessels less than 60 ft LOA would be required to carry an observer for 30 percent of their fishing days. Expanded coverage would reduce the uncertainty from the effects of the fisheries on direct takes of target and non-target species. As with Alternative 3, the funding mechanism would be changed to address conflict of interest. However, the change in emphasis from industry and community concerns to ecosystem-oriented management would likely result in changes to the data collection protocols as well, which would increase the costs of the program. The emphasis on ecological relationships among species may emphasize the need for trophic interaction data, such as stomach collections, in addition to other critical observer data such as otolith collections, bycatch accounting, and total catch estimates. If the Alternative 4 policy is adopted in the form of FMP 4.2, however, there would be no need for the Observer Program until NOAA Fisheries could certify that a directed fishery has no adverse effect on the environment. Alternative 4 also calls for the use of technology to achieve more accurate monitoring and enforcement by requiring the use of motion-compensated scales on all vessels, and expanding VMS to all groundfish vessels. The Data and Reporting Requirements paper in Appendix F-11 contains a more detailed description of the implications of these management measures. The requirement to install motion-compensated scales on all vessels may become an obstacle to some vessels that are not large enough to accommodate the equipment. However, the use of motion-compensated scales on AFA and CDQ vessels has already increased the accuracy of reported catch, and could be expected to do the same in this application. Requiring VMS on all vessels (rather than only being used in certain directed fisheries, as is currently the case) would increase its utility as a management tool. Although such a program would increase costs for industry to install, maintain and transmit VMS data, and for NOAA Fisheries to track incoming data, it would prove an effective tool for monitoring the additional closure areas in place under this alternative. Additionally, as VMS software becomes more advanced, it could be linked with electronic logbook entries to record and verify the location of hauls, further improving the accuracy of fisheries data. A further description of the management implications of scales and VMS is included in Chapter 5.

The baseline ecosystem collection effort that would be initiated under Alternative 4 would be used to improve the implementation of the Fishery Ecosystem Plan developed under this alternative in accordance with the Ecosystem Principles Advisory Panel recommendations (EPAP 1999). This research initiative for baseline ecosystem information would likely be coordinated by NOAA Fisheries, but would require input from a wide variety of sources (e.g., industry, academic, federal and state). At its optimum, the program would provide the necessary evidence to determine the impact of the fisheries on resources, and thus allow for modification of the restrictive measures imposed on the fisheries as appropriate.

Alternative 4 also advocates the adoption of the recommended research plan included in this document. Research priorities and identified data gaps are included in Chapter 5 of this document. Alternative 4 seeks to expand research efforts to be able to collect these data.

The assumption of Alternative 4 is that fisheries do impact all aspects of the ecosystem through the complex relationships that link its elements. Until these relationships are more fully understood and downstream effects as well, there is an urgent need to manage interactions with the ecosystem, in terms of fishery removals, with great precaution. This fundamental assumption of Alternative 4 prioritizes the need for increased accuracy and breadth of monitoring and enforcement efforts on the one hand (e.g., to monitor and control fishing-related disruption to the ecosystem), and of research efforts on the other (e.g., to accelerate the scientific understanding of the ecosystem in order to determine what level of fishing is appropriate.)

4.10.6 Analysis of the Preferred Alternative

The preferred alternative (PA) consists of a management approach statement and a set of policy objectives. The management approach statement provides the key to the underlying rationale and assumptions for the policy goals and objectives, and additional guidelines for the implementation of the policy.

The management approach statement for the PA represents a precautionary approach, of applying judicious and responsible fisheries management practices, based on sound scientific research and analysis, proactively rather than reactively, to ensure the sustainability of fishery resources and associated ecosystems for the benefit of future, as well as current generations. This management approach statement is summarized in Table 4.10-3. Under this approach, the NPFMC and NOAA Fisheries intend to consider and adopt, as appropriate, measures that accelerate the stated precautionary, adaptive management approach through community or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and increased habitat protection and bycatch constraints, where appropriate and practicable.

The PA management approach statement also indicates that the NPFMC and NOAA Fisheries management process will:

- Base management measures on the best scientific information available.
- Consider reasonable, adaptive management measures as described in the MSA in conformance with the National Standards, the ESA, NEPA, and other applicable law.
- Take into account the National Academy of Science's recommendations on Sustainable Fisheries Policy.

A summary of the impacts of the PA follows below in Section 4.10.6.1. In the remainder of Section 4.10.6, the impacts of the alternative are analyzed in detail, in relation to nine policy subheadings: prevent overfishing; promote sustainable fisheries and communities; preserve food web; manage, reduce and avoid bycatch and incidental catch; avoid impacts to seabirds and marine mammals; reduce and avoid impacts to habitat; promote equitable and efficient use of fishery resources; increase Alaska Native consultation; and improve data quality, monitoring and enforcement. For each subheading, the impacts of the relevant goals and objectives from the management approach are analyzed, using as a guideline the range of implementing management measures for the PA identified in Section 4.2 and analyzed in Section 4.9.

4.10.6.1 Summary of the Preferred Alternative

The key policy elements that predominantly influence the impacts under the PA are: the emphasis on rationalizing the fisheries (resulting in increased efficiency and flexibility); the incorporation of ecosystem considerations (increasing the uncertainty buffers in management accounting); and the likelihood of additional closure areas (which may result in a variety of impacts, depending how the closures are situated).

Predictions about the impacts under this alternative are difficult due to the uncertainty involved in defining ecosystem management and predicting the impacts of protecting areas. Increased emphasis on relatively less abundant species, through protection measures and increased monitoring, indicates a tendency towards ecosystem management but as the implications of such management are uncertain, the tendency is to manage cautiously while accelerating research and data-gathering. The large potential gain in flexibility from rationalization has the potential to create ecosystem benefits.

The PA prevents overfishing of target stocks and reduces the likelihood that stocks will become overfished, through precautionary harvest policies, and imposition of rebuilding regulations when stocks fall below the level capable of producing MSY. Efforts would be accelerated to improve the current harvest strategy, including in PA.2, additional procedures to incorporate uncertainty and develop spawning stock biomass estimates, in particular for Tiers 4-5.

The goal of promoting sustainable fisheries and communities under the PA is likely to be successful. The precautionary adjustments made to quota management decrease the risk of inadvertently overfishing managed species. Additionally, the transition to rights-based management under this alternative will promote the objectives of increasing efficiency, stability and safety in the long-term.

As a whole, through its goal to accelerate precautionary management measures through ecosystem-based principles, and its objectives to develop indices of ecosystem health and to take ecosystem factors into account in ABC setting, this alternative is successful in making many improvements beyond the status quo in achieving the goal of preserving the food web. The emphasis in this alternative is on using the best scientific information available to determine catch levels, but also on providing additional protection against uncertainty by designation of MPAs and reserves. If these improvements are implemented, this strategy is likely to provide protection to a broad range of food web components.

The bycatch and incidental catch reduction policies in the PA are consistent with minimizing human-caused threats to protected species and accelerating precaution through additional bycatch constraints, such as reduced PSC limits. Bycatch reduction objectives and reductions in incidental catch are likely to be achieved without a major cost to industry due to the incentives for more efficient use of fishery resources under cooperatives, comprehensive rationalization of fisheries or other bycatch incentive programs implemented under this alternative.

The goal of minimizing human-caused threats to protected species, and if appropriate and practicable, other seabird and marine mammal species, is largely met in the PA by actively adjusting seabird and marine mammal protection measures, and status review of endangered and threatened marine mammal fishery interactions. This approach, which may provide additional conservation measures in response to scientific evidence, is likely to maintain protection to ESA-listed marine mammals and seabirds, and may increase protection for other seabirds and marine mammals.

This alternative has the potential to reduce and avoid impacts to habitat by careful placement of closures. Placement of closures in lightly fished or not fished areas will provide mitigation and result in avoidance of future habitat impacts if fisheries were to move effort into surrounding areas. Closures in heavily fished areas should be small to minimize displaced efforts and reduce chances of unintended consequences. To achieve overall benefits, closures should not encompass entire habitat types or areas of fishing intensity. In the short-term, information from the Observer Program could be used to locate such closures. In the long-term, scientific information gained from this policy can potentially lead to modification of the placement of MPAs and help meet the policy objective to assess the necessary and appropriate habitat protection measures. Cumulatively, the alternative results in a split impact rating, as the adverse condition of the baseline is coupled with continued damage and mortality to living habitat, however the alternative has strong potential to mitigate these adverse impacts.

The PA promotes increased social and economic benefits through the elimination of the race-for-fish while also emphasizing the long-term economic value of the fishery through the promotion of rights-based allocations to individuals, sectors, and communities. In addition, this alternative promotes ecosystem based management and is likely to increase non-market, recreational, and tourism values assigned to the ecosystem. It is not possible to determine the long-term effect on overall ecosystem value (commercial and non-market values combined) because it is not known whether the fishing sectors, even with rights-based allocations, will be able to adapt to the changes resulting from the increased emphasis on ecosystem tools and, in particular, the potential addition to the number and significance of closed areas.

The goals and policies for Alaska Native consultation and participation in fishery management under the PA would increase current levels by expanding informal and formal consultation between the NPFMC/NOAA Fisheries and Alaska Native participants and tribal governments. Local and Traditional Knowledge would be more formally incorporated in fishery management and additional data would be collected. Other goals and objectives in the PA, such as reductions in PSC limits, may benefit subsistence salmon use by reducing bycatch levels in the groundfish fisheries.

Through data collection measures that will result in reducing uncertainty, the PA is likely to be effective in achieving the goal of accelerating the use of precautionary management measures. The objectives to improve the Observer Program and observer data will increase the quality of fishery data by implementing increased flexibility of, and potentially expanding, observer coverage. Additionally, the expanded economic data and potential for independent verification would allow for more accurate and credible assessments of economic impacts. A funding source would, however, need to be identified to implement improvements to these programs. The alternative also emphasizes the importance of enforcement concerns in fishery management.

4.10.6.2 Prevent Overfishing

The PA incorporates forward looking conservation measures that address differing levels of uncertainty. Under this approach, the NPFMC would seek to accelerate precautionary management measures through community or rights-based management, ecosystem-based management principles that protect managed species from overfishing, and, where appropriate and practicable, increased habitat protection and bycatch constraints. The PA policy is illustrated by PA.1 and PA.2. Each FMP contains a number of management measures that pertain to the sustainability of fisheries and fishery resources. The bookends represent a range of actions that alter constraints to fishery removals.

A detailed description of PA.1 appears in Section 4.2. Briefly, PA.1 continues precautionary practices seen in Alternative 1 where TAC is less than or equal to the ABC, and the ABCs are less than the OFL. Uncertainty corrections applied under Alternative 1 to BSAI and GOA Pacific cod and GOA pollock would also apply. OY restrictions would be identical to Alternative 1, where the OY range for the BSAI and GOA is capped at 2 million mt and 800,000 mt for the BSAI and GOA, respectively. The 2 million mt cap in the BSAI limits the expansion of fisheries. The FMP would formally specify MSSTs for Tiers 1-3 in accordance with National Standard Guidelines. Efforts to develop ecosystem indicators to be used in TAC-setting, as per ecosystem management principles, would be continued. Under PA.2, the calculation of OY caps would be revisited to determine their relevancy to the current environmental conditions and the current knowledge of stock levels.

PA.2 incorporates an uncertainty correction into the estimation of ABC for all species. This represents a significant acceleration of precautionary management. PA.2 would also develop and implement criteria for using key ecosystem indicators in TAC-setting, and other precautionary practices. As a proxy for a more conservative harvest strategy for rockfish, PA.2 capped F_{ABC} at $F_{60\%}$ rather than $F_{40\%}$ for rockfish stocks managed in Tier 3. In implementing this bookend, analysis and data collection would be initiated for specifying MSSTs for priority stocks in Tiers 4-6. The development of criteria to manage target and non-target species consistently, and for moving stocks from the other species and non-specified species categories, would begin with breaking BSAI and GOA sharks and BSAI skates out of the other species group for TAC-setting.

Impacts of Policy

As in Alternative 1, the PA limits the impact of fishing mortality by setting an ABC less than the OFL. This alternative defines four management categories for which catch is constrained by various regulatory mechanisms: target species, other species, prohibited species and forage fish species. The PA harvest policies are consistent with ecosystem principles that call for in-season multi-species catch monitoring to ensure that catch does not exceed the OFL of groundfish. This catch monitoring is facilitated by at-sea observers, port samplers, weekly production reports and fish ticket information (Appendix F-10). Stocks can be moved from one management category into another only by FMP amendment. Within the target species category, stocks are managed either individually or as part of a stock complex. Stocks within the target species category can be added to or removed from a stock complex within the same category as part of the TAC-setting process (i.e., without an FMP amendment).

The bookends provide a range of potential impacts associated with this alternative. PA.1 is similar to FMP 1, and harvest control rules would continue to be used and improved to maintain a spawning stock biomass with the potential to produce sustained yields on a continuing basis. PA.2 imposes more constraints to fishery removals and develops criteria for bringing non-specified species into a managed category.

Goals, Objectives	Corresponding Management Measures	
<p><u>Goals</u></p> <ul style="list-style-type: none"> NPFMC intends to take appropriate measures to insure the continued sustainability of the managed species Consider and adopt measures that accelerate ecosystem-based management principles that protect managed species from overfishing Recognizes need to balance many competing uses of marine resources including protection of the long-term health of the resource and the optimization of yield Seeks to provide sound conservation of living marine resources <p><u>Objectives</u></p> <ul style="list-style-type: none"> Adopt conservative harvest levels for multi-species and single species fisheries and specify OY Continue to use existing OY cap for BSAI and GOA groundfish fisheries as stated in current law. Provide for adaptive management by continuing to specify OY as a range Initiate a scientific review of the adequacy of $F_{40\%}$ and adopt improvements as appropriate Continue to improve the management of species through species categories. 	<p>Example Range: $ABC < OFL$, sum of TACs within OY range, formal adjustments for uncertainty, automatic rebuilding, appropriate harvest policies for rockfish</p>	<p>Quota management based on a tier system. F_{ABC} set below F_{OFL} except at very low stock sizes protecting the stock from unintentional overfishing. Additional adjustments for uncertainty are incorporated into F_{ABC} under PA.2. PA.1 continues to use harvest control rules to maintain sustainable stocks. For example purposes only, F_{ABC} for Tier 3 rockfish stocks would be set at $F_{60\%}$ in PA.2.</p>
	<p>Time/Area</p>	<p>For several species, fishing quotas are distributed across time and area in proportion to the expected underlying biomass of fish in the region at that time. These policies reduce the possibility of spatial temporal concentration of the catch. Relative to FMPs 1 and PA.1, PA.2 imposes additional marine reserves and marine protected areas.</p>
	<p>Gear restrictions</p>	<p>For walleye pollock, Pacific cod, and sablefish, gear allocations partition catch to specific gear groups. Differences in gear selectivity are addressed in the stock assessment models and quotas reflect the expected age distribution of the catch by gear.</p>
	<p>OY caps</p>	<p>OY restrictions cap the aggregated groundfish catch in the GOA and BSAI at 800,000 mt and 2 million mt, respectively. These caps limit the expansion of fisheries (particularly in the BSAI). As a progressive measure, the calculation of OY caps would be revisited under PA.2 to determine their relevancy to the current environmental conditions and information on stock levels.</p>
	<p>Inseason Multi-species TAC and ABC monitoring</p>	<p>The catch of a given target species is limited by prohibited species bycatch caps and the TACs for other groundfish. The halibut bycatch caps serve as a constraint to BSAI and GOA flatfish expansion. Reduced bycatch allowances would further constrain target fisheries. Sharks and skates would be moved from the other species management category under PA.2.</p>

Several measures associated with the PA could result in reductions in catch relative to baseline conditions. First, an uncertainty correction could be applied that would account for measurement and process error in the assessment (PA.2). Second, the development of appropriate harvest strategies Tier 3 rockfish species could result in a more conservative strategy (PA.2). Third, a 0-10 percent (PA.1) or 0-20 percent reduction (PA.2) in bycatch would be imposed under this alternative. Finally, sharks and skates could be broken out of the other species complex (PA.2). The FMPs used to illustrate the PA demonstrate conservative harvest policies. Direct and indirect impacts analyses revealed that overfishing did not occur in the stocks or stock complexes modeled under PA.1 or PA.2 (Table 4.9-1). Relative to the comparative baseline, the expected

fishing mortality under the PA would have no significant impact on any of the target groundfish stocks. Consideration of cumulative impacts does not change the expectations for direct or indirect impacts of this alternative on fishing mortality.

Relative to the comparative baseline, the likelihood of a stock falling below the level where the stock is capable of producing MSY is reduced under the PA. Under PA.1 and PA.2 none of the stocks managed in Tiers 1-3 would be expected to become overfished. The direct and indirect impact of the PA on changes in biomass of all of the Tier 1-3 target groundfish stocks would be insignificant relative to the baseline (Table 4.9-1). The direct and indirect impact of commercial fishing on the biomass of target groundfish stocks managed in Tiers 4-6 is unknown because the status of such stocks relative to their respective MSSTs is unknown (Table 4.9-1). Consideration of cumulative impacts does not change the expectations for direct or indirect impacts of this alternative on changes in biomass.

Relative to the comparative baseline, PA.2 adds several spatial and temporal restrictions on catch. These restrictions would decrease the spatial/temporal concentration of the catch. Under this policy, commercial fishing is expected to have insignificant impacts on the genetic makeup or the reproductive success of the 19 stocks managed in Tiers 1-3. The direct and indirect impact of commercial fishing on the genetic makeup or reproductive success of stocks managed in Tiers 4-6 is unknown because the status of such stocks relative to their respective MSSTs is unknown. The PA would initiate research to collect information necessary to determine MSSTs, particularly for stocks managed in Tiers 4-5. Once the MSST definition is established, the significance of commercial harvest on those stocks could be evaluated. Consideration of cumulative impacts does not change the expectations for direct or indirect impacts of this alternative on fishing mortality.

Relative to the comparative baseline, the PA would increase restrictions on the spatial temporal partitioning of catch and could reduce overall harvest of target groundfish. The direct and indirect impact of these changes on prey availability is expected to be insignificant for all stocks managed in Tiers 1-3 (Table 4.9-1). Direct and indirect impacts of commercial fishing on prey availability of all stocks or stock complexes managed in Tiers 4-6 are unknown because the status of such stocks relative to MSST is unknown (Table 4.9-1). Consideration of cumulative impacts does not change the expectations for direct or indirect impacts of this alternative on fishing mortality.

Harvest restrictions, spatial temporal constraints, and gear allocations all serve to mitigate the impact of commercial fishing on fish habitat. The closure system described in PA.2 would close approximately 18 percent of the EEZ to some form of MPA and designate approximately 3.1 percent of the EEZ as a no-take reserve (Figure 4.2-9). For the fishable area (depth to 1,000 m) of the EEZ, PA.2 would designate approximately eight percent of the fishable area as a no-take reserve and about 40 percent of the fishable area as some form of MPA. Relative to the comparative baseline, the impacts on target species resulting from habitat disturbance are considered insignificant for all stocks managed in Tiers 1-3 (Table 4.9-1). The impacts are unknown for stocks or stock complexes managed in Tiers 4-6.

When taken in aggregate, the PA appears to increase existing precautionary management measures. Irreversible or long-term adverse effects on fishery resources are avoided by precautionary harvest policies and imposition of rebuilding regulations when stocks fall below the level capable of producing MSY. Strengths of the PA are that the FMPs will adopt formal criteria for status determination, and research will be accelerated to develop ecosystem-based harvest policies. Community or rights-based management adopted under the PA would reduce the race-for-fish. Efforts would be accelerated to identify methods for reducing

the number of stocks where the status relative to an overfished condition is unknown. Another strength of this policy is that PA.2 would develop a list of priority stocks for moving stocks from the other species and non-specified species categories, using consistent criteria. The catch of these species would be monitored. Until this system is developed, harvest policies may build and maintain the species complex, but it is still possible to over harvest a vulnerable member of the complex.

4.10.6.3 Promote Sustainable Fisheries and Communities

The PA sets goals and objectives to promote sustainable fisheries and communities, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p><u>Goals</u></p> <ul style="list-style-type: none"> • Ensure the sustainability of fishery resources and associated ecosystems for the benefit of future as well as current generations • Provide socially and economically viable fisheries and fishing communities • Recognize the need to balance different social and economic goals for sustainable fishery management including protection of the long-term health of the resource and the optimization of yield <p><u>Objectives</u></p> <ul style="list-style-type: none"> • Promote conservation while providing for OY in terms fo providing the greatest overall benefit to the nation with particular reference to food production, and sustainable opportunities for recreational, subsistence, and commercial fishing participants and fishing communities • Promote management measures that, while meeting conservation objectives, are also designed to avoid significant disruption of existing social and economic structures • Promote fair and equitable allocation of identified available resources in a manner such that no particular sector, group, or entity acquires an excessive share of the privileges • Promote increased safety at sea 	TAC-setting Process	<p>Quota management based on a tier system. F_{ABC} set below F_{OFL} except at very low stock sizes, protecting the stock from unintentional overfishing. Additional adjustments for uncertainty are incorporated in ABC setting.</p> <p>Optimum Yield restrictions cap the aggregated groundfish catch in the GOA and BSAI. These caps limit the expansion of fisheries (particularly in the BSAI).</p>
	Overcapacity	Maintain existing restricted access programs while developing rationalization that includes benefits to rural communities

Impacts of Policy

The goal of promoting sustainable fisheries and communities is pursued through the following objectives: provide the greatest overall benefit to the nation, increase efficient use of fishery resources, avoid significant disruption of existing social and economic structures, promote fair and equitable allocation of resources, and promote increased safety at sea.

The impact of these goals and objectives for sustainable fisheries and communities would not be significantly different from the comparative baseline. To the extent that these goals are in the MSA, the objectives are also part of the status quo fishery management policy. Specific management actions that would further implement these goals under the PA are also captured in Section 4.10.6.2, Prevent Overfishing, and Section 4.10.6.8, Promote Equitable and Efficient Use of Fishery Resources. Management measures such as conservative quota management, and adjustments made under the PA to account for uncertainty, ensure the sustainability of the managed species by maintaining a spawning stock biomass for the target species with the potential to produce sustained yields. Improvements to the monitoring and data collection programs, as described in Section 4.10.6.10, Improve Data Quality, Monitoring and Enforcement, would allow fishery managers to achieve a more accurate understanding of the impact of fishing activity on the stocks and the ecosystem, and of the status of the stocks.

The acceleration under the PA of the move towards comprehensive rationalization of the groundfish fisheries is also an effective implementation tool for the objectives considered in this section. As discussed in further detail in Section 4.10.6.8, the implementation of rationalization, which allows for flexible fishing practices, is likely to improve efficient use of fishery resources while reducing unwanted incidental catch and bycatch, to increase overall benefit to the nation in terms of food production, and also to increase safe fishing practices. The transition to rationalization in the short-term could disrupt stability, however in the long-term, the stability of fisheries would be increased in comparison to a derby-style fishery. Likewise, communities would also tend to experience an increase in stability as a result of built-in community protections to the rationalization programs. The objective of equity would likely be met through allocating the resource based on historic participation in the fishery.

The goal of promoting sustainable fisheries and communities under the PA is likely to be successful. The precautionary adjustments made to quota management decrease the risk of inadvertently overfishing managed species. Additionally, the transition to rights-based management under this alternative will promote the objectives of increasing efficiency, stability and safety in the long-term.

4.10.6.4 Preserve Food Web

The PA sets goals and objectives to preserve the food web, as well as recommending a range of management measures that would implement these objectives.

Impacts of Policy

Impacts to food webs of the BSAI and GOA are mitigated through many of the goals and objectives and related management measures of this alternative, some of which are improvements beyond those provided in the comparative baseline. In addition to objectives specifically for incorporating ecosystem considerations into fisheries management decisions and prohibiting directed fisheries for forage fish (which often form a central position in channeling energy through the food web), and the precautionary adjustments to the ABCs of Tier 1 stocks that were part of Alternative 1, this alternative provides for the possibility of developing other precautionary ABC adjustments to account for ecosystem factors, and specifically develops indices of ecosystem health as targets for management. Other policies of this alternative, such as preventing overfishing, reducing bycatch, avoiding impacts to seabirds and marine mammals, reducing impacts to habitat, and improving data quality, monitoring, and enforcement, are critical to protection of food web components, which include target and non-specified species, PSC species, HAPC biota, marine mammals

and seabirds. Management measures, such as revised procedures for ABC, MSST setting, incorporating precaution, and spatial/temporal allocation for TAC (Section 4.10.4.2); additional bycatch reduction measures (Section 4.10.4.4); further gear modifications for seabird protection (Section 4.10.4.5); procedures to identify MPAs and no-take marine reserves (Section 4.10.4.6) and improvements to the Observer Program coverage (Section 4.10.4.9), that are proposed as improvements beyond the baseline in the PA provide increased protection to a variety of food web components. See the policy analysis in those sections for details on the level of protection provided by the PA to these individual components.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> • Precautionary approach that incorporates forward looking conservation measures that address differing levels of uncertainty • Incorporate ecosystem-based considerations into management decisions • Accelerate precautionary management measures through ecosystem-based principles that protect managed species from overfishing • Take into account NAS Sustainable Fisheries policy recommendations • Promote sound conservation of living marine resources <u>Objectives</u> <ul style="list-style-type: none"> • Develop indices of ecosystem health as targets for management • Improve the procedure to adjust ABCs as necessary to account for uncertainty and ecosystem factors • Continue to protect the integrity of the food web through limits on harvest of forage species • Incorporate ecosystem-based considerations into fishery management decisions as appropriate 	TAC-setting Process	Prohibit directed fishery for forage fish
		Procedures to incorporate precaution and uncertainty into ABCs
		Procedure to develop and use key ecosystem indicators in TAC-setting

This alternative specifically attempts to incorporate ecosystem considerations into fishery management decisions through advancements in how uncertainty and ecosystem factors are used in ABC adjustment. It will continue to prohibit directed fisheries for forage fish, and develop ecosystem indicators. Analysis of the ecosystem effects of the PA involved selection of indicators that would show changes in key members or ecosystem characteristics that are important to the structure and function of marine food webs. Changes in pelagic forage, top predators, spatial/temporal availability of prey, exotic species introductions, energy removal and redirection through fishery catch removals and discards/offal production, and various measures of diversity were evaluated with respect to the potential of fishing to cause changes sufficient to bring these attributes below population, community, or ecosystem thresholds, if such thresholds could be defined. Most of these indicators showed there were insignificant impacts of this alternative on these ecosystem attributes. There were unknown effects of this alternative on top predator species and species diversity due to our lack of knowledge of abundance levels and life history characteristics of species such as skates, sharks, and grenadiers, although breaking these species out of the other species group and giving each its own TAC (PA.2) would provide additional protection. The additional area closures, including the Aleutian Islands management area to protect corals and live bottom habitat, proposed in PA.2, would result in improvements relative to the comparative baseline in spatial/temporal availability of forage to marine mammals and birds

and protection of corals. Qualitative analysis with respect to the ecosystem effects of the TAC-setting process in Appendix F-1, Alternative 3, which is similar to the PA in terms of the TAC-setting process, showed that increased protection would be provided to stocks that need it most, such as slower-growing, long-lived species such as rockfish, skates, and sharks, and would thus reduce the possibility of adverse impacts to those groups and to their role in the food webs of these ecosystems. Thus, if these improvements are implemented, this alternative has the potential to decrease ecosystem impacts relative to the comparative baseline.

As a whole, through its goal to accelerate precautionary management measures through ecosystem-based principles, and its objectives to develop indices of ecosystem health and to take ecosystem factors into account in ABC setting, this alternative is successful in making many improvements beyond the status quo in achieving the goal of preserving the food web. The emphasis in this alternative is on using the best scientific information available to determine catch levels, but also on providing additional protection against uncertainty by designation of MPAs and reserves. If these improvements are implemented, this strategy is likely to provide protection to a broad range of food web components.

4.10.6.5 Manage Incidental Catch and Reduce Bycatch and Waste

Several policy changes adopted in the PA would change the incidental catch of target and non-target species, and bycatch (regulatory and economic discards). Under PA.1, the cap on OY is maintained, so the absolute amount of target and non-target groundfish catch is unlikely to change. The calculation of OY caps would be revisited under PA.2 to determine if the caps are still relevant to environmental conditions and the current knowledge of stock levels. However, the amount of incidental catch of groundfish and subsequent discard of groundfish (bycatch) is likely to decrease due to the policy emphasis on rationalization. Other measures would likely lead to reductions of incidental catch for various species including prohibited species. These additional measures include the uncertainty correction and reduced rockfish F_{OFL} described in PA.2, and the separation of sharks and skates from the other species complex (PA.2). The latter would ensure that these species are not harvested above the maximum fishing mortality threshold. Furthermore, criteria for defining the membership within species complexes and the circumstances when species should be broken out of complexes would be developed.

The comprehensive rationalization of the groundfish fisheries, in PA.1 and PA.2, will address bycatch reduction objectives (a review of bycatch in existing programs is initiated), by eliminating the race-for-fish, and providing internal incentives to minimize catches of less valued groundfish and PSC. It is expected that with rationalization in all groundfish fisheries, incidental catch and discards (bycatch) may be reduced by as much as 20 percent. Even without predicted reductions in PSC resulting from rationalization, a moderate reduction of PSC limits would be adopted as an intermediary step. Habitat and bycatch concerns would also be addressed by reducing concentrated effort in the fisheries.

Impacts of Policy

The PA is expected to encourage the development of practical measures that reduce bycatch and incidental catch of target and non-target species. With respect to the impact on the sustainability of prohibited species that are currently in a depressed or overfished condition (BSAI and GOA chinook salmon, *C. bairdi* crab, *C. opilio* crab, BSAI and GOA red king crab, and BSAI blue king crab [Table 4.10-2b]). The impacts of mortality and change in biomass associated with the PA policy are likely to be positive, but are unlikely to be significant overall. Cumulative impacts are considered conditionally significant adverse due to mortality

for BSAI chinook and other salmon and GOA chinook salmon. The PA is expected to have an insignificant impact on forage fish, but is none-the-less expected to reduce bycatch of these species. The impact of the PA on other species and non-specified groups is unknown.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p>Goals</p> <ul style="list-style-type: none"> Accelerate precautionary management measures through increased bycatch constraints where appropriate and practicable Minimize human-caused threats to protected species Promote sound conservation of living marine resources <p>Objectives</p> <ul style="list-style-type: none"> Continue and improve current incidental catch and bycatch management program Develop incentive programs for bycatch reduction including the development of mechanisms to facilitate the formation of bycatch pools, VBAs, or other bycatch incentive systems Encourage research programs to evaluate current population estimates for non-target species with a view to setting appropriate bycatch limits as information becomes available Continue program to reduce discards by developing management measures that encourage the use of gear and fishing techniques that reduce bycatch which includes economic discards Continue to manage incidental catch and bycatch through seasonal distribution of TAC and geographical gear restrictions Continue to account for bycatch mortality in TAC accounting and improve the accuracy of mortality assessments for target, PSC bycatch, and non-commercial species Control the bycatch of prohibited species through PSC limits or other appropriate measures Reduce waste to biologically and socially acceptable levels 	Spatial/Temporal Management of TAC	Spatial/temporal distribution of TAC
	MPAs and EFH, Bycatch and Incidental Catch Restrictions, Gear Restrictions and Allocations	Seasonal, gear/fishery specific, and total closure areas identified to reduce bycatch; reviews to develop appropriate bycatch closure areas in the GOA
	Bycatch and Incidental Catch Restrictions	Reduce existing PSC limits, or other appropriate measures, for prohibited species, establish PSC limits for prohibited species other than halibut in the GOA
		Procedure to develop mortality rate-based approach to setting limits
		Retention standards for DSR, and IR/IU for pollock, Pacific cod, shallow-water flatfish in the GOA, and groundfish retention standard for other groundfish species in the BSAI
		Review bycatch reduction incentive programs (repeal/maintain VIP)
Bycatch restrictions (including in-season)/repeal or modify MRBs and establish system of caps and quotas		

The PA policies as illustrated by PA.1 and PA.2 are consistent with the goal of accelerating precautionary management measures through increased bycatch constraints where appropriate and practicable. The PA policies are also consistent with the objective of controlling prohibited species bycatch. Increased precaution regarding bycatch would be achieved through reductions in PSC limits. Bycatch reduction objectives (0-10 percent for PA.1 or 0-20 percent for PA.2) are likely to be achieved due to the incentives for more efficient

use of fisheries resources under cooperatives, comprehensive rationalization of fisheries, or other bycatch incentive programs implemented under this alternative.

4.10.6.6 Avoid Impacts to Seabirds and Marine Mammals

The PA policy sets goals and objectives to avoid impacts to seabirds and marine mammals, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p><u>Goals</u></p> <ul style="list-style-type: none"> Minimize human-cause threats to protected species Promote sound conservation of living marine resources <p><u>Objectives</u></p> <ul style="list-style-type: none"> Continue to cooperate with USFWS to protect ESA-listed species, and if appropriate and practicable, other seabird species Maintain or adjust current protection measures as appropriate to avoid jeopardy to ESA-listed Steller sea lions Encourage programs to review status of endangered and threatened marine mammals stocks and fishing interactions and develop fishery management measures as appropriate Continue to cooperate with NOAA Fisheries and USFWS to protect ESA-listed marine mammal species, and if appropriate and practicable, other marine mammal species 	TAC-setting Process, Steller sea lion Measures	Steller sea lion prey species low biomass rules
	TAC-setting Process	Prohibit directed fishery for forage fish
	Spatial/ Temporal Management of TAC	Spatial/temporal distribution of TAC
	MPAs and EFH, Steller sea lion Measures, Gear Restrictions and Allocations	Maintain/modify as scientifically appropriate the seasonal, gear/fishery- specific, and total closure areas identified to protect walrus and Steller sea lions
	Seabird Measures	Short-tailed albatross take restrictions
		Develop further gear modifications to protect seabirds (trawl and longline)

Impacts of Policy

This alternative seeks to provide conservation of living marine resources and minimize human-caused threats to protected species. It will accomplish those goals through continued cooperation with USFWS to protect seabird species in the longline and trawl fleets, cooperation with NOAA Fisheries and USFWS to protect marine mammal species, maintenance or possible adjustment of current protection measures for Steller sea lions to avoid jeopardy, and review of endangered or threatened marine mammal and fishery interactions and development of appropriate fishery management measures for mitigation, if needed. Management measures that are improvements beyond those provided in the status quo include modification of closure areas for walrus and Steller sea lion protection as appropriate scientific information becomes available, and possible gear improvements to protect seabirds. Elimination of the race-for-fish in this alternative may also tend to decrease direct takes of marine mammals and seabirds. Impacts of the alternative with respect to seabirds were evaluated with respect to the potential for fisheries to cause direct mortality through fishing gear and vessel strikes, changes in prey availability (including offal), and changes in benthic habitat that might affect

certain prey species of seabirds. Impacts for marine mammals were evaluated with respect to the potential for fishery incidental take or entanglement in marine debris, harvest of prey species, spatial/temporal concentration of fishing on prey, and fishing vessel disturbance.

These indicators showed that the PA provides increased protection to seabirds and marine mammals relative to the comparative baseline. As in Alternative 1, incidental take of albatross, fulmars, shearwaters, and gulls is substantially reduced due to new mitigation measures in the longline fleet. In addition, mitigation measures for the trawl fleet, currently under development through cooperation between industry and USFWS, are likely to reduce collisions with trawl third wires. The Seabird Protection Measures paper (Appendix F-6) analyzed components of Alternative 3 that are similar to the PA, and noted that the potential expansion of the Observer Program would improve the collection of seabird/fishery interaction data that measure the effectiveness of mitigation measures. The groundfish fishery is not expected to have population level effects on any seabird species through mortality, changes in food availability, or benthic habitat. The impact of the policy on Steller sea lions is likely to be similar to Alternative 1, except as new research indicates appropriate modifications will be made to existing protection measures.

The goal of minimizing human-caused threats to protected species, and if appropriate and practicable, other seabird and marine mammal species, is largely met in the PA by actively adjusting seabird and marine mammal protection measures, and status review of endangered and threatened marine mammal fishery interactions. This approach, which may provide additional conservation measures in response to scientific evidence, is likely to maintain protection to ESA-listed marine mammals and seabirds, and may increase protection for other seabirds and marine mammal species.

4.10.6.7 Reduce and Avoid Impacts to Habitat

The PA sets goals and objectives to reduce and avoid impacts to habitat, as well as recommending a range of management measures that would implement these objectives.

Impacts of Policy

The PA addresses impacts to habitat by having specific goals and objectives that focus on living marine habitat. This policy accelerates habitat protection where appropriate and practicable and could result in a gradual-to-rapid reduction and avoidance of impacts to habitat depending on how quickly management measures are implemented. Development of a procedure to identify MPAs and no-take marine reserves and identification of EFH mitigative features are identified as specific management measures.

In addition to the objectives specifically designed to address habitat concerns, the PA policies are designed to prevent overfishing, reduce and avoid bycatch, incorporate ecosystem considerations, and improve data quality and enforcement. These goals are important ancillary objectives that could provide reduced impacts to habitat. Management measures such as revised procedures for ABCs that incorporate greater precaution can potentially reduce impacts to habitat if fishing effort is reduced. Closures for marine mammal protection, especially if they are year round for all target species, can also provide protection to specific habitat types. Measures to avoid and reduce impacts could occur on a rapid time line, especially if precautionary measures are implemented before complete scientific information is available.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Goals</u> <ul style="list-style-type: none"> Accelerate precautionary management measures through increased habitat protection where appropriate and practicable Maintain a healthy marine resource habitat Promote sound conservation of living resources <u>Objectives</u> <ul style="list-style-type: none"> Review and evaluate efficacy of existing habitat protection measures for managed species Identify and designate EFH and HAPC pursuant to MSA rules, and mitigate fishery impacts as necessary and practicable to continue the sustainability of managed species Develop an MPA policy in coordination with national and state policies Encourage development of a research program to identify regional baseline habitat information and mapping, subject to funding and staff availability Develop goals, objectives and criteria to evaluate the efficacy of MPAs and no-take marine reserves as tools to maintain abundance, diversity, and productivity Implement MPAs if and where appropriate 	MPAs and EFH, Bycatch and Incidental Catch Restrictions, Gear Restrictions and Allocations	Existing system of closed areas including Sitka Pinnacles, modify based on MPA process
		Establish Aleutian Island special management area to protect coral/live bottom habitats (PA.2)
	MPAs and EFH	Develop procedure to identify MPAs and no-take marine reserves, including definition of terms
		Identify and designate EFH and HAPC, determine extent of adverse effects from fishing, if any, and implement mitigation measures if necessary

The PA addresses habitat protection by developing and adopting a methodology for establishing MPAs and, in PA.2, adopting a MPA closure system. A composite of several different concepts for habitat protection and mitigation were qualitatively analyzed. After the concepts were analyzed, specific implementations of the concepts were analyzed and results compared to the comparative baseline. The basis for these conceptual closures is to illustrate how the effects of fishing on EFH can be mitigated by reducing the impacts caused by a particular fishery by closing specific areas. The conceptual strategies are:

- Reduce the impacts caused by a particular fishery by closing specific areas.
- Protect a diversity of habitat types across a range of geographic areas where closures do not encompass entire habitat types or areas of fishing intensity, incorporating a "band-approach" where appropriate with closures oriented perpendicular to depth contours from near shore to deep water.
- Develop a special conservation area in the Aleutian Islands to protect sensitive cold water coral communities.
- Limit size of closures in heavily fished areas to minimize displaced effort.

All of these approaches are variations of MPAs. Concepts 1-3 have the most potential for benefits to habitat. However, careful placement of the MPAs is required to avoid unintended consequences. Displacement of effort to new areas with more sensitive habitat may be an unintended consequence. If closures are placed primarily in areas with high fish densities and displace effort into areas of low densities then increased effort in a given area could lead to more habitat impacts. For closures to be most effective they should be combined with some effort controls. Ancillary management measures associated with the PA that result in reduced effort could result in increased effectiveness of MPAs. However, closures alone, if they are strategically placed within historically fished areas, can provide benefits to habitat without necessarily requiring a reduction in TACs. Benefits to habitat could occur with closure areas strategically placed that do not encompass entire habitat types or clusters of fishing intensity. To be most effective, closure areas should include some portion of areas where high fishing intensity has occurred, but need not be so large that they encompass entire habitat types or clusters of fishing intensity. Placement of small closures within areas of high fishing intensity could also promote scientific understanding of the effectiveness of such management measures. The specific location of MPAs could have serious social and economic consequences. Determining where to locate MPAs for habitat goals should include consultation with the fishing industry and nearby communities.

Analysis of specific management measures indicated mixed ratings relative to the comparative baseline for effects to mortality and damage to living habitat under PA.2. These mixed ratings result from the specific location of bottom trawl closure MPAs (see Figure 4.2-9) and the uncertainty of how changes in TAC will interact with MPAs. For example, in the GOA many of the specific strategy (1) closed areas on the slope encompass high effort areas which would be expected to have higher target fish densities. This could result in a much higher effort to catch fish in lower density open areas. This higher effort could result in enough of an increase in habitat impacts to negate impact reduction in the closed areas. Whether decreased TACs for some species will offset this increase in habitat impacts is uncertain. This uncertainty in predicted impacts led to an insignificant or possibly significantly adverse change to mortality and damage to living habitat relative to the baseline in the GOA.

This policy could, however, lead to improved benthic community diversity and geographic diversity of impacts. Analysis of specific management measures in the Bering Sea under PA.2 indicated some improvement in the geographic diversity of impacts. Large expanses of high fishing intensity could still remain open in the Bering Sea, but there is at least one closure area that covers a portion of a high fishing intensity area, providing some improvement in the geographic diversity of impacts. In the Aleutian Islands, the example closure areas that represent the established management area to protect coral and live bottom habitat, bisect apparent historic clusters of fishing patterns, thus providing a diversity of impacts for the habitat being fished. In the GOA closures also often encompass clusters of historically high fishing intensity, leaving little diversity or contrast of fishing intensity and thus leading to no improvement over the baseline.

From a cumulative impacts perspective, the baseline condition is adversely impacted due to historical impacts that have potentially caused long-term and possibly irreversible loss of living habitat, especially to long-lived, slow-growing species which are slow to recover. Although some benefits accrue to habitat within the proposed MPAs in PA.2, impacts from fishing are not totally eliminated, and TAC/effort is likely to remain high. While there is an incremental expansion of no-take MPAs, the closures analyzed under this FMP are not refined and may not be effective at preventing mortality or protecting benthic community structure. However, if properly designed and located, future closures could provide successful mitigation of the effects of fishing and, over time, adversely impacted habitat could recover. The cumulative impact predicted for this

alternative is a split rating of conditionally significant adverse/conditionally significant beneficial. The existing adverse impact to the baseline condition coupled with continued damage and mortality to living habitat results in a conditionally significant adverse impact, because the extremely slow growing corals that have already been impacted are not likely to recover from their current impacted state. However, the alternative has strong potential to provide mitigative protection to habitat.

Overall, this policy has the potential to reduce and avoid future impacts to habitat by careful placement of closures. Placement of closures in lightly fished or not fished areas could result in avoidance of future habitat impacts, if effort expands to new or lightly fished areas. Placement of small closures within heavily fished areas can potentially mitigate impacts, reduce unintended consequences, and achieve overall benefits to habitat and meet policy goals and objectives. Strategic placement of small closures will also help meet the policy objective of evaluating the efficacy of MPAs. In the long-term, scientific information gained from this policy can potentially lead to modification of MPAs to help meet the policy objective to assess the necessary and appropriate habitat protection measures and reduce unnecessary impacts to the fishing industry.

4.10.6.8 Promote Equitable and Efficient Use of Fishery Resources

This policy would seek to accelerate the existing precautionary management measures through community or rights-based management and ecosystem-based management principles. Under this approach, additional conservation and management measures would be taken as necessary to respond to social, economic or conservation needs, or if scientific evidence indicated that the fishery was negatively impacting the environment. This policy recognizes the need to balance many competing uses of marine resources and different social and economic goals for fishery management.

Impacts of Policy

The PA promotes increased social and economic benefits through the promotion of rights-based allocations to individuals, sectors and communities. For this reason the alternative is likely to increase the commercial value generated from the groundfish fisheries. In addition, this alternative promotes ecosystem-based management which could increase the specificity of the species reporting, could increase the areas in which fishing is restricted, and places additional emphasis on the reduction of bycatch. For that reason this policy alternative has some potential to increase non-market value and the benefits derived from recreational, subsistence and tourism activities related to the Bering Sea and GOA marine ecosystems. Overall benefits derived from the ecosystem (the combination of commercial and non-commercial values) are likely to be positive. See Section 3.9.8 and Section 4.10.4.3 for additional information on ecosystem values.

As the race-for-fish is eliminated, the alternative could result in positive effects in terms of producer net revenue, consumer benefits, and participant health and safety. For additional information on the effects of the race-for-fish and rights-based management see the discussion under Alternative 3 in the overcapacity qualitative analysis paper in Appendix F-8. The PA provides economic stability to fishery participants and communities by maintaining current allocation percentages to sectors. However, the elimination of the race-for-fish will likely result in a decrease in overall participation levels. In the long-run, communities are likely to see fewer persons employed in jobs related to the fishing industry (fishing, processing, or support sectors), but the jobs that remain could be more stable and provide higher pay.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p>Goals</p> <ul style="list-style-type: none"> Accelerate precautionary, adaptive management measures through community or rights-based management Take into account National Academy of Science Sustainable Fisheries policy recommendations Provide socially and economically viable fisheries and fishing communities Recognizes need to balance different social and economic goals for sustainable fishery management <p>Objectives</p> <ul style="list-style-type: none"> Provide economic and community stability to harvesting and processing sectors through fair allocation of fishery resources Maintain LLP program, and modify as necessary, and further decrease excess fishing capacity and overcapitalization by eliminating latent licences and extending programs such as community or rights-based management to some or all groundfish fisheries Provide for adaptive management by periodically evaluating the effectiveness of rationalization programs and the allocation of access rights based on performance Develop management measures that, when practicable, consider the efficient use of fishery resources taking into account the interest of harvesters, processors, and communities. 	Gear Restrictions and Allocations	Allocate by gear for certain directed fisheries
	Overcapacity	Maintain existing restricted access programs (LLP and moratorium, AFA, IFQ sablefish, etc.)
		Development of rights-based management programs for the groundfish fisheries, to include protections that maximize benefits in rural communities

With an end to the race-for-fish and implementation of rights-based allocations, participants are expected to be better able to adapt to the additional restrictions placed on the fishery because of increased emphasis on ecosystem management. To the extent participants are able to adapt, the rights-based allocations within the alternative are expected to decrease the number of direct participants and activities of support industries. Remaining participants however, are likely to have increased stability and incomes. The alternative's promotion of rights-based allocations is also expected to increase consumer benefits and health and safety of participants. Additionally, because the disincentives for bycatch reduction inherent in the race-for-fish are reduced, the alternative could reduce bycatch, even if additional bycatch regulations are not imposed.

The alternative also promotes, in PA.2, expanding the range of data reporting required by industry. The collection of additional economic data could be critical in the development and eventual acceptance of additional ecosystem regulations. Regulations such as bycatch restrictions and the creation of MPAs have the potential to have negative effects at least in the short-term on industry participants; if additional data can reduce the uncertainty of social and economics effects associated with these types of restrictions, then it may increase the probability that these regulations could be approved and implemented. A further discussion of the benefits of additional socioeconomic data can be found under Alternative 3 in the Data and Reporting Requirements qualitative analysis paper in Appendix F-11.

4.10.6.9 Increase Alaska Native Consultation

The PA sets objectives to increase Alaska Native consultation, as well as recommending a range of management measures that would implement these objectives.

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<u>Objectives</u> <ul style="list-style-type: none"> Continue to incorporate local and Traditional Knowledge in fishery management Consider ways to enhance collection of local and Traditional Knowledge from communities, and incorporate such knowledge in fishery management where appropriate Increase Alaska Native participation and consultation in fishery management 	Alaska Native Issues	Develop and implement procedures to incorporate local and Traditional Knowledge into fisheries management/ do local and Traditional Knowledge research
		Increase consultation with Alaska Natives
		Encourage increased participation/ representation of Alaska Natives in fishery management
		Allow for subsistence uses consistent with Federal law

Impacts of Policy

Under the PA, there would be some changes to current management policies and measures used by NOAA Fisheries and the NPFMC regarding Alaska Native consultation. These changes increase efforts to collect local and Traditional Knowledge, and develop and implement measures to incorporate it into fishery management. NOAA Fisheries staff anthropologists would increase the collection of existing local and Traditional Knowledge, expand an in-house local and Traditional Knowledge database, and continue informal consultation with individuals in Alaska Native communities. NOAA Fisheries and the NPFMC would work with Alaska Natives to evaluate and develop measures to incorporate Traditional Knowledge. Formal consultation with federally recognized tribal governments during NEPA compliance under EO 13175 would also continue at current levels during NEPA scoping activities and public comment periods on draft NEPA documents, but other forms of consultation would also be considered. Similarly, opportunities for Alaska Native participation in NEPA compliance and NPFMC deliberations would continue to be available during NEPA scoping, public comment periods on draft NEPA documents, review of NPFMC documents, and at NPFMC meetings. However, other forms of outreach and information exchange would be considered to increase participation.

Increased participation and representation of Alaska Natives in fishery management would be encouraged under the PA. NOAA Fisheries and the NPFMC would work with Alaska Natives to identify and develop measures that would increase participation and representation in fishery management.

Under the PA, Alaskan Native participation in the fisheries will be affected by rationalization of fisheries. CDQ groups fishing in the BSAI would continue to benefit from rationalization. Non-CDQ Alaska Native participants in the GOA would also benefit from rationalization of fisheries. Benefits to Alaska Native communities would be mixed, with CDQ communities receiving increased revenues, while non-CDQ Native communities could experience a reduction in employment and support services due to rationalization of fisheries.

Reduced levels of salmon bycatch and additional area closures under PA.2 could benefit subsistence harvest of Steller sea lions and salmon in western Alaska, although cumulative effects have a greater influence on the availability of both subsistence resources. The potential for Environmental Justice impacts as a result of this alternative would be limited to any adverse effects of rationalization on non-CDQ Alaska Native communities.

Under the PA, subsistence uses would continue consistent with federal law. Joint production of subsistence resources, where Alaska Natives who participate in groundfish fishing take advantage of their commercial fishing efforts to harvest subsistence resources, would continue at current levels.

4.10.6.10 Improve Data Quality, Monitoring and Enforcement

The PA accelerates precautionary management of the groundfish fisheries. The policy sets goals and objectives to improve data quality, monitoring, and enforcement, as well as recommending a range of management measures that would implement these objectives.

Impacts of Policy

The goal of the PA, as with all the alternatives, is to base fishery management on the best scientific information available. The PA objectives are to increase the utility of observer data, and to improve the Observer Program; to improve economic impact assessments by changing data reporting requirements; to utilize advances in technology to improve the quality of monitoring and enforcement data; to encourage an ecosystem monitoring program; to work with research institutions to identify research needs and to develop programs to address them; and to promote enforceability.

The Observer Program objective would be implemented through management measures that would either maintain or expand existing coverage but allow more flexible deployment of observers; improve species identification in observer data, and develop uncertainty estimates; and identify alternate funding mechanisms. Building more flexibility into observer deployment, so that coverage can be adjusted rapidly to respond to monitoring needs for data or compliance, would be beneficial and was an original intent of the Research Plan that preceded the interim Service Delivery Model program currently in place (for further historical description, see the Observer Program paper in Appendix F-10). Expanding coverage from 30 percent to 100 percent on the 60 to 125 ft LOA component of the fleet would provide more data on those vessels and address the issue of non-random coverage, but would not resolve lack of coverage issues with the <60 ft vessels.

Implementing improvements to observer data under the PA is accomplished through measures addressing the level of species identification in observer samples and uncertainty estimates. Historically, observers have identified only fish that are managed to the species level; however, the Observer Program has responded to requests to further identify other organisms, most recently skates, sculpins, and some coral species. The program must maintain a balance in consideration of the amount of time to teach identification and to record these species in the field, so as not to sacrifice target species data. A pilot project to determine the recording time required in the field is currently underway, with the goal of understanding the cost-benefit relationships of increasing the specificity of identification. This program would be expanded under PA.2. Regarding the setting of uncertainty estimates, currently there are no established confidence intervals for observer data. A 1997 analysis has indicated, however, that while statistical procedures may be appropriate for the most

abundant species in the catch, the statistical precision decreased for rarer species, and the adoption of statistical estimators may need to be paralleled with an increase in the current level of observer coverage and the amount of hauls sampled (see discussion under Alternative 3 of the Observer Program paper in Appendix F-10 for additional information).

Goals, Objectives	Corresponding Management Measures	
	FMP Component	Management Measure
<p><u>Goals</u></p> <ul style="list-style-type: none"> • Precautionary approach that applies judicious and responsible fisheries management practices, based on sound scientific research and analysis • Base management on the best scientific information available <p><u>Objectives</u></p> <ul style="list-style-type: none"> • Increase the utility of groundfish fishery observer data for the conservation and management of living marine resources • Improve groundfish Observer Program, and consider ways to address the disproportionate costs associated with the current funding mechanism • Improve community and regional economic impact costs and benefits through increased data reporting requirements • Increase the quality of monitoring and enforcement data through improved technological means • Encourage a coordinated, long-term ecosystem monitoring program to collect baseline information and compile existing information from a variety of ongoing research initiatives • Cooperate with research institutions such as the NPRB in identifying research needs to address pressing fishery issues • Continue to cooperate and coordinate management and enforcement programs with state and federal agencies, the IPHC and other organizations • Promote enhanced enforceability 	Observer Program	Observer Program coverage expanded or modified based on compliance or data needs, scientifically based; coverage to all vessels regardless of length (less than 60' or 60' or greater).
		Explore alternate funding mechanisms
		Improve observer species identification, develop uncertainty estimates (PA.2)
	Data and Reporting Requirements	Require broader range of economic data from industry participants, verified through third party (PA.2)
	Require VMS for Steller sea lion prey species; modify to incorporate new technology and system providers	

The Observer Program funding objective issue stems from the appearance of a conflict of interest arising from the direct financial relationship between the observer's employer and industry. The PA explores changes to the funding mechanism in order to alleviate any taint on the credibility of observer data, and proposes a range of solutions that include full federal funding, industry fee-based funding and setting aside a portion of TAC (see discussion under Alternative 3 of the Observer Program paper in Appendix F-10 for additional information).

The implementation of changes to the data and reporting requirements under PA.2 expands the range of economic data requested from industry participants, and sets up a third party verification system, potentially in aggregate, for reported data. New information would include data on employment, variable harvesting and processing costs, and fixed/annual costs (see Appendix F-11, the Data and Reporting Requirements paper, Alternative 3). This additional information would enhance the ability of analysts to provide accurate estimates of the costs and benefits of proposed regulatory actions. Additionally, third party data collectors

would be able to verify revenue data currently submitted. While authenticated data would allow for more accurate and credible economic impact assessments, a funding source would need to be identified to support the independent verification system.

The use of available technology to improve monitoring data is addressed in the FMPs through the ability to modify VMS to incorporate new technology and system providers. This may lead to a reduction in costs or improvements in technology and usage.

Establishing an effective ecosystem monitoring plan would accelerate precautionary management by providing an appropriate baseline against which to measure the impacts of fishing. Various ongoing research initiatives would contribute to this program, and new areas of research would be identified. The results would be compiled into a comprehensive monitoring plan. Funding for such a program would need to be identified, but the results would be a beneficial step in understanding the ecosystem impacts of fishery interactions.

The PA expands research efforts by seeking out partners, such as the North Pacific Research Board, to help identify research needs and to source funding for the research programs to address these data needs.

The objective to promote enhanced enforceability would encourage NPFMC to continue to prioritize enforcement considerations in designing management measure and program changes to the groundfish fisheries. It is likely that this objective may result in increased consultation with the Coast Guard in the design of management measures.

Cooperation, consultation, and coordination by the NPFMC and NOAA Fisheries with the State of Alaska agencies, federal agencies such as the USFWS and USCG, and organizations such as the IPHC, facilitate effective and efficient management and enforcement measures that promote conservation and sustainability.

The PA data quality, monitoring, and enforcement objectives conform with the overall policy intent of the alternative, namely to accelerate precautionary management in two ways: where appropriate, to take steps to incorporate uncertainty and ecosystem considerations into fishery management, and at the same time, to increase efforts to improve scientific understanding and diminish uncertainty. The objectives in the PA result in data collection on direct fishery impacts and interactions as well as on broader ecosystem relationships and indirect effects, and emphasize the importance of enforcement concerns in fishery management.