

## **4.11 Comparison of Alternatives at the Policy Level**

In this section, we first compare the alternatives against the relevant requirements of Federal law, as well as other national recommendations that pertain to groundfish fishery management. Then, after summarizing the impact analysis of the alternatives from Section 4.10 of this document, we compare the alternatives are compared against each other in regard to their impacts on the human environment.

### **4.11.1 Comparison of Alternatives Against Laws and National Recommendations**

The alternatives developed for this Programmatic SEIS are policy statements that present a “vision”; one that is based on a management approach and a suite of goals and objectives, on how Alaska groundfish resources can be managed for the common good. Each policy alternative was designed to meet the minimum federal statutory requirements applicable to fisheries management and in most cases exceed those minimum requirements. The range of policy alternatives encompass the range of social values as expressed by Congress, NOAA Fisheries, the NPFMC, and the public.

This section presents a policy review of each alternative against key federal laws that apply to fisheries management, national policy goals, and other recommendations for management of fishery resources in order to illustrate how well each policy alternative satisfies various statutory requirements. A detailed summary of all applicable federal laws and EO is presented in Chapter 2 (Section 2.2.2) and will not be repeated here.

#### **4.11.1.1 Federal Statutory Requirements**

NOAA Fisheries is mandated by a variety of federal statutes to manage, conserve, and protect the Nation’s living marine resources. Some of the main tenets of the agency’s legislative mandates require a balancing of objectives. For instance, the MSA directs the agency to manage living marine resources for optimum sustainable utilization, while the MMPA prohibits exploitation of marine mammals and directs the agency to protect and maintain them at optimum sustainable population levels. The alternatives under examination in this Programmatic SEIS consider all of the statutory requirements and EO mandates relevant to fisheries management. The alternatives represent different ways in which the objectives embodied in the statutes and EOs can be balanced. The following statutes and EOs are at the heart of federal fisheries management and play an integral part in defining the scope of the policies, goals, and objectives contained in, and management measures that flow from, an FMP:

- The Magnuson Stevens Fishery Conservation and Management Act of 1976 (MSA)
- Endangered Species Act of 1973 (ESA)
- Marine Mammal Protection Act (MMPA)
- EO 12866 – Regulatory Planning and Review
- EO 12898 – Environmental Justice Guidance Under NEPA
- EO 13084 – Consultation and Coordination with Indian Tribal Governments
- EO 13158 – Marine Protected Areas

Table 4.11-1 compares the above-mentioned statutes and EOs with each alternative and describes how the alternatives take into account the statutory and EO requirements. The table also points out possible inconsistencies between the alternatives and the statutory and EO requirements.

#### **4.11.1.2 NOAA Fisheries Strategic Plan**

In 1998, the NOAA Fisheries published its strategic plan outlining its mission and its goals for guiding marine resource management decisions. In the spirit of the Government Performance and Results Act, the agency focused its plan on measurable results which were viewed as important to the American people, rather than on specific activities or programs. NOAA Fisheries intentionally set ambitious standards for itself against which its performance can be measured, so that after five years the agency could review its performance, celebrate its accomplishments, and learn from its shortcomings. NOAA Fisheries is currently conducting its five-year assessment and, based on its findings, will revise its strategic plan for the next five years.

In order to fulfill its stewardship mission, NOAA Fisheries has structured its divisions around three broad strategic goals:

1. Rebuild and maintain sustainable fisheries;
2. Promote the recovery of protected species; and
3. Protect and maintain the health of coastal marine habitats.

#### **Rebuild and Maintain Sustainable Fisheries**

A sustainable fishery is one in which the rate of fishing mortality does not jeopardize the capacity of the stock to produce the maximum sustainable yield on a continuing basis. By building and maintaining sustainable fisheries, NOAA Fisheries ensures that fish stocks are available for commercial, recreational, and subsistence uses. To realize this goal, they will:

- Maintain healthy stocks important to commercial, recreational, and subsistence fisheries;
- Eliminate overfishing and rebuild overfished stocks important to commercial, recreational, and subsistence fisheries;
- Increase long-term economic and social benefits to the nation from living marine resources; and
- Promote the development of robust and environmentally sound aquaculture (where applicable).

#### **Promote the Recovery of Protected Species**

As part of its stewardship responsibility, NOAA Fisheries must ensure that our nation's living marine resources will be protected and enhanced for future generations. Protected species under the agencies' jurisdiction include all cetaceans and pinnipeds (excluding walruses) in addition to those marine species listed as threatened or endangered under the Endangered Species Act. NOAA Fisheries will provide effective leadership to conserve and recover marine species protected by statute or international treaty through

conservation programs that are based on sound scientific research and decision-making. They will also provide for non-consumptive uses of protected resources which are compatible with their long-term conservation. To realize this goal, they will:

- Recover and maintain protected species populations; and
- Reduce conflicts that involve protected species.

### **Protect and Maintain the Health of Coastal Marine Habitats**

All living marine resources are vulnerable to habitat degradation, which can threaten the biodiversity on which they depend. These habitats are at risk from human activities which degrade or destroy habitat quality and quantity. NOAA Fisheries recognizes that wise protection of living marine resource habitat is crucial to the success of management and conservation efforts. To realize this goal, they will:

- Protect, conserve, and restore living marine resource habitat and biodiversity

### Evaluation of Policy Alternatives

NOAA Fisheries is committed to achieving its strategic goals when making its management decisions. It will evaluate reasonable alternative management measures for achieving these goals and objectives, with appropriate consideration to competing interests and demands for fishery resource use. All the policy alternatives in this Programmatic SEIS comply with the three strategic goals. The BSAI and GOA groundfish resources and their essential habitats can be destroyed if harvest is not carefully controlled or their important habitat goes unprotected. But with proper management, healthy stocks can be maintained, and diminished fish, Steller sea lion, and other populations can be restored to bring greater wealth to coastal communities. Policy Alternatives 1, 3, 4, and the PPA provide the greatest management control over the harvest of groundfish. BSAI and GOA groundfish fisheries that are sustainable over the long term allow United States citizens to reap the greatest economic and social benefits which include a continuing supply of high-quality seafood and recreational and subsistence fishing opportunities.

Sound scientific research is the basis for sustainable fisheries. Currently, NOAA Fisheries must make management decisions without having conducted sufficient investigations of the spectrum of ecological and anthropogenic factors that contribute to the equilibrium of natural systems. Examples include the effects of noise on marine mammal health and behavior and the impact of habitat modification by fishing gear. These unaccounted factors may unknowingly create or exacerbate stock declines, giving rise to crisis management of fisheries. To help ensure productive future harvests, NOAA Fisheries scientists study the life history, stock size, habitat, and ecology of economically important fishes, and the effects of climate and ocean processes on their populations. This information is used by fishery managers to set TACs, fishing seasons, bycatch limits, and gear restrictions each year. All of the policy alternatives rely on continued scientific research and monitoring of the fisheries. Alternatives 3, 4, and the PPA commit the agency to explore additional funding to support an expanded research program aimed at filling the scientific data gaps identified through preparation of this Programmatic SEIS. Such data is needed to measure progress in achieving policy goals and objectives and to answer the many questions about the effects of fishing on the marine ecosystem.

Many marine mammals, such as Steller sea lions, whales, and seals, as well as seabirds, listed albatross, salmon and sea turtles, are all protected by federal law. These valuable resources comprise important members of the BSAI and GOA ecosystem. They all can be affected by fisheries and other human activities as well as by environmental change. NOAA Fisheries seeks to reduce the impacts of these activities on protected species while ensuring the viability of valuable fisheries. All of the policy alternatives in this Programmatic SEIS include measures that to date have been determined to avoid jeopardizing the recovery of Steller sea lions and short-tailed albatross and avoid adverse modification of critical habitat for Steller sea lions. Alternatives 1 and 2 commit the agency to its current protection plan and its continuing relationship with the USFWS. Policy Alternative 3 and the PPA builds on this commitment by indicating it will adjust protection measures as appropriate based on new scientific evidence supporting a need for change. Policy Alternative 4 would result in immediate adjustments to the level of groundfish harvest and suite of other protection measures, including the possibility of temporary suspension of the fisheries as a precautionary measure, until scientific information is obtained that would support a relaxation of precautionary measures. All alternatives explicitly prioritize as a policy objective the recovery of threatened and endangered species.

Coastal habitats, such as estuaries, offshore pinnacles and gullies, and a variety of physical substrates, provide food and shelter for marine fish and shellfish during important stages of their life cycle. NOAA Fisheries monitors threats to these fragile ecosystems by monitoring development, water and sediment contamination, dredging and filling activities, and oil development projects off Alaska. The agency is a major force in maintaining the health of marine ecosystems by leading research to identify and restore damaged habitat, and by recommending measures to offset development and use impacts. Alternatives 1, 2, 3, 4, and the PPA all explicitly recognize through specific policy objectives the importance of protecting EFH and if need be other marine habitat from human activities. Alternative 3 and the PPA builds on current policy, legal requirements, and protection initiatives by recognizing the use of MPAs (in all their forms) as a legitimate management tool, and based on scientific review, the NPFMC and the agency will develop a MPA policy in coordination with national and state policies. Alternative 3, 4, and the PPA would establish large MPAs as a precautionary measure until scientific evidence shows they are not needed.

#### **4.11.1.3 Ecosystem Principles Advisory Panel and National Research Council Recommendations**

The Sustainable Fisheries Act of 1996 strengthened the MSA by mandating new conservation measures. One provision of the Sustainable Fisheries Act was the appointment of a NOAA Fisheries Ecosystem Principles Advisory Panel. The Panel was tasked to report to Congress on the extent to which ecosystem principles are being applied in fishery conservation and management activities, including research activities, and to propose actions that should be undertaken to expand the application of ecosystem principles in fishery conservation and management. The Panel's report was published in 1999, and thus provides updated information on ecosystem-based management of fisheries (Ecosystem Principles Advisory Panel 1999).

The Panel developed a list of basic ecosystem principles and policies, and recommended that Fisheries Ecosystem Plans (FEPs) be developed as a first step towards a full ecosystem-based fisheries management approach. Components of the plan include food web models, habitat needs, estimates of total removals, an assessment of uncertainty and buffers, indices of ecosystem health and use, long term monitoring plans, and an assessment of other elements. The basic principles outline the complex and dynamic nature of marine systems that are composed of interconnected groups of living organisms and their habitats and form the foundation of ecosystem based management strategies.

Building on these principles, the Panel developed six general ecosystem-based management policies to guide fishery managers. These policies reflect the importance of the ecosystem-based principles associated with the limitations on extraction, uncertainty, and the role of humans within ecosystems. A description of these six policies, provided by the Panel (in *italics*), are listed below.

1. Change the burden of proof. – *We live in a world where humans are an important component of almost all ecosystems. Thus, it is reasonable to assume that human activities will impact ecosystems. The modus operandi for fisheries management should change from traditional mode of restricting fishing activity only after it has demonstrated an unacceptable impact, to a future mode of only allowing fishing activity that can be reasonably expected to operate without unacceptable impacts.*
2. Apply the precautionary approach. – *The precautionary approach is a key element of the United Nations Agreement for Straddling Stocks and Highly Migratory Species (United Nations 1996) and the Food and Agriculture Organization of the United Nations (FAO) Code of Conduct for the Responsible Fisheries (FAO 1995). The U.S. is a signatory of both.*
3. Purchase “insurance” against unforeseen, adverse ecosystem impacts. – *Even under the precautionary approach, there is a risk of unforeseen, adverse impacts on ecosystems. Insurance can be used to mitigate these impacts if and when they occur.*
4. Learn from management experiences. – *Management actions and policies can be considered as experiments and should be based upon hypotheses about the ecosystem response. This requires close monitoring of results to determine to what extent the hypotheses are supported.*
5. Make local incentives compatible with global goals. – *Changing human behavior is most easily accomplished by changing the local incentives to be consistent with broader social goals. The lack of consistency between local incentives and global goals is the root cause of many “social traps,” including those in fisheries management (Costanza 1987). Changing incentives is complex and must be accomplished in culturally appropriate ways.*
6. Promote participation, fairness, and equity in policy and management. – *Ecosystem approaches to management rely on the participation, understanding and support of multiple constituencies. Policies that are developed and implemented with the full participation and consideration of all stakeholders, including the interests of future generations, are more likely to be fair and equitable, and to be perceived as such.*

The overall recommendation of the Panel was to expand the application of ecosystem principles, goals, and policies to fishery management and research. The mechanism to accomplish this is through development of an FEP that would be developed for each major ecosystem. A requirement for regional councils to develop FEPs is being considered now by Congress. A comparison of the four policy alternatives in this Programmatic SEIS against these six recommended ecosystem-based management policies reveals that most of these principles are incorporated into the alternatives.

### **Change the Burden of Proof**

Only Alternative 4 meets this principle in the strictest sense. This alternative represents a paradigm shift in management policy and in the near term would likely lead to significant restrictions placed on commercial groundfish fisheries off Alaska. However, Alternatives 1, 3 and the PPA do informally meet the principle in certain circumstances. For example, the NPFMC does now restrict the development of certain fisheries for lack of information and concern over unknown impacts, thereby assuming some of the burden of proof due to uncertainty.

### **Apply the Precautionary Approach**

Alternatives 1, 3, 4, and the PPA all incorporate this management principle. Alternatives 3, 4 and the PPA would accelerate precautionary measures to address uncertainty. Under the PPA, the OY caps in the BSAI and GOA are kept in place even though the ABCs for many groundfish stocks would support greater harvests. Alternative 2 would pose the greatest risk to the ecosystem compared to the other alternatives.

### **Purchase “Insurance” Against Unforeseen, Adverse Ecosystem Impacts**

Alternatives 1, 3, 4, and the PPA all apply the precautionary principle and therefore institute various buffers and other safeguards to reduce the risk of overfishing and to mitigate the adverse effects of fishing on the ecosystem. The aggressive harvest policy illustrated by Alternative 2 poses the greatest risk of harming the environment compared to the other alternatives.

### **Learn from Management Experiences**

All five alternatives were structured based on a historical review of the lessons learned from over 25 years of groundfish fisheries management. Each alternative is adaptive and as new scientific information is obtained, changes to the groundfish FMPs are likely to occur.

### **Make Local Incentives Compatible with Global Goals**

All five alternatives aim to achieve their policy objectives (e.g., “global goals”) through use of specific FMP components and management measures. To varying degrees, the alternatives illustrate a range of potential management actions, many of which are designed to influence fishermen and processor behavior. The PPA and Alternative 3 are similar in this regard. Past experience in managing the Alaska groundfish fisheries has shown the value of consulting with various stakeholders and the public to ensure that the eventual measures are meaningful and will achieve the intended goals and objectives.

### **Promote Participation, Fairness, and Equity in Policy and Management**

The MSA and regional council process rely heavily on public involvement throughout the decision-making process. Public involvement would continue under all four policy alternatives. Under Alternative 1, the NPFMC has already begun to incorporate these ecosystem policies into its groundfish management program. The NPFMC has established a Ecosystem Committee, comprised of scientists, stakeholders, and interested public, to review the scientific literature and provide advice to the Council. The Ecosystem Considerations

Chapter to the SAFE report that is prepared annually by the NOAA Fisheries AFSC, together with what is provided in this Programmatic SEIS, already assembles most of the information required for an FEP. Should Congress require that councils prepare an FEP for their respective regions, the NPFMC has in many ways already gathered the necessary information to put such a document together under any of the four alternatives. Under Alternative 2, it may prove difficult to build on the information base needed to keep an FEP current. Alternative 2 policy presumes that there are no adverse effects of fishing on the ecosystem and such a presumption may serve as the basis for curtailing existing research and monitoring programs. Alternative 3, 4, and the PPA would seek to expand on current data gathering programs, and the FEPs prepared under these alternatives would certainly be more thorough and easier to update over time

### **Evaluation of Alternatives relative to National Research Council's Ecosystem Based Management Standards**

In 1999, the NRC, an agency organized by the National Academy of Sciences, set out new performance standards for fishery management in "Sustaining Marine Fisheries" (NRC 1999). The publication reviews the status of global fisheries, the problems facing fishery managers, and provides recommendations on how to improve management to achieve sustainable marine fisheries. The overall recommendation of the NRC was the adoption of an ecosystem-based approach for fishery management with the goal "to rebuild and sustain populations, species, biological communities, and marine ecosystems at high levels of productivity and biological diversity, so as not to jeopardize a wide range of goods and services from marine ecosystems, while providing food, revenue, and recreation for humans" (National Research Council 1999). To achieve an ecosystem-based approach, the NRC made several specific recommendations (see inset on this page).

**Summary of the National Research Council's recommendations for ecosystem-based management to achieve sustainable fisheries.**

1. Adopt conservative harvest levels for single species fisheries.
2. Incorporate ecosystem considerations into fishery management decisions.
3. Adopt a precautionary approach to deal with uncertainty.
4. Reduce excess fishing capacity and define and assign fishing rights.
5. Establish marine protected areas as a buffer for uncertainty.
6. Include bycatch mortality in TAC accounting.
7. Develop institutions to achieve goals.
8. Conduct more research on structure and function of marine ecosystems.

Although neither the MSA nor the NOAA Fisheries Strategic Plan has been amended to specifically incorporate the NRC's recommendations, a comparison of the alternatives to the NRC recommendations is useful.

### **Conservative Single Species Management of Commercially Important Fisheries**

Relative to elsewhere in the world, the management of commercially important groundfish fisheries under Alternative 1 is conservative. Low harvest rates, combined with other management elements, provide for conservative single-species management of commercially important species to achieve sustainable groundfish fisheries in the North Pacific. All groundfish stocks are considered relatively healthy after 20 years of sustained annual harvests of about two million metric tons. No fish stocks have been deemed overfished, approaching an overfished condition, or subject to overfishing in a recent evaluation of the status of U.S.

fisheries (NOAA Fisheries 1999). Existing single species management of North Pacific groundfish meet the conservative and risk averse approach standard recommended by the NRC. None of the groundfish stocks is subject to overfishing as defined under the MSA. The NPFMC is considering revising its harvest rate strategy for rockfish.

Alternative 2, which would adopt a more aggressive harvest policy, would seek to prevent single species overfishing while maximizing yield. Such a policy would increase the risk of overfishing, especially for those fish stocks where there is little information on stock status. Alternatives 3, 4 and the PPA would all institute a more precautionary management policy where harvest strategies, if modified, would more likely be reduced. In the case of Alternative 4, reductions in single species ABCs and TACs would be made soon after adopting of the policy by NOAA Fisheries until scientific information were available to show that a higher exploitation rate would not adversely impact the stock.

### **Incorporating Ecosystem Considerations into Fishery Management**

The NPFMC has been actively developing an ecosystem-based approach to managing fisheries. A working draft of their approach is provided at right. The NPFMC's approach under Alternative 1 involves public participation, reliance on scientific research and advice, conservative catch quotas, comprehensive monitoring and enforcement, bycatch controls, gear restrictions, temporal and spatial distribution of fisheries, marine protection areas, and other biological and socioeconomic considerations. Management measures are also taken to minimize potential impacts of fishing on sea floor habitat and other ecosystem components such as marine mammals and seabirds.

The public, scientists, and policy makers have all contributed to development of an ecosystem-based management strategy. Since 1995, the groundfish plan teams have added an Ecosystem Considerations

#### **The North Pacific Fishery Management Council's Working Draft for Ecosystem-Based Management.**

**Definition:** Ecosystem-based management, as defined by the NPFMC, is a strategy to regulate human activity towards maintaining long-term system sustainability (within the range of natural variability as we understand it) of the North Pacific, covering the GOA, the eastern and western Bering Sea, and the Aleutian Islands region.

**Objective:** Provide future generations the opportunities and resources we enjoy today.

**Goals:**

1. Maintain biodiversity consistent with natural evolutionary and ecological processes, including dynamic change and variability.
2. Maintain and restore habitats essential for fish and their prey.
3. Maintain system sustainability and sustainable yields of resources for human consumption and non-extractive uses.
4. Maintain the concept that humans are components of the ecosystem.

**Guidelines:**

1. Integrate ecosystem-based management through interactive partnerships with other agencies, stakeholders, and public.
2. Utilize sound ecological models as an aid in understanding the structure, function, and dynamics of the ecosystem.
3. Utilize research and monitoring to test ecosystem approaches.
4. Use precaution when faced with uncertainties to minimize risk; management decisions should err on the side of resource conservation.

**Understanding:**

1. Uncontrolled human population growth and consequent demand for resources are inconsistent with resource sustainability.
2. Ecosystem-based management requires time scales that transcend human lifetimes.
3. Ecosystems are open, interconnected, complex, and dynamic; they transcend management boundaries.

section to their SAFE document that provides an annual assessment of the ecosystem, a review of recent ecosystem-based management literature, updates of ongoing ecosystem research, local observations from coastal people and fishermen, and any new information on the status of seabirds, marine mammals, habitat and other components of the North Pacific ecosystem. The NPFMC also has an Ecosystem Committee, which was established to discuss and recommend possible approaches to incorporating ecosystem concerns into the fishery management process. A major role of this committee has been to provide the NPFMC and stakeholders with information on ecosystem-based fishery management in the North Pacific. While a full understanding of North Pacific ecosystem dynamics remains beyond our grasp, the NPFMC and NOAA Fisheries are striving to achieve a better understanding of this system and, in the interim, are attempting to incorporate what we do know into the fisheries management process.

Although the NRC report provides some guidance on ecosystem-based management, there is no roadmap to follow or other examples to emulate. In a recent international meeting on the ecosystem effects of fishing, the NPFMC's efforts on ecosystem management (Witherell *et al.* 2000) were considered to be state-of-the-art.

All alternatives would incorporate ecosystem considerations into the fishery management decision-making process. The difference in alternatives is reflected in both the level of commitment toward ecosystem-based management principles (as illustrated by their stated management approach and objectives and further defined by their example FMP bookends) and the commitment for expanded research. Alternatives 3, 4, and the PPA more fully capture the NRC recommendations compared to Alternative 2.

### **A Precautionary Approach to Deal with Uncertainty**

The primary sources of scientific uncertainty in fishery management are the uncertainty about fishing effects on ecosystems and the uncertainty associated with stock assessments. For stock assessments, uncertainty can be associated with catch statistics (e.g., observer estimation error, misreporting), biological parameters (e.g., maturity, mortality, growth), resource assessment survey measurement error, and natural variability in dynamics such as recruitment.

In the North Pacific fishery management arena, uncertainty under Alternative 1 is dealt with in several ways. In the case of establishing acceptable harvest rates, the ABCs are based on a system of tiers, corresponding to information availability on population dynamics parameters. The Pacific cod stock assessment went an additional step of evaluating uncertainty regarding specific model parameters. The ABC for the 2003 fisheries was based on a risk-averse optimization procedure that adjusts for uncertainty in the selectivity coefficients and natural mortality rate. This type of analysis will likely be expanded to other assessments in coming years.

Uncertainty regarding species interactions, environmental factors, and human actions is addressed with other management measures under Alternative 1. Regulatory changes that have to some degree addressed these sources of uncertainty include establishment of marine protected areas, the OY cap in the BSAI and GOA, the forage fish prohibition, and spatial/temporal restrictions to reduce adverse affects to Steller sea lions and walrus.

Alternatives 3 and 4 present two dramatically different approaches to applying the precautionary principle to fisheries management. Like Alternative 1, Alternative 3 presents an adaptive approach to management where the FMPs are modified as scientific information indicates that the ecosystem is stressed or that there are unacceptable environmental impacts caused by fishing. Alternative 3 differs from Alternative 1 by formalizing a procedure for addressing uncertainty in stock assessments and other information, where at present uncertainty factors are treated on an ad hoc basis. The PPA , commits to completing its scientific review of current harvest strategies and adopting any improvements necessary to provide protection to target groundfish species. The NPFMC will also look for ways to better manage species currently not targeted or managed using a species-assemblage approach. Alternative 4 shifts the burden of proof from demonstrating adverse impacts in order to prohibit or proscribe a fishery to demonstrating no adverse impacts in order to authorize a fishery. Under this policy, substantial restrictions on the current levels of harvest among other actions, would protect the resource until scientific information could be collected to determine whether a more liberal harvest could be authorized. Such information would have to possess a higher level of certainty than presently exists for most fisheries and stocks.

### **Reducing Excess Fishing Capacity and Assignment of Fishing Rights**

There is no doubt that the groundfish industry in the North Pacific is overcapitalized due to limited quotas and the race for fish. The NRC report tends to link overcapacity with overfishing, because some fisheries (e.g., New England groundfish and scallops) have been traditionally managed with effort control, rather than quotas. Because catch is limited under Alternative 1 by TACs in the North Pacific, overcapacity does not necessarily increase the potential for overfishing. However, participants in overcapitalized fisheries can exert strong pressure for liberal catch quotas and other risk prone management measures, though there has been little evidence of that in fisheries under NPFMC jurisdiction. Also, in extreme cases, excess harvesting capacity may shorten seasons to a point that fishing quotas cannot be accurately monitored. The GOA pollock fishery is an examples of a fishery where quota overages have occurred in the North Pacific.

Under Alternative 1, the NPFMC has developed several programs to address overcapacity in the fisheries. Groundfish management programs generally limit the number of vessels that are allowed to fish off Alaska. In addition, halibut and fixed gear sablefish are managed under an IFQ program, which does not limit the number of vessels, but instead, grants permission to individuals to harvest a specified percentage of the TAC each year.

The AFA, passed in late 1998, among other things limited the number of harvesting and processing vessels that would be allowed to participate in the BSAI pollock fishery. Only harvesting and processing vessels that met specific requirements, based on their participation in the 1995-97 fisheries, are eligible to harvest BSAI pollock. Twenty-one catcher/processors and 120 catcher vessels qualified under the AFA. Nine large capacity catcher/processors were retired from the fishery by the AFA. Under the fishery cooperative structure now in place, not all 21 eligible catcher/processors have chosen to fish in the late winter and early spring pollock seasons. The AFA also restricts eligible vessels from shifting their effort into other fisheries. “Sideboard” measures, as they have become known, prevent AFA eligible vessels from increasing their catch in other fisheries beyond their average 1995-97 levels. Sideboard restrictions reduce the likelihood that the fishing capacity of AFA eligible vessels will be increased to better compete in those fisheries. The fishery cooperative has proven to be an effective and efficient operating structure for fishermen and processors.

Adoption of Alternative 2 would result in a systematic review of existing license limitation and rights-based management programs ( with the exception of those mandated under the AFA and MSA) and based on that review, the NPFMC and NOAA Fisheries could determine that such programs are not working and that these programs should be modified or eliminated. Such actions would not be consistent with the NRC recommendation to reduce excess fishing capacity and assign fishing rights. More consistent are Alternatives 3, 4 and the PPA, all of which seek as a matter of policy to further reduce overcapacity and explore various means of achieving that objective. Alternative 3 and the PPA seek to provide economic and community stability to the harvesting and processing sectors through fair allocation of fishery resources. This policy alternative also would seek to eliminate the race-for-fish in all groundfish fisheries by eliminating latent licenses and extending programs such as community or rights-based management cooperatives.

Alternative 4 emphasizes ecosystem considerations above economic and community considerations, but otherwise shares the objectives of Alternative 3 and the PPA. One notable difference is that Alternative 4 formally incorporates the concept of non-consumptive use valuation into the fishery management decision-making process.

### **Marine Protected Areas**

It has been long recognized that sea floor habitat is essential for maintaining productivity of fishery resources. Habitat that provides structural relief on an otherwise featureless bottom can be particularly important to fish for food, reproduction, and shelter from predators. Structural habitat includes boulders, corals, anemones, kelp, and other living organisms attached to the ocean bottom.

Because structural habitat has the potential for being disturbed by fishing gear, regulations have been implemented to protect areas where this habitat type is known to occur. Vast areas of the North Pacific have been permanently closed under Alternative 1 to groundfish trawling and scallop dredging to reduce potential adverse impacts on vulnerable habitat and to protect juvenile crab. Other closures occur on a seasonal basis, and additional closures to mobile fishing gear are under consideration. A unique nearshore pinnacle off Cape Edgecumbe in Southeast Alaska has been closed to groundfish fishing with all gear types.

The NRC considers permanent marine protected areas to be an important and useful tool for fisheries managers. MPAs would provide a hedge against uncertainty, provide habitat protection, and allow for species and ecosystem protection. The NRC defines marine protected areas as those where all fishing is prohibited. Furthermore, the NRC suggests that 20 percent of the potential fishing area be considered for marine protected areas. In this Programmatic SEIS, we use the term “no-take marine reserves” rather than “marine protected area,” to make clear that such an area would be closed to all commercial fishing. The term “marine protected area”, or MPA, is used in this Programmatic SEIS to distinguish an area where some form of gear or fishery restriction is in place, but that is not totally closed to all gear types or fisheries.

MPAs (as defined in the Programmatic SEIS; e.g., areas subject to some form of gear or fishery restriction but not totally closed ) comprise a relatively large portion of the continental shelf (29 percent of the shelf and slope to a depth of 1,000 m; termed fishable area in this Programmatic SEIS; Figure 4.2-1). In the BSAI, MPAs encompass about nine percent of the EEZ, or about 22 percent of the fishable area. The GOA closures encompass about 14 percent of the EEZ, or 46 percent of the fishable area. Some environmental advocates and scientists have suggested that no-take marine reserves should be at least 20 percent of available habitat

in order to be effective. The current suite of closed areas under both the BSAI and GOA falls far short of this objective, with less than one percent of the EEZ/fishable area closed to all groundfish fishing.

Alternative 2, the more aggressive harvest policy, assumes that there are no adverse impacts of commercial fishing on the environment and that there is no need to establish a Alaska groundfish MPA program. Adoption of this policy would be inconsistent with the NRC recommendation to establish a MPA program and EO 13158.

Adoption of Alternative 3, a more precautionary management policy, would at a minimum initiate a formal review of the applicability of an MPA program off Alaska and develop the necessary criteria and process for review of existing closed and restricted areas and to identify new areas as candidates under such a formalized program. This policy would also commit the agency to increased research on EFH. Under Alternative 3, both no-take reserves and MPAs would be considered viable management tools for achieving habitat protection and ecosystem-based management objectives. As such, this alternative is fully consistent with the NRC and Ecosystem Advisory Panel management standard.

Alternative 4 is also consistent with this standard. It differs from Alternative 3 by increasing policy emphasis on establishing no-take marine reserves as a means of ensuring that ecological processes and individual species protection objectives are met. It is recognized elsewhere in this Programmatic SEIS that considerable care is needed in determining where such reserves should be established and that such care requires considerable public and community involvement.

The PPA is a modified version of the Alternative 3 policy in reference to habitat protection and the use of MPA and no-take reserves. Under the PPA, the NPFMC would commit to developing a MPA policy for Alaska and coordinate its development with both state and federal MPA committees recently established. Under the PPA, the NPFMC recommends that the agency maintain all existing closures until criteria can be developed for evaluating the effectiveness of all current closed areas in achieving habitat protection objectives as well as identify possibly new areas as candidates for MPA designation. For purposes of analysis and illustration, the PPA uses the maps developed for Alternative 3 as examples of the range of concepts that will be pursued by its EFH Committee and a future MPA committee (Figures 4.2-8 and 4.2-9). Figure 4.2-8 illustrates the system of closed areas and MPAs currently in effect. Figure 4.2-9 illustrates an expansion of closures up to 20 percent of the EEZ/fishable area. It should be noted that Figure 4.2-9 illustrates a true composite of MPA concepts that could be used to protect habitat as well as other closures to protect Steller sea lions and king and Tanner crab. It is not likely that all the concepts would be implemented simultaneously. It is also unlikely that all the areas shown as closed in the illustration would be implemented. Detailed analysis conducted in conjunction with this Programmatic SEIS revealed that some of these areas provided questionable benefits to habitat. In addition, the scale of the mapped closures are too crude to satisfy legal requirements and are only intended to provide conceptual representation of MPAs. [The reader should refer to the NPFMC's EFH EIS analysis scheduled to be released in early 2004 for more detail on EFH and the range of possible mitigation alternatives.]

### **Bycatch and Discards**

The issues of bycatch, discard, and waste of fish resources stem from social, economic, and conservation concerns. From an ecosystem perspective, mortality of unwanted and prohibited species may reduce

spawning potential, reduce biodiversity, alter regular paths of energy flow and balance, enhance the growth of scavenger populations, and add uncertainty to estimates of total removals.

The NRC notes that conservation concerns are raised in world fisheries where bycatch and discards are treated as side effects of fishing. Fortunately, however, in the North Pacific, this is not a problem. Under Alternative 1, all bycatch and discarded groundfish are counted toward the TAC established for individual stocks. Additionally, because observers sample the entire catch, not just the retained portion, the information on bycatch and discards is available and is directly incorporated into the annual stock assessments.

Fish are discarded for two reasons: either they are required to be thrown back due to regulations (prohibited species), or they are unwanted for market reasons. In the North Pacific, discards of unwanted groundfish (so-called economic discards) result when fishermen do not have markets, sufficient equipment, time, or economic return to retain and process the catch. In the 1997 BSAI groundfish fisheries, a total of 258,000 mt of groundfish were discarded, equating to about 15 percent of the total groundfish catch. Although this discard rate is much lower than most of the world's groundfish fisheries, which average about 19.9 percent discards, and it is deducted from the TAC, the sheer volume of discards is troublesome to many people who consider economic discards as a waste of food and as having an unnecessary impact to the ecosystem.

Bycatch management measures implemented for groundfish fisheries of the EBS under Alternative 1 have focused on reducing the incidental capture and injury of species traditionally harvested by other fisheries. These species include crab, herring, halibut, and salmon. Collectively, these species are called "prohibited species," as they cannot be retained as bycatch in groundfish fisheries and must be discarded with a minimum of injury.

In addition to bycatch limits, gear restrictions and other regulatory changes have also been implemented to reduce bycatch and waste. Biodegradable panels are required for pot gear to minimize waste associated with so-called ghost fishing of lost gear. Tunnel openings for pot gear are limited in size to reduce incidental catch of halibut and crabs. Gillnets for groundfish have been prohibited to prevent ghost fishing and reduce bycatch of non-target species. With the implementation of an IFQ system for halibut and sablefish longline fisheries in 1995, bycatch and waste were reduced because the race for fish was eliminated, allowing for more selective fishing practices and significant reductions in actual gear deployment/loss. BSAI Amendment 57 prohibited the use of non-pelagic trawl gear for vessels targeting pollock in the Bering Sea, and made a concomitant reduction of allowable prohibited species bycatch of halibut and crabs.

To reduce groundfish economic discards, the NPFMC adopted an improved retention and utilization program for all groundfish target fisheries. Beginning in 1998, 100 percent retention of pollock and Pacific cod was required, regardless of how or where it was caught. Only fish not fit for human consumption can be legally discarded. This measure has dramatically reduced overall discard of groundfish. For example, in 1997, about 22,100 mt of cod (8.6 percent of the cod catch) and 94,800 mt of pollock (8.2 percent of the pollock catch) were discarded. In 1998, discard amounted to only 4,300 mt of cod (2.2 percent) and 16,200 mt of pollock (1.6 percent). A regulation requiring full retention of all demersal shelf rockfish species (e.g., yelloweye rockfish) was adopted by the Council although this measure has not yet been approved by NOAA Fisheries. Required retention of BSAI rock sole and yellowfin sole and GOA shallow water flatfish is being considered in the development of a multi-species amendment. These retention requirements are expected to reduce overall discard rates (all species) from about 15 percent to about 5 percent.

Waste of salmon and halibut has been reduced by allowing bycatch of dead fish to be donated to food banks. The food banks in turn distribute the fish to needy people in the northwestern United States. Many fishing companies voluntarily participate in the donation program. Through 2001, over 4 million pounds of donated fish have produced an estimated 14 million meals for needy persons.

Numerous regulations have been implemented to reduce bycatch and discards of groundfish and crabs. It is unlikely that discards can be significantly reduced below the 5 percent rate projected under current regulations, without requiring full retention of fish species unwanted for human consumption. In other words, a full retention requirement for sculpins and other species would likely result in less discards, but more fishmeal production. Bycatch and discard of crabs, halibut, and herring are a function of regulations. If full retention of all species was required, there would be virtually no bycatch or discard.

Adoption of Alternative 2 would result in a review and potential relaxing of bycatch control measures currently in effect. As mentioned previously, adoption of this policy alternative assumes that there are no adverse environmental effects of groundfish fishing and that bycatch at present levels is not adversely affecting the ecosystem. Under Alternative 2, groundfish harvests could be increased substantially, with little effort controls in place. Bycatch and discards are predicted to increase significantly under this alternative, even if the underlying assumption of no adverse effect to the ecosystem is proven true. Adoption of this policy would be inconsistent with this standard and NOAA Fisheries' own national bycatch reduction program.

Alternative 3 and the PPA are similar to Alternative 1 but they further commit the NPFMC and the agency to achieving bycatch and waste reduction objectives. Bycatch accounting mechanisms would be improved and consideration given to establishing additional bycatch limits and/or reducing existing bycatch limits. As a result, the Alternative 3 and PPA policy alternatives are consistent with this standard and national policy objectives.

Adoption of Alternative 4 would commit the NPFMC and NOAA Fisheries to much lower harvest rates and perhaps even temporary suspension of the fisheries until more information is known about the effects of fishing on the ecosystem. Such reductions in overall groundfish TACs would result in much lower fishing effort and lower bycatch of non-target groundfish and prohibited species.

## **Institutions**

The NPFMC is one of eight regional councils established by the MSA to manage fisheries in the 200-mile EEZ. The NPFMC primarily manages groundfish in the GOA and BSAI, including cod, pollock, flatfish, mackerel, sablefish, and rockfish species harvested mainly by trawlers, hook-and-line longliners, and pot fishermen. The NPFMC also makes limited entry decisions for halibut, though the U.S.-Canada IPHC biologically manages the resource. Other large Alaska fisheries such as salmon, crab, and herring are managed primarily by the ADF&G.

The NPFMC has eleven voting members, six from Alaska, three from Washington, one from Oregon, and a federal representative, the Alaska Regional Administrator of NOAA Fisheries. Voting members represent state fisheries agencies, industry, fishing communities, and academia. The NPFMC's four non-voting members represent the U.S. Coast Guard (USCG), U.S. Fish and Wildlife Service (USFWS) Department of

State, and the Pacific States Marine Fisheries Commission. The NPFMC's staff resides in Anchorage, Alaska. The NPFMC receives advice each meeting from a twenty-three member Advisory Panel representing user groups, environmentalists, recreational fishermen, and consumer groups, and from a thirteen-member SSC of highly respected scientists who review all information brought to the NPFMC.

Each NPFMC decision is made by recorded vote in public forum after public comment. Final decisions then go to NOAA Fisheries as recommendations for FMP or regulatory amendments. NOAA Fisheries reviews the Council's submission, issues proposed amendments and regulations for public review and comment and then makes a decision on whether to approve, disapprove, or partially approve the action. Decisions must be consistent with the MSA, NEPA, ESA, MMPA, and other applicable law including several EOs. Regulatory changes may take up to a year or longer to implement, particularly if they are complex or contentious.

The NPFMC and NOAA Fisheries have worked as successful institutions for achieving the goal of sustainable fisheries. The structure of the NPFMC's numerous committees (e.g., Advisory Panel, SSC, Plan Teams, Ecosystem Committee) allows for incorporation of diverse views from interested parties. The NPFMC and NOAA Fisheries coordinate their activities with other institutions including the IPHC, ADF&G, USFWS, USCG, and others.

The NPFMC, its committees, and its well established public process described under Alternative 1 would continue under all of the policy alternatives. Specific changes to this existing institutional structure would occur under Alternatives 3 and 4 (the NPFMC's recommended PPA is identical to Alternative 3 in this regard). Under Alternative 3, the NPFMC and NOAA Fisheries would pursue ways to increase Alaska Native participation and consultation in fisheries management. Such methods include adding more Alaska Native representatives on the Council Advisory Panel and video conferencing. The agency might consider adding a tribal government coordinator to its staff to enhance its government-to-government consultation abilities and serve as a liaison to Native organizations and Native communities. Other options include establishing a student intern program to provide opportunities for Native students to learn more about fisheries management and to share information. Alternative 3 (and the PPA) would also build on the existing relationship with USFWS and ADF&G in expanding its cooperative research programs. Alternative 4 would expand on these concepts by increasing participation of Native and non-Native subsistence users when making fishery management decisions.

### **Information Needs**

While the fisheries in the North Pacific are managed with the best available science in the world, there is an ongoing need to increase our current understanding of the biological and socioeconomic factors in the fisheries. There is also a mandate to achieve some level of understanding of overall ecosystem dynamics and incorporate that understanding into our management approach.

The NOAA AFSC, along with other institutions such as the University of Alaska, ADF&G, the Prince William Sound Science Center, and others have all been doing ecosystem level research. This research is expected to continue at about the current level, unless funding increases are made. An integral part of this Programmatic SEIS has been to identify data gaps and research needs for improved management of the Alaska groundfish fisheries. Due to the importance of this subject and the heavy reliance of any successful

application of a management policy on adequate scientific information, NOAA Fisheries has prepared a separate chapter on this subject (Chapter 5) in this Programmatic SEIS.

Continued research and monitoring of the Alaska groundfish fisheries are essential to ensure the sustainability of these fisheries for future generations, regardless of which policy alternative or a vision” for management is adopted. Each of the four policy alternatives must be supported by research and monitoring. Alternative 2 requires the lesser level of commitment, while Alternatives 1, 3, 4 and the PPA all require expanded data quality, monitoring, and enforcement programs to ensure that policy goals are achieved. Such programs are typically funded by Congress through the federal appropriations process. Generally, NOAA Fisheries and the regional councils have been well funded though all research and agency expenditures are usually not. Decisions must be made by the agency as to what projects and programs get funding and which ones are put aside until funds become available. Recently, a new organization, the North Pacific Research Board, has been formed which could provide funds for ecosystem-related research. The fishing industry also has a long history of supporting research.

One area of anticipated growth and understanding is in the form of Traditional Ecological Knowledge. Traditional Knowledge comprises the historical observations of the environment that has accumulated by Native people who have close ties with the ecosystem and have socially and culturally relied on natural resources for subsistence. Recent efforts to share this knowledge and “wisdom” have begun to enter into the realm of fishery management decision-making. Under Alternative 1 and 2, these efforts would continue. Alternatives 3, 4, and the PPA would seek to enhance collection and study of such information and consider new ways of incorporating traditional knowledge into the decision-making process. Such methods might include increasing Alaska Native involvement in fisheries management, through co-management agreements and cooperative research initiatives. All four policy alternatives are consistent with this ecosystem-based management standard.

#### **4.11.2 Comparison of Alternative Impacts on the Human Environment**

The alternatives are analyzed in detail from a policy perspective in Section 4.10 of this document. The sections below present the results of that analysis in a format that allows for comparison of the alternatives. The discussion is organized around the eight major goals identified as key components of North Pacific groundfish fishery management.

Table 4.11-2 presents the information summarized below in table format, and uses a color key to indicate the direction of effect associated with each alternative. The intent of the summary below, and in Table 4.11-2, is to provide a broad, policy-level understanding of the general impacts of the alternative. The analysis deals with effects at the population or fishery level, rather than calling out impacts to individual components (a more detailed analysis of the example FMP bookends provides a basis for the policy-level analysis; see Section 4.10.1 for further information.) Where the impacts within a policy goal are substantially different for major component groups, the color key is split in half and two colors are assigned. The bulleted language in the table explains the rationale.

The colors assigned to the effects are red, orange, light green, and dark green. Red indicates an adverse effect in the judgement of the analysts, but does not distinguish the degree of uncertainty associated with that effect. Orange indicates that no adverse effect is expected as long as all analytical assumptions are correct; however,

there is no room for uncertainty in the assumptions, and the effect could easily veer to adverse. Light green also indicates that no adverse effect is predicted, but also that the rating accounts for a buffer of uncertainty against the potential that incorrect assumptions may result in an adverse effect. Dark green indicates a beneficial effect, and one in which a large buffer of uncertainty is incorporated.

## **Prevent Overfishing**

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.

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 that 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.

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.

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.

The PPA 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 example FMP PPA.2, additional procedures to incorporate uncertainty and develop spawning stock biomass estimates, in particular for Tiers 4-5.

## **Promote Sustainable Fisheries and Communities<sup>1</sup>**

Alternative 1 continues to provide economic and community stability within the current system, while adapting management programs when the need arises. Some fisheries and communities are stressed due to the negative effects of the race for fish.

Long-term sustainability of fisheries and communities may be problematic if Alternative 2 policies, as illustrated in example FMP 2.1, are implemented. In the short-term, fisheries and communities will likely see improved economic conditions. If less aggressive actions are pursued, the alternative is likely to be no better or worse than Alternative 1.

The rationalization of the fisheries under Alternative 3 holds the promise of improved fishery and community sustainability. Extensive area closures associated with more aggressive ecosystem-based management may reduce small boat and Alaska community involvement<sup>1</sup> in fisheries.

The extensive TAC reductions and area closures under Alternative 4 reduce the viability of fisheries and fishery-dependent communities. Some fisheries may survive if the assumptions of impacts are correct.

The goal of promoting sustainable fisheries and communities under the PPA 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.

## **Preserve Food Web**

Alternative 1 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.

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 3 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.

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<sup>1</sup> This policy goal was explicitly identified only in the PPA; in other alternatives, this goal was addressed under the policy heading of “Allocation Issues”.

Alternative 4 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.

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, the PPA 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.

### **Reduce and Avoid Bycatch<sup>2</sup>**

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 2, as illustrated in example 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 example 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 that 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.

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 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.

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<sup>2</sup>For the Preliminary Preferred Alternative, this policy goal was reworded “Manage, Reduce and Avoid Bycatch and Incidental Catch”.

The bycatch and incidental catch reduction policies in the PPA 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.

### **Avoid Impacts to Seabirds and Marine Mammals**

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.

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 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 goal of minimizing human-caused threats to protected species is largely met in Alternative 3 by actively adjusting protection measures, by 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.

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 goal of minimizing human-caused threats to protected species is largely met in the PPA 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.

### **Reduce and Avoid Impacts to Habitat**

Alternative 1 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 2 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 3 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 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 environmental 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 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 environmental 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 PPA 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 environmental 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.

### **Allocation Issues<sup>3</sup>**

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, but would create fewer, although possibly higher paying, fishery related jobs. Non-market,

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<sup>3</sup> For the PPA, this policy goal was reworded “Promote Equitable and Efficient Use of Fishery Resources”.

recreation, and tourism values could decrease in the short-run before the transition to rights-based systems is completed.

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.

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 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.

The Preliminary Preferred Alternative 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.

### **Increase Alaska Native Consultation**

The Alternative 1 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.

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.

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.

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.

The goals and policies for Alaska Native consultation and participation in fishery management under the PPA 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 the PPA, such as reductions in PSC limits, may benefit subsistence salmon use by reducing bycatch levels in the groundfish fisheries.

#### **Data Quality, Monitoring and Enforcement<sup>4</sup>**

The Alternative 1 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.

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. However, 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.

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<sup>4</sup> For the PPA, this policy goal was reworded “Improve Data Quality, Monitoring, and Enforcement”.

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.

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.

Through data collection measures that will result in reducing uncertainty, the PPA 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. The alternative also emphasizes the importance of enforcement concerns in fishery management.