10.0 IDENTIFICATION OF RESEARCH NEEDS FOR EFH IN THE ALASKA REGION

The guidelines specify that each FMP should contain recommendations, preferably in priority order, for research efforts that the Councils and NMFS view as necessary for carrying out their EFH management mandate. The need for additional research is to make available sufficient information to support a higher level of description and identification of EFH. Additional research may also be necessary to identify and evaluate actual and potential adverse effects on EFH, including, but not limited to, direct physical alteration; impaired habitat quality/functions; cumulative impacts from fishing; or indirect adverse effects such as sea level rise, global warming and climate shifts; and non-equipment related fishery impacts. The Magnuson-Stevens Act specifically identifies the effects of fishing as a concern. The need for additional research on the effects of fishing equipment on EFH and a schedule for obtaining that information should be included in this section of the FMP. If an adverse effect on EFH is identified and determined to be an impediment to maintaining a sustainable fishery and the managed species' contribution to a healthy ecosystem, then the research needed to quantify and mitigate that effect should be identified in this section. The following excerpt from the draft NMFS paper entitled "Linking Fish Productivity to Habitat: An Initiative for FY 2000" provides an overview or research needs for EFH.

10.1 Overview of Habitat Research Needs

The Magnuson-Stevens Fishery Conservation and Management Act (M-SFCMA) as amended by the Sustainable Fisheries Act of 1996, is notable for its essential fish habitat (EFH) provisions. Implementing these provisions requires a program of research that will make available sufficient information to support a higher level of description and identification of EFH and to identify and evaluate actual and potential adverse effects on EFH, and to develop measures to conserve and enhance EFH. The ultimate goal of attaining a high level of description and identification of EFH is to directly link fish productivity to habitat. This concept will serve the nation in two important ways. It not only provides for the management of marine habitat via its protection, restoration and maintenance, but it also advances our objectives to provide sustainable fisheries. Increasing our understanding of how habitat affects the growth, reproduction, and survival rates of fish will ultimately improve our ability to predict changes in stock status, and will require the use of new, innovative technologies and development of predictive models. This knowledge will be used to provide for protection of presently undegraded habitat and make the necessary improvements to degraded habitats that will maintain and improve stock status. To move this objective beyond its conceptual stages will require commitment to advance our capabilities in three areas:

I) Describe and identify essential fish habitat utilizing new and innovative technologies.
II) Identify, describe, and understand the effects of adverse activities on essential fish habitat.
    A) Identify, describe, and understand the effects of non-fishing related activities on essential fish habitat.
    B) Understand the effects of gear and fishing activities on habitat.
III) Develop methods and approaches to conserve and enhance essential fish habitat.

These areas are identified as major areas of information need in the National Marine Fisheries Service Habitat Research Plan (Thayer et al. 1996). The need for such a coordinated program of coastal and estuarine research is not only mandated by the M-SFCMA, but also was recognized by the National Academy of Sciences in their 1994 National Research Council Report on Priorities for Coastal Ecosystem Science which states that among the research areas requiring scientific information to eliminate shortcomings in our understanding of coastal habitat needs, functions, and processes are: relationships between habitat structure and function; recruitment and population and community development in both natural and restored ecosystems; processes that regulate and control interannual

variability in populations; techniques, including the use of dredged material, for coastal habitat restoration; improved physical and biological models to help advance the design of ecosystem restorations.

The ultimate goal of the research described below is to link fish productivity to habitat. In concept it not only provides for the management of marine habitat via its protection, restoration and maintenance, but it also advances our objectives to provide sustainable fisheries. Objectives under this goal are to respond to the needs of the eight FMCs and NMFS by undertaking a program of research as required by the M-SFCMA to provide information to support increasingly more sophisticated levels of description and identification of EFH, to identify and evaluate actual and potential adverse effects on EFH (including both fishing-related and non-fishing related impacts), and to develop methods and approaches to conserve and enhance EFH. These objectives will be accomplished through: 1) enhanced biological sampling to complete life history distributions and abundances of managed species; 2) characterization and relating of benthic habitats to the distributions and abundances of managed species; 3) identification of habitat properties that contribute most to managed species' survival, growth, and productivity; 4) determination of habitat properties important in recruitment of managed species; 5) determination and evaluation of adverse effects on EFH from point and non-point sources, harmful algal blooms, hypoxia, endocrine disrupting chemicals, and pathogens; 6) identification of impacts of fishing gear on habitat of managed species; 7) testing of harvest refugia concept for selected areas and managed species; and 8) development of new methods and approaches for restoration of degraded EFH.

RESEARCH ACTIVITIES

The multi-species coastal and near shore research described here will be conducted with both conventional and new technologies. New technologies, such as multibeam sonar and others, and standardization of technologies are needed to assess and type deep benthic bottom habitat. The broad spatial extent of these fisheries generally has precluded careful examination of the nature of the exploited habitats, the relationships among species and habitats, and the degree to which fishing activities have affected these habitats. Other technologies, such as stable isotope analysis, insulin-like growth factor, and fatty acid analyses may be useful in establishing and confirming predator-prey relationships. Multiple stable isotopes as food web tags will be used to assess linkages between fishery organisms and habitats. Habitat related growth rates also will be examined using relatively new techniques based on microstructure of otoliths, RNA:DNA ratios, and cell-based growth measurements. Finally, remote sensing is important in providing a holistic view of landscapes covering large areas and monitoring changes in these landscapes which affect EFH and the living marine resources which reside there. Mapping of essential fish habitat will be conducted through synthesis of existing information and the development of GIS. We would expand on our use of submersible or ROV to transplant living coral and monitor coral settlement and growth and to document fish and invertebrate community changes in damaged and restored habitat.

I) Describe and identify essential fish habitat

Implementation of the M-SFCMA requires a program of research that provides information to support a higher level of description and identification of EFH. Research on the ecology of fish and their linkages with habitat is the foundation for such description and identification of EFH. The diversity, quality, and extent of habitats are among the most significant environmental determinants of distribution, abundance, and diversity of fishery resources. At present, the contribution of many of these habitats to the productivity of managed fishery species is unknown. Scientific information is required on the structure

and function of fishery habitats to judge the impacts of threats to and provide recommendations to protect and restore habitats. To support description and identification of EFH, research is required to:

- Enhance biological sampling to complete life history distributions and abundances of managed species in the Alaska region. Identify and investigate inshore habitats of the Bering Sea that currently are not sampled, but are likely habitat for such important commercial species as king crab, flatfish, Pacific cod, and herring. Conduct biological surveys of continental slope habitats not adequately sampled for abundance and distribution of Eastern Bering Sea Greenland turbot, Gulf of Alaska shortraker and rougheye rockfish, and Dover sole. Utilize acoustic bottom typing to characterize bottom fish habitat in untrawlable areas in the Alaska region. Describe and understand habitat factors influencing distribution, abundance, growth, species interactions, and survival in order to forecast abundance trends and yield.

- Characterize benthic habitats in the Alaska region and relate to managed species biology. Identify and map continental shelf and slope benthic habitats (e.g., mud, sand, gravel, cobble, live bottom, etc.) in each NMFS region, as well as submerged reef and seagrass habitat where appropriate, using high resolution acoustic systems, submersibles and air and spaceborne remote sensing platforms. Conduct retrospective analyses of extant data on dominant species stratified by depth and latitude to relate habitat type and fish density. Use GIS to integrate bottom imagery (i.e., acoustic data) and other technologies with managed species data (i.e., distribution, abundance, and size) and determine relationships. Develop spatially explicit habitat models for demersal fishes.

- Identify habitats and habitat properties in the Alaska region that contribute most to managed species' survival, growth, and productivity. Determine the most productive habitats and watersheds for managed species. Conduct literature survey for habitat and life history information to develop habitat characterization and GIS maps for managed species in each region and develop a national GIS database. Develop and test laboratory and field techniques to measure habitat-specific survival, growth, reproduction, and production rates. Conduct habitat related growth and maturity investigations and food habitat studies using new technologies such as stable isotope and insulin-like growth factor analysis. Examine genetic parameters such as presence of rare alleles to determine the reproductive value of different habitats for major managed fish species. Examine the utility of using molecular genetics, biochemical and tissue indices of energy status of selected species as indicators of habitat quality. Conduct research on the growth and metabolic rates of larval and juvenile fishes as a function of salinity, temperature, and habitat type. Use GIS to analyze relationships between managed species and habitats. Develop individual-based models of populations and foodwebs.

- Determine importance of habitat properties in recruitment processes of managed species in all NMFS regions. Identify primary cues (e.g., temperature, salinity, currents, turbidity, habitat structure, habitat location or quality, and prey abundance) used by larvae and juveniles of commercially and recreationally important fisheries species for recruitment from oceanic spawning areas to coastal and estuarine habitats using remote sensing and field surveys. Identify factors regulating utilization of emergent and submergent coastal and estuarine habitats using field surveys, remote sensing, and such approaches as stable isotope analysis. Determine the importance of hydrographic, biotic, and structural components of the environment to the growth and survival of young of the year managed species that recruit to offshore banks. Identify the sources and sinks of managed species' production in the Alaska region, including identification of the origins of spawning adults and the fate of offspring spawned in various aquatic habitats. Utilize existing ichthyoplankton time series data (i.e., CALCOFI data) to determine fish production from inshore EFH in California. Use GIS and geostatistical analyses to develop models of EFH for estuarine dependent and continental shelf species, and develop spatial models that incorporate critical environmental features and which will provide management tools for FMCs.

II) Identify, describe, and understand the effects of adverse activities on essential fish habitat

Coastal ecosystems receive virtually all of the water flowing off the continental U.S. As human population increases, so do waste loads and use of the terrestrial surface. Changes in land use result in changes in land cover, which affect water quality and, subsequently, affects coastal and estuarine habitats and their living marine resources. Lack of understanding of the cumulative effects of land cover and changes in land cover on these habitats and their resources has limited the appropriate management of landscape activities. Additionally, in the U.S., as elsewhere, human population in the coastal region is increasing at an ever-quickening pace. Our ability to monitor resultant land cover and habitat change has not kept pace with the change, and management, thus, has been more reactive than proactive.

Mapping and monitoring of inshore (estuarine and riverine habitats of anadromous fish) EFH and determination of cumulative threats (i.e., adverse effects) and changes in those threats to EFH from non-fishing, land-based sources on watershed and regional scales has not occurred. Such information is required for management of fishery resources which migrate along our coasts and are affected by the numerous estuaries and rivers they occupy along the way. Thus, research is required to:

- Determine and map adverse effects of the watershed and regional changes in land cover on essential fish habitat. Utilize existing salmon and other managed species' abundance data and information on land use, water quality, hydrology and geology to determine non-fishing impacts at the ecosystem level employing a GIS/habitat modeling approach. Construct GIS database and maps on degradation of habitat quality by chemical contaminants. Develop regional GIS databases of permit related-activities, adverse impacts, and point source runoff information to assess potential hotspot areas along all coasts, including surveys of the current condition of culverts and bridges on logging roads crossing anadromous and high value resident fish streams. Overlay fishery resource information and conduct correlative and statistical analyses. Establish relationships between indices of habitat degradation and reductions in biological productivity and construct predictive models for use by FMCs. Predict the impact of coastal development activities on salmonid and other managed species' spawning and rearing habitats using GIS modeling techniques.

There is increasing concern among marine ecologists, resource managers, and fishery biologists over potential impacts of mobile fishing gear (e.g. bottom trawling and dredging) to essential benthic fish habitats. As fisheries expand, perceived and real damage to habitats is cause for even greater concern encompassing portions of the marine environment heretofore not considered, such as the deep shelf/slope. This type of disturbance can result in alteration of the physical complexity of benthic habitats, removing essential biological and sedimentary structure. Evidence of fishing activity can be clearly discerned in side scan sonar images of the seafloor. Acoustic analysis of groundfish habitats allows the mapping and quantification of these features in relationship to fishery and habitat distributions, and enables development of an index of benthic habitat disturbance caused by fishing activities. Comparisons also can be conducted on habitat recovery and community structure in areas closed to fishing relative to areas being fished. This would allow us to judge both impact to and recovery of habitats impacted by various gear types. We anticipate that a large-scale assessment of potential damaging effects to habitats by fishing activities could lead to improved habitat management and maintenance of the biological productivity of these fragile habitats. Thus, research is required to:

- Identify the impacts of mobile fishing gear on the continental shelf and the rate of recovery of these habitats after gear disturbance. Utilize side scan sonar, multi-beam acoustics, submersibles, video, and other new technologies to conduct large scale assessments in the Alaska region to evaluate effects on habitats by fishing activities. Conduct comparative evaluations in areas closed to fishing relative to similar areas being fished. Examine how different mixes of fishery management (e.g., gear exclusion)

effects biodiversity and EFH over a wide variety of important habitats. Utilize existing data and retrospective analyses to evaluate if there have been changes in biodiversity, community composition, and size structure of fish populations in heavily trawled areas. Where impacts to habitat are observed that are statistically significant, conduct gear design research to minimize impacts. Via syntheses define and prioritize gear research needs that will minimize the adverse effects of fishing activities on EFH.

III) Develop methods and approaches to conserve and enhance essential fish habitat

Unfortunately, coastal marine and estuarine habitats are continuing to be lost through natural and man-induced causes. Approaches to minimization and conservation of essential fish habitats must continue to be sought. Identification of potential areas of refugia (i.e., research closure areas) and experiments on no take and limited take zones and time-area closures must be conducted as an evaluation of potential management approaches. Research is required on restoration methodology in order to counter and reverse the effects of habitat degradation and loss, and to develop measures for the conservation and enhancement of essential fish habitat. Technologies may exist to restore some habitats which, if done properly, have a chance of succeeding. However, creation, enhancement, and restoration of marine and estuarine habitats involves more than just capping of contaminated sediments, cultivating vegetation, breaching dikes, or nourishing beaches, for example. Limited methodologies exist for many habitat types and there has been little emphasis placed on rapidly restoring biodiversity and monitoring for success and persistence. Research also is needed to identify indicators of functional restoration, which may lag behind structural restoration of degraded habitats. NOAA with its stewardship for living marine resources has both the responsibility and capability to conduct such evaluations and implement the findings in its management decisions and its claims case responsibilities. Research will lead to scientific information on pathways of recovery and stability of created and restored habitats. Assessing new techniques and evaluating current technologies throughout geographic regions and scales will not only provide foundations for judging success but will generate guidelines for improving best management practices. A goal here is to return impacted systems to full productivity and biodiversity as efficiently and as economically as possible. Thus, research is required to:

- Develop and implement a scientifically valid experimental design to evaluate the best approaches to utilization of harvest refugia to manage, protect, and conserve Alaska rockfishes and other managed species. Synthesize existing information, identification of target species, potential sites, and assessment and monitoring requirements both within and outside the refugia. Evaluate potential fishery reserves in the Alaska region through mapping of spawning aggregations, determination of essential fish habitat and oceanographic features, and proximity to nearby nursery areas, using acoustic surveys and development of a GIS framework. Model source-sink dynamics of Alaska habitats through examination of ocean dynamics and larval distribution patterns. Develop spatially explicit models on important Eastern Bering Sea fishery organisms to provide management tools to conserve and sustain stocks.

- Evaluate new, innovative techniques directed at assessing functional value and restoration success of anadromous fish habitat, restored saltmarsh, seagrass, and shellfish reef habitats in all NMFS regions. Conduct comparative research on the impacts of urban development, agriculture, mining, and silvaculture on fishery habitats and evaluate restoration approaches that will include assessment of the role of buffer zones to ameliorate land use effects. Use comparative studies of restored and natural habitats to develop chemical and biological indicators of restoration. Determine the importance of patch size and proximity to adjacent habitats in the development of restored habitats. Develop simulation models based on field evaluations of the functional development of restored habitats to provide management recommendations on the most cost effective design, approaches, and specifications for habitat restoration. Conduct watershed level evaluations for areas of restoration opportunity/need on major systems on each coast.

EXPECTED PRODUCTS/BENEFITS

Products will support the description and identification of EFH as required under the M-SFCMA. Specific products for the Alaska region will include: enhanced life histories for managed species, particularly for eggs, larval, and juvenile stages inhabiting inshore and estuarine areas of Alaska, and adults inhabiting deeper shelf and slope waters of Alaska; detailed bottom habitat type maps entered into a GIS and related to managed species distributions and abundances; and identification of habitat factors contributing most to managed species survival, growth, productivity, and recruitment.

The link between habitat and fisheries productivity is poorly understood. These products will support the FMCs not only as a required element in the development of FMPs, but also in the conservation and enhancement of EFH for species managed under the M-SFCMA (i.e., Which habitats in what quantities and conditions are required to meet the long-term potential yields of managed species?). Improved understanding of fisheries habitats could lead to more accurate stock assessments and better conservation and management of fishery resources and the economic benefits derived from them.

Products will support the identification, description and understanding of non-fishing related adverse effects on EFH as required under the M-SFCMA. Products for the Alaska region include: GIS based maps of land cover and land cover change in 5 year increments to identify and locate, magnitude and change in landscape/watershed non-point sources affecting EFH; GIS databases of point sources affecting EFH; GIS based maps of managed species' habitat quality (indices of degradation), quantity and trends; GIS based analysis of relationships between habitat status and managed species' distribution, abundance, survival, growth, and productivity.

Non-fishing related adverse impacts to EFH are not well understood. Improved science is required to know which habitats in what quantities and conditions to protect in order to meet the long-term potential yields of managed species. Products listed above will enhance the FMCs ability to identify and understand non-fishery related adverse effects on EFH and to develop measures to conserve and enhance EFH of managed species. This research also will provide FMCs and NMFS with information to assess cumulative impacts and define when and where those impacts either are or will become unacceptable.

Products will support the identification and understanding of effects of gear and fishing activities on EFH as required under the M-SFCMA. Products for all NMFS regions include: detailed assessments of location and magnitude of gear impacts to benthic habitats of managed species, including changes in biodiversity and size structure of fish populations; information on comparisons between fished and non-fished areas and rates of recovery for areas impacted by bottom fishing gear.

The extent of impacts from fishing activities on seafloor habitat, benthic communities, and cover and food abundance for commercially valuable, managed species is unknown. Information on actual impacts would help decrease unnecessary contention among gear groups and assist the FMCs in making rational management decisions to reduce impacts as required by the M-SFCMA.

Products will support the development of methods and approaches to conserve and enhance EFH as required under the M-SFCMA. Products for all NMFS regions include: a synthesis of information regarding use and design of harvest refugia for managed species; new methods and approaches for the restoration of EFH; assessments of the role of buffer zones to ameliorate land use effects on EFH; development of indicators of degradation and recovery for EFH; and watershed evaluations for areas of restoration opportunity/need.

These products will strengthen the ability of the FMCs to develop measures to conserve and enhance EFH for inclusion within FMPs and to comment on federal and state activities that might adversely affect EFH. Additionally, these products will assist NMFS in developing recommendations during consultations required under the M-SFCMA to minimize or compensate for federal or state activities that might adversely EFH.

Conclusion

Alaska leads the Nation in fish habitat are and in the value of fish harvested, yet we lack the most basic information on distribution and habitat utilization for most early life stages of commercially valuable groundfish and shellfish. Systematic sampling exists only for targeted adults. A program is required to generate distributional data on which to determine EFH for the juvenile and larval stages of most or our marine fish. Additionally, Alaska fisheries are affected by two general anthopogenic impacts: (1) anthropogenic development that impacts watersheds, wetlands, estuaries, and nearshore benthic environment. Mapping and assessing impacted wetlands and eelgrass beds in an established GIS database with all salmonid producing streams (including riparian and upland land cover and use determinations) and escapements in the system is required to make necessary resource management decisions. Priority needs to be given to assessing and mapping high priority habitats, such as identifying and mapping eelgrass beds near roads and log dumps. Functional values of high-priority habitats need to be established, and the linkages between fishery productivity and habitats need to be understood. Fishing impact studies are in their infancy in Alaska. Increased emphasis needs to be placed on fish ecology and marine benthic habitat typing in conjunction with impact assessments of trawls, dredges, longlines, pot gear, and other fishing gear used in Alaska fisheries. Development of a standardized marine benthic habitat typing technology is a required precursor.

10.2 BSAI and GOA Groundfish FMP

The EFH Core Team developed a draft framework for evaluating research and management activities. The framework reflects the Team's strategy of organizing efforts and activities around the goals of protecting and managing habitat essential to productive fisheries. By evaluating current knowledge levels and status of EFH, priority research and management activities can be identified for the various FMPs. In applying the framework to groundfish, priorities are narrowed to where level 0 information for EFH intersects with habitats that are most at risk to human activities. The Team considered this intersection to be bottom habitats where groundfish fisheries take place as well as nearshore areas subject to shoreside and upland development. Specific research needs are:

- Information on habitat distribution, in conjunction with fish distribution is necessary to determine species habitat requirements and utilization. Information on the extent and distribution of complex habitat types easily impacted by bottomfishing will greatly improve the ability to evaluate the potential of a fishery to physically alter bottom habitat and evaluate proposed measures to minimize impacts on EFH. To attain this information we recommend increased support to evaluate remote bottom typing technology and increased application of currently available technology such as multi-beam sonar, that can provide detailed topographic maps of the continental shelf and slope.

- Surveys and studies of nearshore pelagic and benthic areas are needed to determine their use by a variety of species, including Atka mackerel, Pacific cod, pelagic rockfishes, sablefish, octopus, flatfishes, salmon, and juveniles and larvae of all species and forage species considered in NPFMC FMPs.

10.3 BSAI King and Tanner Crab FMP

As a first step to identify the most productive habitat types for each life stage of Bering Sea and Aleutian Islands king, Tanner and snow crabs, several analyses of existing data would be useful.

- Analyze trawl survey data to evaluate co-occurrence of crabs with flora, fauna, invertebrate and vertebrate species by survey station and year.
- Evaluate co-occurrence relative to changes in mature crab abundance and time lagged abundance as an index of recruitment.
- Investigate species interchange and niche displacement over time relative to crab and groundfish abundance by area.
- Evaluate relative crab and groundfish abundance by statistical area over time relative to intensity of commercial fishing effort.

Equally important is to ground truth assumed crab habitat associations by life stage and in so doing initiate regular surveys using appropriately scaled tools for the target sample space (e.g. oblique bongo tows, crab collectors, diver/submersible observation, beam trawl, and laser line scan). Regular survey allows estimation of prey usage, growth, reproductive potential and potentially natural and fishing mortality. Given the temporal nature of crab in time and space, multiple surveys spread throughout the year are important. Areas to focus survey sampling would include:

1. Established habitats associated with each life stage of crab by species.
2. Probable habitats for crab species and life stages of unknown habitat.
3. Known commercial fishing locations to assess abundance of bottom dwelling species and area of habitat types before and after a concentration of fishing gear occurs in the area.

Crabs exhibit a number of migratory behaviors throughout their life stages. Imperative to understanding changes in crab habitat association within a year and from life stage to life stage is development of scaled to size tags that can be retained through molt. To date no such tag exists for mature Chionoecetes crabs. Integral to a crab tagging program is sufficient technological support to track and recover tags.

10.4 Alaska Scallops FMP

The level of knowledge about the distribution, biology, life history, population dynamics of pink, spiny and rock scallops in Alaska is very poor. For weathervane scallops, limited information about biology and life history is available, and information about distribution is relatively good for adults but poor for other life stages. Accordingly, evaluations of fishery management strategies and potential impacts on Essential Fish Habitat of Alaskan scallops are data-limited. Highest priority research areas include (1) scallop biology and life history including spawning timing, ocean conditions favorable to early life survival, specific habitat features that determine scallop bed locations, and predators, (2) estimation of recruitment, mortality, and growth rates, (3) stock assessments, (4) population dynamics, (5) estimation of biological reference points as harvest controls, and (6) effects of dredge gear on scallop stocks, other invertebrate and fish species, and benthic habitats.

10.5 Alaska Salmon FMP

In applying the Core Team's framework to salmon, research priorities are focused on two activities: 1) acquiring basic data on salmon distribution and life history for regions where these data are missing; and

2) acquiring knowledge and developing management tools for use in conserving or restoring habitat areas of particular concern (identified above). Based on the draft framework, the following research needs are considered to be the highest priorities:

- Increase the scope of survey data for presence/absence, habitat-specific utilizations, in areas where intensive development, current or planned, threatens salmon habitat.

- Digitize species distribution and life-history information in anadromous stream atlas for inclusion in SASpop GIS system. A one-time effort would allow efficient use of existing information for definition of EFH.

- Research into the habitat values for salmon of the identified Habitat Areas of Particular Concern. These include nearshore marine and estuarine areas with submerged or emergent aquatic vegetation and freshwater streams and lakes in areas under intensive development for urban, industrial, timber harvest, and other land uses.

10.6 Strategic Investment Framework

A STRATEGIC INVESTMENT FRAMEWORK FOR THE ALASKA REGION'S ESSENTIAL FISH HABITAT PROGRAM

Background

The Sustainable Fisheries Act amended the Magnuson Fishery Conservation and Management Act to require the description and identification of essential fish habitat (EFH) in fishery management plans. It also requires that adverse impacts of federally authorized fishing practices on EFH be minimized, and provides the opportunity for review of any actions authorized,
funded, or undertaken by other federal agencies that may have adverse impacts on EFH. Along with these increased requirements, the National Marine Fisheries Service (NMFS) anticipates that additional funds for fish habitat protection and research will be provided by Congress.

This document is to be used as a planning tool to identify priority needs. New funds may be directed toward programs and research projects designed to address those needs. Existing programs and projects may be evaluated according to their responsiveness to identified needs.

GOAL: Ensure sufficient habitat to sustain fisheries at current levels (or increased levels where appropriate).

PRINCIPLES:

1. Adequate, high-quality fish habitat is essential to production of optimum yields of managed fish species.
2. Protection of fish habitat is an integral part of NMFS science and management responsibilities.
3. Adverse impacts to EFH by federally managed fisheries is a direct NMFS responsibility.
4. Habitat conservation programs will be developed using an ecosystem context.
5. The Magnuson-Stevens Act EFH project review program will be used in conjunction with the National Environmental Policy Act, Clean Water Act, and Federal Power Act project review programs, as well as the Sustainable Fisheries and Protected Species management programs.
6. NMFS will provide information to other agencies to conserve and enhance EFH, and recommend measures to mitigate adverse impacts on EFH.

Four objectives were identified toward achieving the goal for the EFH program. Each objective is associated with strategies and investments necessary for its achievement. The terminology follows the NMFS guidelines for identification of EFH. The fish species receiving EFH descriptions are those which are listed as target species in Department of Commerce approved fishery management plans, as well as Pacific halibut.

OBJECTIVE I. Describe and Identify EFH in fishery management plans.

Strategies:

A. Describe essential fish habitat for appropriate fish species in the Alaska Region.
Investments: (1) Review the literature and analyze unpublished information.
(2) Depict EFH locations by species and life history stage on maps.

B. Obtain presence/absence information by life history stage for species and locations that presently are poorly known.
Investments: (1) Conduct research to determine presence/absence information by life history stage.
(2) Amend EFH descriptions and maps with new information.

C. Develop and refine knowledge of marine habitat in the North Pacific Ocean.
Investments: (1) Conduct surveys to determine bottom type of marine benthic habitat where bathymetric maps are unavailable. (2) Standardize bottom type information and create maps with survey data.

D. Conduct research to fill information gaps in EFH descriptions.
Investments: (1) Conduct research to describe EFH by life history stage. Obtain data on little known life history stages of marine species. (2) Amend EFH descriptions and maps with new information.

OBJECTIVE II. Describe and identify habitat areas of particular concern by determining habitat function, distribution, and vulnerability to habitat alterations.

Strategies:

A. Compile and assess knowledge on distribution of habitats.
Investments: (1) Catalog available maps (e.g., NOS catalogs), existing data, literature review, and analysis of unpublished information. (2) Conduct surveys of habitats in areas where information is unavailable and produce maps for these areas.

B. Compile and assess knowledge on habitat function: Identify specific habitat parameters that are critical for survival of a species life stage to the next life stage. Habitat parameters include, but are not limited to: spawning substrate, egg-attachment substrate, species associations, feeding habitat, habitat used for protection from predators, or aspects of the physical environment (surge, light, salinity, etc.), preferences for freshly disturbed substrate or preference for substrate with fauna in climax state.
Investments: (1) Review the literature and analyze unpublished information. (2) Conduct research to determine habitat dependancies by life history stage.

C. Identify type and location of habitats vulnerable to loss or impairment by anthropogenic actions.
Investments: (1) Conduct research to determine effect of disturbance by trawl gear on biological substrate, resuspension of sediment by trawl gear, and reduction of complexity and diversity in benthic environment due to frequency of disturbance. (2) Conduct research on anadromous fish and crab species to determine effect of conversion to uplands of eelgrass beds and other intertidal and

subtidal habitat in coastal waters. (3) Utilizing results of II.A and B above, determine where HAPC is vulnerable to adverse impacts from anthropogenic activity.

OBJECTIVE III. Minimize habitat impact by managing human activities.

III.1. FISHING ACTIVITIES

Strategies:

A: Eliminate or decrease fishing activities known to adversely impact habitat of particular concern.
Investment: Based on appropriate research results and available habitat distribution knowledge, propose necessary area, gear, and season regulations in EEZ and State fisheries.

B. Where research on fishing activity impacts on habitat is lacking or incomplete, manage fisheries to the extent practical to enhance understanding of and minimize impacts from fishing activities.
Investment: Based on available habitat fishery knowledge, solicit, evaluate, and enact proposals for precautionary measures to minimize adverse impacts on habitat from fishing activities, while allowing prosecution of the fishery.

III.2. NON-FISHING ACTIVITIES

Strategies:

A. Minimize loss and impairment of vulnerable habitats.
Investments: (1) Conduct Magnuson-Stevens Act EFH consultations recommending avoidance and or minimization of activities that alter habitat important to a life stage of a managed species. Activities deserving EFH consultations include: aquaculture practices, timber harvest and forest management, urban developments, road construction and maintenance, programs that concentrate and/or promote increases in human population, oil and gas exploration and development, mineral and metal mining, energy transport, hydropower development and production, and transportation of hazardous materials.
(2) Review water quality standards for opportunities to reduce chronic water pollution that alters habitat parameters required by specific life history stages of managed species. Advise management agencies of findings.
(3) Assist management agency (EPA) with determinations of upper limits for total maximum daily load limitations on waterbodies declared as impaired.

OBJECTIVE IV. Where habitat has been impaired, develop and implement recovery programs.

Strategies:

A. Restore degraded habitat where cost-effective and will result in higher exploitable biomass of a managed fishery species.
Investments: (1) Determine which fishery species could have a higher exploitable biomass if additional or higher-quality habitat were available to one or more life stages of the species.
(2) Determine recovery rate or conditions necessary for recovery. (3) Develop cost-effective techniques to restore impaired habitat. (4) Restore habitat where cost-effective. (5) Foster

cooperative community-based restoration programs. (6) Export habitat restoration technology to other Regions.

Contributors: Tamra Faris, Lowell Fritz, Jeff Fujioka, Cindy Hartmann, Norris Jeffrey, Michael Murphy, Stan Rice, Ramona Schreiber, Jeff Short, David Witherell, and Steven Zimmerman.