

## **6.0 CONSERVATION AND ENHANCEMENT MEASURES**

### **6.1 INTRODUCTION**

The Magnuson-Stevens Fishery Conservation and Management Act requires all fishery management plans (FMPs) to identify actions to promote the conservation and management of fishery resources. Prior to the concept of essential fish habitat (EFH), conservation primarily involved management measures to reduce overfishing and rebuild overfished stocks. Such measures embraced the need to minimize and avoid the mortality of bycatch. While these issues remain very important in fishery management, the EFH amendment will strengthen the role of the New England Fishery Management Council to further conserve and enhance EFH and related fishery resources.

The regulatory text of the Interim Final Rule directs the Council to describe options to avoid, minimize, or compensate for the adverse effects of activities identified in the non-fishing threats section of this amendment. The Interim Final Rule also directs the Council to promote the conservation and enhancement of EFH, especially in habitat areas of particular concern. The Council has the discretion to provide comments on non-fishing activities authorized by federal and state agencies which impact the EFH of non-anadromous fish species. The conservation and enhancement options promoted by the Council include, as directed in the Interim Final Rule: the enhancement of rivers, streams, and coastal areas; improving water quality and quantity; watershed analysis and planning; and habitat creation. The enhancement of rivers, streams, and coastal areas may include reestablishing endemic trees or other appropriate native vegetation on riparian areas adjacent to EFH, restoring natural bottom characteristics, removing unsuitable materials from areas affected by human activities, or adding gravel or substrate to stream areas to promote spawning. Improving water quality and quantity may include the use of best land management practices, improved treatment of sewage, proper disposal of waste materials, and providing appropriate in-stream flows. Watershed analysis and planning may include encouraging local and state efforts to minimize destruction / degradation of wetlands, restore and maintain the ecological health of watersheds, and encourage the restoration of native species. Habitat creation may be considered as a means of replacing lost or degraded EFH.

This section of the amendment primarily addresses recommendations from the Council to other organizations and agencies. The fishing impacts section of the amendment addresses those activities and measures that the Council is currently taking, or is considering, to mitigate the adverse impacts to EFH associated with fishing activity under the Council's jurisdiction. By developing and articulating the options suggested to avert or minimize non-fishing threats to EFH, the Council defines its position relative to these types of activities. In developing mitigation recommendations, the Council applied the definition of mitigation used by the President's Council for Environmental Quality. This definition focuses on mitigation as a means of sequentially avoiding impacts, minimizing impacts, and compensating for remaining unavoidable impacts, and provides five types or categories of mitigation:

1. *Avoiding* the impact by not taking a certain action or parts of an action.
2. *Minimizing* impacts by limiting the degree or magnitude of the action and its implementation.
3. *Rectifying* the impact by repairing, rehabilitating, or restoring the affected environment.
4. *Reducing* or eliminating the impact over time by preservation and maintenance during the life of the action.
5. *Compensating* for the impact by replacing or providing substitute resources or environments.

The first step in the process for developing conservation and enhancement recommendations was to develop working definitions of the terms conservation, enhancement, and restoration. A working definition of restoration is worth noting because of the interrelation of this issue with the conservation and enhancement of habitat and fishery resources. The following definitions serve as terms of reference for the Council's EFH process:

- *Conservation* ≡ The rules, regulations, conditions, methods, and other measures which are useful in rebuilding, restoring, or maintaining, any fishery resource and the marine, aquatic, estuarine, or riparian environment (adapted *Magnuson-Stevens Fishery Conservation and Management Act*).
- *Enhancement* ≡ Activities conducted in existing marine, aquatic, estuarine, or riparian areas, which improve one or more of the ecological functions and/or the biodiversity of existing, but degraded or impoverished, habitats (NOAA. 1995 and Pywell, R. and P. Putwain. 1996).
- *Restoration* ≡ Re-establishment of marine, aquatic, estuarine, or riparian resource characteristics and function(s) at a site where they have ceased to exist, or exist in a substantially degraded state (adapted from NOAA. 1995).

Details on how the Council will distribute this information to the federal and state agencies targeted are provided in the EFH Strategic Plan (Section 8.3). The Strategic Plan also describes the Council's role in the federal EFH consultation process, how the Council will interact with the federal or state agencies targeted with conservation and enhancement recommendations, and the process the Council will use to determine and prioritize activities warranting Council attention.

### **6.1.1 New England Fishery Management Council's Authority**

The Magnuson–Stevens Act empowers the federal government to manage fishing from three miles offshore to 200 miles [Exclusive Economic Zone (EEZ)] and established the Regional Fishery Management Councils that are managed by the Secretary of Commerce. The Council's existing FMPs are amended with the development of this EFH amendment, and all future FMPs and other Council actions and recommendations will include EFH considerations.

The EFH amendment will strengthen the New England Fishery Management Council's involvement in habitat consultation processes. The Sustainable Fisheries Act (SFA) gives direct authority to the Council to comment and make recommendations on all environmental issues that occur within or indirectly impact habitat designated as EFH. The Council has the authority to comment on habitat issues in federal, state, and international waters. Federal waters include marine waters from the three mile state jurisdiction line offshore to the 200 mile Hague Line and EEZ boundary. State waters are not limited to coastal waters, but also estuarine, riverine, and terrestrial habitats that directly influence aquatic and marine environments. Activities in Canadian waters may also directly influence the fishery resources of New England.

The Council will assist the agencies discussed below to incorporate EFH considerations into existing projects and future programs. The Council will require assistance and support from federal and state agencies and non-governmental organizations to promote an awareness of EFH and develop and implement conservation and enhancement measures to protect EFH from fishing and non-fishing impacts (Sections 4.0 and 5.0). The Council is required to establish procedures for reviewing federal and state actions that may adversely affect the EFH of any species managed under its authority, and to cooperate with the National Marine Fisheries Service (NMFS) as closely as possible to identify actions that may adversely affect EFH, to develop comments and EFH conservation recommendations to federal and state agencies, and to provide EFH information to federal and state agencies.

The Council's partnership with NMFS derives from the NMFS Habitat Conservation Policy (FR 53142-53147), specifically Implementation Strategy 3, which provides a process to assess, comment, and make recommendations on habitat issues. Prior to the EFH provisions of the Sustainable Fisheries Act, there was no mandate for the Council to review state activities and the consultation primarily was limited to commenting on activities in federal waters. EFH broadens the scope of consultation to any activity that potentially impacts habitat necessary for the development of any life history stage of federally managed species. The Council will fulfill its obligation under the Magnuson-Stevens Act regarding the EFH by working closely with NMFS in the consultation process. Details of the process to be used by the Council to coordinate with NMFS in the consultation process are provided in the EFH Strategic Plan (Section 8.2).

The Magnuson-Stevens Act requires that the Council review and comment on any activity which is likely to substantially affect the habitat of any anadromous fishery resource under its authority. In addition to Atlantic salmon, this includes species such as river herring, striped bass, and American shad. The Council plans to work closely with the U.S. Fish and Wildlife Service, National Marine Fisheries Service, the states, and the Atlantic States Marine Fisheries Commission to meet this obligation.

The Council has developed a process to review and comment on activities that may influence EFH of any managed species. The following groups were formed with specific tasks in the development of the EFH Amendment and will assist with future decisions

related to EFH (see Sections 2.5, 8.1, and 8.4):

- *Habitat Oversight Committee*: the Committee consists of Council members that are responsible for bringing habitat issues to the attention of the entire Council for review and consideration. Other tasks may include developing position statements on particular issues that may impact EFH and developing recommendations for the protection of EFH.
- *Habitat Advisory Panel*: advisors are responsible for reviewing EFH-related issues and information and providing assistance to the Committee as needed.
- *EFH Technical Team*: members are responsible for technical oversight of all EFH documents drafted for Committee review and provide technical information to the Committee as needed.

The following sections provide recommendations to address fishing (section 4.0) and non-fishing threats (section 5.0) previously discussed. The recommendations primarily are targeted to federal and state authorities that are responsible for developing and enforcing conservation and enhancement measures for particular natural resources that may influence EFH. Certain recommendations also apply to non-government organizations and the general public.

## **6.2 RECOMMENDATIONS TO ADDRESS FISHING THREATS**

Conservation and enhancement measures to protect fishery resources from fishing activities will include current fishery tactics and emerging fisheries that are not regulated and may present environmental considerations in the future. Where gear types regulated by the Council are used in similar habitats in state waters or federal waters outside the jurisdiction of the NEFMC, Council recommendations may take the form of suggestions that the states or other entities (such as the Atlantic States Marine Fisheries Commission, the Mid-Atlantic Fishery Management Council, or NMFS) adopt similar habitat protection measures as implemented by the NEFMC. When different gear types are used in these waters, the Council may recommend identifying and, if necessary, developing the means to reduce the impacts of those gears on essential fish habitat. Fishing threats under the authority of the Council are addressed in Section 4.0. The Council is not prepared to make specific recommendations at this time.

Other fishing related activities, such as aquaculture and fish processing plants operating at-sea (e.g. within the water), may present substantial impacts to Council-managed resources (see Sections 4.7 and 4.8). The Council may find certain operations are having substantial impact on EFH and determine mitigation is necessary. The following recommendations address the Council's concerns with these activities:

- To reduce the risk associated with at-sea aquaculture and fish processing, the Council recommends facilities be sited in the least environmentally harmful

locations. The siting should include a thorough investigation of the natural resources and environmental conditions at the proposed development sites and surrounding habitats.

- The Council recommends that EFH designations be considered in the development and construction of any aquaculture and processing operation, and these activities be discouraged in HAPC.
- The Council recommends that aquaculture and processing operation discharge be closely monitored and discharge levels be strictly enforced to ensure safe levels of potential chemical and biological threats.

### **6.3 RECOMMENDATIONS TO ADDRESS ANTHROPOGENIC NON-FISHING THREATS TO EFH**

The non-fishing threats assessment serves to identify the variety of threats of primary concern, including the threats for which the Council may consider recommending action to lessen potential impacts (see section 5.0). The Council has developed a list of recommendations to federal, state, and local agencies and non-governmental organizations to consider implementing into existing or developing conservation and enhancement programs. The Council will provide recommendations to address non-fishing threats to the appropriate action agencies and recommend the agencies incorporate EFH into all existing habitat-related programs when the EFH designations occur within their jurisdiction. If particular organizations do not have programs to address non-fishing related issues, the recommendation will be that the particular organization should develop a program to mitigate a specific concern or a suite of environmental issues that potentially impact EFH occurring within their jurisdiction. In general federal and state agencies should, to the extent of their authority, take proactive approaches to reduce non-fishing threats to EFH in riverine, inshore, and offshore waters. The following recommendations address mitigation options for chemical, biological, and physical threats to essential fish habitat in the New England region.

#### **6.3.1 Chemical Threats**

##### Oil Spills

- The U.S. Coast Guard (USCG), in collaboration with other federal, state, and local agencies should continue to update and implement coastwide area contingency plans and incorporate EFH mapping to ensure the rapid and effective response to discharges of oil and hazardous substances in the marine environment. Plans should include a prioritization of clean-up plans to protect known areas of high productivity (e.g. HAPC).
- State environmental agencies should develop contingency plans for addressing oil spills in rivers (particularly rivers designated as HAPC for Atlantic salmon), estuaries, and other inshore habitats, if this task is not yet completed.
- The USCG should integrate EFH maps into the coastwide area contingency plans.

- State and federal resource agencies should develop and implement a policy on the use of oil spill chemical counter measures (e.g. dispersants) to protect EFH from the adverse effects of oil spills.
- Municipalities should establish and promote the use of used motor oil collection facilities to ensure proper collection and disposal of used motor oil from the general public to mitigate the threat of oil entering the environment and potentially impacting EFH.
- Federal, state, and local agencies and nonprofit organizations should work together to educate the public, particularly car and boat owners, about the potential hazards of petroleum products discharged to marine, estuarine, and riverine habitats.

#### Heavy Metals and Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), Pesticides and other Toxic Organic Compounds

- State agencies and business communities should form partnerships to facilitate safe management of hazardous products, emphasizing recycling and reduced use of hazardous products wherever possible, to reduce the potential threat of toxicants entering the environment and impacting EFH.
- EPA and state regulators should carefully monitor discharge monitoring reports of NPDES permit holders and work with them to ensure that they are in compliance with their heavy metals, PAHs, PCBs, pesticide, and other toxic organic compound limits to mitigate impacts on EFH.
- Municipalities should establish household hazardous waste collection programs to ensure the proper disposal of hazardous products to reduce the potential threat of toxicants entering the environment and impacting EFH.
- Municipalities should adopt and implement the following types of regulations to ensure the safe use, storage, and disposal of hazardous materials for the conservation of EFH: 1) hazardous materials regulations, 2) underground storage tank regulations, and 3) commercial and industrial floor drain regulations.
- Federal and state agencies should identify and form a database of contaminated sediments that may pose substantial threats to fishery resources and EFH for New England coastal, estuarine, and riverine benthos.
- Federal, state, and local agencies and nonprofit organizations should work together to educate the public about the potential problems of hazardous wastes discharged to marine, estuarine, and riverine environments that may potentially impact EFH.
- Wastewater treatment facilities need to continue their efforts to require pretreatment and recycling from industries that produce hazardous wastes so that these wastes do not reach the marine environment and impact EFH.

#### Chlorine

- EPA and state regulators should carefully monitor discharge monitoring reports of NPDES permit holders and work with them to ensure that they are in compliance with their chlorine limits to mitigate impacts on EFH.
- Where feasible, other methods of disinfecting wastewater, such as UV irradiation,

should be used instead of chlorine to minimize or remove any level of chlorine discharge.

- In cases where human health concerns from the consumption of contaminated shellfish or from contact with contaminated water are not issues, EPA, state regulators, and wastewater treatment facilities operators should consider eliminating the use of chlorine, at least seasonally, to reduce the amount of chlorine entering the environment that can potentially impact EFH.
- In general, all agencies and industries should consider developing innovative and cost-effective methods to minimize and reduce levels of chlorine discharged into EFH, while enhancing or maintaining water quality.

### Nutrients

- States should identify nitrogen sensitive embayments containing EFH, building on work that has been carried out in New England coastal states through the National Estuaries Program. Planning agencies, in collaboration with state environmental agencies and local officials, should determine critical loading rates and recommend actions to prevent or reduce excessive nitrogen and phosphorous loading to EFH, including freshwater spawning sites of anadromous fish, estuaries, and coastal water, all of which may be EFH.
- Actions to prevent or reduce nitrogen loading to protect EFH could include discouraging or banning the use of lawn fertilizers, requiring denitrifying systems on septic systems and nitrogen removal by wastewater treatment facilities, the protection of vegetated buffer zones and wetlands surrounding rivers and estuaries, the protection of open space, the use of catch crops by agriculture industries to reduce the amount of nutrient rich run-off between growing seasons, and development limits.
- The Natural Resource Conservation Service and state agricultural agencies should work with farmers to implement best management practices (BMPs) to reduce nutrient runoff entering EFH from the agriculture industry.
- The EPA, working with state environmental agencies, should require water quality standards that enhance and protect nitrogen-sensitive coastal embayments containing EFH. Specifically, the EPA and state agencies should strengthen enforcement of sewage discharge permits (e.g. NPDES) and ensure proper maintenance and operation of septic systems.
- Federal, state, and local agencies and nonprofit organizations should work together to educate the public, particularly agriculture industries, about the potential hazards of excess nutrients discharged into marine, estuarine, and riverine habitats that may contribute to the degradation of EFH.

### Thermal Discharges

- Thermal pollution should be minimized in EFH, especially in areas known to have high productivity and important habitat parameters.
- Permitting agencies should insist that all life history stages of organisms, especially eggs and larvae, be assessed relative to thermal impacts on local spawning populations

as well regional stocks when issuing discharge permits to power plants.

### Suspended Solids

- For the protection of EFH in rivers with particular reference to anadromous fish and estuaries, municipalities should adopt subdivision regulations that require the incorporation of stormwater runoff BMPs and EFH mapping into all new development plans that specifically prevent sedimentation.
- The Natural Resource Conservation Service and state environmental agencies should disseminate information on EFH, BMPs, and financing options for controlling stormwater runoff and mitigating existing problems. This information should be targeted particularly toward state and local public works and highway departments.
- State highway departments should prepare design manuals (e.g. stormwater management guides) that integrate environmental considerations and EFH mapping into all phases of highway project planning, design, construction, and maintenance. The highway departments should schedule annual workshops for local departments on the importance of reducing suspended solids entering aquatic and marine environments.
- Highway Departments should require the consideration of EFH designations and the use of on-site stormwater BMPs as a precondition to the permitting of private property tie-ins to state drainage facilities.

### **6.3.2 Biological Threats**

#### Nonindigenous Species / Reared Organisms

- State environmental agencies need to strictly regulate research projects, biotechnology laboratories, and aquariums (and aquaculture – see Section 6.2) to ensure that reared organisms do not escape or are not intentionally released without strict guidelines. Strict measures and enforcement guidelines should be developed and required to reduce the threat of nonindigenous or reared organisms that may change the natural functions of habitats and populations dynamics within New England waters, particularly within EFH. The scientific community and general public needs to be alerted to the seriousness of the potential environmental problems related to the release or escapement of nonindigenous and reared organisms.
- Public awareness of this issue needs to be raised so that people understand the threat that nonindigenous and reared organisms pose to our marine and aquatic ecosystems, specifically within EFH. This enhanced awareness would help reduce the inadvertent introduction of organisms attached to boat hulls, released in ballast water, escaped from aquaculture facilities, released from domestic aquariums, etc.
- Specifically, a comprehensive effort needs to be undertaken by state wetlands agencies to reduce the spread of *Phragmites* in coastal marshes, primarily by mitigating the effects of tidal restrictions. State regulatory frameworks need to be adjusted, if necessary, to allow reasonable restoration projects that promote the rehabilitation of natural processes and communities that protect and enhance EFH and other



environmental interests.

#### Nuisance / Toxic Algae (Harmful Algal Blooms)

- See “Nutrients” section
- A comprehensive federal, state, and local effort should be initiated to reduce the threat of nuisance / toxic algae from spreading spatially and temporally that may impact fishery resources and EFH.

#### Pathogens

- A comprehensive effort should be initiated by federal, state, and local agencies to reduce the threat of pathogens, either occurring naturally or released accidentally, from spreading spatially and temporally and thereby impacting fishery resources and EFH

### **6.3.3 Physical Threats**

#### Channel Dredging and Disposal of Dredged Material

- State programs should incorporate EFH mapping to determine proposed dredging locations and disposal sites to minimize impacts on EFH.
- State environmental agencies should coordinate the development of a comprehensive dredging and dredged material disposal plan to improve and maintain access to ports, harbors, and channels, and to minimize adverse impacts to EFH.
- Any dredging of channels or dredged material disposal should be timed to avoid impacting EFH of migratory fish (e.g. Atlantic salmon), spawning fish (e.g. winter flounder), or critical life stages (e.g. larval and juvenile fishes).
- Any new dredging or disposal sites should avoid impacting areas designated as EFH and attempt to minimize environmental impacts in surrounding areas. For channels subjected to maintenance dredging, an alternative analysis should be carried out if these channels have become HAPC since the last time it was dredged to consider mitigating impacts to EFH.
- The performance standard for dredging and disposal should incorporate that any dredging or disposal shall not degrade EFH.

#### Protecting Coastal and Inland Wetlands from Dredge and Fill Operations

- All New England states should adopt and implement a policy to not allow any net loss of wetlands to ensure the protection of coastal and riverine EFH.
- In order to replace the large acreage of wetlands lost and degraded from past dredge and fill operations, all coastal states should work with the NMFS Habitat Division, NMFS Restoration Center, the U.S. Fish and Wildlife Service, and the U.S. Army Corps of Engineers, to facilitate the restoration of salt marshes and other estuarine habitats to promote the recovery of fishery resources and enhance EFH. States should have programs such as the Massachusetts Wetlands Restoration and Banking Program

that provide technical and financial assistance and work with communities and non profit organizations to identify potential sites and implement projects.

- State and federal regulations governing wetlands need to be adapted to allow the streamlining of legitimate restoration projects for quick and thorough protection and enhancement of EFH.
- State and local land protection agencies should work together to identify and then acquire critical parcels of land whose acquisition would protect coastal and riverine EFH by preventing any dredging and filling operations. These might include areas surrounding anadromous fish spawning habitats, buffer zones around coastal wetlands, the coastal wetlands themselves, and natural corridors adjacent to rivers where anadromous fish run.

#### Marina and Dock Construction

- Marina and dock facilities should be constructed and maintained in a manner that EFH is not degraded either by the structures themselves or by the vessel activity they engender. This includes constructing docks and piers such that submerged vegetation is not degraded, sedimentation patterns are not altered, and water quality is maintained.
- New technology in mooring chains (e.g. Helix and Manta Systems) should be encouraged to minimize environmental impacts associated with mooring use and minimize the chain dragging on the bottom which damages submerged vegetation and other EFH benthic features..
- Coastal communities should be encouraged to adopt harbor management plans to protect EFH. These would indicate where the most appropriate, least environmentally damaging locations are for any new or expanding marinas and docks. To reduce the overall footprint of marinas and docks and EFH environmental impacts, emphasis should be placed on community piers accessible to all residents and maritime businesses that will centralize vessel activity.

#### Vessel Activity

- Boat channels should avoid passing over shallow EFH (e.g. submerged vegetation habitats) that might be subject to erosion or siltation from prop wash.
- Vessel owners need to be educated by Coastal Zone Management offices, the Coast Guard, and local harbor masters about the need to adhere to no wake zones in order to prevent or minimize damage to EFH. State and local agencies should integrate EFH mapping and develop methods of reducing the degradation of coastal marshes, erosion of submerged aquatic vegetation beds, and siltation of shellfish flats to minimize vessel-induced impacts to EFH.
- No vessel discharge zones and pump out facilities that are approved by the states and/or EPA should be encouraged to reduce the potential threats.
- State and federal agencies and non-profit groups should promote education programs on environmentally safe boating to recreational boaters to reduce impacts on EFH.

### Erosion Control

- Bulkheads, seawalls, jetties, groins, and other erosion control structures should be designed and located to avoid creating any impacts on EFH, such as interrupting the natural flow of sand to EFH.
- Municipalities should incorporate EFH mapping into existing erosion control programs and adopt and implement strict development/redevelopment standards within the Federal Emergency Management Act A and V flood hazard zones and other areas subject to coastal flooding, erosion, and sea level rise. Communities should also develop effective floodplain management regulations that consider EFH.

### Tidal Restrictions

- All coastal states should integrate EFH mapping into existing programs and work with the NMFS Habitat Division, NMFS Restoration Center, the U.S. Fish and Wildlife Service, and the U.S. Army Corps of Engineers, to restore habitat conditions degraded from altered hydrology. States should have programs, such as the Massachusetts Wetlands Restoration and Banking Program, that provide technical and financial assistance and work with communities and non profit organizations to identify potential sites and implement projects.
- All coastal states should adopt a policy that any construction project, including public works projects, within or adjacent to EFH will not restrict the tidal flow or alter freshwater inflows in any way.
- State highway departments and local departments of public works should be educated about the need to maintain or increase tidal flow through culverts such as those underneath roads and railroad corridors. These flows protect and restore ecological functions potentially important to EFH and fishery resources.
- Wildlife agencies should be discouraged from creating impoundments in tidal areas. Generally, these areas eventually degrade into brackish marshes dominated by invasive vegetation that potentially disrupt and degrade the natural functions of EFH or hinder the accessibility of organisms to important habitats.

### Dam Construction/Operation

- Fisheries agencies should prepare an up to date inventory of anadromous fish runs incorporating EFH mapping and designations and develop a strategy to prioritize, restore, and maintain these runs.
- State fisheries agencies should implement a citizen-based fishway stewardship program to restore and maintain EFH in New England rivers and estuaries.
- Fish and wildlife agencies should put funding in place to ensure the proper maintenance of fishways for the protection and restoration of riverine dependent fishery resources and EFH.
- Natural resource agencies, working with local officials and organizations, should identify dams that are no longer functional and are therefore candidates for removal. State agencies should modify regulations that hinder the removal of such dams when

removal is in the best interest of enhancing EFH for anadromous species and protects other environmental interests.

#### Water Diversion/Withdrawal

- The state agency responsible for water management should integrate EFH mapping into existing or developing programs and develop and promote the use of river basin plans to facilitate responsible water resource planning and management at local and regional levels.
- Standards for water withdrawals should include that EFH not be degraded.
- Municipal water resource agencies should be required to make water conservation devices available to the public and to educate the public about the need to conserve water for the protection of fishery resources and EFH. State agencies should set conservation goals that include protecting EFH to enhance fishery resources.
- Yearly assessments should be carried out by the state agency responsible for water management to determine if municipalities are complying with their water use permits. Those that exceed their allocated withdrawals should be fined and the money used for restoring riverine anadromous fish EFH.
- Existing power plants should be retrofitted with the best technology available to minimize plant-induced entrainment and impingement mortalities.
- Thorough fisheries assessment, including ichthyoplankton surveys, should be incorporated into all entrainment studies by power plants that withdraw water from inshore regions.

#### Deforestation

- Municipalities should prepare and implement a state-approved open space plan to preserve and protect key wetlands and migration corridors that contribute to environmental conditions of EFH.
- Municipalities should adopt and implement river protection districts to protect riverine EFH. States should develop and promote the use of river basin plans that protect EFH and other environmental values.
- State and local land protection agencies should work together to identify and then acquire critical parcels of land whose acquisition would protect coastal EFH through the prevention of deforestation. These areas might include land surrounding anadromous fish spawning habitats, buffer zones around coastal wetlands, the coastal wetlands themselves, and natural corridors adjacent to rivers where anadromous fish run.
- Local conservation commissions and planning agencies should require the maintenance of the most appropriate naturally vegetated buffer strips around coastal wetlands, rivers, and anadromous fish spawning sites that have been designated as EFH.

#### Mining

- Mining that alters the sedimentary composition (e.g. sand and gravel) or other

important environmental features (e.g. depth) should be banned from any area designated as EFH for demersal species or organisms with demersal life stages.

- Performance standards of any other mining operations (e.g. oil and gas, peat) should include a provision not to alter EFH.
- All mining should be prohibited from HAPC.

#### Debris

- Coastal municipalities should work cooperatively with Coastal Zone Management offices, neighboring communities, and waterfront users to design and implement beach and marine debris reduction programs to reduce the threat of debris impacting EFH.
- CZM offices, municipalities, and NGOs should continue their efforts to educate the public on the hazards of marine debris to certain marine life and EFH.

#### Artificial Reefs

- EFH should be considered and incorporated in any Army Corp of Engineer or state fishery agency plans to develop artificial reefs to enhance fishery resources.
- Artificial reefs should only be constructed with materials and methods that do not adversely impact EFH.

### **6.4 PROACTIVE MEASURES TO IMPROVE HABITAT CONSERVATION AND ENHANCEMENT**

Management approaches to mitigate adverse impacts from fishing and non-fishing activities that address the previous recommendations from the Council to other regulatory, collaborative, and non-governmental agencies may include proactive conservation and enhancement measures to protect EFH. Research, models, and theories present several alternative conservation and enhancement approaches to protect marine resources. Methods to complement the traditional management strategies based on stock assessments to protect and maintain sustainable levels of fisheries have been discussed, and scientific information is beginning to support other techniques to conserve and enhance fishery resources.

There are a variety of designations and techniques that are used to classify approaches to protect and enhance fishery resources, other than single stocks or stock complexes, with a wide range of objectives. Objectives of the approaches include conserving biodiversity, promoting tourism, protecting sensitive habitats, providing refuge for overexploited organisms, enhancing production of selected species, providing management guidelines for multiple use resources, serving as demonstration projects, or a combination of these goals (reviewed by Allison *et al.* 1998). The following potential management measures may be considered by the Council for the conservation and enhancement of essential fish habitat.

#### 6.4.1 Marine Protected Areas

Conservation and enhancement measures based on closing a marine area to a particular or all activities has potential benefits to EFH and fishery resources of the New England region. Marine protected areas (MPA) potentially reduce or stop actions that adversely impact EFH important to the sustainability of fisheries. MPA is a generic term defined as any area of intertidal or subtidal terrain, together with its overlying waters and associated flora, fauna, and historical and cultural features, which has been reserved by legislation to manage and protect part or all of the enclosed environment (the 4<sup>th</sup> World Wilderness Conference).

MPAs exist in an array of sizes, configurations, and denominations, but they all afford some level of habitat protection. MPAs include marine or harvest refugia, fishery reserves, non-extractive parks or reserves, marine reserves, marine sanctuaries, marine or national parks, cross shelf reserves, 'no-take' marine reserves, biosphere reserves, conservation zones, marine zoning, and closed areas. Each concept presents similar habitat protection hypotheses and goals that the Council may want to investigate to protect EFH and its fishery resources. Regulatory agencies with direct authority to protect other natural resources, apart from fishery stocks, could be involved with managing MPAs to further protect habitat conditions from activities not related to fishing (e.g. 'no discharge zone' administered by the EPA or 'critical habitat areas' administered by NMFS and USFWS under the Endangered Species Act). Collaborative efforts between the Council and other agencies to develop and manage MPAs may be initiated to protect, conserve, and enhance EFH in the New England region.

Research has demonstrated that fish distributions can be closely associated with specific small-scale habitat conditions (Langton *et al.* 1995). Specific associations between fish and habitat conditions have also been documented through ontogenetic development studies (Auster *et al.* 1997). Refugia designations based solely on fishery independent data demonstrating stock abundance and distribution are not intended to correctly capture important habitat functions. Refugia based on other physical, chemical, and biological features that serve a variety of ecological functions may illustrate more easily defined and static habitat conditions that are important to fishery resources. Management methods to protect critical ontogenetic stages of organisms that react to the dynamic relationships between the environment and fish stocks potentially represent appropriate conservation and enhancement measures for the Council to consider. MPAs developed to protect EFH may support sustainable levels of finfish, shellfish, and mollusk stocks.

Marine refugia have been discussed as a method to protect fishery stocks in the management of commercial fisheries, but few studies have focused on the use of refugia to conserve seafloor habitats that serve important ecological functions for targeted fishes and invertebrates (Lindholm *et al.* In Press). Specifically, postlarval settlement reserves may present a management technique to protect habitat for early life history fishes to obtain refuge and suitable nutrition conditions before emigrating out of the reserve at a larger size (Auster and Malatesta 1995). Refugia designed specifically to protect juvenile fishes

may include habitat with great complexity and consider juvenile migration patterns and size of populations, since juvenile fishes are often migratory (Lindholm *et al.* In Press). In general, increases in habitat complexity refer to greater vertical relief and increased variability in the size of interstices between structures and may result in higher survivability of demersal juvenile fishes (Auster and Malatesta 1995; Lindholm *et al.* In Press). The application of refugia designed to protect seafloor habitat with the highest complexity may increase recruitment to exploited fish populations in the New England region (Lindholm *et al.* In Press).

Research documents the importance of specific bottom topography to the survivorship of newly settled juvenile fishes (e.g. Lough *et al.* 1989; Valentine and Lough 1991; Gotceitas and Brown 1993; Tupper and Boutilier 1995; Tupper and Boutilier 1995; Valentine and Schmuck 1995; Auster *et al.* 1997; Lindholm *et al.* In Press). Specific examples illustrate the close relationships between surficial sediments and emergent epifauna with juvenile haddock (*Melanogrammus aeglefinus*), Atlantic cod (*Gadus morhua*) (e.g. Lough *et al.* 1989), and whiting (*Merluccius bilinearis*) (Auster *et al.* 1997). In support of these observations, research on the settlement of these juvenile fishes on preferential surficial sediments and biogenic structures have demonstrated increased survivorship, growth rate, and predation refuge of fishes associated with highly complex habitats (e.g. Tupper and Boutilier 1995; Tupper and Boutilier 1995; Auster *et al.* 1997). These particular examples are only a few of the available research projects demonstrating the importance of habitat conditions to the survivorship of early life history fishes, supporting management measures to protect seafloor habitat critical for post settlement fishes.

*Marine reserves*, in general, potentially serve as a conservation buffer from the lack of scientific information that limits management measures to directly conserve EFH, and potentially improve the long-term sustainability of fishery resources (Lauck *et al.* 1998). Reserves may be important for conservation efforts because they provide direct protection for habitat, they can provide refuge for commercial organisms, and act as a potential buffer for unforeseen population fluctuations (Allison *et al.* 1998). Designating a reserve or any closed area alone is insufficient for the protection of EFH and related fishery resources because they are not isolated from surrounding impacts. Efforts to complement reserve dynamics must be made outside the reserve designation to control potential incoming threats (Allison *et al.* 1998).

*Marine sanctuaries* (Dixon 1993; Sobel 1993) have been nationally designated to protect known inhabitants (e.g. corals, seagrasses, marine mammals, and fishery resources). The National Marine Sanctuary Program is a federal program specifically designed to provide comprehensive protection of marine environments in U.S. waters (Sobel 1993). Marine sanctuaries have been recognized for the potential to preserve species and genetic diversity (Policansky and Magnuson 1998) and habitat heterogeneity (Sobel 1993), along with containing valuable economic resources important to local and national economies (Dixon 1993). The Stellwagen Bank National Marine Sanctuary is the only nationally designated region in New England federal waters. It was recognized for its abundance of marine mammals and fishery resources and was designated in 1993 (Auster *et al.* In Press).

National Marine Sanctuaries have their own management plans that may include conservation and enhancement measures to protect fishery resources. Marine protected areas designated as marine sanctuaries may also contribute to increasing public awareness and support for marine conservation and provide research and monitoring areas to advance the available scientific information on the importance of protecting EFH.

*Marine or national parks* have been identified by the International Union for the Conservation of Nature (IUCN) to protect natural and scenic areas of national or international significance for scientific, educational, and recreational use and to provide ecosystem stability and diversity. Marine parks have been generally limited to tropical coral reef environments that support local economies with tourism. Measures to form parks may contribute to the conservation, protection, and enhancement of EFH and the sustainability of fishery resources.

*Cross shelf reserves* is a concept being investigated in the southeast U. S. Cross shelf reserves are proposed to preserve the genetic integrity of tropical reef fishes (Auster *et al.* In Press). This type of MPA would protect areas across the continental shelf that run perpendicular to the coast. This concept may warrant further research to prove its effectiveness as management measure in New England waters.

*'No-take' marine reserves* as described by Ballantine (1995; 1996) are a network of closed areas based on general principles to assist in fishery management. This approach is underway in other parts of the world (e.g. New Zealand). There may not be data to support decisions on the spatial and temporal boundaries of the 'no-take' reserves, but the network of closed areas may promote the conservation and enhancement of EFH conditions and associated organisms. Further research is needed to investigate the assumption that 'no-take' reserves enhance fish populations by a 'spillover' effect (e.g. fish emigrate from protected areas to fishable areas).

The *biosphere reserve* concept originated from the need to more systematically preserve genetic resources within a representative terrestrial ecosystem through rational use of natural resources. Its applicability to coastal marine resources has recently been discussed. The IUCN states the objectives of a biosphere reserve program are to provide a network of protected areas representative of the world's ecosystems and to develop effective models for conservation, research and monitoring, training and education, and sustainable development. The biosphere reserve concept is based on a hierarchical method to protect natural resources. The center of the reserve would be completely protected against any activity, the surrounding habitat protected against a few major threats, and the further outward adjacent habitat only protected against the major recognized threat to any given habitat property. The 'bull's eye' approach can present as many levels as appropriate to conserve a given environmental condition. Biosphere Reserve programs in European nations attempt to protect terrestrial and aquatic habitats along a coastal region for the conservation of marine resources (reviewed by Batisse 1990).

*Marine zoning* has been discussed and used in fishery management as a regulatory tool to



protect fishery resources (Bohnsack 1996). Zoning is a common approach to terrestrial land management, but is controversial in marine or aquatic environments (Bohnsack 1996). Marine zones may be used to designate and separate fishing areas for particular fisheries that are in conflict. Zoning can potentially present a range of protective measures for a large geographic region. Similar to the biosphere reserve concept, zoning can prohibit certain activities in some regions and allow the same actions in adjacent habitats depending on environmental conditions and the type of activity. This may be particularly useful for many species and life stages vulnerable to gear selectivity and release mortality (Bohnsack 1996).

*Closed areas* represent a level of MPA that the Council may continue to use to protect EFH for the sustainability of fishery resources. Areas closed to some level of fishing and non-fishing activities are a potential tool to protect EFH. The designation of long-term closures has resulted in the removal or reduction of fishing effort from important fishing grounds (Fogarty and Murawski 1998). This approach to protect fishery resources primarily for the purpose of reducing fishing effort has been implemented in the New England region with the designation of closed areas such as Closed Area I and II and Nantucket Lightship Closed Area. Closed area may be indirectly serving as conservation and enhancement measures for the protection of EFH.

#### **6.4.2 Management Approaches**

The Council may want to consider several other management approaches and measures to conserve and enhance EFH. Research documents the effectiveness of proactive measures to protect habitat such as restoration, enhancement, and rotational management. The variety of methods to manage EFH and fishery stocks may most effectively occur under an integrated process. The integrated management technique may be analogous to the Council's mission of allowing unconditional access to the fishery management process, but the Council may want to take a more active role orchestrating the time and effort of all natural resource users and competitors.

*Restoration* efforts have been documented to promote the conservation and enhancement of fishery resources. The Council has adopted a definition of restoration, and may consider similar concepts to protect or re-establish degraded habitats. Other related terms include rehabilitation, reclamation, re-creation, and ecological recovery (Meffe and Carrol 1994). The majority of restoration has been limited to coastal environments, but has had notable impacts on improving ecological functions of particular habitats. For example, efforts have been focused on re-establishing tidal flow to salt marshes to mitigate the impacts resulting from tidal restriction (Burdick *et al.* 1997). The tidal restorations at Mill Brook Marsh, NH and Drakes Island, ME have had a positive influence on local resources (Burdick *et al.* 1997), and may serve as examples to other areas to restore natural functions to improve the state of EFH and related fishery resources.

The Council has adopted a definition of *enhancement* to classify all management measures that may protect or promote the development of EFH and fishery resources. This

particular concept is closely associated with restoration efforts with more attention at establishing new habitat conditions to support a fishery resource. Such approaches may include the construction of artificial reefs that provide suitable environmental conditions for a variety of marine organisms. For example, projects underway in Narragansett Bay to use artificial reefs to provide protective cover for lobsters (*Homarus americanus*), and reseeding techniques to promote northern quahog (*Mercenaria mercenaria*) and Atlantic sea scallop (*Placopecten magellanicus*) development and growth. If data support findings that enhanced habitat conditions increase the productivity of EFH, the Council may initiate habitat enhancement projects.

*Rotational management* may be an appropriate management technique that the Council investigates to conserve and enhance EFH of particular species. Certain organisms may exhibit behavior and development patterns that would benefit from rotational management techniques. Rotational management is a multifaceted approach to manage fishery stocks. Issues to consider are designation of regions, duration of closures, pattern of rotation, economic impacts, and the growth rate of target organisms. Rotational management measures may be appropriate for sessile organisms such as the Atlantic sea scallop (*P. magellanicus*). The concept of rotational management is a potential method of conserving, enhancing, and protecting EFH. Other similar concepts include *ocean zoning* and *alternation of closed areas*.

*Integrated resource management* (Ehler and Basta 1993) is a theoretical concept that considers all levels of participation of the entire natural resource *a priori*. Management of multiple-use natural resources requires diverse activities such as planning, assessing, implementing, enforcing, monitoring, evaluating, and educating. These activities could be integrated and performed continuously to obtain maximum social, economic, and ecological benefits (Ehler and Basta 1993). The integration of economic sectors (e.g. fishery, agriculture, energy, and recreation), agencies (e.g. natural resource, environmental protection, economic development, and land-use departments), authorities (e.g. federal, state, regional, and local institutions), management tasks, and other disciplines (e.g. science, engineering and technology, economics, politics, and law) may promote the conservation and enhancement of EFH and related fishery resources (Ehler and Basta 1993).

*Education outreach* is an important component of the conservation and enhancement of EFH. Sharing information and educating resource managers, scientists, and the general public assist in general habitat protection. Promoting outreach may contribute to a high degree of community involvement and support of particular protection efforts and encourage the enhancement of EFH. Many state, federal, and non-governmental agencies promote healthy environments by outreach programs and may want to further develop and promote their particular programs. For example, the Stellwagen Bank National Marine Sanctuary may want to expand and enhance its public programs to emphasize the importance of habitat. Information available to all public and professional levels can promote and assist in the conservation of fishery resources.

## **6.5 EXISTING CONSERVATION AND ENHANCEMENT MANAGEMENT AUTHORITIES AND RESEARCH AND MONITORING PROGRAMS**

The Council will work closely with a variety of management authorities and non-profit organizations to incorporate EFH designations into existing initiatives and future management decisions, promote EFH awareness, develop measures to conserve and enhance EFH, and enforce existing conservation and enhancement measures. Research and monitoring programs present the opportunity to provide scientific information to the Council that may be useful for making defensible management decisions. The following overview of existing agencies and programs represents potential partners that the Council will cooperate with to incorporate EFH into their respective programs and decision making processes (reviewed in *Water Quality Guidance for EFH Amendments*, NOAA).

### **6.5.1 Federal Programs**

The *Department of Commerce (DOC)* is responsible for managing marine fisheries in federal waters. The Secretary of Commerce delegates this responsibility to the National Oceanic and Atmospheric Administration (NOAA). NOAA derives its authority for the conservation and enhancement of fishery resources, including habitat, from several sources and partially delegates responsibilities to other federal agencies.

The Coastal Zone Management Program (CZMP) is administered under the Coastal Zone Management Act of 1972. Objectives of the CZMP include protection of natural resources, life, and property from coastal hazards, public shorefront access, and consultation and coordination with federal agencies. For example, many participating states are developing or have developed coastal non-point source pollution control programs, established under section 6217 of the Coastal Zone Management Act Reauthorization Amendments of 1990 (CZMA), that are approved jointly by NOAA and the Environmental Protection Agency (EPA). Once the federal government has approved a state's coastal management plan, the state is eligible for federal grants and technical assistance to implement the plan. The CZMA includes the restoration of coastal resources as a program goal.

Several other programs are administered directly under NOAA's authority. The National Status and Trends program determines current status and detects changes in environmental conditions of estuarine and coastal waters. The Mussel Watch and Bioeffects Survey Projects are examples of monitoring programs designed to protect habitat under the Status and Trends program. The Estuarine Eutrophication Survey is a national assessment of the status of estuarine eutrophication and develops a national Estuarine Trophic Index to assist in the conservation of habitat. The Coastal Intensive Site Network (CISnet) provides long-term data on eutrophic conditions and effects on ecosystems. The National Coastal Pollutant Discharge Inventory (NCPDI) produces data characterizing pollutants from point and non-point sources in estuarine drainage areas. The Ecology and Oceanography of Harmful Algal Blooms (ECOHAB) program initiates research on nutrient concentration and cycles in estuarine and coastal waters to explain

associations between nutrient input and HABs. Indicator Development programs develop habitat condition bioindicators to measure the health of fish habitats. The Habitat Research / Restoration program develops and promotes research to address ecosystem function, alteration, restoration, indicators, and synthesis and information transfer. The National Estuarine Research Reserve System (NERRS) monitors water conditions and manages data of particular estuarine habitats. Within New England, there are NERRS sites in Wells, Maine, Waquoit Bay, MA, Great Bay, NH, and Narragansett Bay, RI.

The National Sea Grant College Program, administered under NOAA, provides expertise on a variety of environmental issues and educational outreach to public. The Sea Grant Program was established in 1966 to hasten the development, use, and conservation of the nation's marine and Great Lake's resources (based on *National Sea Grant College mission statement*). The Sea Grant Program is active in research and general conservation and enhancement projects throughout the U.S.

NOAA also derives regulatory power with habitat implications from the National Marine Sanctuaries Act (NMSA). The NMSA developed the National Marine Sanctuaries Program (NMSP) and authorizes further fishery resource regulations should measures be necessary to address specific problems at a particular sanctuary. Sanctuaries in the NMSP are managed by NOAA's Sanctuaries and Reserves Division of the National Ocean Service Office of Ocean and Coastal Resource Management. The NMSP has direct authority to mitigate habitat-related threats within identified sanctuaries. The NMSA also empowers NMSP to develop direct measures to conserve and enhance habitat within sanctuaries. The Stellwagen Bank National Marine Sanctuary was designated off the coast of Massachusetts in federal waters in 1992.

NOAA's National Undersea Research Program (NURP) is an agency created to provide scientists the capability to conduct *in situ* research. To understand the ocean environment and to clarify the complex interrelationships within the environment and between humans and environment, it is often necessary to place scientists under the sea at the actual site of investigation (*in situ*). NURP is involved in several projects and initiates research that promotes the protection, conservation, and enhancement of habitat and living marine resources.

The Cooperative Marine Education and Research (CMER) Program is a cooperative agreement administered through NOAA and academic institutions. This program combines NOAA and academic expertise to address marine issues affecting local, regional, and national natural resources. Several cooperative research projects throughout the nation directly promote the conservation of habitat, and many other studies investigate general marine resource issues. The CMER Program is a substantial source of funding for the cooperative institutions and participating students, faculty, and staff.

The National Marine Fisheries Service (NMFS) is the agency of NOAA that has the responsibility and authority to conserve and enhance living marine resources and their habitat. NMFS conducts research and provides services and products to support fisheries

management, fisheries development, trade and industry assistance, enforcement, and protected species and habitat conservation programs. The NMFS Habitat Conservation Policy established the guidelines to assess habitat issues pertaining to managed species. This policy strives to protect, conserve, restore, and create habitats important to self-sustaining populations of fishery resources. To further the conservation and enhancement of EFH in accordance with section 305(b)(1)(D) of the Magnuson-Stevens Act, NMFS will compile and make available to other federal and state agencies, information on the locations of EFH, including maps and/or narrative descriptions. NMFS will also provide information on ways to improve ongoing federal operations to promote the conservation and enhancement of EFH. Federal and state agencies empowered to authorize, fund, or undertake actions that may adversely affect EFH are encouraged to contact NMFS and the Council to become familiar with areas designated as EFH, and potential threats to EFH, as well as opportunities to promote the conservation and enhancement of such habitat.

The NMFS's Restoration Center is another initiative that promotes restoration of coastal and estuarine habitats. The Center serves NOAA, other federal agencies, state and local governments, and works with non-governmental organizations, schools, and private industry. Objectives of the Center include restoring fish habitat and other natural resources that have been adversely impacted by human activities, advancing the science and technology of coastal habitat restoration, and transferring restoration technology to the public, the private sector, and other governmental organizations.

The Restoration Center is a part of NOAA's Damage Assessment and Restoration Program (DARP) through which NOAA claims damages for adverse impacts to marine resources resulting from oil spills, hazardous releases, or other human-induced environmental disturbances. Parties responsible for the degradation of habitat provide funds or conduct projects to restore, replace, or acquire the equivalent of the injured resources. To date, this program has initiated restoration activities at over 25 locations around the country. The Center also administers grant programs to foster community-based habitat restoration projects to promote stewardship and conservation ethic among coastal communities and to fund research on restoration to advance science and technology. Over the past two years, 13 community-based and 16 research grants have been awarded. The Restoration Center has demonstrated the effectiveness of habitat restoration for countering human impacts on the marine environment.

NMFS provides a variety of consultative services to regulatory and construction agencies, developers, and the general public to promote methods to lessen and avoid human-induced threats or unavoidable habitat loss or degradation. NMFS serves as a federal trustee to oversee and ensure the restoration of marine habitats damaged by human activities and unforeseen events. NMFS is the primary enforcement regulatory agency for the protection of marine resources in federal waters. NMFS programs relevant to habitat conservation and enhancement are derived from several acts including the Marine Mammals Protection Act, Endangered Species Act (shared responsibility with U.S. Fish and Wildlife Service), Marine Protection, Research and Sanctuaries Act, Fish and Wildlife Coordination Act, and National Environmental Policy Act (review agency in the

consultation process).

The *U.S. Environmental Protection Agency* (EPA) authority on habitat issues stems from several sources. The Clean Water Act (CWA), Section 102, 305, 319, 401, 402, and 404, directs the EPA to address and mitigate habitat problems and groundwater contamination through several programs and state support. Specifically, the EPA is dedicated to addressing the environmental considerations of polluted run-off and established the National Pollutant Discharge Elimination System (NPDES). The NPDES permit contains three major elements; (1) water quality limitations and monitoring requirements, (2) operating conditions and best management practices, and (3) environmental programs. The National Environmental Policy Act requires a full Environmental Impact Statement for proposed projects to be reviewed by the EPA and other consultation agencies.

The EPA also administers the National Estuary Program (NEP) under the CWA which established a program to protect and restore the health of estuaries, while supporting economic and recreational activities. The NEP includes 28 estuaries along the coast of the U.S. and provides a source of coastal protection and to demonstrate practical, innovative approaches for protecting estuaries and their living resources. Within New England, there are six NEP sites, including Casco Bay, New Hampshire estuaries, Massachusetts Bay, Buzzards Bay, Narragansett Bay, and Long Island Sound. Along with NEP, the Environmental Monitoring and Assessment Program (EMAP) provides information on ecological conditions of the nation's estuaries. EMAP is developing a national monitoring design and determining bioindicators to assess estuarine quality. The Food Quality Protection Act also authorizes EPA to assess current pesticide tolerances of marine and estuarine organisms by the year 2006.

The Safe Drinking Water Act (SDWA) authorizes EPA to ensure that water is safe for human consumption. EPA's primary initiative to ensure clean water for human consumption is to protect groundwater sources. Protecting groundwater directly protects natural resources and is achieved through the following SDWA programs; the Source Water Assessment Program (ensures that states assess drinking water quality), the Wellhead Protection Program, the Sole Source Aquifer Program, and the Underground Injection Control Program. The Resource Conservation and Recovery Act (RCRA) is part of the EPA's overall program to protect groundwater resources. RCRA addresses issues related to the development of regulations and methods for handling, storing, and disposing hazardous material. EPA also operates several programs through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Act of 1986 that protect and restore contaminated groundwater.

The *Department of Agriculture* (USDA) has authority to develop and promote conservation and enhancement measures through the Natural Resources Conservation Service (NRCS) and the Forest Service. The 1996 Farm Bill authorized the NRCS to promote a community-based approach to environmental improvement. A number of programs implement various projects to conserve habitat (i.e. Water Quality Program, Conservation Reserve Program, Snow Survey and Water Supply Forecasts, Wetlands

Reserve Program, etc.). The Forest Service oversees all forestry activities on public lands and within the forestry industry. Current activities include protection of riparian areas, restoration of stream corridors, reclamation of abandoned mines, re-licensing hydro-power facilities, etc. Under the Forest Service, the Agricultural Research Service implements research in order to lessen the effects of agricultural non-point pollution that can indirectly impact EFH.

The *Department of Defense* (DOD) delegates management authority to the Army Corps of Engineers (ACOE). The ACOE's authority stems from Section 10 of the River and Harbor Act of 1899, the Clean Water Act, and the Marine Protection, Research, and Sanctuaries Act. The ACOE is involved with providing navigation, flood damage prevention, environmental restoration, wetlands protection, etc. The ACOE is also involved with several interagency reviewing and consultation processes.

The *Department of Interior* (DOI) is directly involved with conservation and enhancement measures through a multifaceted approach. The DOI delegates authority to study, conserve, and enhance habitat to the Bureau of Land Management (BLM), Geological Survey (USGS), National Park Service (NPS), Fish and Wildlife Service (USFWS), and Bureau of Reclamation.

The BLM provides measures to conserve and enhance habitat through the Range Reform and National Riparian Initiative programs. The Range Reform program provides framework for improved watershed management through the development and implementation of the Standards and Guidelines of a community-based, management approach for each participating state. The Standards and Guidelines are meant to provide an efficient approach for watershed management decisions. The National Riparian Initiative program develops projects on the general improvement of wetland and riparian habitat.

The USGS is involved with the Federal-State Cooperative Program that implements water resource investigations including water quality assessment. The USGS also administers the National Stream Quality Accounting Network (NASQUAN) that monitors pollutant loads on the Mississippi, Columbia, Colorado, and Rio Grande Rivers with the potential to expand its monitoring range. The National Water Quality Assessment (NAWQA) Program, within USGS, collects and assesses information on current water quality conditions, changing water quality, and improved understanding of natural and human impacts on habitat.

The USGS focuses research on the geology of the marine environment and oceanographic processes that directly relate to fish habitat. USGS and NMFS have collaborated on several research projects that have investigated the relationship of fishery resources and habitat conditions. The research programs administered under USGS have and continue to assist in the identification of important environmental conditions for finfish and shellfish populations.

The National Park Service is directly involved with managing the nation's parks through two programs. The Inventory and Monitoring Program monitors environmental conditions of existing parks, and the Integrated Pest Management Program limits the use of pesticides that pose great risk to the environment.

The USFWS is involved with many aspects of conservation and enhancement programs authorized under the Marine Mammal Protection Act, Endangered Species Act, Anadromous Fish Conservation Act, Fish and Wildlife Coordination Act, North American Waterfowl Management Plan, Watershed Planning and Protection Act, and Federal Power Act. The USFWS works in collaboration with federal and state agencies to develop programs to conserve and enhance fishery resources including the USFWS Fisheries Program that describes and monitors Atlantic salmon habitat in freshwater. Other initiatives that USFWS has developed directly to conserve and enhance habitat include the National Wildlife Refuge System and Partners for Fish and Wildlife Program to restore and protect wetlands and other freshwater habitats and the Contaminants Program to assess, remediate, and restore impacted habitats. The USFWS also works to achieve and maintain fish passage facilities in several New England rivers.

The Bureau of Reclamation administers the DOI's Departmental Irrigation Drainage Program. The objective of the program is to address areas of concern in western states of irrigation flow returns directly impacting Federally protected areas. The incentives of this program may migrate to the east coast of the U.S. with successful management accomplishments.

The *Department of Transportation* (DOT) authority is delegated to the Federal Highway Administration. The Federal Highway Administration's authority to develop measures that pertain to the conservation and enhancement of habitat is derived under the Intermodal Surface Transportation Efficiency Act of 1991 that developed erosion and sediment control guidelines for states. The Surface Transportation Program also identifies methods and techniques of reducing highway run-off as eligibility for Federal-aid Highway financing. The DOT is indirectly involved with reducing run-off and controlling erosion and sedimentation in order to protect habitat, resulting in notable conservation and enhancement measures for marine and anadromous resources.

*Interagency* measures are an important sector of efficient conservation and enhancement programs. Specific examples of interagency efforts include a comprehensive document of technical information about management measures to prevent and reduce non-point source pollution in coastal habitats (e.g. The Guidance Specifying Management Measures for Sources of Nonpoint Source Pollution in Coastal Waters). The Guidance document is a collaboration between NOAA, EPA, USDA, USFWS, and several other federal and state agency experts. The Chesapeake Bay Program is another collaborative interagency effort. The Chesapeake Bay Program is worth noting because of the success of addressing environmental concerns within the Bay associated with point and non-point sources that are derived from several sources in a large region.



### 6.5.2 State Programs

The Coastal Zone Management Act (CZMA) of 1972 established a national policy to preserve, protect, develop, and where possible, to restore or enhance, the resources of the nation's coastal zone and to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone [16 U.S.C. 1452, Sec. 303 (1)(2)]. This federal law and many state and local acts have implemented and delegated authority to appropriate organizations and levels of government for the conservation and enhancement of coastal resources (CZMA Section 309 Enhancement Grants Programs are reviewed by Pogue *et al.* 1994).

The 1990 amendments to the re-authorization of the CZMA established a requirement for all state coastal zone management (CZM) programs to develop coastal non-point source pollution control programs. CZM programs have developed programs to monitor and assess sources of non-point pollution that may impact habitat.

Special Area Management Planning was also administered under Section 309 of the Coastal Zone Management Act of 1972 as amended. This set up a process for awarding Coastal Zone Enhancement Grants to states to support the state's development and implementation of their overall program objectives. Special Area Management Planning administers measures specifically designed to protect, conserve, and potentially enhance habitat conditions. Other specific management measures to protect submerged aquatic vegetation are reviewed in ASMFC Habitat Management Series #1 (Ernst and Stephan 1997).

*Connecticut* manages the coastal region of the Long Island Sound through the Connecticut Coastal Management Act (CMA). The CMA creates a single set of policies, standards, and criteria for all government levels in Connecticut to manage marine, estuarine, and riverine resources (Ernst and Stephan 1997). The lead agency that initiates and runs the coastal management program is the Connecticut Department of Environmental Protection. The main focus of Connecticut's program is outreach and education on a variety of environmental and land use issues. Important habitat conservation issues identified by Connecticut cover five general issues: wetlands, public access, cumulative and secondary impacts, special area management planning, and coastal hazards (Pogue *et al.* 1994). Currently, Connecticut is involved in efforts to protect and restore Atlantic salmon in the Connecticut River.

The *Rhode Island* Coastal Resources Management Program (RICRMP) addresses the physical and organizational aspects of natural resources. The RICRMP requires a Category B permit for major activities in tidal and coastal pond waters, shoreline features, and adjacent areas. The permit directly and indirectly conserves coastal resources (Ernst and Stephan 1997). Rhode Island identified issues of wetlands, public access, special area management plans, and cumulative and secondary impacts as concerns for the conservation and enhancement of habitat. Specifically, NOAA, University of Rhode

Island, and Rhode Island Department of Environmental Management are working in coordination on coastal restoration projects, including lobster habitat and quahog bed restoration in Narragansett Bay. The Narragansett Bay Critical Resources Mapping Project is another initiative to develop a critical resource inventory that would serve as the basis for a bay-wide approach to resource protection and restoration. The project evolved from a pilot mapping effort using donated equipment and staff time to a much larger federal and state grant funded effort to delineate and map eelgrass beds, salt marshes, and other coastal features. Several salt ponds, Providence Harbor, Pawcatuck River Estuary, and Narrow River are areas for which the RICRMP has special management plans.

The Commonwealth of *Massachusetts* has several levels of authority to conserve and enhance habitat. The major programs for which Massachusetts focuses effort are water quality, habitat, protected areas, coastal hazards, port and harbor infrastructure, public access, energy, ocean resources, and growth management. Massachusetts derives its authority for program policies through the Scenic Rivers Act, Mineral Resources Act, Massachusetts Environmental Policy Act, Massachusetts Endangered Species Act, Historic District Act, Public Waterfront Act, Massachusetts Clean Air Act, Massachusetts Solid Waste Management Act, Coastal and Inland Wetlands Restriction Act, Wetlands Protection Act, Inland Wetlands Protection Act, and Ocean Sanctuaries Act. Examples of existing programs include the Wetlands Restoration and Banking Program (WRBP), GROWetlands Initiative, and Areas of Critical Environmental Concern Program.

The coastal habitats of *New Hampshire* are protected under the programs of the NH Department of Environmental Services. The Wetland Program derives its authority from the NH Code of Administrative Rules. Wetlands and cumulative and secondary impact issues are identified by NH as major environmental concerns (Pogue *et al.* 1994). Regulations include measures regarding dredge and fill activities and development in coastal regions. Coordination among the University of NH, Maine Department of Marine Resources, and NH agencies are mapping important submerged aquatic vegetation areas (Ernst and Stephan 1997).

The *Maine* Coastal Program sets priorities among the issues that coastal communities confront in their efforts to prosper economically, protect natural resources, and preserve quality of life. The Coastal Program derives its authority from 13 of the state's environmental land use laws which pertain to air and water quality, construction near wetlands and along beaches, marine resources, solid waste sites, and land use planning and regulation (ME 1998). The land use laws include the Natural Resources Protection Act, Site Location of Development Act, and Municipal Subdivision Law, and Land Use Regulation Act. The Department of Environmental Protection is the primary regulatory agency. The Coastal Program's priority issues are the impacts of development, ocean resources, aquaculture, and coastal economic development (ME 1998). Other important issues in which the Coastal Program is involved include public access, coastal hazards, coastal wetlands, port and harbor development, marine debris, and siting energy and government facilities (ME 1998). Program objectives to undertake these issues include identifying important coastal habitats, protection of wetlands from human activities, and

assessing non-point sources of pollution (Ernst and Stephan 1997). Currently, Maine is involved in a cooperative effort to map coastal submerged aquatic vegetation (Ernst and Stephan 1997). An example of a specific program is the Shore Stewards Partnership Program that is Maine's cooperative effort to conserve habitat through training volunteers to solve local water problems.

*Vermont* administers several habitat-related programs that could conserve and enhance freshwater habitats that may be important to Atlantic salmon populations. Other anadromous fishes may be protected by Vermont's conservation and enhancement programs that may influence salmon populations.

The *Atlantic State Marine Fisheries Commission* (ASMFC) is a cooperative effort by the Atlantic coast states responsible for managing fishery resources that traverse state boundaries. The ASMFC has several policy statements and develops documents that directly promote and assist the conservation and protection of habitat along with enhancement and restoration initiatives to assist in management of fishery resources. The ASMFC assists in the habitat consultation processes with state and federal agencies.

An important objective for ASMFC is the conservation and improvement of marine fish habitat. The ASMFC approach for this objective includes policy development and education. Habitat policy development has focused on ensuring that habitat information and needs are clearly outlined in the ASMFC fishery management plans, and disseminated to the agencies with the regulatory authority to protect habitat. The ASMFC educational efforts complement the policy by providing additional information to fishermen and the general public, along with advice about what individuals can do to assist in the protection of fishery resources (Dunnigan 1997).

The ASMFC administers protection of fishery resources through fishery management plans and the Sport Fish Restoration Program. Fishery management plans regulate the harvest of transboundary fishes along the Atlantic coast. The Sport Fish Restoration Program is aimed at improving fishery conservation and wise utilization of critical sport fisheries resources of the Atlantic. The ASMFC role in this program is as a liaison between state and federal agencies and non-governmental organizations to promote interstate and state/federal cooperation on recreational fisheries programs (Dunnigan 1997). The ASMFC is currently developing an EFH policy very similar to the Council's policy.

### **6.5.3 Non-Profit Organizations**

Non-profit organizations can be very influential in management decisions to protect fishery resources. Several organizations develop programs to monitor and research habitat conditions and promote awareness of the importance of habitat conservation and enhancement. Commercial and recreational fishing groups have a vested interest in protecting habitat for sustainable fishing. A variety of organizations contribute to conservation and enhancement measures by providing valuable information on fishery

resources. The following are examples of organizations that are currently or may become active participants in EFH issues:

- American Oceans Campaign
- Cape Cod Hook Fishermen's Association
- Center for Coastal Studies
- Center for Marine Conservation
- Conservation Law Foundation
- Environmental Defense Fund
- Greenpeace
- New England Aquarium
- Gloucester Fishermen's Wives Association / Gloucester Fishermen's Association
- Maine Lobstermen's Association
- Maine Sardine Council
- National Resources Defense Council
- National Audubon Society
- Massachusetts Audubon Society

## 6.6 DISCUSSION

Fishery managers, scientists, and the general public have discussed a variety of approaches to obtain sustainable fisheries for many years. Amendments 5 and 7 to the Northeast Multispecies Fishery Management Plan (NEFMC 1993 and 1996) discussed the issues regarding managing fisheries based on an ecosystem approach. Stock assessment is the conventional approach to promote sustainable fisheries, and the methods for dealing with stock assessment uncertainty are widely accepted in the management community. The Council continues to base its decisions primarily on calculations of the impacts on catch (e.g. fishing mortality rate), and estimations of stock size and recruitment expectations. These approaches implemented by the Council are appropriate until overfishing is under control. As fishing effort becomes manageable, habitat issues will become particularly compelling.

The Council may consider the *precautionary approach* when making management decisions to protect fishery resources and their essential fish habitat. The precautionary approach states that where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation (Intergovernmental Agreement on the Environment 1992). Particularly, the precautionary approach may be applied to situations with high levels of uncertainty and a potentially irreversible fishing and non-fishing impact exists or is proposed. No single approach to manage fisheries on an ecosystem basis has yet emerged. The alternatives, however, present potential mechanisms to maintain and restore the productivity of the marine environment in the New England region.

The Council, federal and state agencies, and non-government organizations play key roles in protecting New England's natural resources, particularly fishery resources and EFH. Organizations and interest groups assist in the conservation and enhancement of habitat with many actions from management measures that directly protect habitat to habitat-related research that assists with management decisions. The Council's Essential Fish Habitat Amendment to existing fishery management plans promotes a greater awareness of the importance of habitat protection to all government and non-government agencies. The EFH designations, fishing impact assessment, non-fishing threats overview, and the

conservation and enhancement recommendations can serve as a starting point to protect EFH for the sustainability of New England's fishery resources.