Ad Hoc **Review Group**

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Implementation Plan

USA

U.S. Implementation Plan for Meeting the Objectives of NASCO's Agreements – Performance Period 2007 - 2011

February 2008

Introduction

1.1 Objectives of the U.S. Strategy for Atlantic Salmon

The NASCO Vision is to pursue the restoration of abundant Atlantic salmon stocks throughout the species' range with the aim of providing the greatest possible benefit to society and individuals. As illustrated below, the goals of U.S. recovery and restoration programs for Atlantic salmon are consistent with the NASCO Vision. Within the U.S., Atlantic salmon is managed at the watershed level by a partnership of the federal government, the government of the State or States within each watershed, and relevant NGOs and industry. These individual watershed programs are described in section 1.2. Among these, there are two primary types of Atlantic salmon programs – those targeted toward recovering endangered Atlantic salmon populations where they have persisted and those aimed at restoring Atlantic salmon to areas where they have been extirpated.

Throughout New England, agencies and groups responsible for Atlantic salmon management have similar goals, objectives and strategies. Strategies recognize the need for ecosystem based management and engaging a broad range of groups. Strategies articulated in the U.S. include: (1) establish an adaptive management approach to recovery; (2) embrace an ecosystem approach to salmon recovery and restoration; (3) implement a watershed approach to diadromous fish restoration; (4) develop new and enhance existing partnerships with watershed stakeholders that maximize resources available; and (5) develop and implement educational and outreach activities to build an informed public and promote anadromous fish restoration. The objectives of each of the specific programs are described below in more detail.

The DPS Rivers in Maine - The goal of the U.S. Strategy for the Gulf of Maine (GOM) Distinct Population Segment (DPS) of Atlantic salmon, listed as endangered under the U.S. Endangered Species Act (ESA), is to recover and ultimately delist this species. The first objective of the recovery effort is to immediately halt the decline of the DPS and demonstrate a persistent increase in population abundance such that the overall probability of long-term survival is increased. The second objective is to achieve the conditions necessary for establishing self-sustaining populations. The third objective is to ensure that threats have been diminished such that the self-sustaining populations will remain viable into the future.

Other Populations in Maine - The Maine Atlantic Salmon Commission's[1] strategic goal in Maine is to restore a viable population of Atlantic salmon with access to historical habitat that provides a public benefit. This goal is clearly consistent with the goals for the DPS articulated above. It also guides salmon restoration in other rivers in Maine that contain Atlantic salmon that are not part of the currently listed GOM DPS. The Penobscot River has the largest population of salmon in the U.S. with returns fluctuating around 1,000 adults annually. A multi-species fishery management plan is currently being developed for the Penobscot River. Similar efforts on the Kennebec and Presumscot Rivers have lead to substantial improvements in diadromous fish production. Stocking plans for all Atlantic salmon populations (including the currently listed GOM DPS) are reviewed by a panel of experts from the state and federal resource agencies Review of stocking plans

[1] In 2007, the Maine Atlantic Salmon Commission was merged into the Maine Department of Marine Resources to become the Bureau of Sea Run Fisheries and Habitat. Future reports will likely, therefore, reference this new Bureau.

by these experts ensures consistency with the Maine Atlantic Salmon Commission's strategic goals, the Maine Atlantic Salmon Interim Stocking Plan, and the Broodstock Management Plan for Atlantic salmon at the Craig Brook National Fish Hatchery.

The Connecticut River - The mission of the Connecticut River Atlantic Salmon Commission (CRASC) is to protect, conserve, restore and enhance the Atlantic salmon population in the Connecticut River basin for the public benefit, including recreational fishing. The Strategic Plan for the Restoration of Atlantic Salmon to the Connecticut River includes the following seven goals: (1) manage Atlantic salmon production to produce sea-run Atlantic salmon returns; (2) enhance and maintain the quantity, quality and accessibility of salmon habitat necessary to support re-established spawning populations; (3) protect Connecticut River Atlantic salmon from exploitation; (4) allocate adult Atlantic salmon to maximize benefits to the Program; (5) assess the effectiveness of the Program by conducting monitoring, evaluation, and research and implement changes when appropriate; (6) create and maintain a public that understands and supports salmon restoration efforts and participates whenever possible; and (7) improve administration and operations within the Program.

The Merrimack River - A Strategic Plan for the Merrimack River has the goal of restoring Atlantic salmon to a self-sustaining level and developing and maintaining American shad and river herrings to their historic habitat. The following three specific objectives have been identified by the state and federal agencies cooperating in the Merrimack River: (1) an adult Atlantic salmon population that will exceed the sea run brood stock holding capacity of the Nashua National Fish Hatchery (300) and provide some level of reproduction in the wild; (2) an annual average of 35,000 adult American shad passing the Essex fishlift in Lawrence; and (3) an annual average of 300,000 adult river herring passing the Essex fishlift in Lawrence. The Strategic Plan for the Merrimack River includes the following three strategies to reach the objectives: (1) implement a watershed approach to anadromous fish restoration; (2) continue to develop new and enhance existing partnerships with watershed stakeholders which maximize resources available for achieving program objectives; and (3) continue to develop and implement educational and outreach activities to protect anadromous fish restoration.

The Pawcatuck River - The Strategic Plan for the Pawcatuck River has the goal of reestablishing a self-sustaining population of Atlantic salmon in the Pawcatuck River Watershed, for maximum public benefit including recreational fishing. Given the number of impediments to achieving the overall goal, the Rhode Island Division of Fish and Wildlife has identified an interim objective of returning adult Atlantic salmon in excess of the established sea-run broodstock holding capacity for the Pawcatuck and providing some level of reproduction in the wild.

1.2 Nature and Extent of the Resource

The known historic natural range of Atlantic salmon in the U.S. was from the Housatonic River (State of Connecticut) in the south to the St. Croix River (State of Maine) in the north (Figure 1). Anadromous Atlantic salmon were native to 45 rivers in this region known as New England. The annual historic Atlantic salmon adult population returning to U.S. rivers has been estimated to be between 300,000 and 500,000. The largest historical salmon runs in New England were likely in the Connecticut, Merrimack, Androscoggin, Kennebec and Penobscot rivers. By the early 1800s, these Atlantic

salmon runs had been severely depleted, greatly reducing the species distribution. Natural Atlantic salmon runs had disappeared from southern New England by 1865. By the mid-20th Century, the total adult run of Atlantic salmon to U.S. rivers had declined from hundreds of thousands of fish to a probable range of 500 to 2,000 fish, mostly in rivers in eastern Maine.

The DPS, Penobscot, and other rivers in Maine - Runs of Atlantic salmon persisted at low levels in eastern Maine, and in 2000 a DPS of Atlantic salmon in the Gulf of Maine was listed as endangered under the U.S. Endangered Species Act. The DPS ranges from the Kennebec River in Maine to, but not including, the St. Croix River at the border between the U.S. and Canada. Atlantic salmon in the Kennebec River above the former site of Edwards Dam and salmon in the Penobscot River above the site of the former Bangor Dam were not included in the listed entity. Adult returns to the GOM DPS are low and are below 15% of the conservation spawning escapement, and have been approximately 100 adults across the DPS in recent years. Returns to the Penobscot River in recent years have been approximately 1,000 adult salmon. Other rivers in Maine with documented adult returns include the Androscoggin, Saco, Union, Kennebec, and Aroostook Rivers. Less than a total of 100 adult salmon return to these rivers on an annual basis.

The Connecticut River - Atlantic salmon were extirpated from the Connecticut River Basin in the early 1800s by dam construction. After an earlier attempt, a restoration program was initiated in the late 1960s and has grown to a major cooperative program involving four basin states and four federal agencies working together under guidance from the Connecticut River Atlantic Salmon Commission. A Strategic Plan was adopted to guide the restoration effort. Atlantic salmon were re-established in the Connecticut River with eggs from the State of Maine, dominated by fish from the Penobscot River, as returns to Connecticut increased, Penobscot-origin hatchery fish were used for broodstock and continued importation from the Penobscot was eliminated. Over time, it is expected that selective pressures in the freshwater and estuarine environment will produce a locally-adapted stock. Since 1990, the annual adult run to the Connecticut River has averaged 190.

The Merrimack River- By the mid-1800s the population of Atlantic salmon in the Merrimack River was extirpated because of the building of impassible dams, overfishing and possibly pollution. Efforts to restore Atlantic salmon to the Merrimack River in the later part of the 1800s were moderately successful, but eventually failed. The States of Massachusetts and New Hampshire and the Services initiated recent Atlantic salmon restoration efforts in the late 1960s. The restoration program is administered by cooperating state and federal natural resource agencies through the Policy and Technical Committees for Anadromous Fishery Management of the Merrimack River. Approximately 125 adult salmon have returned annually to the Merrimack River in recent years.

The Pawcatuck River- Atlantic salmon were extirpated from the Pawcatuck River in the 1700s. Reestablishment of Atlantic salmon would add to the biological diversity of the Pawcatuck River system. Other anadromous species such as river herring and American shad will benefit from the Atlantic salmon restoration effort through improved upstream and downstream fish passage, land acquisition, watershed protection, and

public attention and support. In recent years, the annual adult run to the Pawcatuck River has been less than ten.

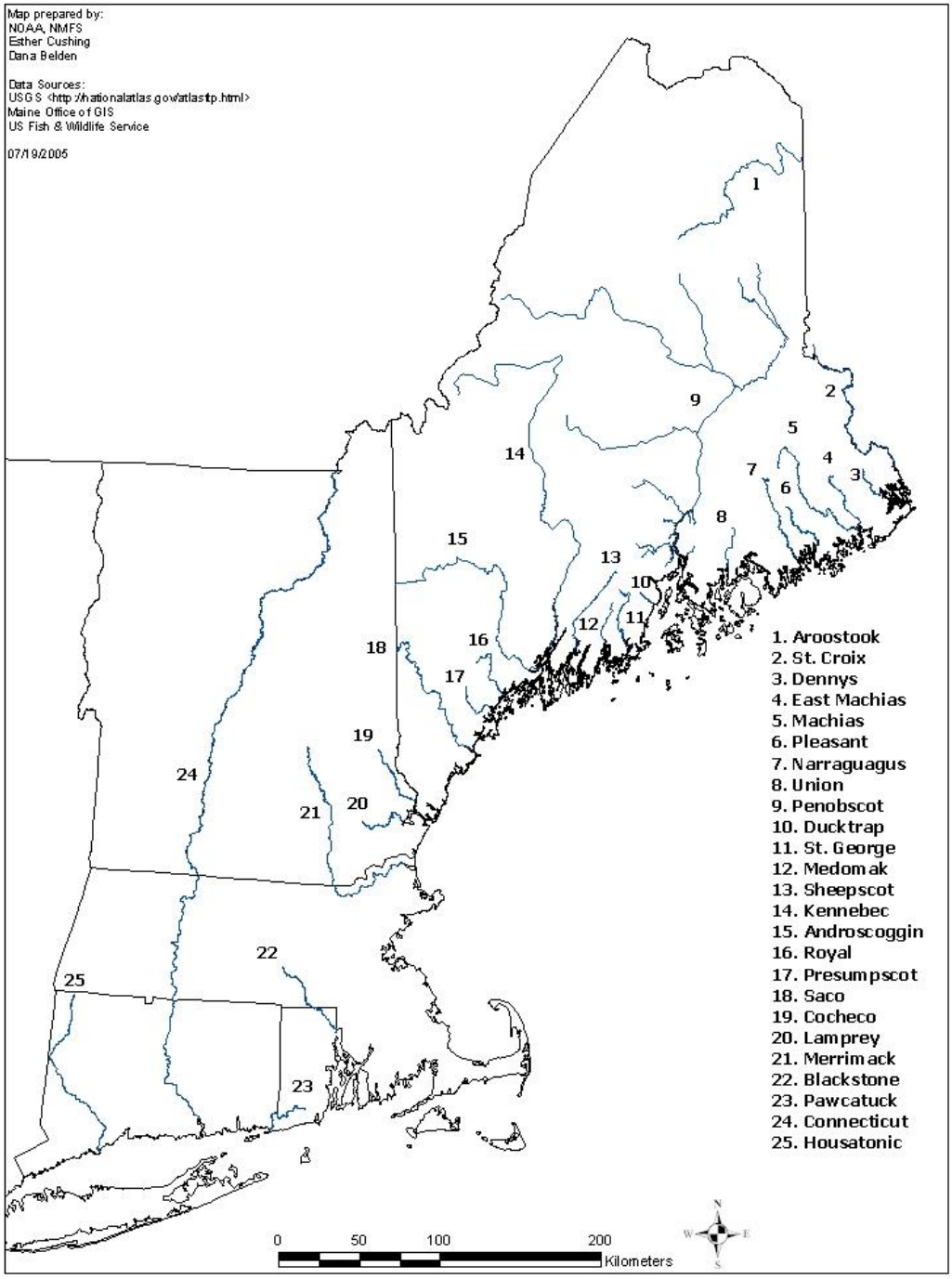

Figure 1. Selected historic Atlantic salmon rivers in the U.S.

1.3 Overview of the Fisheries

There have been no commercial fisheries for Atlantic salmon in the U.S. for over 50 years. A fishery has been conducted annually on reconditioned surplus hatchery broodstock released in the Merrimack River. The last recreational fishery for sea-run salmon (in Maine) was closed in 2000, but in 2006 and 2007 the State of Maine authorized and conducted a thirty day experimental catch and release fishery in the Penobscot River. Any Atlantic salmon incidentally taken in other fisheries must be immediately returned to the water without harm. Special regulations have been promulgated to minimize the potential for incidental take of anadromous Atlantic salmon while fishing for other species including trout, landlocked salmon, and American shad. Ongoing public outreach and educational campaigns are designed to reduce the potential for anglers to misidentify salmon. Focused enforcement patrols and surveillance are being used to protect endangered Atlantic salmon from poaching activities.

1.4 Management Entities

At the federal level in the U.S., the U.S. Fish and Wildlife Service (USFWS) and NOAA's National Marine Fisheries Service (NMFS) (collectively, the Services) share responsibility for Atlantic salmon conservation and recovery. The GOM DPS of Atlantic salmon is listed under the ESA, and therefore receives the greatest amount of protection. All federal agencies (Action Agencies) funding, permitting or carrying out activities in the vicinity of these listed populations must consult with the Services to evaluate and mitigate any impacts to these fish and their habitat. Such Action Agencies must conduct an analysis of the potential impact of their activities on salmon and their habitat. Those proposing activities have the burden to prove that they will not adversely affect Atlantic salmon or their habitat. Federal agencies are prohibited from undertaking any activity that would jeopardize a listed species. Under the ESA, federal agencies also have an affirmative responsibility to carry out their mandates in a way that facilitates recovery of listed species.

Other Atlantic salmon in the U.S. receive direct protection under the Magnuson-Stevens Fishery Management and Conservation Act and the Fish and Wildlife Coordination Act. These acts require consultation with the Services as well, but the recommendations of the Services are not as binding as they are under the ESA. Atlantic salmon and their habitat receive consideration and protection through a variety of other laws including the National Environmental Policy Act which requires a full analysis of environmental and economic impacts of all major federal actions. The Environmental Protection Agency administers the Clean Water Act, which regulates discharges to rivers and waterways to ensure that water quality conditions are not degraded. The Federal Power Act authorizes the Services to prescribe fishways at hydroelectric facilities. The Federal Power Act requires that equal consideration be given to energy development and the protection, mitigation of damage to, and enhancement of fish and wildlife, including related spawning grounds and habitat. Proactive restoration and enhancement activities are implemented largely through federal grant programs.

Within the State of Maine, the Maine Atlantic Salmon Commission (MASC) has been charged with the management and conservation of all Atlantic salmon. The MASC's mission is to protect, preserve, enhance, restore and manage Atlantic salmon and their habitat; to secure a sustainable recreational fishery in the State; and to conduct and

coordinate all projects involving research, planning, management, restoration or propagation of Atlantic salmon. The MASC coordinates with other state agencies including the Department of Marine Resources and the Department of Inland Fish and Wildlife to carry out its responsibilities. The Services and the State of Maine have entered into a Cooperative Agreement for Atlantic salmon since the early 1940s. This Cooperative Agreement describes mutual interests in restoration, enhancement and conservation of Atlantic salmon in Maine and commits the parties to cooperate in field activities, propagation, and research. The Cooperative Agreement also establishes a Technical Advisory Committee (TAC), which is charged with advising the Signatories on any technical matters relative to Atlantic salmon restoration and rehabilitation programs in Maine.

The multi-state/federal, interagency Atlantic salmon restoration program in the Connecticut River is guided by the Connecticut River Atlantic Salmon Commission with recommendations from the Technical Committee. The Commission is composed of ten Commissioners representing the fisheries agencies from the States of Connecticut, Massachusetts, Vermont, and New Hampshire, a public sector representative appointed by the governor of each State, and the Services. In addition to the above agencies, the Massachusetts Division of Marine Fisheries and the U.S. Forest Service are represented on the Technical Committee.

The Merrimack River Anadromous Fish Restoration Program is administered by the cooperating agencies through two committees. The Policy Committee for Anadromous Fishery Management of the Merrimack River (Policy Committee) provides overall program direction and resolves policy issues. The Technical Committee for Anadromous Fishery Management of the Merrimack River (Technical Committee) provides oversight of program implementation and advises the Policy Committee on technical issues. The Policy Committee is composed of the Directors of state agencies within Massachusetts and New Hampshire and the Services. Each member of the Policy Committee assigns a staff member to the Technical Committee. There is also an advisory committee, the Sport Fishery Advisory Board, established by the Policy Committee in 1989. It is made up of members from the public (three representatives from Massachusetts and four representatives from New Hampshire) and advises the Policy Committee on sport fishery issues.

The Strategic Plan for the Restoration of Atlantic Salmon to the Pawcatuck River is administered by a Technical Committee that coordinates activities of the Rhode Island Division of Fish and Wildlife, USFWS, and the NMFS to provide consultation on any technical matters relating to the implementation of the anadromous fish restoration and rehabilitation program in the Pawcatuck River and related interjurisdictional waters. The Technical Committee consists of a member designated by each of the four signatories. In addition, the RIDFW will invite appropriate members of state and federal fisheries agencies and academia to join the Technical Committee as advisors. The Technical Committee members and advisors are selected for their technical expertise and involvement in anadromous fish restoration and rehabilitation activities within their respective agencies.

The States in New England have joined together to form the New England Atlantic Salmon Committee (NEASC). The Directors of each of the nine state fishery agencies in New England, NMFS, USFWS and the U.S. Forest Service are members of NEASC. The purpose of the NEASC is to facilitate the recovery and restoration of Atlantic salmon

and associated anadromous species to New England Rivers by providing a venue where action can be initiated in a coordinated, cooperative and collaborative manner. The goals of NEASC are: (1) to restore and maintain self sustaining populations of Atlantic salmon and associated anadromous species throughout their historic range in New England; (2) to develop and implement unified approaches to address and resolve major obstacles that impede the Atlantic salmon restoration effort; (3) to identify and seek resolution of common problems that hinder the attainment of Atlantic salmon management objectives across the region; and (4) to create a joint venture involving other governmental agencies, nongovernmental organizations and interested parties who support the goals of the Committee.

In addition to the federal and state agency efforts and mandates referenced above, there is a great deal of local effort driven by private citizens, non-governmental organizations and industry representatives. The Atlantic Salmon Federation and Trout Unlimited are very active in the protection and enhancement of Atlantic salmon and their habitat throughout the U.S. The forest and agriculture industries in Maine have formed Project SHARE (Salmon Habitat and River Enhancement), which promotes landowner stewardship and the recovery of endangered Atlantic salmon. The Connecticut River Salmon Association is a non-profit organization formed with the mission of supporting the effort to restore Atlantic salmon in the Connecticut River basin. Watershed councils have formed around many of the watersheds in Maine to encourage land and water quality protection.

2 Status of Stocks

2.1 Abundance

Total returns of Atlantic salmon to US Rivers in 2006 was 1,480 salmon (Figure 2). The average documented returns to New England Rivers from 2002 – 2006 was 1,365 salmon. Returns of 2SW fish from traps, weirs, and estimated returns in 2006 were only 3.5% of the 2SW conservation spawner requirement for the US.

Replacement rate has been selected as a quantitative measure of recovery of the Gulf of Maine (GOM) DPS to indicate if the overall population decline has been halted. A replacement rate of 1.0 would indicate a stable population; a rate below 1.0 indicates a declining population; and a rate above 1.0 indicates a growing population. The replacement rate for 11 generations of Atlantic salmon starting with returns in 1996 from the 1991 spawning cohort averaged 0.6 and the mean replacement rate has not exceeded 1.0 during this time period. However, in 5 of the 11 years the upper bound of the 90% confidence limits did exceed 1.0. The replacement rate for 2006 was 0.77 (0.46 – 1.21) and was the fourth highest in the time series.

Basin-wide smolt production in the Connecticut River is thought to approach 250,000 (USASAC 2005). These estimates do not include smolt mortality during migration, which may be significant as most smolts have to travel long distances and pass multiple dams to reach the estuary. Rotary screw traps are used on some rivers within the GOM DPS to estimate smolt outmigration. In addition, telemetry has been used to better understand smolt migration.

During 2006, approximately 12 million juvenile salmon (91% fry) were released into 15 river systems in the US. Fry were stocked in the Connecticut (8 million), Merrimack (1 million), Saco, Penobscot (2 million) and six rivers within the geographic range of the GOM DPS (1.5 million total). Smolts were stocked in the Penobscot (549,200), Merrimack (50,000), Connecticut (53,132), Dennys (56,500), Pleasant (15,200) and Pawcatuck (12,842) Rivers. In addition to juveniles, nearly 3,800 adult salmon were released into rivers in the US.

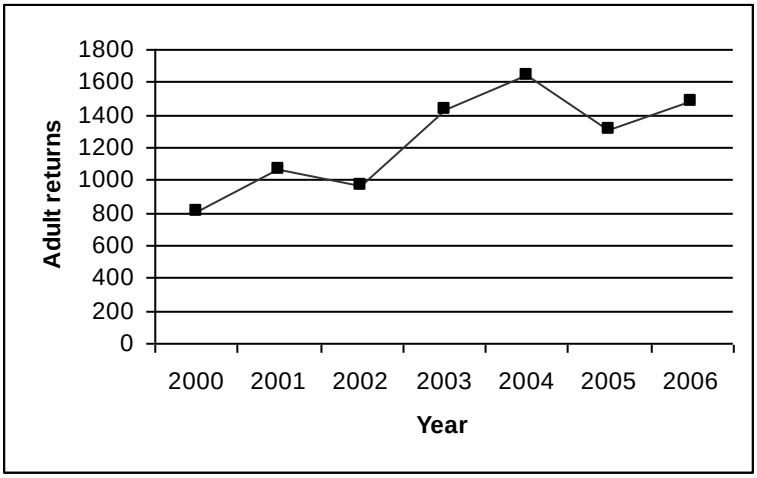

Figure 2. Adult Atlantic salmon returns to U.S. Rivers for the period 2000 to 2006.

2.2 Diversity

Smolt Age- Within the range of the GOM DPS, naturally reared returning adults predominantly emigrated at river age two (88 to 100%) with the remainder emigrating at river age three. Smolt ages from naturally reared adults returning to the Merrimack and Connecticut River are also dominated by river age two smolts with some emigrating at river age three, but river age one smolts are also present (3-8%). Returns to the Penobscot River, however, are dominated by age one smolts as those smolts are reared in an elevated temperature regime in the hatchery, which is not reflective of the natural freshwater rearing environment.

Sea Age- Most salmon of U.S. origin have spent two winters at sea (i.e., 2SW salmon), though grilse are also fairly common. For the period of 1967-2003, approximately 10% of the wild/naturally-reared origin adults returning to adult monitored U.S. rivers were grilse and 86% were 2SW (USASAC 2004); the remainder were 3SW salmon or repeat spawners.

Run Timing - Historically, it is likely that most large rivers in the U.S. had multiple stocks with different return dates. Much of that diversity has been lost. Currently, runs in the Connecticut and Pawcatuck rivers in the south begin in April and end in June. Coastal

waters are too warm to support summer and fall runs. Runs in the Gulf of Maine typically begin in May and continue to October. Information on run timing is lacking on some rivers due to low abundance and lack of collection facilities on all rivers.

Genetic resources - Genetic analysis of Atlantic salmon populations in the U.S. has identified statistically significant genetic variation among all populations examined. Further, these populations are more similar to each other than they are to Canadian and European populations, although the magnitude of genetic differences among U.S. populations is smaller in comparison to genetic differentiation among Canadian populations (Spidle et al. 2003). The conservation hatchery program designed to facilitate recovery of the endangered populations is currently being managed on a river-specific basis (Bartron et al. 2006). That decision may be revisited and mixing of the various river strains could be conducted if it was determined to be necessary or advisable for the conservation of the DPS.

Salmon in the Merrimack, Pawcatuck, and Connecticut rivers were extirpated in the 1800s. A substantial amount of genetic diversity was clearly lost with these extinction events. However, populations in several of these rivers have been re-established with eggs from the State of Maine, dominated by fish from the Penobscot River. Recent genetic analyses have shown that salmon from the Connecticut and Penobscot Rivers still share many alleles and traits; although, the Connecticut River population has shown some genetic divergence from its primary and most recent donor stock, the Penobscot (Spidle et al. 2004).

2.3 Threatened or Endangered Stocks

In 2000, the Services listed the GOM DPS as an endangered species under the ESA. The GOM DPS is defined as all naturally reproducing wild populations of Atlantic salmon having historical river-specific characteristics found north of and including tributaries of the lower Kennebec River to, but not including the mouth of the St. Croix River at the U.S. – Canada border and the Penobscot River above the site of the former Bangor Dam. The Services explicitly identified Atlantic salmon populations in the Dennys, East Machias, Machias, Pleasant, Narraguagus, Sheepscot and Ducktrap Rivers and Cove Brook as meeting these criteria. River-specific hatchery populations were included in the listing. The development of a recovery plan is required for a listed species.

In the 2000 final rule listing the GOM DPS, the Services deferred the determination on including fish that inhabit the main stem and tributaries of the Penobscot River above the site of the Bangor Dam. The deferred decision reflected the need for further analysis of scientific information, including a detailed genetic characterization of the Penobscot population. Furthermore, the Services were committed to reviewing data regarding the appropriateness of including the upper Kennebec and other rivers as part of the DPS. In late 2003, the Services assembled a Biological Review Team to (1) review and evaluate all relevant scientific information necessary to evaluate the current DPS delineations, (2) determine the conservation status of the populations that were deferred in 2000 and (3) explore their relationship to the currently listed GOM DPS. Following peer review, the Status Review prepared by the Biological Review Team was made available to the public in September 2006 (Fay et al. 2006). In light of that Review, the Services are determining what, if any, additional action is warranted under the ESA.

3 Threats to Stocks and Current Management Measures

The DPS Rivers - The Recovery Plan for DPS salmon populations lists the following threats: (1) acidification of freshwater habitats, (2) depleted diadromous fish communities, (3) direct and indirect marine harvest, (4) incidental capture and poaching, (5) competition with non indigenous fish, (6) hatchery supplementation, (7) sedimentation, and (8) avian predation. The Recovery Plan contains demographic and threat-based criteria that would need to be met in order for the species to be considered for downlisting from endangered to threatened or delisted/recovered.

Other Rivers in Maine - In recent years there have been a number of initiatives to identify and prioritize threats to Atlantic salmon stocks in the US. The National Academy of Sciences (NAS) highlighted the following threats to salmon in Maine: (1) dams; (2) hatcheries; (3) aquaculture; (4) acid deposition; (5) fishing; (6) change in atmosphere and ocean climate; (7) predation and food supply; (8) research and monitoring; and (9) governance.

Merrimack and Connecticut rivers - Dams, change in atmosphere and ocean climate, predation and food supply, low marine survival and upstream and downstream passage are the primary threats to restoration of Atlantic salmon populations to the Connecticut and Merrimack rivers.

The Strategic Plans for the Merrimack and Connecticut rivers and the Recovery Plan for the GOM DPS address the factors identified in the NASCO Guidelines on the Use of Stock Rebuilding Programs including an evaluation of the status of the stock, causes of stock decline and threats to stock, identification and involvement of stakeholders, prioritization of management actions, assessment of social and economic factors, and a plan for monitoring and evaluating progress.

3.1 Effects of Fisheries

3.1.1 Homewater Salmon Fisheries

There are currently no directed commercial fisheries for sea run Atlantic salmon in the U.S. A Fishery Management Plan was adopted by the federal government in 1987, which prohibits the possession of Atlantic salmon in the U.S. exclusive economic zone. The only fishery currently prosecuted on sea run salmon was an experimental catch and release fishery that was conducted for 30 days on the Penobscot River in Maine in 2006 and 2007

3.1.2 Distant Salmon Fisheries

U.S. origin Atlantic salmon are susceptible to harvest in the mixed stock fishery off West Greenland and St. Pierre et Miquelon. Based on genetic and scale analysis, a fishery of 20-25 metric tons, as has been prosecuted off West Greenland in recent years, is estimated to include less than 100 U.S. Atlantic salmon, of which approximately 2-25 were from the GOM DPS during the years 2000, 2001 and 2002. While this total seems small, it could represent anywhere from 3 to 45% of the total documented returns to the GOM DPS during those years. Sampling of the fishery of St. Pierre et Miquelon was

initiated in 2003 and continued in 2004 and 2005. Since genetic samples were only taken in 2004, only limited information on the composition of the catch in St. Pierre et Miquelon is available. In 2004, testing of 134 scale and tissue samples was made and, as expected, all the samples were assigned to North America. It was estimated that 2% of the harvest originated from the U.S. and 98% originated from Canada. Additional genetic sampling on the St. Pierre et Miquelon fishery is needed to estimate with more certainty the potential impact of this fishery on U.S. Atlantic salmon, including those listed as endangered.

3.1.3 Bycatch in Homewater Commercial and Recreational Fisheries

Commercial fisheries in U.S. waters were examined to estimate the potential for the interception of salmon as bycatch, which was determined to be unlikely and rare. Recent investigations also suggest that bycatch of Atlantic salmon in herring fisheries is not a significant mortality source for U.S. stocks of salmon, as reported to the Working Group on North Atlantic Salmon at its 2004 meeting.

Poaching (i.e., illegal in-river harvesting) has been documented to occur at low levels. Efforts including enforcement, maximum size restrictions on brown trout and landlocked salmon, and closures of sections of rivers have been implemented. Minimum size restrictions on trout are placed in some rivers at some locations to reduce the potential for anglers to keep salmon parr misidentified as another salmonid species. A maximum length for landlocked salmon and brown trout was adopted in some areas in an attempt to avoid potential accidental sea run Atlantic salmon harvest in the winter and in estuaries.

3.2 Factors Affecting Estuarine and Freshwater Habitat

The earliest impacts to Atlantic salmon in the U.S. were from water quality degradation and barriers to migration. While many of the historical unregulated water and land use practices that degraded salmon habitat have been eliminated, the legacy of these impacts to the physical, chemical, and biological structure of these rivers and streams can remain for decades. In addition, contemporary land and water use practices including forestry, agriculture, urbanization, flood control, water pollution, water withdrawal, and dams continue to substantially reduce the quantity and quality of Atlantic salmon habitat throughout New England by (1) eliminating or degrading spawning and rearing habitat, (2) reducing habitat complexity and connectivity, (3) degrading water quality, and (4) altering ambient stream temperatures. The greatest impediment to self-sustaining Atlantic salmon populations is obstructed fish passage and degraded habitat caused by dams. The National Inventory of Dams lists 639 dams over four feet in height in Maine alone. Dams constructed on the mainstem Connecticut River and its tributaries were largely responsible for the extirpation of salmon in the basin. Currently, there is a large amount of salmon habitat in the Connecticut River that is not accessible to returning adults because of barrier dams. Providing access around these migratory barriers through dam removal and/or the provision of fish passage will allow salmon to use this habitat. However, the regulatory process to implement fish passage is resource intensive and slow.

Human activities, including industrial, residential and agricultural development, have reduced the amount and degraded the quality of Atlantic salmon habitat throughout the Connecticut basin. Gravel beds essential for spawning and fry habitat have been covered with silt. The highly controlled flows in the Connecticut River reduce Atlantic

salmon passage success. Effective downstream passage is also limited by existing technology. Downstream passage is important to protect smolts since many fry are stocked above barrier dams not yet equipped with upstream fish passage.

3.3 Impacts of Aquaculture, Introductions and Transfers and Transgenics

3.3.1 Disease and parasite management

The New England Salmonid Health Committee was established in 1985 to address policy issues and provide guidelines related to Atlantic salmon disease management and other health needs related to salmon culture and restoration. Originally established only to address Atlantic salmon, their charge was expanded to all regional salmonid health issues in 1987. The guidelines created by the New England Salmonid Health Committee were implemented by the relevant agency within each state.

3.3.2 Commercial Aquaculture

Aquaculture operations pose a significant risk to wild stocks of Atlantic salmon in Maine. Permits prohibit the use of reproductively viable non-North American strain Atlantic salmon, require marking of stocked smolts, and require stringent disease testing. In addition, weirs exist on some of the wild salmon rivers to allow for the interception of returning adults and removal of aquaculture escapees. Escapees and resultant interactions with native stocks are expected to continue to occur within the range of the GOM DPS given the continued operation of farms and growth of the industry. Recent containment protocols and audits have greatly decreased the incidence of losses from hatcheries and pens, however large escapes still occur.

3.3.3 Transfers and Transgenics

The transfer of salmonids between facilities or from freshwater hatchery facilities to be stocked into the wild can pose genetic, ecological and disease concerns for wild populations. All transfers are regulated by state agencies and disease certification is required before movement of fish is allowed. The potential risks from transfers can be intensified if a transgenic fish is proposed to be raised in hatcheries or stocked into U.S. waters. Discussion of the potential use of transgenic salmon has been limited to commercial aquaculture and it has not been proposed for any restoration or recovery program. On the Atlantic coast of the U.S., commercial salmon aquaculture is limited to the State of Maine. Permits for freshwater hatcheries and marine cage sites in Maine prohibit the use of transgenic salmonids. An application has been submitted to the U.S. Food and Drug Administration (FDA) for the rearing and sale of transgenic salmon. NMFS and the USFWS have notified the FDA that a consultation is required in order to determine the potential impacts of this application on Atlantic salmon. The FDA is requiring a risk assessment as part of the application and the processing of that application is on hold until that necessary documentation and studies are submitted.

3.3.4 Conservation Hatcheries

Conservation hatcheries intended to facilitate restoration and recovery efforts, while essential to these efforts, have also been identified as a potential threat. The NAS concluded that available information was not sufficient to determine whether hatcheries in Maine can actually help rehabilitate salmon populations, whether they might even be harming them, or whether other factors are affecting salmon so strongly that they overwhelm any good that hatcheries may do. It is recognized that hatchery supplementation can have deleterious genetic and possibly ecological effects.

3.4 Other Influences Affecting Salmon Abundance or Diversity (including marine environment)

For all U.S. Atlantic salmon stocks, one of the major environmental forces affecting salmon recovery and restoration is an increase in oceanic mortality. The reasons for the poor survival of salmon in the ocean are not understood.

Natural mortality in the marine environment can be attributed to four general sources: predation, starvation, disease/parasites, and abiotic factors. While our knowledge of the marine ecology of Atlantic salmon has increased substantially in the past decade, we cannot partition total natural mortality into these categories. Survival of the North American stock complex of Atlantic salmon seems to be at least partially determined when salmon are concentrated during the winter months in the habitat formed at the mouth of the Labrador Sea and east of Greenland.

The purpose of the ESA is to recover the ecosystems upon which listed species depend. Recovery of endangered Atlantic salmon, therefore, depends on our ability to recover the freshwater, estuarine, and marine environments in which salmon live. Historically, abundant runs of at least 10 other native diadromous species existed in New England waters. These other species provided a variety of benefits for Atlantic salmon including contributing marine-origin nutrients to freshwater, serving as predator buffers, and serving as prey. Many of the historical connections among these co-evolved species and their habitats have been eliminated or severely compromised by the same environmental perturbations that have lead to the severe declines in salmon abundance. Restoration of at least a portion of this historical co-evolved diadromous fish assemblage, and the nutrient cycling function it maintained, may be required for the long-term recovery of Atlantic salmon in the U.S.

4 Management Approach

4.1 Management of Fisheries

4.1.1 Distant Salmon fisheries

The U.S. will continue to be an active participant in the West Greenland Commission (WGC) of NASCO with the goal of negotiating a quota that is based on the scientific advice from ICES and is sufficiently protective of U.S. stocks, most significantly those

listed under the ESA. Another goal is to seek a long-term quota agreement for this fishery in light of the severely depressed state of the stocks and the stability of the scientific advice. The U.S. will continue to be actively engaged in collaborating with the other members of the WGC to monitor this fishery and will use the information obtained to evaluate the risk the fishery poses to U.S. stocks.

The U.S. is interested in learning the results of the Trust Fund established under the Conservation Agreement between KNAPK and NASF. The Trust Fund was established to jointly finance projects that were intended to benefit KNAPK and Greenland's inshore fishing industry and reinforce or complement development programs. According to the Agreement, projects were designed to facilitate development of new fisheries or other economic activities, with the potential to provide employment to Greenland society.

The U.S. will continue to emphasize the need for robust sampling of the fishery off St. Pierre et Miquelon to improve our understanding of that fishery and to be able to quantify its potential impact on U.S. stocks of salmon, including those listed under the ESA. We will continue to offer sampling and/or analytical support to process scales and/or genetic samples to determine continent of origin of the fish being intercepted off St. Pierre et Miquelon. Given the extremely poor status of stocks, reducing to the greatest extent possible the interception of U.S. origin salmon in mixed stock fisheries is a high priority for the U.S.

Specific Actions

4.1.1.1 Participate in the annual meeting of the WGC to negotiate a quota based on the scientific advice from NASCO (2007, 2008, 2009, 2010 and 2011).

4.1.1.2 Reach a multi-annual regulatory measure for the West Greenland fishery (2007 and 2009).

4.1.1.3 Participate in annual sampling of the fishery off West Greenland (2007, 2008, 2009, 2010 and 2011).

4.1.1.4 Facilitate a continent of origin analysis on salmon sampled off West Greenland to determine composition of the mixed stock affected by the fishery (2007, 2008, 2009, 2010 and 2011).

4.1.1.5 Collaborate with Canada and France to implement sampling of the salmon fishery off St. Pierre et Miquelon and to conduct continent of origin analysis on the sampled fish (2007, 2008, 2009, 2010 and 2011).

4.1.1.6 Request a report on the Trust Fund established under the Conservation Agreement in Greenland (2007).

4.1.2 Homewater Recreational Fisheries

A significant benefit for recreational anglers along the mainstem of the Merrimack River within New Hampshire has been the Atlantic salmon broodstock sport fishery, initiated in 1993. This initiative provides exciting sport angling opportunities; led to the development

and improvement of access sites along the river for anglers and many other recreational users; heightened awareness of anadromous fishery resources among public and political constituents; and increased economic support for anadromous fishery initiatives through the development of a stamp and print program. The New Hampshire Fish and Game Department, via a permit system, manages an Atlantic salmon broodstock fishery in the mainstem Merrimack River and a lower portion of the Pemigewasset River. Whereas angled Atlantic salmon required an angler tag for harvest in previous years, rule changes have now eliminated the angler tagging requirement but continue to recommend voluntary reporting of catch. Creel limits are one fish per day, five fish per season with a minimum length of 15 inches. The season is open all year for taking salmon with a catch and release season from 1 October to 31 March.

In 2006 and 2007, the State of Maine authorized a limited, experimental open season for directed angling for Atlantic salmon from September 15 to October 15 on the Penobscot River. Atlantic salmon are part of the identity of the State of Maine; Atlantic salmon supported a culturally and economically significant sport fishery up until the late 1990s. This has resulted in a strong connection between the citizens of the State of Maine and Atlantic salmon. The fishery was precipitated by the desire of the State of Maine to maintain a connection between the citizens of Maine and Atlantic salmon. The State believes that maintaining this connection is critical to recovering the species. In order to evaluate whether or not a new recreational fishery would benefit the species overall, it was agreed that risks and benefits would need to be clearly articulated and, to the extent possible, quantified.

A structured risk assessment was conducted which considered a suite of alternatives ranging from an open spring fishery to a limited entry system targeted at reconditioned kelts. The specific proposal for a limited fall catch and release fishery was developed on the basis the risk assessment which specifically considered: 1) the number of fish exposed; 2) proportion caught (exploitation); 3) survival of hooked fish at different temperatures; 4) potential to affect broodstock collection; and 5) potential loss of females. The risk assessment considered a range of alternatives and presented an evaluation of the relative risk of each alternative to current restoration and recovery programs for Atlantic salmon. This risk assessment facilitated transparency in the process of deciding whether to authorize a catch and release fishery by explicitly evaluating and balancing the potential risk to fish with the social and economic benefits of allowing such a fishery. Given the relative risks of some scenarios, ultimately a fall fishery with a series of biologically-driven restrictions was decided upon. The conditions of the fishery were as follows: catch and release only; fly fishing only; the season was limited to September 15 to October 15, and no salmon were allowed to be removed from the water for any reason. This fishery was closely monitored and the regulations allowed for closure if it was deemed necessary to protect the resource. During the 30 day period in 2006, the fishery was closed once due to elevated water temperature.

Similar to the spent broodstock fishery on the Merrimack River in NH, one of the goals of the experimental recreational salmon fishery on the Penobscot river was to heighten awareness of anadromous fishery resources. The fishery generated a great deal of interest with the public and with the media, and was even featured on the front page of the New York Times. While it is difficult to assess the true benefit of media exposure and increased public awareness, attempting to evaluate this benefit and incorporating it into management decisions is consistent with the socio-economic approach to fisheries management adopted by NASCO.

The actions taken in the U.S. for homewater salmon fisheries are consistent with the Decision Structure to Aid the Council and Commission of NASCO and the Relevant Authorities in Implementing the Precautionary Approach to Management of North Atlantic Salmon Fisheries. When stocks are below the conservation spawning escapement, fisheries within the U.S. were closed and management actions were triggered to identify and address failures in abundance and diversity. Many of those actions are described below in the habitat discussion. The principles and approaches described in the Decision Structure were used to facilitate an open and transparent risk assessment process to make a decision regarding the recreational catch and release fishery in the Penobscot River. A suite of alternatives were examined with the goal of identifying one that posed a low risk to the abundance and diversity of salmon stocks and to achieve a high probability of achieving management goals. Similarly, although there was a strong desire to have a recreational fishery on the Merrimack River, it has been based around surplus broodstock in order to gain the public benefits of such a fishery without adversely affecting restoration progress and goals.

Specific Actions

4.1.2.1 Work with the MASC to monitor the fishery in order to ensure that the assumptions of the risk assessment are met and that the fishery does not have a significant impact on Atlantic salmon in the Penobscot River (2007).

4.1.3 Bycatch in Homewater Fisheries

Based on an analysis of the timing and location of herring fisheries off the coast of Maine, we have determined that the bycatch of salmon smolts is unlikely. Observer coverage in this fishery is being increased. We will review that observer information for any documented Atlantic salmon bycatch. In addition, on an annual basis, we will continue to query the observer and fishery logbook database to detect any reported Atlantic salmon bycatch.

To address the potential bycatch of any Atlantic salmon, especially within the geographic range of the GOM DPS, in recreational fisheries in Maine, the Services are currently meeting with the MASC, Maine Department of Inland Fisheries and Wildlife and Maine Department of Marine Resources. A review of activities including stocking practices, fish passage policies, regulations on recreational fisheries, and sampling is being conducted to identify ways that any interception or harm to Atlantic salmon can be avoided, minimized or mitigated. If take of listed Atlantic salmon cannot be avoided, then a permit may be pursued.

Bycatch of Atlantic salmon not listed under the ESA also needs to be eliminated. Laws now prohibit the taking of all salmon but incidental catching (mostly in commercial shad nets and recreational fisheries targeting American shad, striped bass, and trout) still occurs in the Connecticut, Pawcatuck, Merrimack, Saco, Androscoggin, and Kennebec Rivers. Closing these fisheries may not be necessary, but public education and law enforcement are needed to ensure all hooked or netted salmon are released.

Specific Actions

4.1.3.1 Review commercial fisheries log books and observer database for any records of Atlantic salmon (2007, 2008, 2009, 2010 and 2011).

4.1.3.2 Review activities conducted and authorized by Maine IFW to determine potential of incidental take of Atlantic salmon and evaluate the effect of any potential take on recovery (2007 and 2008).

4.1.3.3 Work with Maine IFW to identify changes in regulations and practices that could avoid or minimize the take of endangered Atlantic salmon (2007 and 2008).

4.1.3.4 Work with all state agencies to monitor incidental recreational catches and ensure that hooked salmon are released in an appropriate manner (2007, 2008, 2009, 2010 and 2011).

4.2 Protect and Restore Salmon Habitat

Essential fish habitat (EFH) for Atlantic salmon has been designated under the Magnuson-Stevens Fishery Conservation and Management Act. EFH is broadly defined to include "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Because there is a federal fishery management plan for Atlantic salmon, EFH has been designated and includes all current and historic habitat. Fishery Management Councils must describe and identify essential habitat, minimize to the extent practicable adverse effects on EFH caused by fishing, and identify other actions to encourage the conservation and enhancement of EFH. NMFS must coordinate with other federal agencies to conserve and enhance EFH, and federal agencies must consult with NMFS on all actions or proposed actions authorized, funded or undertaken by the agency that may adversely affect EFH. NMFS must provide recommendations to federal and state agencies on such activities to conserve EFH. These recommendations may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from actions or proposed actions authorized, funded, or undertaken by that agency. The NMFS Habitat Program has a goal of no net loss of fisheries habitat. In order to achieve this goal, a sequence is followed where emphasis is placed on avoiding impacts first, then minimizing any unavoidable impacts and finally mitigating any remaining impacts.

The Fish and Wildlife Coordination Act requires that wildlife conservation receive equal consideration with other features of water resource development. The Act requires that federal permitting and licensing agencies consult with the NMFS and USFWS before issuing a permit for activities that modify any body of water. The Services provide comments and recommendations to prevent loss of, and damage to, fish populations and their habitats.

The take of any species listed under ESA is prohibited, unless authorized through an incidental take statement or incidental take permit. Take is defined broadly under the ESA to include harm which includes significant habitat modification which results in death or injury by significantly impairing essential behavioral patterns including breeding,

feeding or sheltering. In addition, under the ESA the Services are required to designate critical habitat which is defined as habitat that includes physical and biological features essential to the conservation of the listed species. Federal agencies must consult with the Services on any action they are permitting, funding or carrying out that may adversely affect critical habitat. All Federal agencies are required to ensure that any action authorized, funded or carried out by them is not likely to result in the destruction or adverse modification of critical habitat. Critical habitat most directly affects federal agencies; however industries and private citizens are affected if any action they plan to undertake requires any federal approval or uses any federal funding. In addition, areas identified as critical habitat benefit from increased focus and attention for habitat restoration and enhancement. The designation of critical habitat requires an economic analysis of the impact of designation and requires a full public rulemaking process.

The consultation requirements under the Magnuson-Stevens Act and ESA require action agencies to evaluate the potential impact on Atlantic salmon habitat of any action they are undertaking, funding, or carrying out. The action agency prepares this evaluation and submits it to the Services for their review and concurrence. The burden to prove that their activities will not adversely affect Atlantic salmon and their habitat is placed on the project proponent. In the face of uncertainty, the benefit of the doubt is given to the species. The Services review this analysis and may concur, may request additional information or analysis, or may reach a different conclusion regarding impacts. Projects must be modified if they are determined to be likely to result in adverse modification of Atlantic salmon critical habitat.

Dams remain the most significant barrier to successful Atlantic salmon restoration in the U.S. Traditional permitting processes are very long and require a great deal of resources for the Services to remain actively engaged. More innovative agreements have been reached on a number of rivers between the utility owners, state and federal resource agencies, and non-governmental organizations. These agreements establish deadlines for upstream and downstream passage, and outline required studies and methods for evaluating passage effectiveness. One such agreement in the Kennebec River in Maine resulted in the removal of the first barrier on that river, the Edwards Dam. A significant agreement reached in recent years is the Penobscot River in Maine that will result in the removal of the 2 lowermost dams in that River if funds to purchase those dams can be raised within 5 years. The purchase price is $25 million and the estimated cost of removal and restoration is another $25 million.

As described above, the U.S. approach to habitat protection and restoration is consistent with the NASCO Plan of Action for the Application of the Precautionary Approach to the Protection and Restoration of Atlantic Salmon Habitat. Specifically, through the designation of essential fish habitat those areas important to Atlantic salmon have been identified and the public has been notified of the need to protect these areas. The U.S. has a national policy of “no net loss” of habitat consistent with the goal in the NASCO Plan of Action to conserve the protective capacity of habitat. The burden of proof is on the project proponent and licensing agency to identify and evaluate any impacts to salmon and their habitat. In addressing impacts, the applicant must follow the sequence of first avoiding then minimizing any potential impacts. If unavoidable impacts exist, then the project must include mitigation to offset these impacts and, at a minimum, maintain the no net loss policy.

The U.S. approach to salmon habitat is based on the need to protect the current capacity of existing physical habitat through the implementation of legislation that protects these habitats and places the burden of proof on the project proponent. Recognizing that habitat protection is not enough, the U.S. equally embraces the need to restore the productive capacity of Atlantic salmon habitat which has been adversely impacted and limits salmon restoration and recovery. This is accomplished largely through incentive based programs which provide federal, state and private funds to support fish passage, dam removal, habitat enhancement, and purchasing land or conservation easements. Major initiatives in recent years include community-based restoration grants to encourage and support local stewardship and an Open Rivers Initiative.

Also consistent with the NASCO Plan, the U.S. focuses on establishing partnerships with the many jurisdictions and interested parties whose activities may have an impact on the protection and restoration of salmon habitat. At the federal level, NMFS and the USFWS have the lead for salmon habitat protection and recovery but work closely with a variety of federal partners including the Environmental Protection Agency, Department of Transportation and Department of Agriculture to avoid impacts and to direct improvement projects to locations that would benefit Atlantic salmon. Federal agencies work closely with a wide variety of state resource and development agencies. In addition, representatives from a variety of industries and industry organizations are excellent partners to seek the adoption of protective measures into their business rules and also to implement restoration and recovery projects on their lands, frequently using their equipment and staff. Conservation organizations are also key partners in salmon protection and recovery in the U.S., including working with local governments to put together proposals to seek funding to implement community based restoration projects. They offer their expertise and grant writing abilities to towns to develop and implement these collaborative partnership projects.

Specific Actions

4.2.1 Continue to populate NASCO Habitat Database with information from U.S. Rivers (2007, 2008, 2009, 2010 and 2011).

4.2.2 Conduct consultations on all federal actions in areas where Atlantic salmon EFH is designated and issue conservation recommendations to avoid, minimize or mitigate impacts to salmon habitat (2007, 2008, 2009, 2010 and 2011).

4.2.3 Prepare maps and descriptions of critical habitat and provide these to local authorities and state agencies to encourage focus on protection, restoration and enhancement of habitat in these areas (2008 and 2009).

4.2.4 Designate critical habitat for listed Atlantic salmon populations (2007, 2008 and 2009).

4.2.5 Conduct ESA Section 7 consultations on all federal actions in the GOM to determine and minimize impacts to endangered Atlantic salmon and their habitat (2007, 2008, 2009, 2010 and 2011).

4.2.6 Remain active and involved in the oversight of fish passage agreements on the Kennebec, Saco and Penobscot rivers (2007, 2008, 2009, 2010 and 2011).

4.2.7 Remain active and involved in hydroelectric project licensing at dams located within Atlantic salmon habitat in the U.S. and advocate for upstream and downstream fish passage facilities, as appropriate (2007, 2008, 2009, 2010 and 2011).

4.3 Manage Aquaculture, Introductions and Transfers

Annual audits on containment management systems are conducted at all U.S. marine farms in order to verify compliance with standards and to identify any potential problems that could result in losses. In addition, on an annual basis all companies need to submit results of genetic screening to federal resource agencies to verify that all smolts stocked into U.S. marine cages are of North American origin. Companies also need to submit marking plans. All of these plans are required under state and federal permits. Emphasis over the next five years will be on ensuring compliance with these permit conditions and evaluating their effectiveness by monitoring the presence of escapes in rivers.

Audit results, compliance with permit conditions, and the level of escapees detected in rivers are all used to determine if the consultation conducted on aquaculture operations needs to be reinitiated. The consultation estimates and provides legal coverage for a level of impact to listed Atlantic salmon. If this level is exceeded, or if other assumptions used in the analysis are violated, then the consultation would be reinitiated. Reinitiation can result in a wide range of changes to existing operations as required to reduce the level of impact to the listed species and its habitat.

Federal permits for marine cage sites issued by the U.S. Army Corps of Engineers prohibit transgenic salmonids at these facilities. This prohibition is consistent with the NASCO Guidelines for Action on Transgenic Salmon as contained in Annex 5 of The Williamsburg Resolution. Also consistent with the Guidelines, the U.S. has continued to advise the NASCO Council of developments related to transgenics and has also notified the FDA of the potentially serious risks that could be posed to wild stocks from transgenics.

The U.S. approach to the management of aquaculture, introductions and transfers is consistent with the Resolution by the Parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean to Minimize Impacts from Aquaculture, Introductions and Transfers, and Transgenics on Wild Salmon Stocks (The Williamsburg Resolution). Through the requirement for containment management systems and an independent auditing system, the U.S. has taken steps to minimize escapes of farmed salmon to a level that is close as practicable to zero. The U.S. containment management system is consistent with the Guidelines on Containment of Farm Salmon as contained in Annex 3 to the Williamsburg Resolution. Also consistent with The Williamsburg Resolution, the risk of transmission to wild salmon stocks of diseases and parasites from all aquaculture activities is minimized through stringent disease screening required as a condition of the

permit required to stock smolts into marine cages. In recent years, the Maine aquaculture industry has moved to single year class stocking to allow for coordinated fallowing and disease management. Consistent with the guidance in the Williamsburg Resolution, due to the proximity of the Maine industry to wild salmon rivers, additional conditions have been placed on the permits including the requirement to mark all smolts prior to stocking. The permitting system and conditions for commercial aquaculture facilities are also in compliance with the North American Commission Protocols for the Introduction and Transfer of Salmonids as contained in Appendix 1 of the Williamsburg Resolution.

Specific Actions

4.3.1 Conduct annual audits of containment management systems (2007, 2008, 2009, 2010 and 2011).

4.3.2 Review results of genetic analysis to ensure compliance with the permit condition that all smolts must be of North American origin (2007, 2008, 2009, 2010 and 2011).

4.3.3 Review marking plans to ensure compliance with permit conditions (2007, 2008, 2009, 2010 and 2011).

4.3.4 Prepare and implement mitigation plan in response to large losses from Canadian marine cages in the summer and fall of 2005 (2007).

4.3.5 Install and operate weirs and traps on selected rivers to intercept aquaculture escapees and conduct genetic and fish health assessments of any captured escapees (2007, 2008, 2009, 2010 and 2011).

4.3.6 Establish communication procedure with Canada for rapid notification of any reported escapees (2007 and 2008).

4.3.7 Annually review audit results, loss reports, data on permit compliance, and data on escapees detected in rivers to determine if limits have been exceeded and if consultation needs to be reinitiated (2007, 2008, 2009, 2010 and 2011).

4.4 Re-stock rivers for restoration and recovery programs using a science-based hatchery program

Rivers such as the Connecticut, Pawcatuck, and Merrimack have lost their native runs and it has been necessary to reintroduce salmon into these watersheds to facilitate restoration. Annual stocking programs are needed to maintain these efforts until self-sustained populations are established. The Connecticut River program created a Genetics Workgroup that consulted with geneticists to develop protocols for breeding and protecting the genetic integrity of the developing restoration stock. The objectives include maximizing effective population size, maintaining rare alleles, minimizing artificial selection, and maximizing the opportunity for natural selection to create a more adapted stock. DNA fingerprinting is used to develop a deliberate mating scheme to help achieve

these objectives and to allow for genetic marking of fry for subsequent evaluation. In DPS rivers, naturally-occurring populations need to be augmented with hatchery products to maintain the viability of the populations. Both types of stocking efforts have technical challenges pertaining to the source of stocked fish, the number of fish to be stocked, the location of stockings, the life phase to be stocked, and the techniques for stocking. Stocking plans that comply with the NASCO guidelines direct these efforts, although the details vary from river to river. Particular attention is required to maintain genetic integrity of populations of fish to be stocked.

A Broodstock Management Plan has been developed for the conservation hatchery program intended to facilitate the recovery of the GOM DPS (Bartron et al. 2006). Increased attention is placed on developing more comprehensive annual stocking plans that include a justification for the life stage stocked, number stocked, location and also identification of the approach for monitoring the effectiveness of the stocking. Emphasis is placed on the development and implementation of broodstock management plans and stocking plans that seek to optimize positive contributions while minimizing the potential for adverse effects. There is a commitment to adaptively manage hatchery supplementation efforts.

Consistent with the Williamsburg Resolution, the potential adverse genetic and biological interactions from salmon enhancement activities have been minimized with the development and implementation of the Broodstock Management Plan described above. The risk of transmission to wild salmon stocks of disease and parasites from introductions and transfers is minimized through the requirement of screening and quarantine of fish taken from the wild into the hatchery and disease screening of hatchery products before being released into the wild. Stocking in the U.S. for restoration and recovery programs is conducted consistent with the Guidelines for Stocking Atlantic Salmon contained in Annex 4 of the Williamsburg Resolution. Stocking is carried out as part of comprehensive plans that include other actions to address limitations to success including minimizing barriers to migration and improving habitat quality.

The river-specific management plans that have been developed in the U.S. are consistent with the NASCO Guidelines on the Use of Stock Rebuilding Programs in the Context of the Precautionary Management of Salmon Stocks. These plans evaluate all of the causes of stock decline and threats to the sock and include actions to address these threats and to evaluate progress.

Specific Actions:

4.4.1 Review and update as necessary plans to manage broodstock to protect genetic integrity of restoration populations (2007, 2008, 2009, 2010 and 2011).

4.4.2 Review and update as necessary stocking plans for each restoration river system to ensure compliance with the NASCO guidelines contained in the Williamsburg Resolution (2007, 2008, 2009, 2010 and 2011).

4.4.3 Develop white paper proposing approaches for stocking in the DPS in order to optimize riverine production of hatchery fish and information gained on techniques and stock suitability (2007 and 2008).

4.4.4 Conduct independent peer review of conservation hatchery program as a recovery tool for the GOM DPS (2007 and 2008).

4.5 Actions to be Taken in Relation to Other Influences

A variety of anthropogenic perturbations have significantly altered the ecosystems upon which Atlantic salmon depend. In particular, the native diadromous suite of fish that historically flourished in each salmon river in the US has been significantly reduced. Several native diadromous fish likely conferred ecological benefits directly to Atlantic salmon through mechanisms such as serving as prey for salmon, and locally enhancing substrate permeability in spawning and rearing reaches. Other mechanisms are more indirect, such as serving as a prey buffer for salmon smolts and adults and depositing marine-derived nutrients in often nutrient-limited rearing reaches, yet potentially equally important from a demographic perspective.

In recent years, several new investigations have brought to light the linkages between Atlantic salmon and the native diadromous suite of fish. These investigations are beginning to show that the perceived elevated predation rates may in fact be attributable to the decrease in abundance in the native diadromous complex. Thus, enhancing populations of other diadromous fish, alewives and American shad in particular, may ameliorate the effects of predation at the smolt and returning adult stages. To this end and in conjunction with the Penobscot River Restoration Project, the US is beginning active restoration of shad and alewives in the Penobscot River, home to the largest salmon population in the US. In addition, the Connecticut River Atlantic Salmon Commission, the Merrimack River Policy Committee and the Pawcatuck River Technical Advisory Committee seek to restore all native diadromous fish species to respective rivers.

Because the relations between Atlantic salmon, its predators, and the native diadromous suite are not know with certainty, we must continue to refine both our understanding of the historical assemblage of species present in salmon rivers and estuaries and our understanding of the linkages between these species. Using this information, we will further prioritize and subsequently implement actions to recover the ecosystems.

In addition, the Services are currently considering additional regulatory protections of several populations of salmon. At the time the Services listed the GOM DPS in 2000, sufficient genetic and other information was not available to determine whether large river systems were part of the DPS or constituted a separate DPS. In 2003, the Services convened a Biological Review Team (BRT) composed of salmon biologists from the Services, the State of Maine, and the Penobscot Indian Nation. The Services submitted the Status Review completed by the BRT for peer review, made it available to the public, and will now make a determination as to whether any additional action under the ESA is warranted.

Specific Actions

4.5.1 Prepare literature review of species diversity and abundance in Atlantic salmon watersheds (2007).

4.5.2 Prepare review of linkages between Atlantic salmon and other species in order to better understand the relationships and prioritize actions for recovery (2007 and 2008).

4.5.3 Implement the Penobscot River Restoration Project (PRRP; 2007, 2008, 2009, 2010 and 2011).

4.5.4 Prepare and implement restoration plan for the Penobscot River's diadromous fish populations in conjunction with the PRRP (2008 and 2009).

4.5.5 Implement rigorous, pre-removal monitoring of the PRRP to evaluate the effects of dam removal and concomitant changes in ecological function (e.g., predator-prey dynamics) following implementation (2007, 2008, 2009, 2010 and 2011).

4.5.6 Submit Status Review for Peer Review and determine if additional action under the ESA is warranted (2007 and 2008).

4.5.7 In watersheds in which comprehensive diadromous fish restoration has already begun, continue to provide fish passage for American shad, alewife, blueback herring, sea lamprey, shortnose sturgeon, Atlantic sturgeon, American eel, and other diadromous species, as appropriate as well as other support activities such as habitat improvement and stock transplantation (2007, 2008, 2009, 2010 and 2011).

4.5.8 Complete analysis of experimental use of non-lethal harassment of cormorants to determine effectiveness in increasing smolt outmigration success on the Narraguagus River (2008)

4.5.9 Working with Canada and other partners develop plan for SALSEA Greenland and SALSEA North America (2008).

5 Evaluation

Efforts to restore and recover Atlantic salmon and their habitat in the U.S. have not yet achieved significant self-sustaining populations. Regardless, some success has been experienced. Since initiation of the program to restore Atlantic salmon on the Connecticut River over thirty years ago, an annual return of sea-run Atlantic salmon that numbers in the hundreds has been established; a reliable river-specific egg source has been developed; in-stream production of smolts is occurring; upstream passage is in place at the first five mainstem dams; interim and permanent downstream passage is in place at the lowermost eight mainstem dams and a number of tributaries; and fish culture, fish health management and stocking has been improved.

The demographic status of U.S. stocks of Atlantic salmon is evaluated on an annual basis by the U.S. Atlantic Salmon Assessment Committee (USASAC). In 1988 the

USASAC was formally created and charged with the following tasks: (1) to conduct annual U.S. Atlantic salmon stock assessments, (2) to evaluate ongoing U.S. Atlantic salmon research programs and develop proposals for new research, and (3) to serve as scientific advisors to the U.S. Section of NASCO. The USASAC meets annually and produces an Atlantic salmon program assessment that is used by US representatives to ICES to respond to the Terms of Reference from NASCO to the North Atlantic Salmon Working Group. Further, the USASAC responds to direct requests for information from the U.S. Commissioners to NASCO.

The Recovery Plan for the GOM DPS of Atlantic salmon includes recovery criteria. The Recovery Plan includes demographic and threat reduction recovery criteria. The most quantitative criteria require a replacement rate (5-year geometric mean) of adult salmon greater than 1.0 to demonstrate stabilization. This is calculated on an annual basis by the USASAC identified above. The efficacy of management measures is partially evaluated by the response of Atlantic salmon in terms of parr abundance, outmigrating smolts and ultimately adult returns.

In terms of threat reduction recovery criteria, the Recovery Team for the GOM DPS of Atlantic salmon conducts an annual inventory of actions being undertaken to facilitate recovery and the effectiveness of those efforts. Water quality and non-point source (NPS) pollution surveys occur in a variety of watersheds. A reduction in the number of sites negatively impacted by NPS pollution will be considered a success. The number of violations detected during annual audits of the containment management systems at marine aquaculture cages will be used to evaluate success. A reduction in the number of reported losses and detection of escapees in rivers will also be considered a success.

Finally, many management entities in the U.S. are moving toward an adaptive management approach to salmon recovery. Under this paradigm, each management measure is treated as a testable hypothesis. If the management measure has the desired result, then the management measure may be continued or expanded upon. However, if the management measure is unsuccessful at brining about the desired outcome, then alternative management measures (i.e., competing hypotheses) may be subsequently implemented and the ineffective management measure is ceased. Adherence to this model is a simple yet efficacious way to evaluate the success of management measures.

In terms of evaluating this Implementation Plan, the U.S. will examine the extent of implementation and efficacy of management measures outlined in the Plan. We will continue to monitor the status of stocks and habitat characteristics as measures of progress toward recovery and restoration goals. Care must be exercised in reaching conclusions, however, as the reasons for failure to meet management targets may be due to factors not included in the Plan. In this case, the corrective measure would be to add additional components to address these new threats and challenges. In reviewing the Plan, we will ask ourselves if we identified the correct threats and included the appropriate actions to remove or reduce those threats. Answers to these questions will provide valuable feedback to judge the appropriateness and effectiveness of NASCO's agreements, and to evaluate the degree to which the U.S. is successfully implementing these agreements.

6 References of Interest

Atlantic Salmon in Maine 2004 National Research Council of The National Academies The National Academy of Sciences created a multidisciplinary committee to review the available scientific information on the status of Atlantic salmon populations in Maine. The committee assessed causes of population declines and the current threats to their continued existence. The report can be found at: http://fermat.nap.edu/catalog/10892.html

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