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Fisheries Management Focus Area Report

USA

Fisheries Management Focus Area Report for the United States

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The U.S. Implementation Plan describes the status of stocks and management of Atlantic salmon in the United States (IP(07)16 FINAL). This Fisheries Management Focus Area Report is intended to provide a more in-depth assessment of: (1) the measures already in place that address NASCO agreements relating to fisheries management; (2) further actions proposed within the U.S. Implementation Plan to meet those agreements; and (3) progress with implementing these actions. This Focus Area Report is intended to provide the basis for review of our current management approach and proposed actions and to allow for an assessment of their efficacy in addressing the overall objectives of NASCO, particularly the objective to conserve and restore salmon stocks.

The goal of management efforts for Atlantic salmon in the U.S. is to promote the diversity and abundance of salmon stocks and to restore all stocks to levels above their conservation limits.

1. Description of the Fisheries

Introduction: There have been no commercial fisheries for Atlantic salmon in the U.S. for over 50 years. A recreational fishery has been conducted annually on reconditioned surplus hatchery broodstock released in the Merrimack and Connecticut Rivers. We have included brief information on each of these fisheries in our report, although they are not on sea run Atlantic salmon. The last recreational fishery for sea-run salmon in the U.S. was closed in 2000, but in 2006 and 2007 the State of Maine authorized and conducted a 30 day experimental fall catch and release fishery in the Penobscot River. In addition, the State of Maine voted to open a 30 day spring recreational catch and release fishery in 2008. 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.

a) Recreational Fisheries

I. Merrimack River: A recreational fishery was initiated in 1993 on the Merrimack River. This fishery is on broodstock from the hatchery that supports restoration efforts on this river. The New Hampshire Fish and Game Department manages the Atlantic salmon broodstock fishery in the mainstem Merrimack River and a lower portion of the Pemigewasset River. In 2006, a total of 1,232 fish were released to support the fishery in the mainstem of the Merrimack River and the lower portion of the Pemigewasset River and 1,447 licenses were sold. In 2007, a total of 1,560 fish were released to support the fishery in the main stem of the Merrimack River and the lower portion of the Pemigewasset River and a total of 1,395 licenses were sold.

II. Connecticut River: Similar to the Merrimack River, domestic broodstock surplus to the needs of the Connecticut restoration program are made available to states to create sport fishing opportunities. The Connecticut River Restoration Program uses fry stocking as its primary re-stocking tool. To generate sufficient numbers of fry, it raises captive broodstock that never go to sea but are F1 generation of the sea-returns. After they are spawned in their fourth year, they are no longer needed for the restoration program and they are stocked into public waters to support recreational fisheries. All four states involved in the Program have regulations

prohibiting angling for wild sea-run Atlantic salmon, so to avoid confusion none of these released broodstock are placed into the Connecticut River or its tributaries. In Connecticut, all fish are released in either the Naugatuck or Shetucket rivers, which historically supported salmon runs but where there are currently no plans to attempt to restore populations. These rivers flow into Long Island Sound considerable distances from the mouth of the Connecticut River. There has never been any evidence that fish that elude the fisheries have emigrated to sea. In Massachusetts, all fish are released in lakes. In the past, Vermont also stocked broodstock in large lakes. Neither Vermont nor New Hampshire currently stock released broodstock. The broodstock fisheries are not believed to have any negative impact (either ecological of sociological) to the Connecticut River program, but have demonstrated benefits in the form of public education and goodwill.

III. Penobscot River: In 2005, the Maine Department of Marine Resources (MDMR) (then called the Maine Atlantic Salmon Commission (MASC)) began considering reopening a limited catch and release fishery for Atlantic salmon in the Penobscot River. The main purpose for considering such a fishery was to reengage local anglers and citizens in Atlantic salmon recovery. The MDMR led an ad hoc work group that produced a probabilistic estimate of the number of salmon killed as a result of hook and release fishing on the Penobscot River from 1996 to 1999 and produced simulations used to consider options for a limited catch and release fishery. The risk assessment was subsequently reviewed by the Maine Technical Advisory Committee and found to be technically sound. Options considered by the ad hoc work group included a fall fishery in the lower Penobscot, a spring fishery in the lower Penobscot, and a fishery based on excess broodstock stocked in another river. The ad hoc work group reviewed a number of simulations and concluded that a spring and/or summer recreational fishery would result in catch and release mortality risks that had the potential to reduce the spawning population in the Penobscot. Therefore, the group made the following recommendations:

1) Spring or summer catch and release fisheries on returning sea run fish in the Penobscot River below Veazie (and other historic locations on the river) poses an unacceptable biological risk to the spawning population; and
2) A fall fishery in the Penobscot River below Veazie is a reasonable alternative, posing a low risk to the population and a lower risk to naturally reared females.

The risk assessment conducted on the 1-month fall catch and release fishery predicted that mortality would be approximately two to four fish. It was determined that this level of predicted mortality would not negatively impact the restoration effort on the Penobscot River. Furthermore, the timing of the fall fishery was such that it was conducted after broodstock collection was complete.

In 2006, the MDMR authorized a 1-month fishery on the Penobscot River from September 15th to October 15th. During that time period, the fishery was closed for 1 day when river temperatures exceeded 68^{o} F. The fishery was fly fishing only, and barbless hooks were required. A total of 241 licenses were sold, and 147 anglers complied with the reporting requirements. A total of 247 angler trips were reported (average of 3.4 hours/trip with 2.8 hours spent fishing). Based on the catch of salmon at the Veazie trap (150 feet above the area of the fishery), 29 Atlantic salmon were in

the area where the fishery occurred. One Atlantic salmon was captured and released, and 14 more Atlantic salmon were raised or observed.

In 2007, the MDMR again authorized this 1-month fishery on the Penobscot River. There was significantly less interest in this fall fishery in 2007, with a total of 90 licenses sold and about one third of the anglers complying with reporting requirements. A total of 83 angler trips were reported. Anglers had the opportunity to fish over at least 31 Atlantic salmon based on the catch of salmon at the Veazie trap. Three Atlantic salmon were captured and released.

The Atlantic Salmon Commission (ASC) Board, which is composed of the Commissioner of Inland Fisheries and Wildlife, the Commissioner of the MDMR, and a public member, voted in October 2007 to begin a public hearing process on the potential for a spring fishery in 2008. The public process started in December 2007 and after a public meeting, the ASC Board voted to allow a spring fishery in 2008.

The spring recreational catch and release fishery approved by the ASC Board is planned to occur during the 4 weeks of May in 2008 and would be closed if 50 fish were caught and released. The risk assessment prepared by the MDMR and reviewed by the Maine Technical Advisory Committee indicates that, if 50 fish were caught during a spring recreational catch and release fishery conducted during the month of May, as many as 4 of those fish could die. The presence of biologists and wardens on the river will be required to determine when 50 fish have been caught.

b) Commercial Fisheries

I. West Greenland: The stock complex off West Greenland is composed of non-maturing salmon from North America and MSW salmon from Europe. The specific regions harvested are as follows: Newfoundland, Labrador, Quebec, Gulf of St. Lawrence, Scotia-Fundy, United States, and Southern Europe. 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 populations currently listed as endangered in the U.S. 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 listed rivers during those years.

II. St. Pierre et Miquelon: Sampling of the fishery off 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 conducted 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, with a total catch of roughly 3 metric tons. ICES (2006) estimated that 23 Atlantic salmon of US origin were harvested in this fishery in 2004 (90% confidence interval ranging from 0 to 77 individuals).

c) Bycatch or Poaching

State and federal agencies in the U.S. seek and obtain reports on incidental catch from a variety of sources including state and federal law enforcement or agency biologist, concerned citizens, anglers, or groups (salmon clubs, watershed councils and coalitions). More recently, monitoring of angling and conservation web-site chat rooms have proven useful in documenting illegal adult salmon capture and identifying areas where salmon seem to be more susceptible to incidental catch.

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.

2. Exploited Stocks and Reference Points

The main metric used in the U.S. as a reference point is conservation spawning escapement. In the 2005 Recovery Plan for the Gulf of Maine Distinct Population Segment of Atlantic salmon, replacement rates were identified as an interim criteria to be used to indicate stabilization of the population as a first step toward recovery. Recently, quantitative recovery criteria were developed for the expanded Gulf of Maine Distinct Population Segment of Atlantic salmon.

a) Conservation Spawning Escapement Goals

Consistent with the NASCO Agreement on the Adoption of the Precautionary Approach, conservation limits have been set for each river in the U.S. (CNL(98)46). The conservation spawning escapement method assumes a target egg deposition of 2.4 eggs/m^2 as needed to fully seed a river. An average female fecundity of 7,200 eggs per female and a 1:1 sex ratio was used to determine optimal escapement. Total conservation limits for 2SW salmon for the U.S. total 29,199.

b) Replacement Rate for the GOM DPS

Replacement rate has been selected as an interim 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.

c) Recovery Criteria for Expanded GOM DPS

When the interim recovery criteria identified above were included in the 2005 Recovery Plan, a commitment was made to further develop quantitative criteria to establish a clear target for recovery and measures to track progress toward this goal. Draft criteria have now been developed. The range of the Gulf of Maine DPS has been divided into three units

– called Salmon Recovery Habitat Units (SHRUs). The three SHRU's are 1) the Merrymeeting Bay SHRU which incorporates two large basins: the Androscoggin and Kennebec, and extends east as far as, and including the St. George watershed; 2) the Penobscot Bay SHRU which includes the entire Penobscot basin and extends west as far as, and including the Ducktrap watershed, and east as far as, and including the Bagaduce watershed; and 3) the Downeast Coastal SHRU which includes all the small to medium size coastal watersheds extending east of the Penobscot SHRU as far as, and including the Dennys River watershed.

We are proposing that recovery of each of the three SHRUs is necessary for recovery of the overall species to be considered recovered. A census population of 500 was selected to represent the upper threshold at which a SHRU is considered threatened. Franklin (1980) described an effective population size of 500 as necessary to retain sufficient genetic variation for long-term population persistence. Soulé (1980) identified an N_e of 50 or greater as necessary to assure that a population over the short term would have an inbreeding rate of less than one percent. Higher rates of inbreeding that can occur in populations less than 50 can fix deleterious genes too rapidly for selection to eliminate them.

Having established a census population size of 500 as the upper bound for a determination that the GOM DPS was threatened, we determined that a recovered population would be one that was not likely to become a threatened species. Therefore, for the GOM DPS to be considered recovered, each SHRU must have a less than 50% probability of becoming a threatened species over the next 15 years. Additionally, the population must be at or have trended towards recovery for a period of 10 years (or two generations) to assure that a recovered population is not happenstance, but more likely a reflection of sustainable positive population growth.

Using demographic data for the period between 1991 – 2006, a period considered to have had exceptionally low survival, we applied the criteria described above in conjunction with a Population Viability Analysis (PVA) to determine how many adults would be required in each SHRU to weather a similar downturn in survival while having a greater than 50% probability of remaining above 500 adults. This analysis projected that a census population of 2,000 spawners (0.5 ratio male to female) would be needed in each of the three SHRUs for the GOM DPS to weather a downturn in survival such has been experienced over the period of 1991 – 2006.

3. Status of Stocks Relative to Abundance Criteria

Data is collected annually to evaluate returns relative to conservation limits and to determine the replacement rate for the populations currently listed under the Endangered Species Act. If the recovery criteria identified above are adopted, data will also be collected and analyzed to track progress toward achieving this goal.

a) Conservation Spawning Escapement

In 2006, a total of 1,480 salmon returned to U.S. Rivers. The average documented returns to the U.S. from 2002 – 2006 was 1,365 salmon. As reported by ICES, salmon stocks in the

U.S. are suffering reduced reproductive capacity and were at 6% of the 2SW conservation limit in 2006.

b) Replacement Rate
The replacement rate for 12 generations of Atlantic salmon starting with returns in 1996 from the 1991 spawning cohort averaged 0.7 and the mean replacement rate has not exceeded 1 until this year. The replacement rate for 2007 was 1.47 (0.95 - 2.16) and was the fourth highest in the time series. In addition, in 6 of the past 12 years, the upper bound of the 90% confidence limits exceeded 1.

c) Recovery Criteria
As stated above, quantitative recovery criteria are in the process of being developed. Once they are finalized, they will be used in the future to track progress towards recovery.

4. Extent to which Stock is Meeting other Diversity Criteria

Smolt age, sea age, run timing and genetic structure were evaluated to determine the health of U.S. salmon stocks relative to these criteria. As is illustrated below, the decreased abundance and distribution of salmon in the U.S. has resulted in reductions in these other diversity criteria and the current emphasis of salmon management is on preventing the loss of any additional diversity and increasing overall abundance and distribution.

a) 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. The goal for recovery is to increase the number of naturally reproduced fish in the river and to establish a self-sustaining run. The desired characteristics of this recovered run would be those of the wild population and therefore we would strive to achieve 88-100% two year old smolts with the balance being three year old smolts.

b) 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. Deciphering changes in sea age in returning adults is complicated by a variety of factors including changing marine survival regimes and hatchery practices, turbine entrainment of kelts, and interception of 2SW fish. In the 1970s, there was an apparent increase in grilse rate for the Penobscot River in particular. Fay et al. (2006) noted the importance of considering the fishery off West Greenland that intercepted fish that would have returned as 2SW adults and left US-origin grilse essentially unaffected. Fay et al. (2006) concluded that this mechanism lead to the perceived increase in grilse rates during this time period. In addition, summaries of return rates and age distributions of adult salmon that were stocked as fry are not reported for rivers in the State of Maine because adult salmon return rates and age distribution data for Maine rivers can not be accurately reported until returns from natural reproduction and fry stocking can be distinguished (USASAC 2006).

c) 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. The relatively warm temperature regimes in Long Island Sound are likely too warm to support summer and fall runs and result in this constriction in run timing. Runs in the Gulf of Maine, however, typically begin in May and continue to October. Historically, a considerable amount of diversity in run timing was observed across stocks in the Gulf of Maine. These differences in run timing were likely the result of differences in the distances required to migrate to inland spawning areas, availability in refugia in natal rivers, and flow patterns in natal rivers that may have made migration difficult or impossible at low flows. While contemporary information on run timing is somewhat lacking on some rivers due to low abundance and lack of collection facilities on all rivers, it is clear that there have been substantial declines in life history variation concurrent with declines in abundance. Concurrent with this apparent decline in diversity in run timing, Juanes et al. (2004) noted a 0.4 to 0.9 day per year shift to an earlier date of peak migration on the Penobscot and Connecticut Rivers from 1978 to 2001.

d) 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). Craig Brook and Green Lake National Fish Hatcheries are essential for recovery of the GOM DPS because the hatchery populations contain a high proportion of the genetic diversity remaining in the GOM DPS. The conservation hatchery program is designed to facilitate recovery of the endangered populations and is currently being managed on a river-specific basis (Bartron et al. 2006). Estimates of genetic diversity within captive populations, such as average heterozygosity, relatedness coefficients, and allelic diversity and frequency are monitored within the hatchery broodstocks according to the Craig Brook National Fish Hatchery Broodstock Management Plan (Bartron et al., 2006). Although broodstock management is evaluated annually and revised as needed to minimize the potential for inbreeding and other risks (Bartron et al., 2006), many risks cannot be fully removed from the captive propagation program, including potential risks that are currently unknown or cannot be managed against. The removal of natural selective forces, as well as the addition of artificial selective forces for the hatchery environment, are both considered a threat to long-term survival (Hey et al., 2005). At this time, domestication and inbreeding depression do not appear to be negatively impacting the hatchery dependent populations of the GOM DPS since the establishment of the current captive broodstock program; however, the historical loss of diversity cannot be dismissed (Lage and Kornfield, 2006).

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 these rivers have been re-established, or are in the process of being 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).

5. Mixed Stock Fisheries

There are no mixed stock fisheries operating within the jurisdiction of the U.S., but as noted above, U.S. stocks are part of a mixed stock subjected to distant water fisheries prosecuted off Greenland and St. Pierre et Miquelon.

a) West Greenland

For management of the West Greenland fishery, NASCO has adopted a precautionary management plan requiring at least a 75% probability of achieving three management objectives:

(1) Meeting the conservation limits simultaneously in the four northern regions of North America (Labrador, Newfoundland, Quebec, and Gulf);

(2) Achieving increases in returns to the Scotia-Fundy and USA regions relative to the base years 1992-1996. Improvements of greater than 25% and 10% relative to base year returns are presented although, to achieve a 25% increase, by definition the 10% increase is also achieved; and

(3) Meeting the conservation limits for the Southern NEAC MSW complex.

Although not a formal management objective, ICES also has provided the probability of returns to North America being less than the previous five-year average. Management targets have been set for U.S. stocks and this data is used by ICES in their stock assessment. Establishing pre-agreed management objectives and setting a 75% probability of meeting those objectives, as has been done within the WGC, is consistent with the precautionary approach. Of particular relevance to the U.S. is the inclusion of a management objective of an increase in returns to the U.S. Establishing specific objectives for the southern stocks, as the weakest contributing stock to the mixed stock, is also consistent with the precautionary approach.

b) St. Pierre et Miquelon

U.S. origin Atlantic salmon are susceptible to harvest in the mixed stock fishery off St. Pierre et Miquelon. 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 under the ESA.

6. Management Actions Employed to Control Harvest

The U.S. seeks to apply the NASCO agreements on fisheries to its direct management of Atlantic salmon recreational fisheries, bycatch in recreational and commercial fisheries, and in working cooperatively to establish regulatory measures for distant water fisheries in West Greenland and St. Pierre et Miquelon that intercept U.S. stocks.

a) Recreational Fishery

The Decision Structure for Management of North Atlantic Salmon Fisheries, as developed and adopted by NASCO, states that management decisions should be taken such that there is a low risk to abundance and diversity of stocks and that the probability of achieving the management goals should be high. The Decision Structure requires the identification of reference points (Conservation Limits and/or Management Targets) used to define adequate abundance of the stock. The second step is to identify the status of the stock relative to the abundance criteria, and the third step is to determine if the stock is meeting other diversity criteria. Finally, any other factors threatening the stock, beyond fisheries, and appropriate management measures are identified.

In the case of the Penobscot River, the minimum spawner requirement is 6,838, and returns in recent years have been approximately 1,000, less than 15 percent of the requirement. In general, the approach advocated by NASCO would be to not allow a fishery until the minimum spawner requirement has been met. In some cases, Parties have reported to NASCO that they have chosen to allow catch and release fisheries when returns have been at or above 50 percent of targets. Allowing a fishery, even a very limited catch and release fishery, on a stock at less than 15 percent of its minimum spawner requirement would appear to be inconsistent with the Decision Structure, the Precautionary Approach, and the general practice of the other NASCO Parties. An additional concern for the spring fishery proposed in 2008 is the amount of time and effort required to adequately monitor the fishery to determine when the 50 fish maximum limit has been reached. The biologists and wardens required to monitor this fishery would be diverted from other critical Atlantic salmon activities.

The Decision Structure for Management of North Atlantic Salmon Fisheries (CNL 31.332), states that management decisions should be taken in accordance with an assessment of risk such that there is a low risk to abundance and diversity of stocks. As was explained previously, a risk assessment was conducted as part of the decision as to whether to authorize a recreational fishery. While low numbers of salmon are likely to be killed as a result of the catch and release fishery, the federal agencies have determined that such risk is too high, given the status of the stock. In its initial risk assessment, the State of Maine determined that the risk of a spring fishery was too high but later reached a different outcome in its specific consideration of a May (30 day) spring fishery limited to 50 fish. In applying the NASCO Decision Structure to the Penobscot fishery, we conclude that the stock is not meeting conservation limits (reference points), is not meeting other diversity criteria including age structure, and is threatened by a number of other factors most notably hydroelectric facilities. Given these facts, we conclude that a fishery should not be prosecuted.

The recreational fishery conducted in 2006 and 2007 targeted Atlantic salmon in the mainstem of the Penobscot River. This segment of the Penobscot River Atlantic salmon population was not included in the 2000 listing of Atlantic salmon as there was a lack of information on its genetic composition. Consequently, the fishery in 2006, 2007 and 2008, was not targeting listed Atlantic salmon. The decision regarding this fishery was, therefore, a decision made by the State of Maine. In response to the proposal to initiate a spring fishery, the federal agencies have advised the State that such a fishery would be not

supported biologically and would be inconsistent with the NASCO Agreements. It should be noted that the federal agencies are currently considering proposing an expanded listing for Atlantic salmon that would include all of the Penobscot River. If this becomes final, then the decision regarding this fishery would rest with the federal agencies and not the State of Maine. Authorizing a directed fishery, even a catch and release fishery, under the ESA would only be appropriate if one could demonstrate that it was for the conservation of the listed species (i.e., the species would be better off with the fishery than without the fishery). There are no direct biological benefits to the individual Atlantic salmon that are caught and released or to the overall population from those that are caught and released. The socio-economic aspects of this fishery will be discussed in section 9 below.

It should be noted that the fall catch and release fishery was designed to minimize the potential negative impact on the Penobscot River population. A spring fishery was found to have higher biological impacts. In either case, it is important to note the following: (1) The Atlantic salmon population in the Penobscot River is highly dependent on hatchery stocking; (2) broodstock goals have not been met in most recent years; and (3) the population is less than 15 percent of its spawning escapement target. Given these low numbers, it would seem that the biologically sound approach would be to do everything possible to meet broodstock goals and also to allow some returning adults to spawn naturally in the river. Decreasing the chances of reaching both of these goals by allowing targeted fishing on returning adults would not further the conservation of the species. The Precautionary Approach, as adopted by NASCO, requires that undesirable outcomes (not meeting broodstock goals and not achieving spawning escapement targets) be avoided, and that priority be given to conserving the productive capacity of the resource.

b) Distant Water Fisheries in Greenland and St. Pierre et Miquelon

The U.S. participates in NASCO, and specifically within the WGC, to seek to ensure that regulatory measures are discussed and established using the best available scientific data. Specific initiatives to improve management include working with ICES to establish clear management objectives of having a 75% chance of meeting targets which include achieving conservation spawning escapement levels in the northern contributing stocks and a goal of achieving increases in the southern contributing stocks. Sufficient data on stock abundance and pre-established management targets has proven very helpful in ensuring informed decisions are made regarding this fishery. The approach used within the WGC for the management of this fishery is consistent with the NASCO Agreement on the application of the Precautionary Approach to salmon fishery management in its use of specific limits and objectives.

It is also very significant to mention that the Parties to the WGC cooperate annually to implement a monitoring program to collect data on the fish subjected to the internal use fishery off West Greenland. This is a very important management measure as it provides critical inputs to the stock assessment completed by the ICES North Atlantic Salmon Working Group annually.

Management of the fishery at St. Pierre et Miquelon is significantly behind that of the mixed stock fishery off Greenland. There is very limited information exchange and a short time series of data on the biological characteristics of the fish caught in this fishery. The U.S. is very interested in increased opportunities to learn more about this fishery and to engage in

cooperative discussions regarding its management and operation. At the current time, it does not appear that the management of the fishery at St. Pierre et Miquelon is consistent with the relevant NASCO Agreements and the Precautionary Approach. Increased dialogue is needed to agree upon targets and a method for making decisions on this fishery and also to improve data collection.

c) Bycatch, Poaching and Unreported Catch

The U.S. does not have a directed salmon commercial fishery upon which to obtain and report catch statistics. However, we make efforts to collect information and data on bycatch in commercial and recreational fisheries using a variety of means described below. These efforts are consistent with the NASCO Agreement on the Minimum Standard for Catch Statistics (CNL(93)51)).

As a condition of having a federal commercial fishing permit, reporting bycatch is mandatory. In 2007, there were no reports of Atlantic salmon in the mandatory logbooks completed and returned by commercial fisherman. In addition, observers are placed on some commercial fishing vessels to provide a third party estimate of bycatch. No observers documented the bycatch of Atlantic salmon in any fishery in 2007. Fisheries observers are trained in species identification, which should reduce the potential for misidentification.

Reports of incidental catch usually come from State and Federal agency law enforcement or field biologists, concerned citizens, anglers, or groups (salmon clubs, watershed councils, and coalitions). More recently, monitoring of angling and conservation web-site chat rooms have proven to be a useful means of documenting illegal adult salmon capture and identify areas where salmon seem to be more susceptible to incidental catch.

In an attempt to address bycatch issues in recreational fisheries in Maine, federal and state salmon management agencies meet with inland fishery biologists to review any changes in inland fishery regulations and stocking plans within the GOM DPS. In the past, the MASC (now MDMR) has been able to work with Inland Fisheries and Wildlife to promulgate regulations to provide protection for salmon from recreational fisheries in targeted locations where captures have been reported. For example, recently in response to a Maine District Game Warden concern of incidental capture of adult sea-run Atlantic salmon in the Penobscot River in the towns of Medway and Mattawamkeag, new regulations will be implemented in 2008. The new regulations for this area include a 25" length maximum on landlocked salmon, which should provide protection to multi-sea winter salmon, as well as a closure of all fishing 150' below the Medway Dam on the West Branch Penobscot River. Adult salmon (new sea run and kelts) tend to hold in the tailrace below the Medway Dam during spring and summer.

In Connecticut, internet sites are monitored where anglers have documented catch, law enforcement staff patrol recreational fisheries and American shad commercial gillnet fishery sites for incidental salmon catch, biologists monitor recreational shad, striped bass, and trout fisheries and learn of salmon catches, and in some cases, they may intercept angler catches at river-side and take possession of fish. While most reported catches of salmon are released by the angler, biologists often are able to obtain helpful data (sometimes scales) from the released fish. In New Hampshire, consulting company documents record when anglers return radio-tags for a reward, and New Hampshire Fish and Game Law

Enforcement monitors anglers periodically for license and salmon permits to regulate the broodstock fishery in the Merrimack River. Massachusetts uses radio tags to track the location of fish and in some cases this has led them to an angler's freezer or to snowbanks alongside the road. Follow-up on reports from anglers are also taken, and in a few cases catch and kill activities have been observed in the Merrimack River estuary leading to law enforcement repercussions.

In addition to bycatch issues, US federal and state agencies implement enforcement measures to prevent poaching. There is no evidence that Atlantic salmon are being illegally targeted and sold for local consumption. There have been reports of potential poaching in the rivers in Maine, however, it is infrequent and in some cases it could not be confirmed by law enforcement and therefore never prosecuted. When such reports are made, law enforcement personnel increase their presence on the river.

d) Measures to Address any Failure or Trend in Abundance or Diversity

There have been a number of comprehensive reviews on the status of Atlantic salmon in the U.S. These have included Status Reviews conducted in 1995, 1999, and 2006 and a review by the National Academy of Sciences. These reviews have identified a number of threats to U.S. populations including marine survival, passage at hydroelectric facilities, changes in native fish communities, water quality, urbanization, habitat degradation, predation and competition, aquaculture, disease and water withdrawals. Three of these factors are discussed briefly below. These and others mentioned above are addressed in the overall U.S. Implementation Plan and will be the subject of future focus area reports under the categories of habitat and aquaculture, introductions and transfers and transgenics. Consistent with NASCO's Action Plan for the Application of the Precautionary Approach, stock rebuilding programs have been developed for all stocks within the U.S. since they are all below their conservation limits. These rebuilding programs include habitat protection and improvements, stock rebuilding, and ecosystem conservation and recovery.

I. Stock Enhancement Programs: Atlantic salmon populations in the U.S. are the focus of intensive stock enhancement programs designed to assist in rebuilding depleted wild populations and restoring lost populations. Programs are implemented by federal and state agencies as well as private organizations. In 2006 and 2007, over 12 million juvenile salmon were released into 15 rivers systems. Life stages stocked include fry, parr, smolts and adult salmon.

II. Fish Passage Projects: Significant effort has been expended to develop and implement comprehensive fish passage agreements at a watershed level to ensure the safe and timely upstream and downstream passage of diadromous species. Fish passage agreements have been reached on many rivers including the Kennebec, Saco, and Penobscot Rivers.

III. Changes in Native Fish Communities: The construction of dams as well as the stocking of non-native fish has lead to substantial changes in fish community structure (Fay et al. 2006). Within the range of the GOM DPS, the resident fish community was historically quite simple with relatively few predators and competitors in freshwater. Today, however, salmon compete with and are preyed upon by a diverse array of non-native fish such as smallmouth bass, largemouth bass, chain pickerel, and northern pike. In addition, the native diadromous fish community has changed rather dramatically as well. Before European colonization, abundant runs of alewives, blueback herring, American shad, rainbow smelt, and sea lampreys shared the rivers

with Atlantic salmon. Fay et al. (2006) and Saunders et al. (2006) hypothesize that several of these species (at historic abundance levels) provided substantial benefits to Atlantic salmon at key life history events such as alewives serving as prey buffers for smolts, American shad serving as prey buffers for adults, and rainbow smelt serving as food for kelts re-conditioning in lower river and estuarine areas. The contemporary abundance of the native suite is drastically lower compared to historical conditions and any benefits that these species confer to Atlantic salmon must be concomitantly reduced. Recent restoration projects such as the Penobscot River Restoration Project offer hope to begin to restore these connections between salmon and the co-evolved suite of fish.

7. Consideration of Issues

Fisheries focus area reports are to identify how the following issues are considered: (1) uncertainty in the assessments; (2) abundance of the stock/diversity of the stock; (3) selectivity of the fisheries; (4) any non-fishery factors affecting the stock; and (5) other fisheries exploiting the stock. The most relevant of these issues for the U.S. is the abundance and diversity of the stock and any non-fishery factors affecting the stock. ICES has advised that remnant populations of salmon in an extensive portion of North America require alternative conservation actions to fisheries regulation to maintain their genetic integrity and persistence. That is certainly the case for U.S. populations where the extreme measure of listing under the ESA has been taken to ensure that the species and its habitat are offered the highest level of protection. Comprehensive protection and recovery programs have been implemented to halt the decline and reverse the trend for this critical species.

8. Expected Extent and Timescale of Efforts

Action related to the recreational catch and release fishery currently occurring in the Penobscot River is expected to take place when and if the fish in that river become listed under the ESA. Annual monitoring of bycatch in recreational and commercial fisheries will continue and any problems identified will be addressed. The U.S. will continue to work cooperatively within the WGC to set regulatory measures with full consideration of the scientific advice from ICES and work collaboratively with the Parties to the WGC to conduct a sampling program on the internal use fishery. The U.S. will also work cooperatively with Canada and within NASCO to attempt to engage France, on behalf of St. Pierre et Miquelon, on cooperative discussions on understanding and managing the salmon fishery off those islands.

9. Application of Socio-Economic Factors

NASCO's Action Plan for the Application of the Precautionary Approach states that socio-economic factors could be taken into account in applying the Precautionary Approach to fisheries management issues. The Guidelines for incorporating social and economic factors in decisions under the Precautionary Approach state that priority should be given to conserving the productive capacity of the resource (CNL(04)57).

The recreational fisheries in the Merrimack and Connecticut Rivers were initiated largely for social and economic benefits. The fish subjected to these fisheries are surplus broodstock and are no longer useful for contributing to the restoration hatchery program and must be eliminated from the hatchery due to the high cost of maintaining adult fish. Given these facts, their biological value is very limited. There was a desire, therefore, to seek other social and economic benefits that could be accrued from using these fish. The limited recreational

fisheries on these spent broodstock provided such an opportunity. These recreational fisheries provide 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 reopening of a recreational fishery by the State of Maine was precipitated by their desire 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. The justification the State has provided for the fishery is that it engages members of the public and makes them more interested in and supportive of salmon recovery. While maintaining a connection between the citizens of Maine and Atlantic salmon is a critical element to recovering the species, we believe that fishing is not the only way to maintain such a connection. There are no data to demonstrate that increased support for salmon recovery has or would occur as a result of reopening the recreational fishery; therefore, it is not possible to compare the benefit of the support against the biological cost of allowing a fishery. Other benefits that may accrue from a recreational fishery would be economic benefits to the local community from the purchase of licenses, fishing tackle, overnight accommodations, meals, and so forth. From an ESA context, however, these economic benefits would only be relevant if they translated directly into biological benefits for the species that offset the biological impacts from the fishery itself.

The NASCO Guidelines for Incorporating Social and Economic Factors into Management Decisions emphasize the application of the Precautionary Approach when considering social and economic factors. These Guidelines state that impacts to Atlantic salmon and their environment must be weighed against the impacts of social and economic factors. When conducting this type of cost benefit analysis, the Guidelines state that priority should be given to conserving the productive capacity of the resource. In the case of the Penobscot River fishery, we conclude that the risk posed to broodstock collection and percent achievement of conservation spawning escapement are not offset by unquantified social and economic benefits of the fishery.

Socio-economic factors are a significant consideration in the establishment of regulatory measures for the West Greenland fishery. In recent years, the scientific advice from ICES has been that there should be no harvest of the mixed stock off Greenland due to the status of the stocks that contribute to that fishery. This advice has been the basis for the regulatory measures adopted within the WGC to have no commercial fishery. The Parties to the WGC, however, have acknowledged the importance of considering the interests of communities which are particularly dependent on salmon fisheries. In recognition of this important connection between the people of Greenland and marine resources, the regulatory measures agreed have allowed for continuation of the internal use fishery.

10. Monitoring the Effect of Management Measures

The main measure used to track the status of Atlantic salmon in the U.S. is estimated adult returns relative to conservation spawning escapement goal. An additional measure of

replacement rate is used to specifically track the status of those fish currently listed under the ESA. If adopted, a future measure that will be used is the recovery criteria as explained in this report. These measures allow for tracking of the status of salmon in the U.S. and provide an indication as the effectiveness of current management strategies. Lack of improvement in stock status may be due to a variety of factors including the failure of management measures to have the desired/anticipated effect, failed implementation of management measures, absence of measures to address key threats, or lack of knowledge about factors affecting the species and its habitat. We have adopted an adaptive management approach to ensure that actions implemented are carefully selected and, when implemented, are actively monitored to track their effect. Specific to the fisheries management actions included in the U.S. Implementation Plan and discussed in this Focus Area Report, we will closely monitor the implementation of the recreational catch and release fishery on the Penobscot River and reexamine this issue when and if an expanded entity is considered for listing under the ESA. We will continue our participation in the annual sampling of the fishery off West Greenland and seek opportunities to work cooperatively to gather information on the fishery off St. Pierre et Miquelon. We will continue to use the means identified in our report to track bycatch and poaching. Our ultimate measure of success of our overall management plan will be an increase in adult returns, but we will continue to monitor the implementation and effect of individual actions and continue our efforts to partition survival in time and space in order to better understand, and ultimately affect, factors affecting salmon survival.

Relevant Actions from US Implementation Plan with Cross Reference to Focus Area Report

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). (see sections 6(b) and 8)

4.1.1.2 Reach a multi-annual regulatory measure for the West Greenland fishery (2007 and 2009). (see sections 6(b) and 8)

4.1.1.3 Participate in annual sampling of the fishery off West Greenland (2007, 2008, 2009, 2010 and 2011). (see sections 1(b)I, 6b and 8)

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). (see sections 1(b)I and 8)

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). (see sections 1(b)II and 8)

4.1.1.6 Request a report on the Trust Fund established under the Conservation Agreement in Greenland (2007). (The Trust Fund established under the Conservation Agreement is not part of the fisheries management framework of the US. Therefore, we do not consider that to be a management objective to report under. The US did request and receive a copy of the report on the status and progress of the Conservation Agreement.)

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). (see sections 1(a)I-III, 6(a) and 9)

4.1.3.1 Review commercial fisheries log books and observer database for any records of Atlantic salmon (2007, 2008, 2009, 2010 and 2011). (see sections 1(c) and 6(c))

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). (see sections 1(c) and 6(c))

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). (see sections 1(c) and 6(c))

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). (see section 6(c))

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