

North American Commission

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***Report on US Atlantic Salmon Management and
Research Activities in 2008***

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Adult Returns

Total return to USA rivers in 2008 was 2,613 (Table 1), a 108% increase from 2007 returns (Table 2). Changes from 2007 by river were: Connecticut (0%), Merrimack (+59%), Penobscot (+129%), Saco (+158%), and Narraguagus (+109%). In addition to catches at traps and weirs (2,506), returns were estimated for the eight core populations that comprise the federally endangered Gulf of Maine Distinct Population Segment (GOM DPS). Data on adult returns and redd counts collected from the Narraguagus, Pleasant, and Dennys rivers have been used to estimate returns to core populations within the GOM DPS using a linear regression [$\ln(\text{returns}) = 0.5699 \ln(\text{redd count}) + 1.3945$]. One hundred and thirty eight (90% CI = 106 - 178) fish were estimated to return to the rivers with Endangered populations. The ratio of sea ages from trap and weir catches within the GOM DPS was used to estimate the number of 2SW spawners for the estimated returns.

Most returns occurred in Maine, with the Penobscot River accounting for 81% of the total return. Overall, 31% of the adult returns to the USA were 1SW salmon and 69% were MSW salmon. Most (84%) returns were of hatchery smolt origin and the balance (16%) originated from either natural reproduction or hatchery fry. The adult return rate (1SW plus 2SW) of hatchery smolts released in the Penobscot River in 2006 was 0.28%, with the 2SW fish return rate 0.24%. Smolt survival on the Penobscot River correlates well with other large restoration programs in the Connecticut and Merrimack rivers. The estimated return rate for 2SW adults from the 2006 cohort of wild smolts on the Narraguagus was 0.71%, mirroring trends on the Penobscot.

As reported by the ICES Working Group on North Atlantic salmon, pre - spawning adults were stocked into USA rivers, however, even with these, all age classes of spawners (1SW, 2SW, 3SW, and repeat) in 2008 (3045 salmon) represented only 10% of the 2SW spawner requirements for all USA rivers combined (Figure1).

Figure 1: US 2SW returns, 2SW spawners, and 2SW conservation requirements



Stock Enhancement Programs

During 2008 about 12,534,000 juvenile salmon (92% fry) were released into 15 River systems. The number of juveniles released was more than that in 2007 (12,372,000). Fry were stocked in the Connecticut, Merrimack, Saco, Penobscot, and six rivers within the geographic range of the GOM DPS in Maine. The 275,000 parr released in 2008 were primarily the by-products of smolt production programs and included ages 0 and 1 fish. Smolts were stocked in the Penobscot (513,000), Merrimack (89,000), Connecticut (50,000), Narraguagus (54,000), and Pawcatuck (6,000) rivers. In addition to juveniles, 5,848 adult salmon were released into USA rivers. Most were spent broodstock or broodstock excess to hatchery capacity. However, mature pre-spawn salmon released in the Sheepscot, East Machias, and Machias rivers and Hobart Stream produced redds. In the Merrimack River excess broodstock were released to support a recreational fishery and to enhance spawning in the watershed.

Mature adults stocked into Sheepscot, East Machias, and Machias rivers and Hobart Stream in the fall were added to USA 2SW returns to calculate spawners. Thus, spawners exceeded returns in 2008 with USA spawners totaling 3,045. Escapement to natural spawning areas was 1,252 (returns released to rivers + stocked pre-spawn adults).

Tagging and Marking Programs

Tagging and marking programs facilitated research and assessment programs including: identifying the life stage and location of stocking, evaluating juvenile growth and survival, instream adult and juvenile movement, and estuarine smolt movement. A total of 468,246 salmon released into USA waters in 2008 was marked or tagged. Tags and marks for parr, smolts and adults included: Floy, Carlin, PIT, radio, acoustical, fin clips,

and visual implant elastomer. About 11% of the marked fish were released into the Connecticut River watershed and 60% into the Penobscot River.

Description of Fisheries

Commercial fisheries for sea-run Atlantic salmon are closed in US waters, including freshwater systems, coastal/ estuarine systems, and marine waters within the US Exclusive Economic Zone (EEZ). Except for a one-month spring recreational fishery on the Penobscot River, Maine commercial and recreational fisheries for sea-run Atlantic salmon are closed in USA waters (including coastal waters). Estimated catch and unreported catch are zero (metric tonne). A total of 177 licenses were sold, with about one third of the anglers complying with reporting requirements. The fishery had an estimated 790 angler trips of effort. The 61 Atlantic salmon captured and released exceeded the quota of 50 salmon set for the fishery. Anglers had the opportunity to fish over at least 600 Atlantic salmon based on the catch of salmon at the Veazie trap. A fishery in the main stem of the Merrimack River and small reach of the Pemigewasset River was supported by the release of 2,372 broodstock in 2008.

Commercial Aquaculture Production

During 2006, several US aquaculture companies merged into one large producer of salmon for Maine, Cooke Aquaculture. In 2006, 3 million smolts were stocked in order to increase harvest totals for 2007/2008. Production of farmed salmon in Maine was reported to be 9,014 metric tonnes in 2008, about three times the 2,715 metric tonnes produced in 2007. Production in three of the last five years has been less than half of the 13,202 t produced in 2001.

Management Status of the Endangered Gulf of Maine (GOM) Distinct Population Segment (DPS)

The federally endangered GOM DPS of Atlantic salmon, as listed in 2000, includes Cove Brook (a tributary to the lower Penobscot River) the Dennys, Machias, East Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot Rivers. One hundred and thirty eight (90% CI = 106 - 178) fish were estimated to return to the GOM DPS. Data on adult returns and redd counts collected from the Narraguagus, Pleasant, and Dennys rivers have been used to estimate returns to core populations within the GOM DPS using a linear regression.

The U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) collectively referred to as the Services, have joint responsibility for recovery of the endangered GOM DPS of Atlantic salmon. The Services work closely with the Maine Department of Marine Resources Bureau of Sea Run Fish and Habitat (MDMR BSRFH) on salmon management and conservation.

ESA Listing Status

In 2003 the Services assembled an Atlantic Salmon Biological Review Team (BRT) to review and evaluate all relevant scientific information necessary to evaluate whether the population in the Penobscot River and other rivers should be included in the GOM DPS. The populations in the Penobscot and a few other rivers were not included in the GOM DPS at the time it was listed under the ESA in November of 2000 because there was not enough scientific information at that time to demonstrate that those populations were part of the same DPS or constituted a different DPS. Since the listing in 2000, new information has come to light which indicates that the GOM DPS should be re-evaluated to determine if any other populations should be included because they are closely related. The Draft Status Review was completed in January 2006 and underwent peer review. The Center for Independent Experts (CIE) completed the review and the BRT made revisions to the document based upon this critique. The Status Review was made available to the public during the fall of 2006.

On September 3, 2008, the Services jointly proposed that the GOM DPS of Atlantic salmon be listed as an endangered species under the ESA. This proposal essentially adds the 3 largest river systems in Maine to the GOM DPS as it was previously defined and listed in 2000. The Penobscot River is perhaps the most notable of the large rivers proposed for listing given that it has had higher returns in recent years than all of the other rivers in the DPS combined. Public comments were solicited on this proposal and the proposal was peer reviewed. The Services are in the process of making any necessary changes to the listing rule in preparation for finalization. A final rule is expected to publish sometime in June of 2009.

The ESA also requires that the Services designate Critical Habitat for all species listed as endangered or threatened. NMFS proposed to designate critical habitat which includes describing the habitat features essential to the conservation of the species, identifying those activities that likely affect the identified habitat features, and conducting an economic analysis. Finalization of the critical habitat designation for the expanded GOM DPS is expected sometime in June 2009.

Recovery

In 2006 the MDMR, USFWS, and NMFS contracted Sustainable Ecosystems Institute (SEI) (<http://www.sei.org/>) to conduct an independent program review to determine if current hatchery operations, protocols, and practices are scientifically sound, have potential to further recovery, and are integrated with population assessment and evaluation programs. One of the main questions posed during this review was: Is there integrated adaptive management of Atlantic salmon in Maine? A team of six scientists was convened to review the Maine program. The visit included a tour of Craigbrook National Fish Hatchery (CBNFH) and two days of presentations by and discussions with agency staff and interested scientists (i.e. researchers, managers from other programs, and retirees). The report was provided to the Services and the MDMR BSRFH in May 2007. In response to this review, the three agencies are developing a new governance structure for the Maine Atlantic salmon program. The new governance structure addresses needs highlighted by SEI such as (1) the hatchery program should be more fully integrated with the recovery program; (2) the agencies should develop a conceptual framework for

recovery; and (3) this framework should guide all recovery efforts. The new governance structure is replacing the Maine Atlantic Salmon Technical Advisory Committee and the Recovery Team. It is based on an agreed recovery framework with the intent that: 1) recovery and restoration are done in accordance with the framework; 2) the framework and the program are based on best available science; 3) resources are made available to implement those actions or measures agreed to in any given cycle; 4) there is dispute resolution and continuity throughout the year; and 5) horizontal and vertical communication among and within agencies will improve. Action Teams related to estuarine, marine, and freshwater survival and production, conservation hatcheries, managing genetic diversity, population assessment, and outreach are the key component of the new Atlantic salmon program. Action Teams are identifying the highest priority research and management actions to recover the GOM DPS of Atlantic salmon. The finalization and implementation of a new Atlantic salmon recovery framework is not yet complete.

U.S. Conservation and Research Activities

Habitat Conservation, Enhancement, and Restoration

- Project SHARE (Salmon Habitat and River Enhancement) is a non-governmental organization that was established in 1994. Their mission is to conserve and enhance Atlantic salmon habitat and populations in the Downeast (primarily Washington County) region of Maine. In 2008, Project SHARE focused on-the ground restoration efforts primarily within tributary systems draining the Machias River, an important and well-protected salmon migration corridor. Projects completed included: installing 7 open-bottom arched culverts, assisting the Cove Brook Watershed Council with installation of 1 open-bottom arched culvert in Winterport, decommissioning 9 road/stream crossings, native vegetation plantings at over a dozen restoration sites, and partial removal of six remnant log drive dams
- Maine streams have large wood loads far below predicted levels, and notably low compared to other parts of the United States. Although extensive research has been done on the relationship between Pacific salmonids and wood, relatively little is known about the role wood plays in influencing juvenile Atlantic salmon populations. Two hypotheses were tested in Old Stream, Maine, via snorkel survey in sites with naturally occurring high and low wood densities: 1) the density of juvenile Atlantic salmon was higher in sites that contained high as opposed to low loading of wood, and 2) where wood was available, juvenile salmon tended to be associated with it within a site. In 2006 LWD was added to Creamer Brook and East Machias Drainage each with a paired control site. Findings from these additions suggest that wood is an important habitat feature for juvenile Atlantic salmon, but cannot be viewed in isolation of other habitat factors. In 2008 the Maine Department of Marine Resources Bureau of Sea-run Fisheries and Habitat (MDMR BSRFH) continued LWD work through the treatment of two paired control/treatment sites on Baker Brook, a tributary of the Narraguagus River. Both wood addition sites were treated similar to previous work by felling streamside trees at a rate of approximately one tree every 12 meters of

stream length. One paired control/treatment site on Holmes Brook, Machias drainage was treated in November, 2008. Pre-treatment assessment of each site included fish surveys and geomorphologic surveys in cooperation with a geology research team from Boston College.

Fish Passage

- The Services are involved in hydroelectric project relicensing and other fish passage issues. Fisheries agencies in Maine continue to work to establish and improve upstream and downstream fish passage, and to remove dams and other blockages to habitat connectivity. The majority of fish passage work in the range of the GOM DPS focuses on FERC licensed dams on the Penobscot, Kennebec, and Androscoggin watersheds and on opportunities to enhance passage throughout historical Atlantic salmon habitat. This includes participating in the Penobscot River Restoration Project, negotiating improved passage on a number of dams on the Kennebec River pursuant in part to the 1998 Lower Kennebec River Comprehensive Hydropower Settlement Accord, replacing culverts on highways and logging roads, and removing dams. The Services, in coordination with other state and Federal agencies, are also making efforts to improve fish passage on the Sheepscot Rivers. Information regarding some of the most notable efforts made to improve passage for Atlantic salmon in the GOM DPS is summarized below.
 - Penobscot River Restoration Project (PRRP) is perhaps the most significant of the agreements. The PRRP is the result of many years of negotiations between multiple parties. If implemented, the PRRP would lead to the removal of the two lowermost mainstem dams on the Penobscot River (Veazie and Great Works) and would decommission the Howland Dam and construct a nature-like fishway around it. This initiative would improve habitat accessibility for all diadromous species. In June 2004, the Parties to the negotiations signed the Penobscot Multiparty Settlement Agreement (MPA). The MPA includes a 5-year option period during which time the “Penobscot River Restoration Trust” (the Trust) raised the necessary funds to purchase the dams. In June of 2008, the Trust notified PPL Corporation of its intent to purchase the Veazie, Great Works, and Howland dams for \$25 million. This was an important milestone on the road to restoring the largest river within Maine, the Penobscot. In early November 2008 the Penobscot River Restoration Trust and PPL Maine filed permit applications with FERC, Maine Department of Environmental Protection, and Army Corps of Engineers to transfer the operating licenses of the Veazie, Great Works, and Howland Dams from PPL to the Trust, and to surrender those licenses and decommission the dams. FERC is currently reviewing of these permits.
 - Lower Kennebec River Comprehensive Hydropower Settlement Accord (KHDG Accord, May 26, 1998): The KHDG Accord addresses fish passage issues at eight hydroelectric projects on the Kennebec River and Sebasticook River. The 1998 Accord was signed by various state and Federal fishery agencies and approved by the FERC. In addition, the

Anson and Abenaki Offer of Settlement (January 30, 2002), also signed by various state and Federal fishery agencies and approved by FERC, addresses fish passage provisions on two hydroelectric projects within the middle reaches of the Kennebec River (Anson and Abenaki Projects). On the Kennebec River, fish passage agreements were reached at the lower four hydroelectric projects including the Lockwood, Hydro-Kennebec, Shawmut, and Weston as part of the KHDG Accord. The lowermost hydroelectric project, Edwards Dam, was removed as part of the KHDG Accord. On the Sebasticook River, fish passage agreements were reached on the Benton and Burnham Projects, and in 2008, the Fort Halifax dam was breached pursuant to the passage agreement.

- In March of 2008, the Maine Legislature's Marine Resources Committee heard testimony on LD 1957, an act to overturn the 1995 state law closing fishways at the Woodland and Grand Falls Dam to anadromous alewives. While the original bill would have provided access to 52% of the spawning habitat available in the 1980s, an amended bill was passed, opening fish passage at the Woodland Dam only and restoring alewives to just over 2% of that habitat. The MDMR, the Maine Department of Inland Fisheries and Wildlife (MIFW), and the Passamaquoddy Tribal Government will be working collaboratively over the next year to resolve the issues that resulted in the changed legislation.
- In 2008, the multi-agency New Hampshire River Restoration Task Force continued to work on identifying dams and fish passage impediments for removal in state waters, as well as pursuing strategic alterations and/or modifications of dams. Merrimack Village Dam, Souhegan River, Merrimack, NH was successfully removed. Work has begun on the Black Brook Dam, Black Brook, and Manchester, NH.

Diadromous Fish Restoration

- In anticipation of the restoration potential of the Penobscot River Restoration Project, the State of Maine has completed a draft strategic management plan for diadromous fish in the Penobscot River. This plan includes four strategic goals: (1) coordinating management activities, (2) providing safe and effective upstream and downstream passage for diadromous fishes, (3) maintaining or improving abiotic (physical) and biotic habitat for diadromous fishes using ecosystem-based management, and (4) rebuilding diadromous fish populations.

Telemetry

- NOAA's National Marine Fisheries Service Northeast Fishery Science Center (NEFSC) has used ultrasonic telemetry to assess Atlantic salmon smolt migration since 1997. In 2008, NEFSC tagged and released 156 emigrating smolts of 3 rearing histories, naturally reared (n = 46), fall parr (n=31) and hatchery smolts (n = 80), into the lower Penobscot River. Fish movement was passively monitored via the NEC Pen Bay Array a network of ultrasonic receivers deployed throughout the estuarine and near-shore marine environment to observe migration dynamics of the emigrating smolts. The NEFSC Penobscot Bay Array is connected to 11 buoys in the Gulf of Maine Ocean Observing System (GoMOOS)

- www.gomoos.org) through cooperative efforts of NEFSC and University of Maine. One of the GoMOOS buoys was located in Penobscot Bay and the remaining 10 were located throughout the Gulf of Maine. These sites are monitored continuously, throughout the year. Further offshore, NEFSC collaborates with the Ocean Tracking Network (OTN – www.oceantrackingnetwork.org)) headquartered out of Dalhousie University (Halifax, NS) to gain a comprehensive understanding of Marine life and conditions with hopes that the worldwide network of telemetry receivers and research equipment will assist in better managing the oceans.

Outreach and Education

- The use of salmon egg incubators in school as a tool to teach about salmon, watersheds and conservation continued to expand throughout the basin. The Connecticut River Salmon Association (CRSA), in cooperation with CT Department of Environmental Protection conducted their **Fish Friends program** at schools in Connecticut. Trout Unlimited in cooperation with MADFW carried a similar message to schools in Massachusetts. Several cooperators including CRSA, New Hampshire Fish and Game (NHFG), US Forest Service, USFWS, Vermont Fish and Wildlife and the Southern Vermont Natural History Museum cooperatively conducted the program in Vermont and New Hampshire. For the 2008-2009 school years 165 schools participated in this type of salmon education in the four states.
- The 2008 school year marked the sixteenth year in which the **Adopt-A-Salmon Family Program** has been providing outreach and education to school groups in ME, NH, and MA in support of Atlantic salmon recovery and restoration efforts. The program is administered by the Central New England Fisheries Regional Office with support from the Nashua National Fish Hatchery (NNFH), the Amoskeag Fishways, and a corps of very dedicated volunteers and Student Conservation Association interns. Most participating schools implement the program throughout the school year with highlights including a visit to NNFH for a ninety minute educational program in November, and incubating salmon eggs in the classroom beginning in January/February for release as fry into the watershed in the late spring. In February 2008, 36 schools received 13,470 eggs to be reared in classroom incubators. Throughout the winter and spring, eggs were monitored by students until they hatched. In late spring, fry were released into the Merrimack River watershed. In November 2008, 1,007 students and 67 teachers and parents from 13 schools throughout central New England participated in the educational program at NNFH. During the visit, participants learned about the effects of human impacts on migratory fish and other aquatic species and observed Atlantic salmon spawning demonstrations.
- The Merrimack River Anadromous Fish Restoration Program continued to be represented in **The Amoskeag Fishways Partnership** [Partnership (www.amoskeagfishways.org)]. Partners that include PSNH, Audubon Society of New Hampshire, NHFG, and the USFWS continue to create and implement award winning environmental education programs based at the Amoskeag Fishways Learning and Visitors Center (Fishways) in Manchester, NH. With the

Merrimack River watershed as a general focus, the partnership is offering educational outreach programming to school groups, teachers, the general public, and other targeted audiences. Fishways visitation in 2008 was 23,326, including 13,573 students and 9,753 adults. Since its inception Fishways has documented greater than one half-million visitors, and about 7,000 school programs have been delivered to date. School programs taught in 2008 totaled 224 with 99 programs taught offsite.