

**North American Commission**

**NAC(07)3**

***Report on US Atlantic Salmon Management and  
Research Activities in 2006***

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#### **Adult Returns**

In 2006, the total return to USA rivers was 1,480, a 13% increase from 2005 returns. Changes from 2005 by river were: Connecticut (+15%), Merrimack (165%), Penobscot (+6%), Saco (+20%), and Narraguagus (+15%). In addition to catches at traps and weirs (1,422), 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 [ $\ln(\text{returns}) = 0.5699 \ln(\text{redd count}) + 1.3945$ ]. The relationship between these estimates and the returns to the Narraguagus River were used to estimate GOM DPS returns in 2006 because high flows precluded complete redd counts. Seventy-nine adult (90% CI = 49 - 122) fish were estimated to return to the rivers within the GOM DPS.

#### **Stock Enhancement Programs**

During 2006 about 12 million juvenile salmon (91% fry) were released into 15 river systems. The number of juveniles released was less than that in 2005 (nearly 14 million). Fry were stocked in the Connecticut, Merrimack, Saco, Penobscot, and six rivers within the geographic range of the GOM DPS in Maine. The 363,379 parr released in 2006 were primarily the by-products of smolt production programs and included ages 0 and 1 fish. 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, 3,755 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 2006 with USA spawners totaling 1,876. Escapement to natural spawning areas was 1,048 (returns – broodstock + 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 473,850 salmon released into USA waters in 2006 was marked or tagged. Tags used on parr, smolts and adults included: Floy, Carlin, HI-Z Turb'N, PIT, radio and acoustical, fin clips, and visual implant elastomer. About 14% of the marked fish were released into the Connecticut River watershed, 18% into the Dennys River watershed, and 57% 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). A limited recreational fishery was conducted on reconditioned surplus broodstock released in the Merrimack River. In spring 2006, 592 (age 2 and 3) domestic broodstock were released for the fishery. In the fall of 2006, an additional 640 (age 2) broodstock were released for a combined total release of 1,232 fish to support the fishery in the main stem of the Merrimack River and the lower portion of the Pemigewasset River. The fishery caught an estimated 434 fish, released 424, and kept 10 salmon. In addition, the State of Maine Atlantic Salmon Commission (MASC) authorized a one-month experimental recreational fishery on the Penobscot River, Maine, from 15 September to 15 October 2006. The MASC had the authority to close the fishery during the open season, as necessary, to protect the resource. The primary criterion for temporary closures was river temperature and the fishery was closed for one day, early in the season, when river temperatures exceeded 68°F (20°C). A total of 241 licenses were sold, with 147 anglers complying with reporting requirements. Non-reporting anglers will not be permitted to fish if there is a 2007 season. A total of 247 angler trips were reported (3.4 hours/trip with 2.8 hours spent fishing). Based on trap records, at least 29 adults were present in the area at the time of the fishery. One Atlantic salmon was captured and released just after 7 a.m. on September 27<sup>th</sup> and an additional 14 Atlantic salmon raised/observed. Despite strict control over authorized recreational fisheries and associated regulations, there is the potential for illegal harvest. Suspected poaching in specific areas has, in the past (2003), resulted in the closure of those sections of the river and increased enforcement presence on other rivers. No illegal harvest of Atlantic salmon was documented in 2006.

## **Commercial Aquaculture Production**

Over the last year, several US aquaculture companies have merged into one large producer of salmon for Maine: Cooke Aquaculture. Production of farmed salmon in Maine was estimated at 3,580 metric tonnes in 2006, a decrease from 5,263 t in 2005 and 8,515 t in 2004. Production in three of the last five years has been less than half of the 13,202 t produced in 2001. Stocking of over 3 million smolts in 2006 should result in an increase in harvest totals in 2007/2008.

## **Habitat Conservation, Enhancement, and Restoration**

- In 2006, 18 stream habitat connectivity projects were completed in three of the Downeast Rivers. The principle funding sources were USDA-WHIP, USFWS, MASC-SCEP, Project SHARE, Washington County Soil and Water Conservation District, and private landowner contributions. Four stream-road crossings (culverts) were completely removed in the Machias River watershed. The remaining 14 projects replaced undersized culverts with open-bottom arches that spanned 1.2 times bankfull stream width in the Machias, Narraguagus and East Machias watersheds.
- The Sandy River Dam, located between the towns of Norridgewock and Starks, was decommissioned and the dam/spillway completely breached in 2006. Total cost of the project was \$500,000. Removal of this dam will allow for 52 miles of unimpeded passage for Atlantic salmon and other migratory fish on the Sandy River to Smalls Falls. The MASC has estimated that the Sandy River can provide up to 80 percent of the salmon spawning habitat on the Kennebec River Basin. Removal of the Madison Electric Works dam also offers significant benefits to American eels, which now have

almost full access to the Sandy River due to recent improvements on downstream hydro-electric stations.

- Maine's rivers have experienced dramatic changes over the last 300 years. One of the most sweeping is the removal, lack of recruitment, and subsequent attrition of large woody debris (LWD). The result is that the rivers likely have very low loading of LWD, and thus have less complex fish habitat compared to the past. LWD creates pools, retains gravel, retains nutrients, supports benthic macroinvertebrates, influences current velocities and water depth, provides cover for fishes, and refugia during high water. The value of LWD in Atlantic salmon habitat is undocumented. A project has been implemented to enhance habitat at a scale that will have population-level benefits, with a design that allows powerful evaluation of the effects of LWD additions on stream geomorphology. LWD was added to two sites, each with a paired control site, in Creamer Brook, East Machias Drainage in October, 2006. Streams in the Narraguagus, Machias and East Machias drainages were also evaluated for potential LWD additions in 2007 or 2008. The Creamer Brook sites were scouted and surveyed for similarity and all four sites were surveyed for fish populations immediately prior to the habitat work. Each site was electrofished using multiple pass depletion and fish were weighed, measured and released into their site. LWD was added at a rate of approximately 12 pieces per 100m by cutting trees in the riparian zone and adjusting their placement to achieve either stability or geomorphologic effect. In addition, all LWD (existing and added) in the treatment sites was tagged with metal numeric tags and marked with spray paint. The site was surveyed with a total station before and after LWD placements. Trees were also felled in the riparian zone to increase roughness to minimize channel migration as a result to the LWD additions.
- In 2006, the multi-agency New Hampshire River Restoration Task Force continued to work on identifying dams for removal in the State and pursuing strategic alterations and/or modifications of dams.
- The New England Atlantic Salmon Committee (NEASC) requested that the US Atlantic Salmon Assessment Committee provide a list of the top priority of fish passage projects for New England. NEASC hopes to use this information to leverage funding from a variety of sources to implement these projects. The prioritized list was developed by soliciting information from representatives from each of the New England States responsible for managing Atlantic salmon. NEASC hopes that this initiative will result in a large-scale effort to improve passage and remove obstructions for salmon and other diadromous fish species throughout New England.

### **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. The total estimated adult returns for the DPS was 79 fish (90% CI= 49-122). Scientists estimated the total number of returning salmon to the GOM DPS using capture data on all DPS rivers with trapping facilities (Dennys, Pleasant, and Narraguagus Rivers) combined with redd count data from the other five rivers of this group. Estimated returns are then extrapolated from redd count data using a return redd-regression established from the 1991-2000 Narraguagus River and 2000 Pleasant River assessments by the Maine Atlantic Salmon Commission.

The US 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 (*Salmo salar*). In December 2005, the Services finalized the Recovery Plan for the Gulf of Maine DPS of Atlantic Salmon (National Marine Fisheries Service and U.S. Fish and Wildlife Service, 2005). A copy of the Final Recovery Plan is available at the following link: <http://www.nmfs.noaa.gov/pr/recovery/>. In September 2005, the Northeast Regional Director for the USFWS and the Assistant Administrator for Fisheries for NMFS appointed a Recovery Team to identify priority recovery actions and provide input and recommendations on specific recovery issues. The Services convened a Recovery Team representing a diversity of expertise in order to facilitate implementation of the Recovery Plan. The Recovery Team was asked to develop recommendations to the Services as to what actions identified in the Plan are the most critical to carry out over the next several years. From a list of over 120 actions in the Final Recovery Plan, the Recovery Team developed a list of 30 priority actions for recovery that they recommended to the Services for implementation.

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. NMFS is currently considering the information presented in the 2006 Status Review, the comments from the peer reviewers, and the response of the BRT to the peer reviewers to determine if action under the ESA is warranted. NMFS could determine that a change to the boundaries or conservation status of the existing GOM DPS is warranted, that a separate listing action is warranted, or that no action is warranted. If NMFS determined that a modification to the existing listing or a new listing was warranted, then a proposed rule will be published along with the rationale for that proposal.

### **Additional Items of Interest**

- The MASC, USFWS, and NMFS contracted the Sustainable Ecosystems Institute (<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. The focus question 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 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 MASC in May 2007.
- NMFS has used ultrasonic telemetry to assess Atlantic salmon smolt migration since 1997. In 2006, naturally-reared (n = 25) and hatchery-reared (n = 25) smolts were tagged and released into the Penobscot River estuary. Fish migration dynamics were passively monitored with ultrasonic receivers moored throughout the estuarine and near-shore marine environment. Survivorship to the furthestmost quantitative marine array was 32.0% for hatchery and 56.0% for naturally-reared smolts. Smolts

sometimes reverse direction during emigration; initially moving downstream, reversing direction upstream, then continuing emigration downstream. Reversals were observed for 44% of naturally-reared smolts and 73% of hatchery-reared smolts. The average distance for reversals was 3.18 km for naturally-reared and 4.64 km for hatchery-reared smolts. Total migration time for successful emigrants was shorter for naturally-reared smolts (3.54 days) than for hatchery-reared smolts (4.39 days). In addition to differing in total migration duration, wild and hatchery smolts travel at different times of day. Naturally-reared smolts utilized non-daytime hours for travel more often while hatchery smolts preferred daylight hours through the estuary portion of the migration. Upon entering the open bay, daytime travel made up the largest portion of arrival times for both groups.

- One of the most significant ongoing restoration projects is the Penobscot River Restoration Project. In June 2004, Pennsylvania Power and Light Corporation filed a multi-party settlement agreement with the Federal Energy Regulatory Commission (FERC) that effectively resolved all fish passage issues for diadromous fish species at their hydroelectric projects on the lower Penobscot River in Maine. The Agreement, which was signed by the US Department of Interior's Bureaus of Fish and Wildlife and Indian Affairs, the National Park Service, the State of Maine, the Penobscot Indian Nation and several Non-Governmental Organizations, details conditions for dam removal, fish passage, and operational changes at eight hydroelectric projects on the lower Penobscot. The partners in the Penobscot Agreement must raise 25 million dollars to purchase the dams within the next 5 years and then another 25 million dollars will need to be raised to support restoration. NMFS has supported fundraising efforts for the Agreement by participating in meetings with the Penobscot Partners concerning fund-raising efforts and we have also worked with various researchers in developing grant proposals for river restoration projects. In addition, the President's budget also currently contains 10 million dollars towards the purchase price and the assessment. Unfortunately, the President's budget could change at any time and therefore those funds are not guaranteed.
- The National Cold Water Marine Aquaculture Center continued USDA efforts to develop a biological and economically suitable North American Atlantic salmon strain for US aquaculture production. The primary research objective is to genetically improve the existing North American stocks through a family-based selective breeding program. This program has received sea-run Penobscot eyed eggs annually since 2004 for this effort.
- The Adopt a Salmon Family Program has been operating for the past 14 years. This is an education outreach program that operates in the three States where there are active Atlantic salmon restoration and recovery programs (Maine, New Hampshire, and Massachusetts). The Program gives students opportunities to be involved with Atlantic salmon restoration, understanding of watershed health in general, and the importance of river health to all species of fish and aquatic life.