

North American Commission

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***Report on US Atlantic Salmon Management and
Research Activities in 2004***

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Adult Returns

Based upon the sum of documented trap returns and redd count estimates, the total number of returns of Atlantic salmon to US rivers for 2004 was 1,635. Of the 1,635 Atlantic salmon that returned to US rivers in 2004, 1,566 were adults. This is a 14% increase from the number of adult returns estimated in 2003. Most documented returns (1,323) occurred in the Penobscot River (Maine), which accounted for 81% of the total US returns. Returns to other New England rivers were as follows: Merrimack (128), Connecticut (69), Saco (19), Narraguagus (11), Androscoggin (11), Union (2), Pleasant (1), Pawcatuck (1), and Dennys (1). The estimated combined returns to the eight Maine rivers that comprise the endangered distinct population segment (DPS) are 82 fish (90% CI= 60-113). The estimate for returns to DPS rivers was obtained through a return-redd regression model developed specifically for these rivers. The majority of US returns (89%) were of hatchery-smolt origin and the remaining 11% as the products of natural spawning or hatchery-fry stocking.

Stock Enhancement Programs

During 2004 about 15,173,300 juvenile salmon (91.9% fry) were released into 16 river systems. The number of releases exceeds the number of juvenile salmon released in 2003. Fry were released into the following rivers: Connecticut, Merrimack, Saco, Penobscot, and six of the rivers that contain endangered populations within the Gulf of Maine DPS. Smolts were also stocked into US rivers: Penobscot (566,000), Merrimack (50,000), Connecticut (96,400), Saco (5,400), Dennys (56,300), Pleasant (8,800), and Pawcatuck (6,100) rivers. In addition to juveniles, 4,311 (spent/excess broodstock) adult salmon were released into US rivers to enhance spawning and in some cases support a recreational fishery.

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 572,000 salmon released in US waters in 2004 was marked or tagged using the following types of tags/ marks: floy, carlin, PIT, radio and acoustic, fin clips, and visual implant elastomer. Approximately 17% of the marked fish were released into the Connecticut watershed, 1% into the Merrimack River watershed, 62% into the Penobscot River, and 20% into other Maine Rivers.

Description of Fisheries

Commercial and recreational 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). Any incidental catch must be released immediately, alive and uninjured, without being removed from the water. Despite this policy 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. A controlled recreational fishery is also permitted for stocked spent/excess broodstock on the Merrimack River. Bycatch of Atlantic salmon also has the potential to occur. During 2004, a dealer in the State of Connecticut reported 24 pounds of Atlantic salmon bycatch to NOAA Fisheries. No additional information is available on the target fishery that the bycatch resulted from or the vessel of origin at this time; however, NOAA Fisheries continues to pursue additional information.

Commercial Aquaculture Production

Production of farmed salmon in Maine was 9,121 metric tonnes (t) in 2004, an increase from the 6,435 t produced in 2003. Production in each of the last three years has been less than the 13,154 t produced in 2001. Production has declined due to ISAv outbreaks and changes in the industry.

Habitat Conservation, Enhancement, and Restoration

- 2004 is the second and final year for the Atlantic Salmon Commission's pH study. The objective of the study was to create a seasonal snapshot of pH-related water chemistry in Maine salmon rivers. The data collected from this study will be used to compare both within and among Maine rivers with varying flow and precipitation conditions.
- The Maine Atlantic Salmon Commission has been working with Kleinschmidt Energy and Water Resource Engineering of Pittsfield Maine, and Sevee and Mahar Engineers, Inc. of Cumberland Center Maine to develop a better understanding of stream basin hydrology and potential effects of hydrology on salmon habitat. This project was conducted on the Pleasant, Narraguagus, and Machias Rivers in Maine and included cataloguing and assessing existing ground and surface water, geologic, habitat, and climatic data within these watersheds. The data collected as part of this study is now being used to develop linked surface-water and ground-water watershed models as tools to assess the effects of surface and ground water withdrawals, land use/land cover changes on river flows, groundwater, and Atlantic salmon habitat.
- In 2004 the multi-agency New Hampshire River Restoration Task Force continued to work on identifying dams for removal in the Merrimack River watershed. On the Contoocook River (Henniker, NH) the West Henniker Dam was breached in August of 2004. Breaching this dam dewatered a small impoundment and exposed run and pool habitat for a distance of approximately 1.5 km upriver.
- In 2004 the USFWS, in cooperation with the Penobscot Indian Nation, continued work initiated in 2003 to examine fish passage, habitat connectivity, and non-point sources pollution in Maine's rivers.
- Project SHARE, watershed stakeholders, and Watershed Councils, with funding from a variety of sources including National Fish and Wildlife Foundation and Atlantic Salmon Commission, were involved in restoration projects that include revegetating NPS sites and reforesting riparian buffers in 2004.
- In 2004 the US Atlantic Salmon Assessment Committee undertook a review of existing studies that have been completed over the past 30 years on downstream passage. These studies included migration on undammed streams and around dams,

both with and without special downstream passage facilities. A compilation of studies at 36 different hydroelectric dams on 13 rivers in four New England states produced information from 72 studies. However, there were some areas that were not fully represented in the compilation (e.g., salmon migration down free-flowing streams) and all of the studies with the exception of one focused on Atlantic salmon smolts. Given that each hydroelectric plant is configured uniquely (i.e., location of turbines, turbine types, flow characteristics, etc.), the effectiveness of downstream passage is very site-specific. Passage effectiveness has been defined as the percentage of fish approaching the dam that use the downstream passage device and avoid the turbines. Effectiveness estimates ranged for each dam and each study contained high and low estimates. Reviewing the effectiveness of downstream passage is very important as the juvenile rearing habitat is in the headwaters of the large rivers that support some of the larger salmon populations.

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 82 fish (90% CI= 60-113). Data on adult returns and redd counts collected from 1991-2004 on the Narraguagus, Dennys, and Pleasant rivers from 2000-2004 were used to develop a return-redd model using a linear regression of the natural log of both values. This model and its associated error were used to simulate the most probable adult returns on a river-by-river basis. NOAA Fisheries and USFWS plan to release the final version of the Recovery Plan for the Gulf of Maine DPS of Atlantic Salmon by mid-summer of 2005. Presently, a status review is also underway to determine the relationship of large river systems (e.g., Penobscot, Kennebec) to the GOM DPS as it is currently delineated. This review will also determine the status of current salmon populations within these large river systems, as well as any other additional salmon populations present within the geographic range of the DPS. The outcome of this review may have implications for the recovery strategy of Atlantic salmon in Maine.

Additional Items of Interest

- In 2004 a report showed that many farmed salmon had elevated concentrations of PCBs, dioxins, and/or heavy metals, which was likely to have come from the fish oil in the commercial feed. Therefore, the US Fish and Wildlife Service (USFWS) evaluated their hatchery broodstock fish to determine if they had elevated levels of these contaminants. Many of the fish at the USFWS National Fish Hatchery had higher levels of PCBs than those reported in the 2004 report on farmed salmon. Contaminant levels in the hatchery fish were generally 10-100 times lower than those reported to cause sub-lethal effects in salmonids. However, currently for Atlantic salmon there is no universally accepted lethal/non-lethal threshold and it is difficult to detect what synergistic effects exposure to a mixture of contaminants is having. In addition, the timing of exposure to certain contaminants can also cause non-lethal, yet harmful, effects including hormonal changes and changes in neural development. Therefore, studies on functional deficits associated with contaminants should continue.
- Since 1997 NOAA has conducted ongoing assessments of smolt migration using ultrasonic telemetry. In 2004 three different studies were conducted on smolt

movement through the estuary into the nearshore marine environment. In the Pleasant and Narraguagus approximately 2+ naturally reared smolts were tagged as well as hatchery smolts, and in the Dennys 1+ smolts were tagged. Survival of smolts to the furthest quantitative marine array was variable. Results showed that the Dennys smolts had the lowest survival rate (19.23%), followed by the Narraguagus (42.86%), and the Pleasant (61.56% for naturally reared smolts and 60% for hatchery smolts). Researchers are pursuing a variety of other studies based upon the telemetry results.

- The Penobscot PIT Tag project is a cooperative research project among the Maine Atlantic Salmon Commission, the US Geologic Service, the USFWS, NOAA, and the Penobscot Indian Nation. This project examined temporal and spatial movements of Atlantic salmon during their upstream migration in the Penobscot River basin using PIT tags. Results of this study have yielded information on the movements and distribution of salmon in the Penobscot drainage after they pass upstream of Veazie Dam. The data gained from this project can also be related to season timing, photoperiod, flow, temperature, and final destination of tagged fish.
- The Adopt a Salmon Family Program has been operating for the past 12 years. The Adopt a Salmon Family Program 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.