



Brief Species Description:

Anadromous Atlantic salmon have a complex life history that extends from spawning and juvenile rearing in freshwater rivers to extensive feeding migrations in the high seas. Most Atlantic salmon of U.S. origin spend two winters in the ocean before returning to their natal (birth) rivers to spawn. Those that return after only 1 year at sea are called grilse. According to Collette and MacPhee (2002), anadromous Atlantic salmon in recent years have averaged approximately 22 inches (57 cm) for fish that spent 1 year at sea, 30 inches (75 cm) for fish that spent 2 years at sea, and 35 inches (88 cm) for fish that were at sea for 3 years.

Spawning occurs predominantly from mid-October to mid-November. Eggs incubate slowly due to cold winter water temperatures, hatching in March or April. The fry emerge from the gravel about mid-May and start feeding on plankton and small invertebrates. Emergent fry quickly disperse from the redd (nest), develop parr marks along their sides and enter the parr stage. The parr stage may last for 1 to 3 years in Maine rivers, with 2 years the most typical.

Atlantic salmon prey upon invertebrates, terrestrial insects, amphipods, euphausiids, gammarids, and fishes while at sea (Collette and MacPhee 2002). Larger Atlantic salmon mainly prey on fish such as Atlantic herring, alewife, rainbow smelt, capelin, mummichogs, sand lances, flat fish, and small Atlantic mackerel (Collette and MacPhee 2002).

Atlantic salmon require free-flowing rivers of moderate gradient that remain cool in the summer and contain clean gravel substrates suitable for spawning. Juvenile salmon feed and grow in rivers for one to three years before **smoltifying** (preparing physiologically for life in salt water) and migrating to the ocean. Parr habitat (often called “nursery habitat”) is typically riffle areas characterized by adequate cover (gravel and rubble up to 8 inches or 20 cm in size), moderate water depth of 4 to 24 inches (10-60 cm) and moderate to fast water flow of 1 to 3 feet/sec (30-90 cm/sec). Atlantic salmon adults of U.S. origin are highly migratory, undertaking long marine migrations from the mouths of U.S. rivers to the waters off the coast of west Greenland while

KEY INFORMATION

Areas of Concern

Other populations in free-flowing portions of rivers in Maine which are not included in the Gulf of Maine DPS.

Year Identified as “Species of Concern”
1997

Factors for Decline

- Dams
- Fishing
- Forest management practices
- Agriculture
- Aquaculture

Conservation Designations

IUCN: Least Concern (entire species)
Species of Greatest Conservation Need: ME



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seasonally inhabiting Newfoundland and Labrador waters (Kocik and Brown 2002).

Rationale for “Species of Concern” Listing:

Demographic and Genetic Diversity Concerns:

The populations of anadromous Atlantic salmon present in the Gulf of Maine **distinct population segment** (DPS) represent the last wild remnant of U.S. Atlantic salmon. Restoration efforts for Atlantic salmon are ongoing in other watersheds where the locally-adapted **stock** has been extirpated. The Gulf of Maine populations represent the southernmost extent of the range of wild Atlantic salmon which historically extended to the Housatonic River in Connecticut. This represents a range constriction of 2° north in latitude and 4° east in longitude (Colligan et al. 1999). The historic Atlantic salmon run in the United States has been estimated to have approached 500,000 fish. The species began to disappear from U.S. rivers 150 years ago and currently, only remnant populations occur in a limited number of rivers in Maine.

Naturally-reproducing Atlantic salmon in U.S. rivers are substantially reproductively isolated from those in Canada. A critical factor in determining the significance of the river populations of U.S. Atlantic salmon was the continuous persistence of a substantial component of native stock reproduction. The continuous presence of U.S. Atlantic salmon in indigenous habitat provides evidence that important local adaptations have persisted. Recent genetic analyses (King et al. 2001, Spidle et al. 2001, Spidle et al. 2003) provide further evidence of U.S. stocks' distinctness from Canadian and European stocks.

On November 17, 2000, NOAA Fisheries and the U.S. Fish and Wildlife Service (the Services) listed the Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon as endangered under the Endangered Species Act ([65 FR 69459](#)). Eight river populations within the DPS were identified that contained persistent populations of Atlantic salmon. In the same notice, the Services noted that other Atlantic salmon populations within the range of the Gulf of Maine DPS would be added if they were found to be naturally reproducing and to have historical, river-specific characteristics. The range of the Gulf of Maine DPS is from the Kennebec River north to, but not including, the St. Croix River. Other populations within the range of the Gulf of Maine DPS were identified as candidate species until such time that additional information could be obtained in order to determine the relationship of these populations to the Gulf of Maine DPS and their conservation status under the ESA. It is these other populations that are Species of Concern. Major rivers included in the Species of Concern listing include the upper Kennebec and Penobscot Rivers as well as the Androscoggin (Figure 1). As of 18 October 2006 these other populations also became **candidate species** (71 FR 61022) as NMFS has initiated a status review of these populations.

Factors for Decline:

Dams and overfishing are major factors contributing to the past precipitous decline of Atlantic salmon that resulted in its current low abundance (Colligan et al. 1999). Dams adversely impact Atlantic salmon by impeding upstream adult migrations, impeding downstream smolt migrations, increasing predation, impounding spawning and rearing habitat, altering water chemistry parameters such as dissolved oxygen levels, increasing water temperature, trapping sediments, and altering flow



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Atlantic Salmon SOC Range

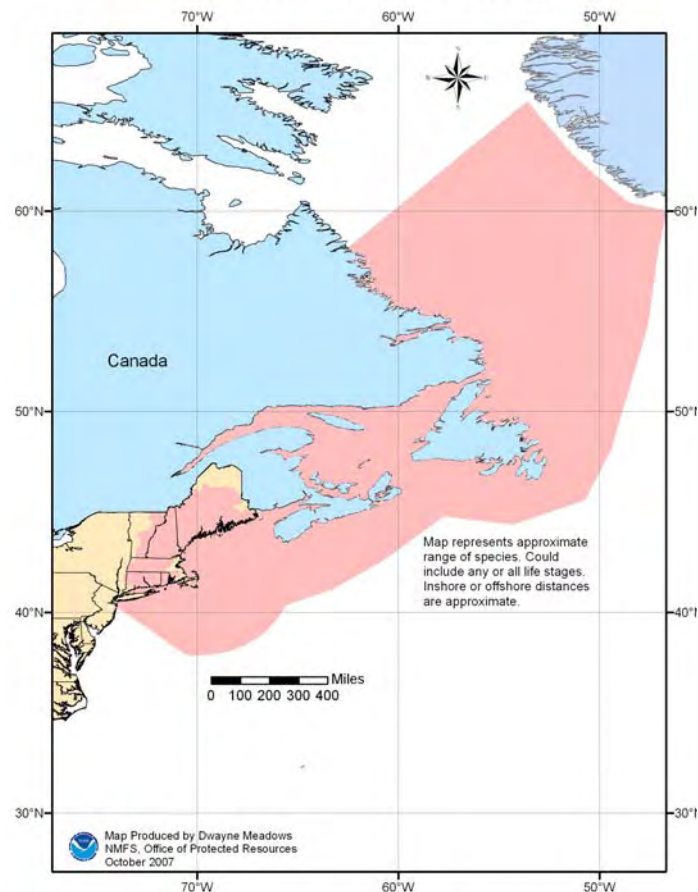


Figure 1. Left: Location of the Gulf of Maine DPS watersheds that are listed as endangered (yellow). Other major rivers that are included in the Species of Concern listing are labeled. NMFS and USFWS 2005. Right: Entire range of the species of concern.

regimes. In the past, these impacts were compounded by inefficient or nonexistent fish passage prior to the installation of modern fishways beginning in the 1960s. Historically, both commercial and recreational harvest of U.S. origin Atlantic salmon was intense. Most of the modern commercial exploitation occurred in foreign fisheries near west Greenland, New Brunswick, Nova Scotia, Newfoundland, and Labrador (Baum 1997). Recreational harvest occurred in rivers as adults returned to freshwater to spawn. Currently, there is only a small subsistence fishery off the west Greenland coast and all recreational fishing for anadromous Atlantic salmon has ceased. Additional anthropogenic impacts to Atlantic salmon include forest management practices, agriculture, and aquaculture. Forest management practices can potentially cause numerous short- and long-term negative impacts to Atlantic salmon, including siltation, shade reduction, and increased water temperature. Historically, these impacts also included severe habitat degradation through log drives and stream channel alterations. Agriculture activities can also impact Atlantic salmon through water



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extractions and diversions, sedimentation, and pesticide application. However, current regulatory mechanisms have alleviated most of the impacts from timber harvest and agriculture. The escape of fish from Atlantic salmon aquaculture operations poses a substantial threat to the genetic integrity of Atlantic salmon within the DPS. In addition, concentrations of aquaculture salmon could increase the vulnerability of wild stocks to disease. However, substantial improvements in containment have occurred since Atlantic salmon were listed as endangered. Additionally, weirs installed on several of the DPS rivers allow managers to remove aquaculture origin salmon while allowing wild fish to continue upstream to spawn.

Status Reviews/Research Underway:

As mentioned above, a status review was completed in 1999. In that status review and subsequent listing, a determination on the status of the Penobscot River and other river populations in Maine was deferred pending a comprehensive genetic survey of the mainstem Penobscot River and the collection of other information. That information is now available and a status review has been completed. NMFS will make a determination on whether any populations warrant listing under the ESA, as part of the listed Gulf of Maine DPS or as separate species or DPS.

Data Deficiencies:

Data on the influence of thermal regimes and marine mammal predation could be better. Better information is needed on the threat posed by Salmon Swimbladder Sarcoma Virus.

Existing Protections and Conservation Actions:

Fishing for all Atlantic salmon in Maine is prohibited.

References:

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Point(s) of contact for questions or further information:

For further information on this Species of Concern, or on the Species of Concern Program in general, please contact NMFS, Office of Protected Resources, 1315 East West Highway, Silver Spring, MD 20910, (301) 713-1401, soc.list@noaa.gov; <http://www.nmfs.noaa.gov/pr/species/concern/>, or Rory Saunders, NMFS, 17 Godfrey Dr #1, Orono, ME 04473, (207) 866-4049, Rory.Saunders@noaa.gov.