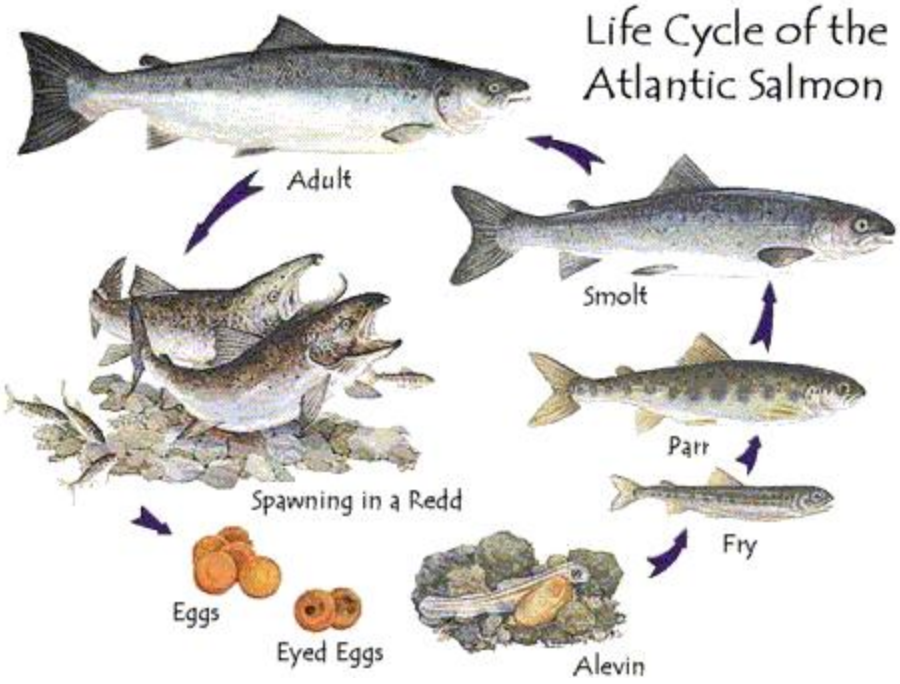
DOWNEAST SALMON FEDERATION

Atlantic Salmon Overview

In addition to the information below, the Maine Department of Environmental Protection's Salmon Habitat Monitoring Program provides updated Atlantic Salmon habitat data and information.



Species Description

Weight:	average 8-12 pounds (3.5-5.5 kg); can be up to 30 pounds (13.5 kg).
Length:	average 28-30 inches (70-75 cm)
Appearance:	silver-blue with black spots, as adults
Lifespan:	they spend 2-3 years in freshwater, then migrate to the ocean where it also spends 2-3 years, and then return to their natal river to spawn
Diet:	small fish
Behavior:	they spawn and rear juveniles in rivers, then feed and migrate on the high seas

The average size of Atlantic Salmon is 28-30 inches (71-76 cm) long and 8-12 pounds (3.6-5.4 kg) after two years at sea. Although uncommon, adults can grow to be as large as 30 pounds (13.6 kg).

Atlantic Salmon have a relatively complex life history that includes spawning, juvenile rearing in rivers, and extensive feeding migrations on the high seas. As a result, Atlantic Salmon go through several distinct phases that can be identified by specific changes in behavior, physiology, and habitat requirements.

Juvenile salmon feed and grow in rivers for one to three years before undergoing “smoltification” and migrating to the ocean. Atlantic Salmon of U.S. origin are highly migratory, undertaking long marine migrations between the mouths of U.S. rivers and the northwest Atlantic Ocean where they are widely distributed seasonally over much of the region. Most Atlantic Salmon of U.S. origin spend two winters in the ocean before returning to freshwater to spawn. Those that return after only one year are called grilse. In the United States, most adult Atlantic Salmon ascend the rivers of New England beginning in spring and continuing through the fall, with migration peaking in June.

Habitat

The Atlantic Salmon is an anadromous fish, typically spending 2-3 years in freshwater, migrating to the ocean where it also spends 2-3 years, and then returning to its natal river to spawn.

Suitable spawning habitat consists of gravel or rubble in areas of moving water. Eggs hatch in March or April and become fry.

Fry remain buried in the gravel for about six weeks. The fry emerge from the gravel about mid-May and start feeding on plankton and small invertebrates. Emergent fry quickly disperse from nests (called redds) within the gravel. They develop camouflaging stripes along their sides, and enter what is termed the parr stage.

Parr habitat, often called “nursery habitat,” is typically riffle areas characterized by adequate cover, shallow water depth, and moderate to fast water flow.

Salmon parr spend 2-3 years in freshwater and then undergo a physiological transformation called smoltification that prepares them for life in a marine habitat.

Atlantic Salmon leave Maine rivers in the spring and reach Newfoundland and Labrador by mid-summer. They spend their first winter at sea south of Greenland.

After the first winter at sea, a small percentage return to Maine while the majority spend a second year at sea, feeding off the southwest or, to a much lesser extent, the southeast coast of Greenland. Some Maine salmon are also found in waters along the Labrador coast.

After a second winter in the Labrador Sea, most Maine salmon return to rivers in Maine, with a small number returning the following year as what is referred to as three sea winter fish.

Distribution

There are three generally recognized groups of Atlantic Salmon:

- North American
- European
- Baltic

Atlantic Salmon reproduce in coastal rivers of northeastern North America, Iceland, Europe, and northwestern Russia and migrate through various portions of the North Atlantic Ocean. European and North American populations of Atlantic Salmon intermix during their at-sea stage, where they share similar summer feeding grounds off Greenland.

The North American group historically ranged from northern Quebec southeast to Newfoundland and southwest to Long Island Sound. It includes Canadian populations and U.S. populations, including the listed Gulf of Maine DPS. In Canada, significant

reproducing populations remain throughout the historic range, though many populations are severely depleted.

Population Trends

By the early 19th century, Atlantic Salmon runs in New England, which historically occurred in almost every major river north of the Hudson River, were severely depleted. By the end of the 19th century, Atlantic Salmon had been extirpated from three of the five rivers with the largest populations (Androscoggin, Merrimack, and Connecticut Rivers).

In general, the abundance of Atlantic Salmon continued to decline in all rivers through the first half of the 20th century. The primary distribution of Atlantic Salmon in the U.S. by the mid-20th century was, except for a few remnant populations, limited to the eastern third of Maine's coast.

The populations of Atlantic Salmon present in the Gulf of Maine Distinct Population Segment (DPS) represent the last wild populations of U.S. Atlantic Salmon. At the time of listing under the ESA in 2000, there were at least eight rivers in the geographic range of the DPS known to still support wild Atlantic Salmon populations:

- Dennys river
- East Machias river
- Machias river
- Pleasant river
- Narraguagus river
- Ducktrap river
- Sheepscot river
- Cove Brook
- Penobscot River
- Androscoggin River
- Kennebec River

There are at least fourteen small coastal rivers within the historic range of this Distinct Population Segment from which wild salmon populations have already been extirpated.

Threats

- Acidified water and associated aluminum toxicity, which decrease juvenile survival
- Aquaculture practices, which pose ecological and genetic risks
- Avian (bird) predation
- Changing land use patterns (e.g., development, agriculture, forestry)
- Climate change
- Degradation of water quality (e.g., contaminants, nutrient enrichment, elevated water temperature)
- Traditional hatchery programs (potential for artificial selection/domestication)
- Incidental capture of adults and parr by recreational fishermen
- Non-native fish species that compete with or prey on Atlantic salmon
- Loss of habitat complexity and connectivity
- Poaching of adults in rivers with listed Atlantic salmon
- Sedimentation
- Water extraction

Taxonomy

Kingdom: Animalia

Phylum: Chordata

Class: Osteichthyes

Order: Salmoniformes

Family: Salmonidae

Genus: *Salmo*

Species: *salar*

*Excerpt on Atlantic Salmon species description from NOAA Fisheries:

http://www.fisheries.noaa.gov/pr/species/fish/atlantic-salmon.html

Glossary

References

Ed Baum's book Maine Atlantic Salmon: A National Treasure

http://www.maine.gov/dmr

http://www.nefsc.noaa.gov

http://www.epa.gov/region1/lab/ecology/efishing.html

Alevin:
The period after hatching of the egg when the salmon is entirely dependant upon the yolk sac for nutrition. In the natural environment, alevin are buried within the substrate of the stream bottom.

Anadromous:
An anadromous fish, born in freshwater, spends most of its life in the sea and returns to freshwater to spawn. Salmon, smelt, shad, striped bass, and sturgeon are common examples.

Black salmon:
A synonymous term for kelt. Occasionally referred to as a slink, racer, or snake.

Bright salmon:
A fresh-run salmon which has entered its natal stream. Synonymous with maiden or virgin salmon.

Catadromous:
Opposite from anadromous, catadromous fish live in freshwater and enter salt water to spawn. American eels are a good example of a catadromous fish.

Diadromous:
A general term for fish in the anadromous and catadromous categories.

Electrofishing:
Electrofishing is the technique and science of utilizing an electrical current to momentarily stun fish or force them to involuntarily swim towards an electrical field for collection.

Eyed egg:
The stage from the appearance of faint eyes until hatching (April).

Fed Fry:
Atlantic Salmon of hatchery origin that have fully absorbed the yolk and have begun feeding upon artificial foods.

Fingerling:
An obsolete, non-specific term for parr that is often found in the literature prior to 1960.

Fry:
Salmon become fry when they have absorbed their yolk sac and emerge from the gravel nest the have been developing in since they were fertilised as an egg. Fry emerge in the Spring once river temperatures reach about 50F (10C) and begin feeding on invertebrates as they drift by in the stream current. (Note: this date is not appropriate for all rivers because of the wide variation in the growth and development of salmon in North America).

Green Egg:
The stage from spawning (November) until faint eyes appear in the eggs. The eggs at this stage are very fragile.

Grilse:
A 1SW salmon that has matured (or is about to mature) after one winter at sea. This term is applied to salmon in their natal river, not while at sea.

Iteroparous:
Unlike semelparous, iteroparous fish can recondition itself and return to sea to repeat the migration and spawning patterns multiple times.

Kelt:
A spawned out (spent) adult salmon (male or female) that is found in the freshwater portions of rivers, normally between November of the year of spawning until the salmon returns to the sea the following year.

Long-absence RS:
Alternate year repeat spawners that have spent one year (or more) at sea before spawning again. Long-absence repeat spawners are often referred to as LARS.

Maiden salmon:
Any virgin salmon (1SW, 2SW, 3SW) found in freshwater on its first spawning migration.

Mended-kelt:
Infrequently used term for a post-kelt that has regained the weight lost during the first spawning cycle and has resumed feeding and growth at sea.

Milt:
The male gametes (sperm).

MSW salmon:
Multi sea-winter (MSW) salmon have matured (or are about to mature) after two or more winters at sea. (Note: also see repeat spawner)

Natal Streams:
The stream a salmon hatched in.

Otoliths:
Small bones of the inner fish that have “growth rings” on them that can be used in aging.

Parr:
The period which follows the fry stage; subdivisions have been adopted based upon the age and size of the young salmon.

Parr marks:

0+ Parr: The period from July 1 to December 31 of the year of hatching. 0+ Parr are less than one year old.

1 Parr: The period from January 1 to June 30 one year after hatching.

1+ Parr: The period from July 1 to December 31 one year after hatching.

2 Parr: The period from January 1 to June 30 two years after hatching.

2+ Parr: The period from July 1 to December 31 two years after hatching.

3 Parr: The period from January 1 to June 30 three years after hatching.

3+ Parr: The period from July 1 to December 31 three years after hatching.

Precocious Parr:
An Atlantic Salmon that becomes sexually mature in freshwater without ever going to sea. Nearly all precocious parr are males, although a few females have been documented on rare occasions.

Post-kelt:
A spent salmon that has left the freshwater environment, until December 31 one year after spawning.

Post-smolt:
The life stage during the first year of life at sea, from July 1 to December 31 of the year the salmon left the river as a smolt.

Pre-smolt:
Parr that have commence the smoltification process in preparation for migration to sea. Another commonly used term for this stage is silvery parr.

Redd:
A gravel nest made by a spawning female. The female uses her tail to dig a pit in the stream bed where she will lay her eggs which are immediately fertilised by a male salmon. The female then covers the eggs with gravel, protecting them for the winter until they emerge in the spring as fry.

Repeat spawner (RS):
An adult salmon when found in freshwater on its second (or greater) spawning migration. Alternatively termed a previous spawner.

River Herring:
A general term used to describe the anadromous sea-run Alewives and Blueback Herring that migrate from the ocean into the river systems April-June. These herring are the “fish that feeds all” acting as a vital food source and nutrient source at every part of its life stage. Other fish, marine mammals, and birds are just three examples of the animals that consume the river herring.

Rotary Screw Trap (RSTs):
The type of trap commonly used to evaluate the health, age distribution, and number of smolts out-migrating from the rivers in the spring (April – June). The traps consist of large cone that is turned by the river moving down through it. The fish that swim into the cone end up in a live well that sits behind the cone. The entire trap is held afloat by large aluminum pontoons on either side of the cone.

Sac-Fry:
Synonymous word for alevin; more commonly used in fish culture, where the young salmon can be observed in a hatching tray or trough.

Salmon:
Salmo salar ('the leaper') Atlantic salmon are an anadromous species. Many saltwater sportfishermen consider these fish to be "the king of fish" because of their great leaping ability and determined fight when hooked.

1SW salmon:
A one sea-winter (SW) salmon has passed one December 31st since becoming a smolt.

2SW salmon:
A two sea-winter (SW) salmon has passed two December 31st's since becoming a smolt.

3SW salmon:
A three sea-winter (SW) salmon has passed three December 31st's since becoming a smolt.

Semelparous:
Fish that die after spawning one time (Pacific salmon species).

Short-absence RS:
Consecutive year repeat spawners that have spent less than one year at sea before spawning again. Short-absence repeat spawners are often referred to as SARS.

Smolt:
A silvery-colored, juvenile Atlantic salmon during its active migration to sea in the spring (late April – mid June). Smolts (unlike parr) are able to survive the natural transition from fresh to salt water.

1+ Smolt:
The birth date of Atlantic salmon is arbitrarily set at April 1. Since smolts migrate to sea between April and June, a 1+ smolt migrates 1+ years after hatching. In hatchery terms this is referred to as a P8, meaning after the parr was stocked in its first year of life it only spent 8 months (one fall and winter) in the river before outmigration as a smolt.

2+ Smolt:
The period from January 1 to June 30 of the year of migration. The migration year is two years after hatching. In hatchery terms this is referred to as a P20, meaning the young salmon spent 20 months in the river after being stocked before outmigration.

3+ Smolt:
The period from January 1 to June 30 of the year of migration. The migration year is three years after hatching. In hatchery terms this is referred to as a P32, meaning the young salmon spent 32 months in the river after being stocked before outmigration.

Smoltification:
The parr-to-smolt transformation (smoltification) results in river adaptations giving way to seawater readiness. This is where physiological changes occur in the fish to allow it to survive in saltwater environments.

Underyearling:
An obsolete, non-specific term for parr (or fingerling), often found in the literature prior to 1960.

Unfed Fry:
Atlantic salmon of hatchery origin that have fully absorbed the yolk sac and have not been fed artificial foods.

YOY:
Young of the year salmon. Juvenile salmon found in the rivers the first summer/fall of their lives.