



SALMONIDS OF THE GULF OF THE FARALLONES



Salmonidae, the family of fishes that includes salmon and some trout, inhabit many watersheds all over the world. Known as an indicator species, their abundance or decline can indicate the health of an aquatic ecosystem. Throughout their lives, salmonids rely upon the health of the ocean environment as well as freshwater rivers. Local salmonid populations can be an indicator of the health of the watersheds connected to the Gulf of the Farallones National Marine Sanctuary.

CLASSIFICATION

There are two salmon species and one trout species which can be found within the watersheds and in the ocean habitat of the Sanctuary. Classified in the genus *Oncorhynchus*, they include the Chinook (or king) salmon (*O. tshawytscha*), Coho (or silver) salmon (*O. kisutch*), and Steelhead trout (*O. mykiss*).

LOCAL POPULATIONS

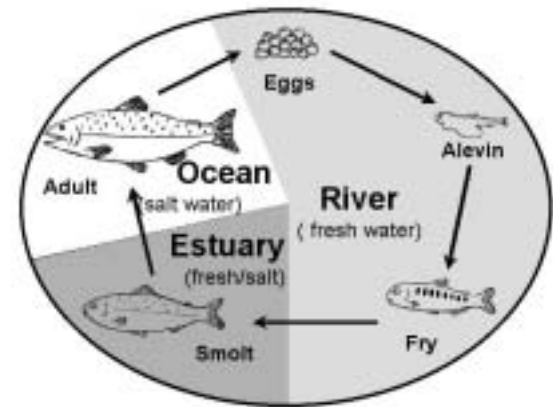
Local species of salmonids can be divided into distinct populations based upon their native river and the season in which they migrate upstream to spawn (known as a run). Chinook salmon have four different runs per year, whereas Coho salmon and Steelhead trout runs occur only once per year.

The fall-run Chinook salmon is the largest population of salmonids found within the Sanctuary. They then migrate through the San Francisco Bay and up the Sacramento and the San Joaquin Rivers. Coho salmon and Steelhead trout migrate inland as well, but they are also found in coastal streams that directly feed into Sanctuary waters. These streams range from Salmon Creek in Bodega to Redwood Creek located in Muir Woods.



Alevin with yolk sac

Watershed Stewards Project



LIFE CYCLE

Salmonids spend their adult lives in the open ocean before returning to their native streams to spawn. They are called an *anadromous* species, meaning they begin their life in fresh water habitats before migrating to salt water environments. Salmonids live in the ocean from one to seven years where they grow and become sexually mature. When the time comes to reproduce, they may use any number of cues ranging from currents, tides, temperature, and salinity gradients to identify their native river. During this return journey, some individuals can travel up to 3,000 miles.

Once salmonids reach their destination, the females create a nest (called a redd) and lay their eggs. The males then fertilize the eggs with sperm (called milt). Chinook and Coho salmon have only one chance to successfully spawn, because they die shortly after reproducing. Steelhead trout may survive to spawn several more times throughout their life.

The fertilized eggs hatch after four to six weeks. Once the young emerge, they feed off a yolk sac and are called alevin. The yolk sac provides nutrients for two to three weeks, after which the alevin leave the redd to find food.

After leaving the redd, the young salmonids (called fry) eat insects and are vulnerable to predators. Dark bars along the sides of their bodies (called parr marks) help to camouflage the fry. During their journey migrating down stream to the ocean, they become larger and undergo physiological adaptations to live in the salt water through a process called smoltification. As a "smolt," their gills and kidneys adapt to saltier water, and their color becomes silvery. They also imprint the scent of their home stream in order to return years later to spawn.

Next, salmonids travel through an estuary (an area where fresh water meets salt water). Most of the physiological changes occur in an estuary, where salmonids may stay as long as six months. The San Francisco Bay, Bolinas Lagoon, and Tomales Bay are local estuaries where young smolts can be found before they migrate into the Sanctuary waters.



P. Siri Bodega Marine Lab

Leaping salmon migrating upstream

STRUGGLE FOR SURVIVAL

From the moment the eggs hatch, young salmonids face endless predators and life obstacles. They are prey for other fish and birds. The large numbers of individuals hatched result in large numbers being eaten, as up to 80% of new alevin are lost. If they survive the migration to the ocean, they face additional predation by dolphins, seals, sea lions, sharks, and humans. Without salmonids, entire food webs may be affected because many predators would be deprived of an important food source.

Some of the human influences that affect salmonids include:

- Dams, which prevent water flow necessary for fish migrations
- Pesticides from agricultural runoff, which can pollute salmonid habitat and food sources
- Road construction along streams, which can cause landslides and erosion that decrease habitat
- Dredging can remove habitat and stir up silt, reducing visibility in the water
- Logging can reduce shade that is needed to keep streams cool and can contribute to stream side erosion
- Overfishing practices which can reduce the population, making it difficult for salmonids to recover and sustain their population numbers over time.

CURRENT STATUS

Over the years, salmonid populations have suffered major impacts primarily due to habitat loss and reduced stream flows from dams. As a result, the distribution, abundance, and historic ranges of local salmonids have declined dramatically. Recent state-wide population estimates indicate a reduction of up to 95% from pre-1950's estimates for some species of salmonids. As of 1996, populations of Coho salmon and Steelhead trout found within the Sanctuary were listed as a threatened species under the federal Endangered Species Act (ESA) of 1972. Among the individual local runs, the Sacramento River winter-run Chinook salmon is listed as an endangered species, while most other salmonid runs are listed as threatened.

The future of California's native salmonids is dependent upon a combination of actions, including pro-environmental policy, habitat restoration, and education. The Farallones Marine Sanctuary Association has developed educational materials about salmonids to teach future decision-makers about the importance of protecting and improving salmonid habitats.

For more information on the Gulf of the Farallones National Marine Sanctuary or Salmonids contact:

The Gulf of the Farallones National Marine Sanctuary
www.sanctuaries.nos.noaa.gov

National Marine Fisheries Service Salmon Page
www.kingfish.ssp.nmfs.gov/salmon/salmon.html
 Farallones Marine Sanctuary Association at (415)561-6625
www.farallones.org

