Glossary of Pacific Salmon and Trout Biology

The five species of eastern Pacific Ocean salmon (Genus *Oncorhynchus*) are Chinook (aka king, blackmouth, tyee), coho (silver), chum (aka dog, keta, silverbrite, and calico salmon), pink (humpback), and sockeye (red). All five are native species in Washington and are found in Skagit County. The Skagit River Watershed has all five species during some period of the year.

The two species of Eastern Pacific Ocean trout (Genus *Oncorhynchus)* are the freshwater resident rainbow and the anadromous steelhead (state fish of Washington) and the resident coastal cutthroat and the anadromous sea-run cutthroat. There are two species of char, Genus *Salvelinus*, the bull trout (may be anadromous) and the Dolly Varden, that are native to Washington and are found in certain Skagit County streams, especially the Skagit River.

Alevin (sac fry)—The stage of a salmonid's life cycle between fertilized egg and fry. The egg incubates in the gravel to produce an alevin upon hatching. The alevin remains in the gravel until it uses all of the yolk sac for its nutrition. It is then a buttoned up fry that leaves the gravel as an emergent fry seeking food in the open water of the stream.

Anadromous (anadromy) fish—a migratory fish whose life cycle involves spawning and a period of juvenile rearing in freshwater followed by a period of salt water (marine) residence for growth and the beginning of sexual maturation prior to or during the spawning migration (spawning run) back to the natal (home) stream where once a juvenile.

Endangered Species—Under the federal Endangered Species Act (ESA), 'in danger of extinction throughout all or a significant portion of its natural range". Section 9 of the ESA prohibits the "take" of an endangered species. "Take" includes to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in such conduct. A **Threatened Species** under the ESA is "likely to become endangered within the foreseeable future throughout all of a significant portion of its natural range''. A **Candidate Species** under the ESA is being monitored because it is a species of concern for listing as being threatened or endangered. In Skagit County, the Puget Sound Chinook, the Puget Sound steelhead and the Puget Sound/Coastal bull trout are listed as threatened species.

Exotic Species (non-Native or non-Indigenous)—A species not native to Washington State; e.g. Atlantic salmon, brown trout, brook trout, lake trout.
Native Species—A species indigenous to Washington State; e.g., Chinook, coho, chum, pink, sockeye, steelhead, cutthroat, bull trout, Dolly Varden.

Fry—A juvenile salmonid that has emerged from the gravel to live in the stream's open water. The length of time a fry spends in the stream before migrating to the estuary and the open ocean depends on the species; **Pink** and **chum** fry spend only a few weeks before the outward migration to the estuary. Some **Chinook** fry out migrate within a few

months as fry or **parr** (exhibit definite vertical parr marks along the body) or out migrate to the estuary as yearlings. **Coho** fry become parr and remain in the stream for one year prior to outmigrating to the estuary as yearlings. **Sockeye** fry enter a lake to become parr spending a year in the lake before outmigrating. **Steelhead** fry become parr and remain in the stream for at least a year before outmigrating to the estuary. For all six species during the seaward migration, the juveniles become **smolts** adapted to living in salt water as they undergo **ecological, behavioral, and physiological changes.**

Indicator Species—A species whose presence, absence or abundance infers a specific environmental condition in an ecosystem such as water quality or quantity, nutrition sources, and space. **Keystone Species**—A species whose presence and abundance is a major contributor to maintaining the richness in the number of the species in an ecosystem and its health. **Salmonids** are considered as Indicator and Keystone Species.

Redd—Site in a stream gravel where a female digs a series of nests sequentially while facing upstream. Eggs are deposited into each nest, fertilized by milt (contains sperm) from a male and covered with gravel during each sequential digging of the series of nests. The gravel from digging of the second nest covers the eggs of the first nest.

Species—Group or population of anatomically similar organisms that interbreed or have the potential to interbreed (can share a common gene pool), share a common ancestry, and are reproductively isolated from all other such groups.

Stock—The salmonid of a single species spawning in a particular stream at a particular time and do not interbreed with any other stock or population of the same species spawning in a different location (spatial segregation) or in the same location at a different time (temporal segregation). Skagit River Spring-Run Chinook Stock and Skagit River Fall-Run Chinook Stock (temporal and spatial segregation) Skagit River Fall-Run Chinook and Samish River Fall Run Chinook Stock (spatial segregation) . **Wild Stock**—A stock sustained by **Natural Origin** production of spawning and rearing (Samish River Chum). **Hatchery or Cultured Stock**—A stock sustained by **Hatchery Origin** production of spawning and early rearing (Samish River Fall Chinook). **Composite Stock**—A stock sustained by both Natural Origin and Hatchery Origin production (Skagit River coho, Baker River/Lake sockeye). **Native Stock**—An indigenous stock whose genetic composition has not been significantly affected by interbreeding with a non-native stock (Baker River/Lake sockeye). **Non-Native Stock**—A stock that has been established outside its original range by introduction into a new area (Samish River Fall Chinook, Samish River steelhead).

Salmonid—Fish belonging to the Family Salmonidae. Pacific salmon (Chinook, coho, chum, pink, and sockeye); trout (steelhead and resident rainbow, sea-run and resident cutthroat); char (Dolly Varden and bull trout); and whitefish (mountain whitefish) are native salmonids of Skagit County.

A) Freshwater Habitat Requirements for Pacific Salmon and Trout
1) Water Quality—cool (3-15 degrees C); clean (low turbidity, absence of point source and non-point source pollution); well oxygenated (saturated);
appropriate and stable pH (6.5-7.6).
2) Water Quantity—appropriate depth and velocity of stream flow for migration, spawning and egg incubation(no scouring of spawning gravel containing fertilized eggs in the redd); adequate irrigation of redds to ensure sufficient oxygen to incubating eggs; low flows in pools and side channels for juvenile feeding and adult resting; natural fluctuations in flow to flush sediments and recruit spawning gravel; sufficient flow to maintain water table in riparian zone (hyporheic flow, exchange of water between stream and adjacent land's ground water).
3) Channel Stability—retention of clean gravel and cobble with appropriate size and depth for spawning and incubation.
4) Channel Complexity—riffles (spawning); deep pools with cooler water from hyporheic flow; side channels for spawning, incubation and rearing.
5) Large Woody Debris (LWD)—recruited from riparian zone to provide stream complexity of riffles and associated pools below LWD
6) Riparian Vegetation—provides LWD; shade to reduce solar heating; nutrients from deciduous plants: bio-filtration; retention of ground water;
reduced bank erosion; complexity of the stream's ecosystem.
7) Absence of Passage Barriers—perched or blocked culverts; excessive velocity of flow in culverts; improper tide gates, dams, and weirs; log and debris jams; excessively low flows.
8) Nutrient Supply—adequate nutrients for juvenile rearing; importance of adult carcasses for food chain to support stream invertebrates (mainly insects); salmon die after spawning (semelparous), trout do not die (iteroparous); carcasses supply nutrients for riparian plants and juveniles feed on carcasses.

B) Estuary and Marine Waters—estuaries (tidal zone of brackish water) where juveniles rear in tidal channels, back water sloughs. tidal marshes;
brackish water is where juveniles (smolts) complete the physiological, behavioral, and ecological transition from freshwater to sea water; estuaries are regions of high food production for further juvenile rearing;
open ocean waters with currents for deeper water upwelling to bring nutrients to the photosynthetic zone to support the food chain from phytoplankton to zooplankton, krill (primarily crustaceans, pteropods (free swimming marine snails), and forage fishes upon which salmon feed for major growth prior to spawning migration; adult salmon stop feeding when entering estuary/freshwater. Both estuary and marine waters require appropriate temperatures and absence of pollutants.