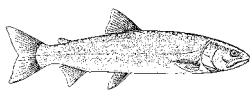


CHINOOK

S  
A  
L  
M  
O  
N



BULL TROUT



# ECOLOGY OF PACIFIC SALMON AND CHINOOK; THE STATUS OF PUGET SOUND STOCKS

## *Salmon Life Cycle*

Salmon hatch in freshwater from eggs laid in the gravel beds of rivers and streams (and in some cases along lake shorelines). Except for steelhead and cutthroat, adults die after spawning a single time. Upon hatching, juveniles spend from hours to years in the freshwater environment before migrating to the sea to grow to adulthood. Oceanic migrations of thousands of miles typically take them northward along the continental shelf, often into the Gulf of Alaska and beyond. On reaching maturity, they migrate from the ocean back to the rivers and streams of their birth to spawn.

## *Range and Adaptation*

All Pacific salmon are members of the genus *Oncorhynchus*, meaning “bent snout”. Their home streams range from southern California to northern Alaska and from Siberia southward to Hokkaido, Japan. Salmon need gravel-bedded rivers and streams with clear, cold (42-58°F), and well oxygenated waters. Gravels must be relatively free from silts and fine sands to allow free flow of water and oxygen to eggs deposited in the inter-gravel spaces. Various salmon species assort themselves by stream size, gravel size, flow and depth of water, and timing of return. Watershed-specific variations in these characteristics have produced populations that are “fitted” to these environments and that differ in subtle ways from adjacent populations. This local adaptation is a fundamental characteristic of wild salmon. Seven species are represented in the waters of King County and Puget Sound: chinook, coho, pink, chum, sockeye, steelhead/rainbow, and cutthroat.

## *Oncorhynchus tshawytscha-Chinook, or “King” Salmon*

In King County chinook are found in the Snoqualmie, Cedar, Green and White River systems. Some basic facts about chinook salmon include:

- Chinook are the largest of all Pacific salmon, averaging 36 inches in length and 22 pounds in weight; they also are the least abundant species.
- Chinook spawn mostly in large streams and are found in all major watersheds in Puget Sound. The largest runs in the Sound are on the Skagit, Stillaguamish and Snohomish (including the Snoqualmie/Skykomish) Rivers. Chinook are also present in smaller tributaries, including Bear Creek, North Creek and Newaukum Creek in King County. Virtually all wild Puget Sound populations are far below what are believed to be their historic numbers; most have declined from 18% to more than 90% since the 1960s.
- There are spring, summer and fall runs of chinook in Puget Sound. Fall runs, which migrate upstream from late July through September, tend to be the most abundant.
- Adult chinook die within 2-5 days of spawning; their eggs hatch in about 60 days. Newly hatched salmon, called “alevins”, remain in the gravel for about 3 weeks. Upon emerging, the “fry” or “parr” remain in freshwater for about 3-6 months feeding on stream and terrestrial insects. In the Lake Washington system, some fry may reside in the lake for 2-3 years. Now ready to

leave the fresh water, these “smolts” migrate downstream to Puget Sound, where they feed and grow for several weeks to over a year. Then the fish migrate northward to the Gulf of Alaska, where they feed on small fishes and krill for 2-4 years before migrating homeward to spawn.

Check out the Salmon Information Center Website at <http://www.salmoninfo.org> or call the Salmon Information Center Hot Line at 1-877-SALMON-9 for more resources.

### *The Status of Wild Salmon in Puget Sound: Chinook Listed*

In 1991, the Endangered Species Committee of the American Fisheries Society (AFS) published an article reviewing the status of Pacific Salmon stocks from California, Oregon, Idaho and Washington in Fisheries magazine<sup>1</sup>. The article was later corroborated independently by the National Research Council<sup>2</sup>. The AFS committee found that:

- More than 75% of Pacific salmon populations were severely depleted and at some risk of extinction;
- Eighteen of the 214 stocks reviewed appeared to be extinct; 101 were found to be at high risk of extinction; and
- Salmon had disappeared from more than 40% of their historic range.

Generally speaking, as you move south along the Pacific Coast, the health of salmon stocks worsens, with the highest degradation in areas heavily influenced by dams and urban development. The healthiest stocks were in Alaska and northern British Columbia.

Consistent with its responsibility under the Endangered Species Act, these findings led the National Marine Fisheries Service (NMFS) to initiate a coast-wide assessment of sea-going salmon and trout in 1992. In Puget Sound, NMFS has focused its concerns on coho and chinook populations and on chum populations in Hood Canal. Virtually all Puget Sound populations of chinook salmon are far below what are believed to be their historic numbers; most have declined from 18% to more than 90% since the 1960s. NMFS has determined that for chinook - and possibly coho - the populations that inhabit the various rivers of the Sound are genetically related and thus share a common destiny; for chum, two population segments in Hood canal are closely related. Such related populations are termed Evolutionarily Significant Units (ESUs) and are the biological unit for listing salmon species under the ESA.

NMFS listed Puget Sound chinook and Hood Canal chum as threatened species under the ESA in 1999, and the U.S. Fish and Wildlife Service listed bull trout as threatened in 1999. Coho are expected to be proposed for listing by the year 2000. The Evolutionarily Significant Unit (ESU) for Puget Sound chinook includes stocks from all rivers in Puget Sound and Hood Canal, including the Elwha and Dungeness Rivers on the Strait of Juan de Fuca.

In 1992, the Washington Department of Fish and Wildlife conducted a status survey of salmon and steelhead in Washington waters. Published in 1993, the Salmon and Steelhead Stock Inventory (SASSI) reviewed 148 stocks in Puget Sound. The review found 11 stocks that were “critical” - that is, subject to permanent harm or extinction; these included stocks of chinook, chum and steelhead. It found 44 stocks that were “depressed” - that is, whose production was below expected levels; these included stocks of coho and, in Hood Canal, pink salmon. It found 93 stocks to be “healthy” - though even these did not distinguish between fish of hatchery or natural origin, only that they returned to spawn in the wild.

The best available information suggests that freshwater habitat loss and modification has been the most significant cause of decline for stocks in Puget Sound, particularly for chinook and coho. Poor ocean conditions and fishing pressures have accelerated the decline.

<sup>1</sup> *Pacific Salmon at the Crossroads...Fisheries*: (16):2. March 1991

<sup>2</sup> *Upstream: Salmon and Society in the PNW*. NRC, 1996