

# FACTS ABOUT KOKANEE

## Description

Kokanee (*Oncorhynchus nerka*) are sockeye salmon that spend their entire lives in freshwater. They are usually found in lakes that have either limited or no access to the ocean.

Kokanee tend to be smaller in size than sockeye, as lakes have more limited food sources than rivers. They average between 10 and 18 inches in length and weigh one to four pounds.

They exhibit similar markings and coloration to the sockeye, with bright silver sides, bluish-black tops and white bellies. Before spawning, kokanee will turn bright red with green heads; the males will also develop a humped back and hooked jaw.



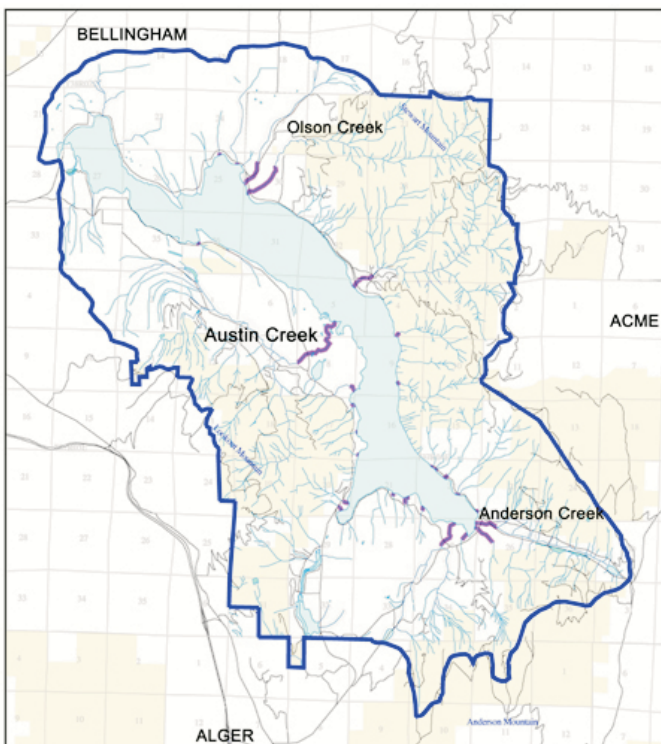
Male kokanee. (Manu Esteve)

## Distribution

In Whatcom County, native populations of kokanee can be found in Lake Samish and Lake Whatcom. They spawn in Brannian, Olson, Fir, and Anderson creeks and, to some extent, in Carpenter and Smith creeks in Lake Whatcom and in Mud Creek in Lake Samish.

The Lake Whatcom stock is also enhanced through hatchery operations, and their eggs are used to stock lakes throughout the United States.

Kokanee are native to British Columbia, Alaska, Washington, Idaho, Siberia and Japan, but have been introduced worldwide into lakes and hatcheries.



The distribution of kokanee in the Lake Whatcom watershed (marked in purple).

## Life Cycle & Reproduction

After reaching maturity around three or four years of age, kokanee return to their natal area and spawn between August and November. Spawning may occur in an inlet stream or gravel beds along the lakeshore. Depending on her size, the female kokanee carries between 250 and 2,000 eggs, which she deposits into three or four redds. She digs the redd using her tail and waits for a suitable male to fertilize them. After covering up the eggs, she repeats the process until all the eggs have been deposited and fertilized. The adults die within days of spawning.

The fertilized eggs will develop in the gravel for one to two months, and will emerge as alevins. The alevins will remain in the gravel until they have consumed their attached yolk sac. They emerge from the gravel as fry between March and April and migrate at night, usually with the spring runoff, downstream to the lake where they will develop into mature adults to begin the cycle again.

## Habitat Needs

The primary source of food for kokanee comes from plankton. Initially they consume copepods, daphnia, and, as they grow, zooplankton. The availability of food during the first year of life is critical to their development and survival.

Habitat issues include the access to and availability of suitable stream and lakeshore spawning habitats. Both these areas can be adversely affected by excess sediment that can smother the eggs by reducing the flow of oxygenated water through the redd (nest). High stream/lake water temperatures and associated low dissolved oxygen levels can also reduce egg and juvenile development and survival. Frequent drawdowns on lakes that are used for water supplies can dry out redds or alevins hidden in the gravel; this has not been documented as a problem in Lake Whatcom.

## Economic Value

The egg-taking program at the Lake Whatcom hatchery on Brannian Creek is nearly 100 years old and has historically produced the largest number of hatchery-propagated kokanee eggs in the country. Two-thirds of the state's kokanee fisheries are dependent on the periodic stocking of fry from this location.

Kokanee are the fourth most preferred game fish in the state and contribute \$36.7 million annually to the state's economic activity. Of that, \$20.7 million (56.5%) is from fisheries supported by the Lake Whatcom program.

Since 1914, over 1.4 billion eggs have been collected from the brood stock of Lake Whatcom. Thirty-six lakes in Washington are stocked annually with 14.4 million Lake Whatcom kokanee, with five million stocked back into the lake to maintain the brood stock and provide fishing opportunities.

## Current Status

Despite the large hatchery egg take, fisheries managers are concerned about the long-term health of the naturally reproducing kokanee population in Lake Whatcom. Habitat issues include the loss or alteration of suitable spawning habitats in key tributaries from forestry and residential development. Poorly understood factors in the lake itself have led to periodic fish kills that include kokanee.

Another issue is that Lake Whatcom is currently certified as being regulated pathogen-free, meaning that eggs from this area can be transferred to other hatcheries and lakes without risk of infections spreading to other locations. Currently the City of Bellingham uses a dam on the Middle Fork to divert water into Lake Whatcom to supplement the municipal water supply. The City is considering modifying or removing the diversion dam to allow anadromous fish passage; these new fish could carry pathogens such as IHN (infectious hematopoietic necrosis), a viral disease to which kokanee are highly susceptible. The salmon co-managers are evaluating options to manage the risk to kokanee from any changes to the dam.

## Sources

Parametrix, Inc. 2003. *Lake Whatcom and Bellingham Hatcheries Production Replacement Feasibility Report*.

Kokanee Salmon Heritage Project ([www.royal.okanagan.bc.ca/kokanee/index.html](http://www.royal.okanagan.bc.ca/kokanee/index.html)).

National Marine Fisheries Service. 1997. *Status Review of Sockeye Salmon from Washington and Oregon*.

