



**STATUS: SPECIES OF
CONCERN**
**Lake Sammamish
Kokanee**

The Lake Sammamish Kokanee occurs in King County, Washington.

On July 9, 2007, the U.S. Fish and Wildlife Service received a petition to list all wild, indigenous, naturally-spawned kokanee, *Oncorhynchus nerka*, in Lake Sammamish, King County, Washington, as a threatened or endangered distinct population segment (DPS) under the Endangered Species Act. On May 6, 2008, the Service published a substantial 90-day finding on the petition, and initiated a 12-month status review.

Current and Historical Status

Kokanee and sockeye salmon are two forms of the same species, *Oncorhynchus nerka* that are native to watersheds in the north Pacific from southern Kamchatka to Japan in the western Pacific, and from Alaska to the Columbia River in North America. Sockeye salmon give rise to kokanee over evolutionary timeframes as a result of isolation or selective pressures related to difficulty of migration and lake productivity. Sockeye salmon are anadromous, migrating to the Pacific Ocean following hatching and rearing in freshwater. They spend two to three years in marine waters before returning to freshwater environments to spawn. Kokanee are non-anadromous, spending their entire lives in freshwater habitats.

Native kokanee populations in western Washington appear to be currently limited to the Sammamish/Lake Washington Basin, Lake Whatcom, Chilliwack Lake, and Lake Ozette. Kokanee are divided into three races (runs), summer or early-run, fall or middle-run, and winter or late-run, in the

Lake Washington and Lake Sammamish watershed. Currently, the summer or early-run kokanee are likely extirpated. Summer-run kokanee in Issaquah Creek may have numbered in the thousands in the 1970s, but severely declined after 1980. The last two sightings of summer-run kokanee in Issaquah Creek occurred in summer 2000. No kokanee were captured in 2001 and 2002, and none were observed in surveys in 2003. The native fall or middle-run kokanee which primarily used larger Sammamish River tributaries, were believed to have been extirpated by the 1970s. These middle-run tributaries now appear to support a population of sockeye salmon and their residuals (sockeye individuals within the population that do not go to sea). Winter or late-run kokanee, are still found in Lake Sammamish and several of its tributaries. These kokanee are reproductively isolated from and appear to be genetically distinct from other sockeye and kokanee populations across the west.

The winter run has had highly variable spawner returns between 1996 and 2006 with returns as low as 64 in 1997, and as high as 4,702 in 2003. From 2004 to 2007, the average spawner return was 463 fish, although in two of the four spawning streams currently used by the winter/late-run there were fewer than 70 fish counted annually in each stream.

Description and Life History

Adult kokanee resemble sockeye salmon, but have significant morphological and physiological differences. Kokanee are more efficient at extracting carotinoids from food resources, have higher gill raker counts, poorer smolting ability (complex physiological changes that enable juvenile salmon to make the transition from freshwater to saltwater), poorer juvenile swimmers, and are normally smaller in size at maturity than sockeye because they are confined to freshwater environments, which are less productive than the ocean. Both kokanee and anadromous sockeye turn from silver to bright red during maturation, while the head is olive green and the fins are blackish red.

Kokanee young are spawned in freshwater streams and immediately migrate to a nursery lake after emerging from the gravel, where they remain until maturity. In some cases they are spawned along the shoreline of the nursery lake itself. When mature, they return to natal freshwater streams to spawn and die, typically around age four. Lake Sammamish early-run kokanee spawned during late summer (August through September) in Issaquah Creek. The middle-run kokanee spawned in the fall (late September through November), primarily in larger Sammamish River tributaries. Late-run kokanee spawn in late fall and early winter (October through January) in tributaries of Lake Sammamish.

Habitat

Kokanee need high quality lake and stream habitat to complete their life cycle. Currently, the longest accessible spawning stream is only 0.75 miles and the total spawning area of all streams is less than one mile. Very little is known about kokanee rearing behavior and distribution in Lake Sammamish. However, the lake seasonally stratifies during the summer and creates unfavorable temperature and oxygen conditions for kokanee.

Reasons for Decline

Habitat loss, degradation, and alteration from increased development (urbanization) in the Lake Sammamish watershed have affected the kokanee population. Development has affected the hydrology and water quality in Lake Sammamish and its tributaries. Alterations in water quality have likely limited the amount of habitat within the lake that is suitable to support kokanee. Increased predation from introduced and native fishes as a result of habitat changes are also believed to have contributed to the kokanee's decline. The Issaquah Creek State Salmon Hatchery, local property owners, and culverts block or have blocked the kokanee's access to habitat needed for spawning.

Conservation Efforts

The Lake Sammamish Kokanee Work Group (KWG) was formed to advance conservation for the late-run Lake Sammamish kokanee. Membership in the group includes each of the local jurisdictions in the watershed, Washington Department of Fish and Wildlife, USFWS, several non-governmental groups including Trout Unlimited, Save Lake Sammamish, Friends of Pine Lake, and the Sno-King Watershed Alliance. The KWG is the main venue for outreach to implementing entities in the watershed with opportunities and/or responsibilities for kokanee conservation actions.

The following actions have been implemented to conserve Lake Sammamish kokanee:

- Kokanee Supplementation – As a result of extremely poor spawner returns in 2008-2010, the KWG implemented emergency supplementation efforts to increase egg to fry survival of Lake Sammamish kokanee, in an attempt to increase overall abundance within the population. USFWS has provided financial contributions and biologists have been participating in the planning and development of this program. Adult kokanee are spawned at the

Issaquah State Fish Hatchery (SFH). To further reduce risk to the species, half of the eggs are incubated at Issaquah SFH and half are taken to Quilcene National Fish Hatchery where they are reared to the “eyed-egg” stage of their life. After all eggs have reached the eyed-egg stage, they are placed in experimental rearing systems at Issaquah SFH. Each experimental rearing system will use water taken from their natal stream to provide adequate imprinting. After the kokanee fry have emerged from their eggs, WDFW and King County staff will then plant the kokanee fry back into their natal creek.

- Kokanee Brochure – A brochure was completed in 2009, under the leadership of a KWG member and her high school-aged son as part of a community service project. This brochure has filled a key outreach gap for our efforts.
- Habitat Restoration Assessment – The KWG was awarded a 2009-2010 grant from the King Conservation District to identify scope and assess the feasibility of several key habitat restoration projects to support kokanee conservation. USFWS biologists provided technical expertise for the assessment. The final product of this assessment was a list of 10 key habitat improvement or restoration projects which can help conserve Lake Sammamish kokanee.
- Kokanee Outreach – King County maintains the following webpage providing the background and status updates of the kokanee conservation efforts:
<http://www.kingcounty.gov/environment/animalsAndPlants/salmon-and-trout/kokanee.aspx>.
- Public Presentations and Briefings – Periodically members of the KWG provide requested presentations on the need to conserve kokanee and the status of efforts. In 2009, the specific audiences addressed included the Metropolitan King County Council, the WRIA 8 Salmon Recovery Council, the City of Bellevue Planning Commission, and the Friends of the Issaquah Salmon Hatchery.
- Research – In 2009, USFWS provided funding for the “Lake Sammamish Late Run Kokanee Synthesis Report” ([Report](#)). The USFWS has also provided funding to King County to document the vertical distribution of Lake Sammamish fishes.

References and Links

[USFWS News Release 2008](#)

[90 Day Finding 2008](#)

[Kokanee Information](#)

[USFWS Conservation Actions](#)