

Project Description

Location:

The project site is located in King County, Washington, in the city of Issaquah, on Issaquah Creek river mile 3 (see attached site map, figure 1).

Historic condition:

Issaquah Creek, the major tributary to Lake Sammamish, begins 14 miles from its outlet in the steep headwaters of the southern Issaquah Creek Basin. Historically, it flowed through a combination of dense forest and complex wetlands before arriving at Lake Sammamish – a large freshwater lake northeast of present day Seattle in King County. The creek provided unobstructed spawning and rearing habitat for fish and wildlife species, including anadromous salmon. Specifically, chinook, coho, sockeye, native cutthroat, kokanee, steelhead and bull trout were among those species found in this area.

In the late 1800's early settlers began modifying the upper and lower basin landscape and tributaries for forestry and agricultural activities respectively. As development continued, these practices have gradually been replaced by dispersed residential development in the upper basin and in the lower basin the City of Issaquah. Although the basin retains high quality habitat and abundant populations of fish and wildlife – in comparison to other basins in King County, there have been notable decreases in the production of fish and wildlife from historic levels in Issaquah Creek as well as decreased hydraulic stability of the creek – increased flooding, and decreased water quality.

In 1936, in response to growing demands of fish resources and diminishing returns, the Washington State Department of Fish and Wildlife began supplementing salmon production through operation of the Issaquah Salmon Hatchery as a salmon production facility located in the Lower Issaquah Creek subbasin, within the City of Issaquah. Two dams were constructed to support the hatchery, the lower dam or “barrier dam” located at the hatchery site and an upper dam, “diversion dam”. This project focuses on the upper dam – and its associated fish passage problems.

Current Condition:

The intake structure or diversion dam, located ½ mile upstream of the hatchery, has supplemented water intake at the hatchery since 1960. The diversion dam, diverts creek flow to create the elevation head necessary to deliver a gravity flow water supply to the hatchery. The intake structure consists of a wooden dam and spillway with concrete apron. To the east of the dam is a fish ladder, consisting of an 8 step pool and weir type with pool dimensions of 5x5 ft extending the length of the concrete apron, a water bypass, and intake screen of 182 square ft, with 1/8” openings (see figure 2); to the west is a concrete retaining wall. The dam is 50 ft in length 25 ft wide and approximately 5 ft high. In 1972 the gravity intake was reconstructed, the walls at the intake were raised one foot, two additional pools were added to the fish

ladder, and a new screen structure incorporated. Since then, no structural modifications have been done.

The intake and its associated fish ladder currently present a challenge to migrating juvenile and adult salmonids restricting access to at least 10 miles of prime spawning and rearing habitat. The fish ladder has inadequate flow velocity, slope, and screening. During floods the area around the intake erodes and the fish ladder becomes plugged with sediment impeding migration. The concrete apron in front of the intake dam attracts adult fish during times of low flow. Once fish jump on to the apron they can become stranded. The bypass water flow is detrimental to juvenile fish passage – as it was originally designed for flushing the screen box of sediment and debris and falls between 6-8 feet to rocks below. The intake screen has insufficient approach and sweeping velocities; during low flow when little water is bypassed, the intake chamber traps juvenile fish.

Purpose of Project:

The primary objective of this project is to provide improved juvenile and adult fish passage over the Issaquah Salmon Hatchery intake dam to improve spawning success of salmonids and reduce the mortality of juvenile and adult fish. By doing so, we will significantly improve juvenile and adult salmonid survival in Issaquah Creek and the larger Lake Washington Ecosystem.

Problem Identification:

During both high and low flows the upper intake system (dam, fish ladder, and intake structure-with screens and water bypass) creates barriers to fish passage.

Infrastructure is inadequate, requires high maintenance, and is largely dysfunctional.

The project will address the following problems:

- Dam: 1) concrete apron, attracts adult fish during times of low flow 2) right abutment, destabilized by eroding waters 3) spillway, clogged with sediment, high maintenance, unstable
- Fish Ladder: 1) ladder, too steep, impassable during high and low flows 2) attractant flow, inadequate
- Intake Structure: 1) screening, 2) juveniles trapped in intake area, 3) inappropriate sweep velocities, and 4) inadequate fish by-pass return.

Expected outputs and how these will be measured:

The proposed fish passage improvement project will significantly improve juvenile and adult salmonid survival in Issaquah Creek. Current conditions at the dam cause high mortality to juvenile salmonids passing over the spillway during spring flows due to the 4-6 ft drop onto the concrete seal below the spillway, along with the 6-8 ft drop at the downstream end of the gravity intake. By creating a gentler slope below the spillway and installing a chute on the downstream end of the intake, we can expect juvenile survival over the structures to be between 90-98%. Releasing a group of hatchery test fish immediately above the structure to be tested, recapturing the fish, and examining them for injury could easily test these improvements.

Adult salmonids encounter several obstacles at the diversion dam that impede migration. First, they have difficulty at the fish ladder entrance due to poor location and inadequate water depth. Second, they have difficulty ascending the fish ladder, due to high water velocity, limited depth, steep slope, and inadequate pool size. Ideally project improvements could be measured by comparing past spawning surveys and redd counts to surveys and redd counts conducted after improvements are made. Unfortunately, however, we only have anecdotal information regarding adult passage and no spawning surveys and redd counts. Therefore, we propose to conduct spawning surveys and redd counts prior to and following project construction. Observation of the improved spillway could address the fall back and apron stranding issues that are present with the existing project. This could be conducted inexpensively, by monitoring the site during the peak of the chinook and coho run for a few hours a day.

Project Benefits:

This project would improve fish access to approximately 10 miles of prime fish spawning and rearing habitat even during periods of low flows. It will provide critical habitat in a basin where urbanization and development is destroying other such habitat opportunities. This project would reduce juvenile mortality. The Puget Sound chinook, and possibly the Puget Sound bull trout which are listed species along with many other species such as coho, sockeye, kokanee, and steelhead will directly benefit from this project. The majority of chinook that enter the Lake Washington watershed spawn and rear in Issaquah Creek, Cedar River or Bear Creek. It is suspected that the Cedar River or Issaquah Creek are the only tributaries of the Lake Washington watershed where bull trout spawning populations are likely to occur. By improving fish passage at the project site, critical spawning and rearing habitat will be accessible for these listed species.

Importance of proposed outputs:

Issaquah Creek provides habitat for the Puget Sound chinook and may potentially provide habitat for the bull trout, both of which are threatened species. In addition, the Puget Sound coho a candidate species, kokanee a Washington state listed endangered species, along with other fish species including sockeye, steelhead, and cutthroat trout will benefit from this project.

Future Condition:

Without modifying the dam, fish mortality will continue – both adult and juvenile, upstream passage will continue to be inefficient, and with the current trends of development, spawning and rearing opportunities will continue to decrease. Given the historic loss of habitat in the Issaquah Basin, and the resulting declines in chinook and kokanee production, continuation of the current system could severely limit any hopes of future chinook recovery and overall salmonid production in the Basin.

Relationship of proposed project to other projects and plans:

The proposed restoration project is consistent with the Lake Washington General

Investigation (GI) study currently being conducted by the Corps of Engineers, King County and the City of Seattle. The Lake Washington GI is investigating ways to improve the environments of the Lake Washington, Lake Sammamish, and Cedar River basins primarily focusing on anadromous species. In addition, the proposed project is consistent with strategies for recovery of imperiled stocks developed in the Draft Water Resource Inventory Area by King County and the Watershed Resource Inventory Area (WRIA) 8 recovery team.