

Date: August 17, 2001
Division: Northwest
District: Seattle

Issaquah Creek Fish Passage Facility Section 206 Preliminary Restoration Plan

1. Project:
Issaquah Creek Fish Passage Facility

2. 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).

3. Description of Proposed Project:

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 As development continued, these practices have gradually been replaced by dispersed residential development in the upper basin and in the lower basin the City of Issaquah.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 fish passage over the Issaquah Salmon Hatchery intake dam and by doing so reduce the mortality of juvenile and adult fish.

Proposed Project:

The proposed project consists of modifying the intake dam to provide more efficient fish passage. Modifications include:

- Stabilize right abutment of dam
- Install a more fish friendly intake screen that meets present criteria, adding a chute to free juveniles unharmed that get trapped
- Modify the down stream slope of the dam by replacing the boards or reshaping the concrete apron to increase slope
- Install a new fish ladder that meets current WDFW and NMFS criteria, with extended length and gentler slope
- Install adjustable slot to the fish ladder to insure all water during low flow goes to the ladder rather than the dam to reduce fish attraction to the apron

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.

Alternatives: In addition to the preferred alternative, listed here as number 2, we will consider no action and a more limited action plan.

1. The No Action Alternative:

No action would allow the current high mortality rate of juvenile and adult salmonids to continue and limit the availability of prime habitat for spawning and rearing.

2. The 2nd Alternative, the Preferred Alternative

The preferred alternative has three major components: 1) modifications to the fish ladder, 2) concrete apron / right abutment/ spillway, and 3) intake screen and water bypass.

These are discussed separately below.

- Fish ladder: The current fish ladder with pool lengths measuring 5 ft wide/ 5 ft long would be removed and replaced with a new fish ladder with pools measuring 8-10 feet long and 6-8 feet wide; current regulation set these minimal standards. We would use a “pool and chute” design to accommodate the short run of river available for the fish ladder rather than a vertical slot ladder design – which would require wrapping around the water intake structure to make up for longer pool lengths. The fish ladder would extend above the dam spillway– rather than adjacent to, to prevent fish from falling back over the dam, and be protected with a trash rack. We would install an adjustable slot to the fish ladder to insure all water during low flow goes to the ladder rather than the dam to reduce fish attraction to the apron. Fish ladder removal and associated sediment loading and water bypass during construction would be issues to resolve in feasibility.
- Concrete apron/ spillway/ right abutment: The concrete apron would be raised by at least 1.7 feet with concrete additions placed on the current apron. It would be sloped downward toward the attractant flow of the fish ladder, acting as a velocity barrier to sweep fish downstream of the vicinity of the fish ladder entrance. The edges would be rounded to reduce scour. The boards on the spillway would be replaced to decrease slope and create a standard ogee face spillway. The option of using concrete instead of wood for the spillway would be investigated in feasibility. The rt abutment would be stabilized to prevent flow from circumventing the current abutment and eroding the bank. We would also investigate cost sharing responsibilities to determine federal and state responsibilities for spillway modifications.
- Intake, intake screen and flume: The intake would be reconstructed to meet WDF&W criteria for sweeping and approach velocities of a maximum of .4 ft/s and a sweeping velocity of equal to or greater than .4 ft/s. The intake wedgewire screen would be

replaced with a new screen with 1.755 mm width between bars, which meets current screen opening criteria and would reduce juvenile passage and/or we would add a flume to the downstream end to transport juvenile fish safely to the river below the dam. We would investigate cost sharing responsibilities to determine federal and state responsibilities for feasibility.

3. The 3rd Alternative:

This alternative would include those actions in the preferred alternative minus replacement of the intake structure system; it would still include the replacement of the intake screen.

4. The 4th Alternative:

This alternative would remove the dam and fish ladder leaving the stream free of obstruction. This alternative was rejected because the Issaquah Salmon hatchery depends upon the water from the intake to supply 50% of their needs. If the intake were removed, the hatchery could no longer function. Also, WDFW, the project sponsor, has no interest in this option for dam removal. It was also rejected due to the erosion and head cutting predicted upstream of the dam, which would destabilize banks and threaten a housing development.

LER:

The proposed project area is comprised of approximately 0.21 of an acre. The Non-Federal Sponsor, Washington State Department of Fish and Wildlife, owns and operates the hatchery, and the lands for the proposed project. The proposed construction associated with modifying the current intake structure or diversion dam consists of 0.05 acres and is located ½ mile upstream from the hatchery. A temporary work area easement will be used during construction and consists of 0.06 acres. Access to the project site as identified in the project location map is located ¼ mile upstream from the hatchery and westerly of Issaquah Creek, consisting of 0.10 acres. The preliminary value of lands within the project footprint has been estimated at \$2,200.00. Reference the following table for a summary of property interests, estimated values, and estimated Non-Federal Sponsor's costs for project implementation.

**SUMMARY OF NON-FEDERAL SPONSOR'S
ESTIMATED LER COSTS**

ESTATE	ACRES	ESTIMATED VALUE
Fee	0.05	\$1,000.00
Permanent Access Easement	0.10	\$1,000.00
Temporary Work Area Easement, (8 months)	0.06	\$ 200.00
Subtotal Land Values	0.21	\$2,200.00
Non-Federal Sponsor Admin Costs	--	\$7,000.00
Total Non-Federal Costs	--	\$9,200.00

Contingency 25%	--	\$ 2,300.00
TOTAL	0.21	\$11,500.00

Corps Real Estate staff effort for coordination of LER certification and final accounting activities is estimated at \$11,300.00, which includes a 25 percent contingency [\$9,000 + \$2,300].

A list of those issues to be addressed in the next phase are summarized below.

- Identify ownership of creek bed.
- Investigate and determine project impact to existing utility line, possibly serving the dam.

The impact of project changes will be reviewed in the next phase. Actual crediting of land values will be based on a crediting appraisal provided by the Non-Federal Sponsor that follows federal appraisal principles, values the minimum property interests determined necessary to support construction, operation and maintenance of the project, and based on the value of the lands as of the date the NFS certifies the lands available to the COE. All lands must be certified available before advertising for construction.

4. Consistency Statement: Not applicable for a Section 206 project

5. Views of Sponsor:

The Washington Department of Fish and Wildlife (WDFW) is the Sponsor for this project. WDFW's letter of intent dated April 18, 2001 is attached as enclosure 1. WDFW will make available all of the lands required for project implementation. WDFW has received a copy of the PRP and is in agreement with it and aware of the estimated project cost. WDFW intends to sign the PCA at the appropriate time, cost share the project, and willing and able to assume responsibility for project O&M.

6. Views of State, Federal and Regional Agencies:

The proposed restoration project has a very high level of support from both the public and local agencies. It offers an excellent opportunity to restore access to salmonid species, including those threatened and will act as a critical milestone in fish habitat restoration. Support for this project has been expressed by Washington State Department of Fish and Wildlife (WDFW), the project sponsor, WRIA 8 (Water Resource Inventory Area), City of Issaquah, FISH (Friends of Issaquah Salmon Hatchery), and King County. Letters of support accompanying this report are from FISH, and the City of Issaquah.

7. Environmental Compliance Requirements:

The project will be compliant with all applicable regulatory requirements. An Environmental Assessment and FONSI, 404 (b)(1) analysis, 401 water quality certification, Coastal Zone consistency determination, Cultural Resource Assessment, Fish and Wildlife Coordination Act concurrence, and Biological Assessment (BA) will be completed for the project. The majority of coordination and permits will be completed during the Planning and Design phase. All environmental compliance will be completed prior to commitment of construction funds. The project sponsor is also expected to acquire the following environmental

coordination: 1) Clear and Grade Permit (County); 2) [Section 106] (CTED-OAHP); 3) Hydraulics Project Approval (WDFW); 4) SEPA; and 5) Shoreline Permit (County).

8. Costs and Benefits:

Costs: The estimated project implementation cost is \$1,005,000. The estimated Non-Federal share is \$352,000, and the estimated Federal share is \$653,000.

OMRR&R: The non-Federal sponsor will be responsible for OMRR&R, currently estimated at \$1,000 per year.

Benefits: This project would provide improved access to 10 miles of prime spawning and rearing habitat for salmonids including the listed chinook salmon and state listed endangered kokanee Salmon. It would significantly reduce juvenile and adult fish mortality at the intake site.

9. Schedule:

Submit PRP	August 2001
Initiate and Complete Feasibility	September 2001-June 2002
Initiate and Complete P&S	July 2002 – June 2003
Initiate Construction	June 2003
Complete Construction	December 2003

Supplemental Information:

Monitoring:

We would assess juvenile survival rates by releasing a group of hatchery test fish immediately above the fish ladder/dam, allow passage through the structure, then recapture them below the structure and examine for injury. This technique would be conducted for the spillway, the intake bypass, and/or the structure as a whole.

We would assess adult passage improvement and survival by conducting spawning surveys above the fish ladder before and after project improvements. In addition to spawning surveys, we would address the fall back and apron stranding issues that are present with the existing structure by visual observation of the improved spillway. This could be conducted inexpensively, monitoring the site during the peak of the chinook and coho run for a few hours a day.

Total monitoring efforts are estimated to cost \$9,400. This is .9% of the total implementation cost.

In-kind Services:

0\$ are estimated at this time to be provided as in-kind services.

11. Financial Data:

a.	Total	Non-Federal	Federal	FY01	Federal Funding Needs		Balance
					FY02	FY03	
PDA Phase	\$ 364,000	\$ 0	\$364,000	\$3,000	\$285,000	\$ 76,000	
Construction	\$ 641,000	\$352,000	\$289,000			\$200,000	\$89,000
Total	\$1,005,000	\$352,000	\$653,000	\$3,000	\$285,000	\$276,000	\$89,000

b. Non-Federal Requirements:

LERR	\$ 11,500
Cash	\$340,000
Work –in-kind	\$ 0
Annual OMRR&R	\$ 1,000

c. Fully funded cost estimate: \$1,005,000

12. Federal Allocations to Date: None