LEWIS CREEK DELTA

Location:	Lewis Creek (tributary to Lake Sammamish), City of Issaquah, King County, WA. WRIA 8.
Proposed Action:	Restore natural shoreline by re-grading the beach to a shallower slope, and adding a combination of wave energy dissipaters and plantings to retain finer sand material. Install bank and riparian habitat features near the mouth of the creek to help maintain a consistent channel grade across the beach.
Species Benefiting:	Chinook, kokanee

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Kokanee/Chinook Restoration Feasibility Assessment in the Sammamish Watershed

Map A - Lewis Creek - Delta Restoration Project

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Project 0-915-17013-0

Sanitary sewer
Storm sewer
Water utility
Contour
Watercourse
Parcel

0 50 100 Feet

Lewis Creek - Delta Restoration Project:

Restore natural shoreline by re-grading the beach to a shallower slope, and add a combination of wave buffers and plantings to retain finer sand material. Install bank and riparian habitat features near the mouth of the creek to help maintain a consistent channel grade across the beach.

SITE BACKGROUND

Lewis Creek flows from its headwaters on the flank of Cougar Mountain, down to the southwestern shore of Lake Sammamish, Washington. The watershed is partly forested but has been developed over the past 20 years for residential purposes. The creek passes under Interstate 90 at the Lakemont Boulevard exit where a substantial culvert and detention pond are used to control stormwater runoff. Above I-90, the creek flows within the City of Bellevue; downstream the creek is within the City of Issaquah. Flows are typically less than 10 cfs, but heavy winter rains can generate flows over 200 cfs.

At the mouth of Lewis Creek, the stream flows under a small two-lane bridge at 187th Ave SE, along the boundary between two private residential lots, and across a narrow beach to the lake. The gradient in this reach is low and, as a result, the channel bed has aggraded with coarse gravel and fine sediments to the point of being only one to two feet in depth. When the creek rises, it floods the adjacent lots. The stream course and location of the mouth have changed frequently over the years, and the problematic nature of its shifting and flooding have caused the property owners to take action by reinforcing the banks to train the stream within a consistent channel. Root wads and other pieces of large wood were installed four years ago. Sand bags and rip-rap are used in addition to the wood structures.

Where the creek flows into the lake, a gravel bench protrudes four feet from the ordinary high water mark and then drops steeply down below the lake level. The area of exposed beach varies slightly at different lake levels and is primarily characterized by coarse gravel, with virtually no fine sediments. Under the stream's current configuration, a 10 inch drop within the channel located approximately 10 feet upstream from the beach (Figure 1), prevents any upstream migration by juvenile fish, especially at lower lake levels common during the spring and summer when Chinook smolts could potentially use the lower portion of Lewis Creek for rearing and refuge. At low lake levels, the beach itself may act as a passage barrier because of the steep gradient, and the hyporrheic flow caused by the coarse beach material.

IMPORTANCE FOR KOKANEE AND/OR CHINOOK POPULATIONS

Lewis Creek is highly significant for both kokanee and Chinook salmon. It is one of only three streams in the Lake Sammamish basin that consistently receive spawning late-run kokanee. Lewis Creek, downstream of the I-90 culvert provides the longest accessible spawning reach in the basin - approximately 0.75 miles (Berge and Higgins 2003). Spawner surveys in Lewis Creek from 1996 to 2007 documented kokanee escapements ranging from 10 to over 3,000 fish with an average of 565 spawners each year (Jackson 2008 as presented in HDR 2009). This represents, on average, almost two thirds of the entire late-run. The Creek is also an important part of the emergency supplementation program which collects broodstock from, and releases fry to Lewis Creek.

Figure 1.

Due to its proximity to Issaquah Creek, the delta, and lower reach of Lewis Creek are important non-natal rearing habitat for juvenile Chinook seeking refuge from predation and high lake temperatures while they migrate out to sea (Tabor, personal communication).

LIMITING FACTORS

For kokanee, the primary limiting factor in this reach is access to spawning habitat. While the steep beach may restrict upstream passage when lake levels are low, it is unlikely that these conditions would exist during the late-run spawning season, which is generally from November through January. However, even at intermediate lake levels, upstream passage may be partially impeded by a 10 inch drop upstream from the beach.

For Chinook, the delta and mouth of Lewis Creek have the potential to provide ideal rearing habitat. However, in its current configuration this area has very limited habitat value due to the coarse

substrate, lack of emergent vegetation, and steep gradient of the beach. Furthermore, the beach and previously described drop prevent juvenile Chinook from accessing high quality non-natal habitat in the lower reach of Lewis Creek.

While it may be impossible to address the larger, watershed-wide problems on Lewis Creek at the local, site-specific level, it is important to consider that the current conditions are in many ways symptoms of problems that occur upstream. Flashy flows and high rates of sediment transport are characteristic of watersheds undergoing a transformation of land uses. These issues may be most effectively addressed in the planning stages; however, other projects within this portfolio have been proposed to ameliorate these systemic problems through engineering solutions.

PROPOSED ACTION

The objective of this project is to develop a consistent stream course that will maintain a low flow channel and connection to the adjacent floodplain in the lower reach, and to restore the beach to more natural conditions that will provide optimal Chinook rearing habitat. The instream work will be accomplished by the placement of two to three key pieces of large wood near the mouth that will create pools, control the grade, and encourage scouring of stream mouth to maintain sufficient depths for fish passage. The beach work will include installation of wave energy dissipating structures, such as boulders or logs, the placement of finer sediment at a gently sloping gradient into the lake, and planting emergent aquatic vegetation and riparian species.

EXPECTED BENEFITS

The project will remove the drop that currently impedes upstream migration by spawning kokanee. The project will also significantly improve the nearshore and stream mouth habitat used by juvenile Chinook salmon as non-natal rearing areas. By re-grading the beach and installing wave energy dissipaters, the stream will course more gradually into the lake, allowing small fish to access habitat in the lower creek even when lake levels are low.

Additional benefits may include a reduction in the frequency with which the creek overtops its banks and floods adjacent properties.

SELECTION CRITERIA SCORING MATRIX RESULTS

Category	Basic Question	Scoring Question	Score	Justification
Location	In which stream and reach is the project located? What is the historical and current significance for kokanee and/or Chinook?	What is the historical and current significance of the site for **kokanee**?	10	Identified as an historically and currently important kokanee stream and is part of the supplementation effort
		What is the historical and current significance of the site for **Chinook**?	10	Proximity to Issaquah Creek gives potential for use as non-natal stream mouth; anecdotal evidence of historic use for spawning
Limiting Factors	Would the project address specific limiting factors?	How well does the project address factors limiting **kokanee**?	7	Project would remove barriers and ensure access to spawning habitat
		How well does the project address factors limiting **Chinook**?	6	Site is believed to have high potential to provide shoreline and non-natal stream mouth rearing area
Watershed Context and Condition	Is project success dependent on conditions elsewhere in the watershed?	Do surrounding land uses and/or management strategies lead to constraints (or opportunities) for the proposed restoration? Examples: water quality, sediment, flow regime, fish access, riparian vegetation	5	Other factors (upstream) will continue to constrain benefits to kokanee and Chinook
		Who owns project area and is long-term protection ensured?	4	Private Residential, unknown level of support
		Who owns neighboring parcels? What land uses occur upstream and/or downstream that could be affected by restoration? What risks do those uses pose to the site now and in the future?	5	Private Residential
Costs	How expensive will proposed action be? What is the likelihood for funding?	What is the order of magnitude cost estimate?	7	Rough estimate of total project cost =$150K
		Are matching funds available?	4	Unsure of funding strategy; strong candidate for Chinook recovery funds
		Are specific grants or appropriations in mind that would be likely to fund this type of project?	4	Unsure of funding strategy
Socio-Political	What other considerations will determine feasibility of implementation?	Does the project have public support and/or support from the local jurisdiction?	8	Project identified in reports for the City and in Chinook plan.
		Does the project have landowner support?	5	One of two landowners is supportive; other landowner not yet contacted
		Does the project utilize or create public access?	1	No

Existing gravel bar at the mouth of Lewis Creek

Proposed log installation and emergent vegetation