

City of Bellevue Watershed Management Plan



Lake Sammamish Watershed Assessment

EXECUTIVE SUMMARY

Purpose of This Assessment

The purpose of this report is to assess the conditions in the portion of the Lake Sammamish Watershed within the City of Bellevue that are limiting the health of its streams. This assessment includes the evaluation of potential limiting factors that describe the primary effects of urban runoff on streams and their consequences for stream health.

The City is preparing a series of Watershed Assessment Reports (ARs) that will provide the basis for the recommended actions to improve stream health culminating in a city-wide Watershed Management Plan (WMP).

One AR will be prepared for each major watershed in the City of Bellevue (City): Coal Creek, Greater Kelsey Creek, the Lake Sammamish tributaries within Bellevue (including Lewis Creek), and the small Lake Washington tributaries within Bellevue.

In addition to the watershed condition assessment, each AR will include limiting factors, data gaps (if any), and identified opportunities for improving in-stream watershed conditions. The ARs are based on data from three primary sources: 1) the recent Open Streams Condition Assessment (OSCA) performed by the City; 2) existing data collected by the City from past projects and ongoing monitoring efforts; and 3) existing project and environmental monitoring data collected by the City and a variety of public resource agencies.



Watershed Management Plan
Our streams, our future

Description and History of the Lake Sammamish Watershed Within the City of Bellevue

The area draining to Lake Sammamish within the City of Bellevue has been broken down into ten subbasins and areas. (A subbasin generally includes open channel streams whereas an area may have several individual discharge locations to its receiving water body and may either be piped or open channel.) The Lewis Creek and Vasa Creek subbasins are the largest within the City portion of the Lake Sammamish Watershed. The City refers to all the other subbasins and areas but Lewis Creek and Vasa Creek as the “lesser tributaries to Lake Sammamish” because of their relative size. The Ardmore/Idylwood Creek Area and Redmond 400 Area both drain to the City of Redmond before discharging to Lake Sammamish.



Each of the subbasins and areas draining to Lake Sammamish are steep with narrow but intact riparian areas, often in ravines. Many of the subbasins and areas have large tracts of City-owned property in the form of City Parks. Interstate 90

(I-90) runs east-west through the Vasa Creek and Lewis Creek subbasins and the South Sammamish area. Similar to the other watersheds within the City of Bellevue, the subbasins and areas that drain to Lake Sammamish have been affected by urban development, yet much of this development is residential with little to no industrial/commercial land use, so these subbasins and areas have been less affected than other subbasins and areas within the City. That said, because of the relatively steep channel slopes, runoff from impervious surfaces causes issues with channel scour and erosion.



Streams in the Lake Sammamish Watershed have been highly affected by urbanization, including altered riparian vegetation, high-flow bypasses, dams, detention facilities, ditching and confinement by roadways, and long stretches that are piped underground. Dense residential development surrounding the majority of the Lake Sammamish shoreline has resulted in the installation of bulkheads and other shoreline armoring to reduce potential erosion along the lakeshore. Due to the steep topography found in much of the Lake Sammamish Watershed, many of the tributaries have naturally confined floodplains and long sections of piped stream that alter sediment transport and convey high-velocity flows that result in channel incision and streambank erosion.

Human intervention in proximate waterbodies has affected the Lake Sammamish Watershed. In the late 1800s, the outlet of Phantom Lake was diverted to Lake Sammamish. Human use and activity within the City's portion of the Lake Sammamish Watershed includes unauthorized encampments, recreational use of riparian areas, roadway and vehicle pollutants, and numerous other urban residential pollutants which all have the potential to negatively impact water quality.

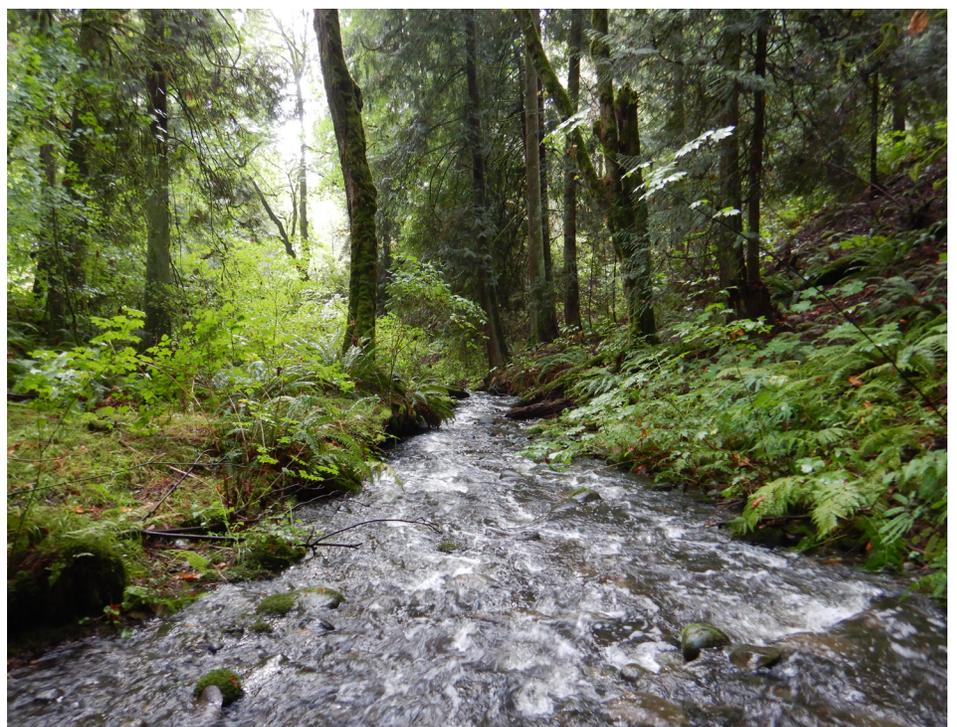
The Lake Sammamish Watershed also has a number of regional stormwater facilities and high-flow bypasses and smaller detention facilities. High-flow bypasses are designed to divert high stream flows during extreme flow events out of the main channel and into storm drainage pipes that carry these flows away from vulnerable areas. The high-flow bypasses in the Lake Sammamish Watershed were implemented to reduce erosion and flooding downstream but may have potential negative effects on fish populations, particularly when sediment and debris accumulation and streambed aggradation result in base flows being diverted out of the stream channel. Additionally, high-flow bypasses can substantially alter sediment transport dynamics (often starving a stream of bed material) and channel morphology where bypassed flows reenter the stream channel, and throughout the portion of stream that is bypassed.

Given the generally steep topography in the Lake Sammamish Watershed, off-channel habitat is naturally limited, therefore restoring lost off-channel habitat where possible, particularly around the creek mouths, is an important consideration. The Lake Sammamish Watershed subbasins include multiple areas that are designated as a priority aquatic and terrestrial habitat by the Washington State Department of Fish and Wildlife (WDFW 2021c). Weowna Park (which extends throughout the North Sammamish Area, Phantom Creek Subbasin, and Spirit Ridge Area) and Lakemont Community Park and Open Space (within Lewis Creek Subbasin) are designated as priority terrestrial habitat. Lewis Creek, Vasa Creek, Phantom Creek, and Phantom Lake are designated as priority aquatic habitat for various salmonid species.



The natural topography of the Lake Sammamish Watershed limits fish use, and subsequently there is limited fish use data for the tributaries within the watershed. In many of the subbasins/areas, salmonid species do not go farther upstream than the tributary mouths at Lake Sammamish. However, in three subbasins and areas (*i.e.*, Lewis Creek Subbasin, Vasa Creek Subbasin, and the South Sammamish Area), salmonids are present, with Lewis Creek and Vasa Creek being the best-studied "fish" streams within the Lake Sammamish Watershed.

The Lake Sammamish Watershed is important for salmonids, as it has historically provided extensive spawning and rearing habitat for a larger number of anadromous and migratory



salmonids and other fish species. Priority fish species within Lake Sammamish Watershed, as designated by WDFW, include Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*Oncorhynchus kisutch*), Sockeye Salmon (*Oncorhynchus nerka*), and resident Cutthroat Trout (*Oncorhynchus clarkii*). Chinook, Coho, and kokanee (lake-dwelling *Oncorhynchus nerka*) salmon are City of Bellevue Species of Local Importance, per Bellevue Land Use Code 20.25H.150A. Additionally, Chinook Salmon are a listed Federally Endangered Species. Lake Sammamish kokanee have been the topic of significant study and investment, a recent partnership between the Cities of Bellevue, Issaquah, Redmond and Sammamish, the Snoqualmie Tribe, and King County was formed to help recover kokanee salmon.

Factors that Limit the Health of the Lake Sammamish Watershed Within the City of Bellevue

The following were identified as limiting factors for the City of Bellevue portion of the Lake Sammamish Watershed, in general order of importance across all ten subbasins and areas within the Watershed:

- 1. Stormwater Runoff from Effective Impervious Surfaces:** Increased stormwater runoff flow rates and volumes during storm events from impervious surfaces in the Lake Sammamish Watershed, in combination with historic channel alterations for flood risk reduction purposes or land development, are contributing to negative effects on water quality and instream habitat quality, including fish and wildlife habitat. Although the City required stormwater flow control for new development beginning in the mid-1970s, facilities designed and built through the mid-1990s have been shown to be not very effective at protecting streams from erosion and other negative effects of runoff.
- 2. Pollutant Loading:** Stormwater runoff from impervious surfaces (Limiting Factor #1) causes erosion from higher flows, and transports pollutants (metals, nutrients, fecal coliform, and others) associated with urban development that are detrimental to the health of aquatic organisms and people. Road runoff, illicit discharges, and possibly septic systems are the likely sources of these pollutants.

3. Road Culverts and Other Physical Barriers:

A number of physical barriers to fish passage have been identified throughout the Lake Sammamish Watershed. In addition, there are undocumented barriers on private properties throughout the Watershed. These barriers prevent fish from accessing areas for spawning and/or rearing, effectively reducing their activities to areas of the stream downstream of these barriers.

- 4. Loss of Floodplain and Riparian Function:** Urban development has confined many of the stream reaches in the Lake Sammamish Watershed. This effectively reduces the amount of floodplain storage and reduces wood from entering the stream, leading to high velocities and flowrates with limited channel complexity. Since many of the streams in the City's portion of the Watershed flow through ravines, the riparian canopy in these ravines have remained intact, though is often very narrow with limited or no buffer.

Past and Present Investments in the City's Portion of the Lake Sammamish Watershed

The City has implemented in-stream projects that include repairing stormwater outfalls, stabilizing stream slopes, removing fish passage barriers, catching and removing fine sediment, and improving conveyance. The City has also invested in protecting critical infrastructure.

Future Opportunities

Future investments in the City's portion of the Lake Sammamish Watershed will address the limiting factors identified here and include both in-stream investments and investments in the contributing areas so as to address the pollutant loading and stormwater runoff challenges in the Watershed.