Willowmoor Floodplain Restoration Project
Frequently Asked Questions

2/26/19

FLOOD BENEFIT

How do wetlands benefit Lake Sammamish, and which legislation protects them?

Lake-fringe wetlands provide a variety of benefits including erosion protection, water quality improvement, and critical habitat for migratory birds and federally protected fish species. These wetlands are protected by the federal Clean Water Act and Endangered Species Act, the state Shorelines Management Act and Hydraulic Code, and the critical areas regulations of the four lakeshore municipalities surrounding Lake Sammamish.

Why is maximizing flood protection for lakeshore residents so constrained by wetlands protection criteria?

Development of the Sammamish River basin from the late-1800s through 1960s involved various individual, municipal, county, and federal drainage projects that eliminated thousands of acres of wetland habitat. The north shore wetlands of Lake Sammamish are among the last remnants of wetlands in the valley and among the highest quality wetlands of those that remain. They exist on a relatively flat lakeshore area compared to the rest of the lake shoreline to the south.

A reduction in the lake level could result in twenty or more additional acres of lost wetland habitat at Marymoor Park, and more losses at Lake Sammamish State Park and other smaller lake-fringe wetlands. It is very unlikely that regulatory agencies would permit lowering lake levels to reduce shoreline flooding around the lake outside of the dormant season for wetland plants because of the resulting wetland impacts. The cost of wetland mitigation through in-lieu-fee programs starts at $40 per square foot for low quality wetlands, putting the cost estimate for mitigating wetland impacts at this scale at more than $200 million dollars.

ORDINARY HIGH WATER MARK

How will the project establish an ordinary high water mark for permit applications at the lake scale when high lake elevations differ geographically?

Ordinary High Water Mark, or OHWM, is a point on the land that varies from place to place, and it can move up or down in elevation over time. OHWM is typically determined based on a “weight of evidence” approach using field-based observations of indicators such as water stains, organic debris lines, and the presence of wetland vegetation that indicate the zone where high water is typically found. Mature wetland vegetation is particularly important for determining OHWM because wetland plants have specific tolerances for minimum and maximum soil moisture and flooding duration and frequency. Wetland plants may tolerate a few seasons of changed hydrology, but not decades. While OHWM is not a static lake elevation nor a line, when physical indicators on the land do not provided adequate evidence to pinpoint an OHWM, the point on the land corresponding to the mean high water elevation may be used as proxy for an OHWM.

On a lake, the OHWM is frequently concurrent with the lake-fringe wetland boundary. Three lines of evidence may be used to determine the OHWM at locations around Lake Sammamish for the Willowmoor project: 1) New wetland delineations in the project area and Marymoor Park, 2) Recent permitting documentation from local jurisdictions that includes wetland or OHWM delineation, and 3) Modeling results of mean high water, where OHWM in a specific location cannot be readily determined.

How are you accounting for the difference between the weir gage and the USGS lake gage?

The difference is predominantly due to energy losses occurring within the outlet channel (between the lake and weir). The loss in energy occurs in the outlet channel because the water is moving (has a velocity and is accelerating), whereas the water in the lake is essentially static. The differences due to this physical phenomenon are not constant, as they are primarily influenced by the weir, lake level, and vegetation management (hydraulic roughness) within the transition zone, or TZ.

The project hydraulic model is set up to account for the physical energy losses within the outlet channel, as well as routing of hydrologic inputs (i.e. creek inflows and rainfall) to the Lake, and provides a reasonably accurate representation of lake levels along shoreline properties. Differences potentially attributed to the influence of wind on water levels (fetch) are not included, as they are considered to vary significantly in both space and time. Attempts to accurately calculate potential fetch differences would require much more instrumentation and monitoring as well as applications of methods which are known to result in high degrees of uncertainty. The project team believes that the costs associated with these additional measures far outweigh the potential value added to the project.

What is the difference between OHW and the OHWM?

Ordinary high water level or stage is the elevation of the mean, or average, high water on a lake or river system. OHW is calculated using gage data, and depending on site conditions the 1.5 to 2–year recurrence interval is an appropriate statistic for estimating OHW. In contrast, the ordinary high water mark, is a mark upon the land that is determined by visible indicators during field studies. Ecology notes that OHWM is not a static location, but rather a mark upon the land that may change over time in response to a number of factors including, but not limited to: accretion, activity of beavers, consistency of pool elevations, erosion, groundwater, land-use changes, stormwater runoff, tributary inflows, waves, and wind. It is because of these factors that the OHW stage and OHWM elevations may vary along the shoreline of the same lake. The Willowmoor project will be required to document potential project impacts to the aquatic resources waterward of the OHWM for the entire lake. The Washington State Department of Ecology has the jurisdictional authority to review and approve OHWM determinations.

A December 6, 1965 Disposition Form of the US Army Corps of Engineers designated 27 feet as the elevation for Ordinary High Water (OHW) for Lake Sammamish for permitting purposes. Why isn’t this project required to achieve that OHW elevation?

US Army Corps Disposition Form NPSOP-00 (1965) documents the 27 foot OHW determination and indicates that estimates for the pre-project OHW elevation ranged from 28 to 30 feet based on a “rough estimate of the elevation of the vegetation line around the lake.” The form states that the pre-project OHW elevation was likely to be on the lower end of that range as 30 feet was “probably high.” The OHW elevation was estimated to drop by two feet from 29 to 27 feet. The determination concludes with the statement, “Until we have records upon which to base a more accurate figure, I suggest elevation 27 feet as a best estimate.” A 27.0 foot ordinary high water elevation is also listed in 1981 Corps documentation that cites a gage location (USGS 12122000) located on a residential pier in the southwest quadrant of the lake (US Army Corps, 1981). Review of historical USGS 12122000 gage data showed annual exceedances of 27 feet for multiple concurrent days at this gage, so the justification of 27 feet as the 1981 ordinary high water elevation and the addition of a significant figure to the 1965 27 foot estimate is unclear.

Investigation of the hydrologic record by Northwest Hydraulic Consultants in 2014 indicates that the 27 foot estimate of ordinary high water was never realized and needs to be updated (King County, 2014). The 1960s US Army Corps estimate was based on a short period of record and an unscientific evaluation of the line of shoreline vegetation. We now know that Bear Creek peak inflow was not only underestimated at the time of project design, but has also increased over the last few decades, likely a result of development in the basin.

King County has documented that TZ vegetation management is one factor that can influence high lake elevations by reducing conveyance of lake outflow. It is possible that during some storm events in the brief period of reduced TZ vegetation maintenance (late 1990's to 2011) lake elevations may have been higher than they would have in a fully maintained TZ condition. During this same time period however, gage and precipitation records indicate that the backwater effect of Bear Creek and multi-day storm events more frequently influenced high water elevations than TZ maintenance (King County, 2014). Storm events in the mid-1970s, late-1990s, and 2015 demonstrate that extreme lake high water levels caused by stream and lake inflows can occur during the flood season for several days in a row and in concurrent years regardless of full TZ maintenance.

During the period of record, Lake Sammamish annually exceeds 27 feet in elevation for more than 14 days, the regulatory criteria for wetland hydrology. Ordinary high water marks currently tend to occur at elevations near 28 feet (NGVD29) at locations evaluated by King County and lakeshore cities in the last two decades. Three shoreline municipalities have established a default elevation for OHW above 28 feet for permitting purposes, Issaquah and Sammamish use 28.18 feet, Bellevue uses 28.2 feet. Field investigations of wetland vegetation and wetland hydrology in 2019, during a period of full TZ maintenance, document lake-fringe wetland presence and OHWMs at elevation 28 feet and higher.

ENDANGERED SPECIES ACT

What is an "action area" for ESA compliance, and how is it determined and approved?

An ESA action area is a biological determination of the reach of the proposed action on listed species. For Willowmoor, the action area will be defined by the geographic extent of biological impacts resulting from the construction and operation of the project. The US Army Corps Seattle District ESA coordinator has indicated that the action area for Willowmoor will likely include the project site and the Lake Sammamish shoreline wetlands up to the ordinary high water mark. The Corps, in consultation with USFWS and NMFS, has sole authority to determine the action area of the project, and will respond to the County's proposed action area by accepting it or requiring a revision.

Why doesn't Lake Sammamish have locks and a fixed OHWM like Lake Washington?

Federal documents from 1891 and 1916 declare that the requisite dredging to develop the Sammamish River for commercial navigation was not warranted at the time. In contrast, Lake Washington was determined to be desirable for commercial navigation. It was connected to Puget Sound through a series of canals with a depth that could accommodate commercial traffic, and locks that could control the lake to a level specific to the needs of commercial traffic.

What does navigability mean for the Sammamish River?

Navigable waters are regulated by the US Corps of Engineers, under Section 10 of the Rivers and Harbors Act of 1889. The definition of navigability of Corps facilities varies among projects ranging from commercial to recreational. The project General Design Memo, or GDM, (1962) and Operations and Maintenance Manual, or O&M Manual, (1964) indicate that navigation of the TZ would apply to small boats, however small boat is not defined. The O&M Manual offers a nuance to the GDM which clarifies that navigability may be seasonal with restricted passage from the lake to the river at summer low flow. County crews maintain the TZ to a navigable width of 15-feet, 3-feet wider than the inner channel width, to accommodate annual willow growth. Summer river depth can be shallow, often less than one foot.

Why is cold water supplementation being considered for this project, and how will it benefit fish?

King County and the US Army Corps of Engineers have been discussing the idea of cold water supplementation at the transition zone since 2002 when they partnered to develop the Sammamish River Corridor Action Plan. This action was recommended in the plan as a response to water temperature standards developed by the Washington Department of Ecology related to the Clean Water Act and the designation of Puget Sound Chinook as threatened under the Endangered Species Act in 1999.

The Sammamish River regularly exceeds state water quality standards (temperature) for core summer salmonid habitat (16°C), with a documented high of 27°C water flowing through the weir in the summer of 2015. Temperatures over 18°C are known to inhibit Chinook salmon migration, and temperatures of 21°C are known to kill Chinook salmon or cause developmental problems for egg and juvenile life stages. Cold water supplementation is an optional project element that may be implemented with partnership funding from the salmon recovery community. A small scale passive cold water supplementation alternative, such as enhancing hyporheic flow in the side channel may be included in the project as mitigation for construction impacts. A larger scale mechanized alternative would require substantial partnership funding from regional salmon recovery partners.