Habitat Use Surveys for Sammamish River

Eric Jeanes

Habitat alteration and/or loss has contributed to large-scale declines in the number and geographic distribution of both resident and anadromous fish species inhabiting the Pacific Northwest. Until the passage of the Environmental Protection Act in 1970, many large federal, state, and locally authorized flood control, hydroelectric, and irrigation projects served to alter the fish habitat in numerous rivers and streams in the Puget Sound. The Sammamish River also suffers from years of extensive modifications of its instream and riparian habitats. Beginning in 1916, the construction of the Lake Washington Ship Canal and Locks lowered Lake Washington approximately 9 feet and lowered Lake Sammamish by nearly 6, when the Sammamish River was free to meander across its floodplain, today municipalities, golf courses, a sewer pipeline, and the Sammamish River Trail, which is a popular recreation site for Redmond, Woodinville, and Bothell residents, border much of the river. Local sponsors have recently adopted a "multi-objective" management approach for the Sammamish River and have initiated the Lake Washington General Investigation Basin Restoration Study (GI) and several small-scale fish enhancement projects. Currently, little information is available on the periodicity and residency of juvenile salmonids in the Sammamish River.

This study was initiated to compare juvenile use of mitigation and restoration sites in the Sammamish River to their use of natural habitats in the Sammamish River. Monitoring also quantified the time period that juvenile salmonids inhabit the Sammamish River. Juvenile salmonid use was monitored in 22 sites during the 2001 study period using backpack electrofishing methods modified for use on the Sammamish River. The first survey was conducted on 20 February, while the final survey was completed on 18 July. A total of 1,627 salmonids were captured during 2001 nighttime electrofishing surveys. The majority of the juvenile salmonids were coho (N=578; 36%), followed by sockeye (N=551; 34%), and chinook salmon (N=311; 19%). The remaining juvenile salmonids were composed of cutthroat (N=163; 10%), and rainbow trout (N=13; <1%), and mountain whitefish (N=11; <1%). Catch (all survey sites combined) of all juvenile salmonids (i.e., chinook, coho, and sockeye salmon, and rainbow and cutthroat trout) peaked in the Sammamish River during the week of 20 May, which also coincided with individual peak of chinook salmon. Catch rates of sockeye salmon fry peaked during the survey conducted on 19 March. Mean coho salmon capture indices increased steadily from the initial survey date through early May, decreasing from there until the last survey conducted on 18 July. The catch rates of rainbow and cutthroat trout in the Sammamish River remained fairly constant throughout the survey period. Mean juvenile salmonid catch was highest in Reach 1 and decreased in subsequent reaches of the river. Mean CPUE from Reach 1 was significantly greater than mean catch from Reach 2; Reach 3; and Reach 4. Reach 2 catch indices were greater than both Reach 3 and Reach 4, however, there was not significant differences in juvenile salmonid catch between the three remaining reaches.

A post-treatment experimental design was used to determine the response of juvenile salmonids to different enhancement/restoration techniques, whereby comparisons were made between test and control sites over time. These comparisons were replicated in different reaches of the Sammamish River. Juvenile salmonid catch indices were consistently greater than their associated control sites at sites containing setback levees without large woody. This difference was apparent at both the site level and between reaches. Juvenile salmonid catch indices from sites containing both large woody and a setback levee were also greater than their associated controls at all sites and on most survey dates. Juvenile salmonid use of large woody debris without setback levees was only examined at one location in the Sammamish River. Catch of juvenile salmonids from this site was greater than the control site; however the difference was not great enough to reject the possibility that the difference is due to random sampling variability. The importance of mainstem habitat for juvenile chinook salmon rearing and migration is becoming more evident throughout the Pacific Northwest. The Sammamish River lacks off-channel habitats, thus increasing the importance of mainstem habitat in this situation.

We found a mixed response of juvenile salmonids to current enhancement/restoration strategies utilized in the Sammamish River. Juvenile salmonids exhibited a preference for levee setback sites that did not contain large woody debris. Juvenile salmonid use of sites containing large woody debris sites, with and without levee setback, were significantly lower than within the levee setback sites without wood. The gradation between the three restoration/enhancement techniques indicate that the shallow bank angle had a greater influence on juvenile salmonid use than the presence of LWD. Even within the natural stream sections of the Sammamish River, juvenile salmonids were consistently found residing in the portions with the lowest bank angle. Water temperatures appear to limit the period that juvenile salmonids can safely reside in the Sammamish River beginning in late July. We recorded mean daily water temperatures exceeding 22ºC in the Sammamish River at Marymoor Park during this study. We recommend that stream enhancement/restoration activities concentrate their efforts in areas located immediately downstream from tributary inflow. Tributary inflow areas may also provide for the majority of spawning habitat in the Sammamish River. In this manner, habitat enhancement benefits would be provided to both juvenile salmonids outmigrating from tributaries and salmonids emerging from spawning locations in the Sammamish River. Finally, this study was developed to evaluate the response of juvenile salmonids to existing stream enhancement/restoration projects that are currently used in the Sammamish River. The response exhibited in the Sammamish River may not be indicative of responses found elsewhere in the Pacific Northwest.