

## **OTHER NEW FIELD STUDIES (2000-2001)**

This section summarizes the results of other field studies that were initiated in the Snoqualmie Watershed by King County WLRD in 2000 and 2001. The information obtained from these studies is new information about the Snoqualmie Watershed. The full products of these studies are available from King County WLRD.

### **Aerial Photography**

In 2000, King County WLRD contracted to have aerial photos taken of the entire county including the Snoqualmie Watershed. These high quality images replace the last set taken in 1996. The aerial images were used to characterize current habitat conditions in the focus areas that were identified in the *Snohomish River Basin Chinook Salmon Near Term Action Agenda* (King County WLRD, 2001). Information about current habitat conditions was then applied to identify specific project ideas for near-term habitat protection and restoration actions in the focus areas.

In late March and early April of 2001, a second and more comprehensive set of photos was taken when the King County photographer flew over the Snoqualmie Watershed in a two-person airplane and shot approximately 2000 low-elevation, oblique aerial photos. Photographs were taken of the entire Snoqualmie River mainstem including the North, Middle, and South Forks, the Tolt and Raging Rivers, and the following creeks: Cherry, Tuck, Adair, Harris, Stossel, Ames, Griffin, Langlois, Patterson, Tokul, and Tate. The early spring time period was selected so that the photography could take place before leaves reappeared on the deciduous trees and blocked views of the river and stream channels.

These photos are in the process of being analyzed for channel configuration, riparian vegetation, wetlands, LWD, and other riparian habitat features. By the end of 2002, the photos will also be accessible in electronic format. Information from the photos will be used to guide habitat inventories in future years.

### **Bull Trout Surveys**

On November 1, 1999, the U.S. Fish and Wildlife Service listed coastal/Puget Sound bull trout as “threatened” under the federal ESA (Federal Register, 1999). In order to comply with federal and state recovery efforts and develop local conservation plans, it is necessary to know where and when bull trout are found. Therefore, King County WLRD implemented a Bull Trout Sampling Program in 2000 to identify existing bull trout populations and habitats in King County waters. The goal of this pilot sampling program was to sample areas with suitable habitat for bull trout spawning and rearing but where the occurrence of self-sustaining populations of this native char has not been proven. Bull trout prefer clean, cold water (temperatures of 4 to 6°C for spawning and egg incubation and 6 to 9°C for rearing) with abundant, clean spawning gravel and good rearing habitat cover such as clean cobbles and boulders and abundant LWD (Spence et al., 1996; Rieman and McIntyre, 1993).

King County implemented the protocol developed by the American Fisheries Society (AFS) for the detection of both juvenile migratory and stream-resident char (Berge and Mavros, 2001). In January 2000, U.S. Forest Service (USFS) and WDFW biologists reported seeing native char near the mouths of the Tolt and Raging Rivers and in the mainstem Snoqualmie River between these

two tributaries. Because some bull trout are freshwater resident fish that spend their entire lives in rivers, streams, or lakes, populations of bull trout also have the potential to be present above Snoqualmie Falls.

In the fall of 2000, electrofishing and snorkel surveys were performed on the North, Middle, and South Forks of the Snoqualmie River above Snoqualmie Falls (Figure 41) to search for bull trout and Dolly Varden, a closely related species of native char. King County WLRD, USFS, and University of Washington biologists partnered in this effort. Rainbow trout, cutthroat trout, rainbow and cutthroat hybrids, sculpin, and brook trout were found, but neither bull trout nor Dolly Varden were detected (Berge and Mavros, 2001).

Thermographs were installed at a total of 10 locations in the upper North, Middle, and South Forks of the Snoqualmie River to determine if water temperatures were suitable for bull trout, especially for egg incubation. In late 2002, the temperature data will be downloaded and analyzed to determine if waters of the Snoqualmie Forks are cold enough for successful incubation, spawning, and rearing in the areas sampled in 2000. If the water temperatures are low enough, then this information will be used to prioritize additional areas in which to conduct future bull trout surveys (Berge and Mavros, 2001).

Inclement weather in the fall of 2000 prevented nighttime snorkeling in the South Fork of the Snoqualmie River and in Denny Creek, one of its tributaries. In the fall of 2001, these snorkeling surveys proceeded. No native char were found, although there were sightings of brook trout, rainbow trout, and cutthroat trout (Berge, Personal Communication, 2002).

Lack of detection does not mean that bull trout and other native char are absent, but does indicate that if they are present, their potential density in the upper watershed is low. The AFS sampling protocol gives a confidence interval of 80% for absence of bull trout. Although native char are found in adjacent watersheds such as the Skykomish Watershed and below Snoqualmie Falls, it appears that a remnant population does not exist upstream of Snoqualmie Falls (Berge and Mavros, 2001).

## **Lower Tolt River Floodplain Reconnection Site Analysis**

King County and the City of Seattle are investigating the feasibility of removing, setting back, or otherwise reconfiguring the existing levees in the lower Tolt River in order to reconstruct a more diverse channel configuration that would improve salmonid habitat, especially for chinook salmon. The *Lower Tolt River Floodplain Reconnection Site Analysis Characterization of Existing Conditions* (Parametrix, Inc., 2001) examines baseline physical and biological habitat conditions for salmonids in the lowest reach of the Tolt River that is constrained by levees and in the unconstrained reach of the river immediately upstream (RM 0-3.75 for both reaches). The unconstrained reach serves as a reference area for habitat conditions that could occur naturally in the constrained reach if levees were to be removed or set back. When linked with hydraulic modeling, comparison of these two reaches provides an indication of potential channel morphology and predicts likely salmonid habitat improvements if river levees are altered or removed to facilitate restoration of natural ecosystem processes.

The project team reviewed and analyzed existing data about habitat conditions in the Tolt River and collected new data, specifically chinook spawner redd counts in fall 2000. Following is a summary of the key findings on hydrology, channel complexity, sediment transport, and chinook salmon spawning and rearing in the Tolt River and an explanation of next steps in the study.

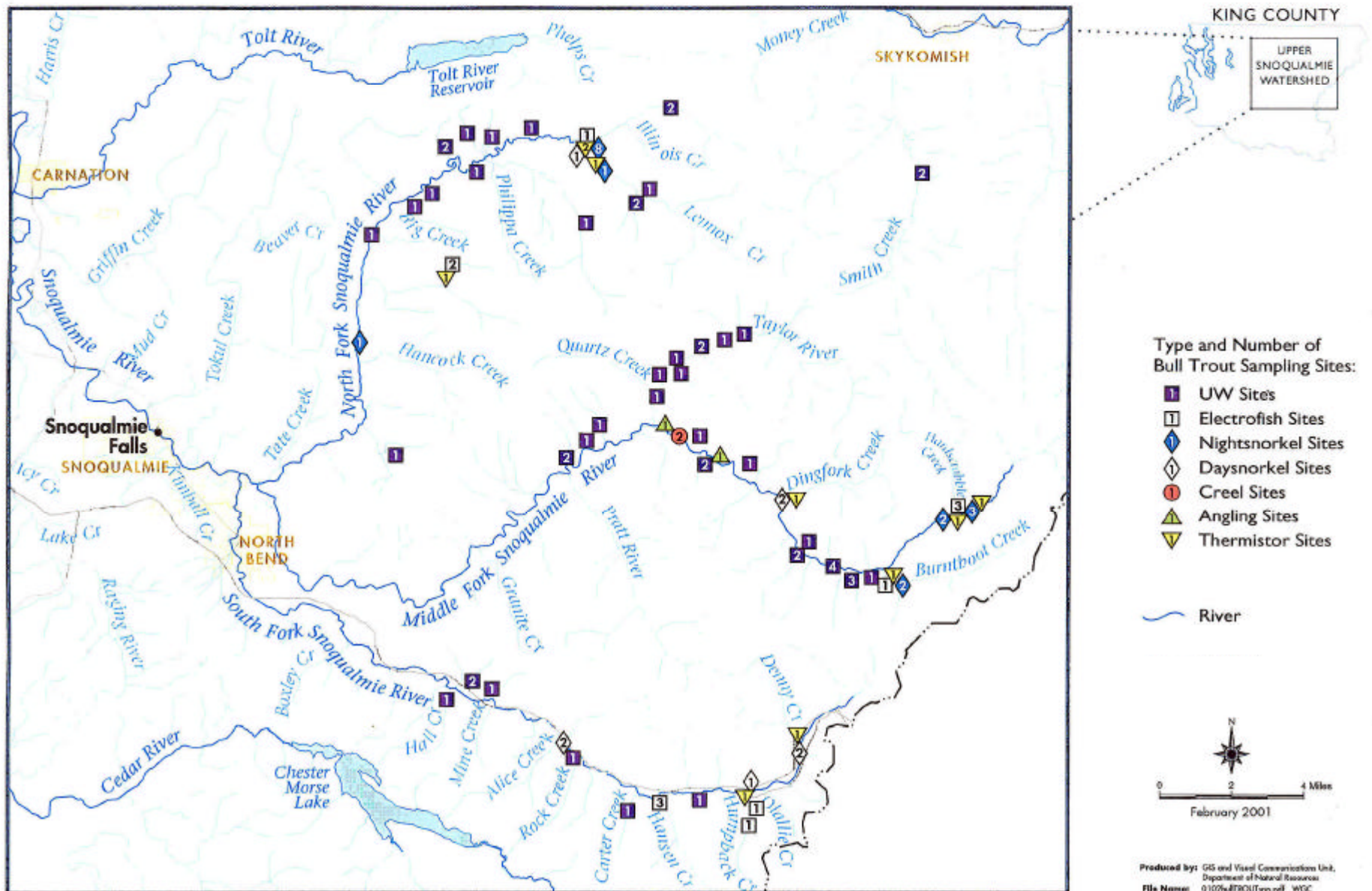


Figure 41. Bull Trout Sampling Sites in the Upper Snoqualmie Watershed

The two-year peak flow at the mouth of the Tolt River is 7,900 cubic feet per second (cfs) which is 223.7 cubic meters per second and the 100-year event is 22,000 cfs (623 cubic meters per second). Historic minimum flows in the Tolt River were 60-70 cfs (1.7-2.0 cubic meters per second) at its mouth. More typical low flows during the chinook spawning period of mid-September through October are about 150 cfs (4.2 cubic meters per second).

Levees along the lower Tolt River below the trail bridge (RM 1) constrain the river channel but do not prevent flooding except for small, frequent events. Levees upstream of the trail bridge do provide effective flood control (Parametrix, Inc., 2001).

Channel complexity has been greatly reduced in the leveed reach of the Tolt River. Unconstrained reference reaches have many more side channels than the leveed reaches and therefore more optimum salmonid spawning and rearing habitat. Because the main channel of the Tolt River is connected to its floodplain in the reference reaches, there is greater channel complexity. This results from river migration across the floodplain, as well as increased influence of LWD jams (Parametrix, Inc., 2001).

Coarse sediments that exit the Tolt River are deposited in the mainstem Snoqualmie River between RM 22-24.5. This deposition provides a gravel spawning area for 20% of the fall chinook salmon that spawn in the mainstem Snoqualmie as well as winter-run steelhead trout, pink salmon, and chum salmon. The average rate of sediment bedload supply to the leveed reach of the Tolt River is 6,036 cubic meters (7,900 cubic yards) per year. The leveed channel reach is predicted to gradually fill in by another meter over the next 30 years, mostly during moderate to large floods. The reason for this is that the constrained portion of the channel has less floodplain area for sediment storage from upstream, so the riverbed elevation is rising faster than in the reference reaches upstream. The riverbed within the leveed reach has risen since dredging was discontinued in the late 1960s. The streambed of floodplain channels is currently at 1 to 2 meters lower elevation than the mainstem Tolt channel bed elevation in some places. If levees with large toe rock were not present, channel migration would naturally occur here including potential channel shifting into the existing floodplain channels currently outside of the levees (Parametrix, Inc., 2001).

Chinook redds were counted in the leveed and reference reaches of the lower Tolt River in fall 2000. Only two redds were seen in side channels; this low number of redds was possibly a result of the combination of low flows and scarcity of side channel habitat. Most redds in the mainstem Tolt were at the edge of the wetted channel due to the presence of somewhat smaller sediment particle sizes in these areas. Many were located on the shaded LB side of the river, and near cover such as downstream from LWD accumulations or under overhanging riparian vegetation (Parametrix, Inc., 2001).

Approximately 20% of all chinook spawning in the Snoqualmie River watershed occurs in the Tolt River. However, the leveed reach of the Tolt River currently provides only marginal habitat for chinook reproduction because of decreased channel complexity, concentrated flows, disconnection of side channels from the main channel, deposition of excessively coarse and suboptimally sized spawning gravel, and limited LWD recruitment and supply. Inadequate LWD holding results in a reduced numbers of pools for juvenile rearing and adult holding areas prior to spawning as well as fewer channel avulsions that create floodplain and bar side channels (Parametrix, Inc., 2001).

The full report on the lower Tolt River floodplain reconnection site analysis is available in hard copy or compact disk format from King County WLRD. This report will be followed by a final summary report that will describe project goals and objectives, identify project alternatives, and evaluate their feasibility (Parametrix, Inc., 2001).