# USFS Lake Chelan Fishery Forum Monitoring Proposal

*2017 Chelan Ranger District – Emily Johnson*

## Introduction

A component of the Lake Chelan Settlement Agreement (SA) and Lake Chelan Fishery Plan is for the USDA Forest Service (USFS) to develop an annual monitoring and evaluation plan in coordination with Chelan PUD, the NPS and WDFW. This monitoring plan describes the methods and schedule used to demonstrate compliance with efforts to restore and enhance, where feasible, native fisheries in Lake Chelan and its tributaries, and to support the lake's recreational sport fishery.

## Lake Chelan Fishery Forum Goals and Objectives

The Lake Chelan Fishery Forum (LCFF) management objectives are to:

1. Emphasize restoration/enhancement of native species, where feasible;
2. Support the recreational sport fishery

The goal for westslope cutthroat trout (WCT) is to increase, significantly, the abundance of WCT in lake tributaries and the lake itself, for these fish to eventually replace themselves naturally, and for WCT to contribute to the sport fishery (LCFF Annual Workplan 2010-2016).

## Background

Westslope cutthroat trout (*Oncorhynchus clarki lewisi*) are indigenous to, and were once abundant in Lake Chelan. During the 1900s, removal of adult cutthroat spawners for hatchery propagation without replacement of young, interactions with nonnative fishes, lake level fluctuations and changes in spawning timing and habitat changes significantly decreased the WCT population in Lake Chelan (WDFW 2002). Although attempts have been made to increase WCT abundance in Lake Chelan by stocking Twin Lakes (native from Lake Chelan) WCT in the lake as well as the adfluvial zones of tributary streams, numbers of WCT continue to be depressed (2016 LCFF workplan).

Extensive stocking, beginning in the 1930's (see Table 1, below), of rainbow trout (*Onchorynchus mykiss*), brook trout (*Salvelinus fontinalis*) and non-native cutthroat trout (*O. clarki spp*), have displaced the native westslope cutthroat trout populations in Lake Chelan and its tributaries. RBT populations did not inhabit Lake Chelan prior to 1908 (WDFW, 2002). Early records show that RBT from Packwood Lake were first introduced into Lake Chelan in 1916 and RBT have been stocked into Lake Chelan until recently. Due to extensive stocking since the early 1900's, a naturally reproducing population of RBT, continues to exist in the Lake and tributary streams both above and below barrier waterfalls. This has created challenges to the conservation of native WCT due to direct competition for food resources and through introgressive hybridization with RBT.

The extent of hybridization of RBT and WCT, especially within tributary streams on FS lands, is not well known. Limited genetic analysis was conducted within several tributary streams on National Forest

Lands in the late 1990's-early 2000's. "Essentially pure" representative strains of westslope cutthroat trout were found only in upper Falls Creek. Hybrid strains of RBTxWCT were found within 25-Mile Creek and Mitchell Creek and Yellowstone CT x WCT were found within Safety Harbor Creek. Observational sightings during USFS stream surveys and lake surveys have indicated that RBT and CT are found in majority of stream reaches, however the genetic purity of these populations is unknown.

Although high mountain lakes and tributary streams above barrier falls were most likely historically fishless, due to extensive stocking of non-native species (see Table 1), these streams now represent source populations of RBT, RBTxCT hybrids and other non-native fish species to Lake Chelan. The probable outlook for WCT in tributaries to Lake Chelan, barring any management action, is population decline with increased introgression leading to a hybrid swarm. Without identifying and proposing treatments for these tributary reaches, of which a large percentage are on USFS lands, cutthroat trout populations will continue to decline due to hybridization and competition with non-native species.

**Table 1.** Stocking History for Lakes and Streams located within lands managed by the USFS, Chelan Ranger District, Okanogan-Wenatchee National Forest (1930-1994).

| Sub-watershed Name(s) | Stream Name | Years Stocked* and Fish Species[1] | Lake Name | Stocked Fish Species[1] | Year Stocked* |
|---|---|---|---|---|---|
| Flat Creek | Flat Creek | UNK | Le Conte Lake | UNK | UNK |
| | | | Glory lake | UNK | UNK |
| Lower, Upper and West Fork Agnes Creek | Agnes Creek | 1939-1940; RB<br>1942-CT | Bannock Lakes | UNK | UNK |
| | | | White Rock Lakes | UNK | UNK |
| Company Creek | Company Creek | 1939; RB<br>1941; CT<br>1959-1962; Silvers | | | |
| Devore Creek-Lake Chelan | Devore Creek | | Lake Marie | UNK | UNK |
| Lower and Upper Railroad Creek | Railroad Creek | 1934- 1947; RBT, CT | Hart Lake | CT | 1942-1976 |
| | | | Holden Lake | RBT, CT | 1939-1979 |
| | | | | | |
| | | | Lyman Lakes | CT | 1942, 1955, 1976 |
| | | | Dole Lakes | UNK | UNK |
| | | | Mirror Lake | UNK | UNK |
| Bear Lake-Lake Chelan | Domke Creek | 1933-1973; RBT, CT | Domke Lake | CT and RBT<br>WCT | 1933-1973<br>1990-1993 |
| | Emerald Park Creek | 1933-1940; RBT | | | |
| TwentyFive Mile Creek | 25-Mile Creek | 1934-1980; EBT, RBT, CT, Kokanee, Silvers | | | |
| | First Creek | 1933-1972; EBT, RBT, CT, Silvers | | | |
| Antilon Creek-Lake Chelan | Antilon Creek | | Antilon Lake | EBT<br>RBT | 1934-1981;<br>1985-1994 |
| Mitchell Creek-Lake Chelan | Mitchell Creek | | | | |
| | Grade Creek | 1939; RB | | | |
| Falls Creek-Lake Chelan | Falls Creek | 1941; CT | | | |
| Safety Harbor Creek | Safety Harbor Creek | 1934-1938; CT<br>1939-1940; RB | | | |
| Lone Fir-Lake Chelan | Corral Creek | 1939; RBT, CT | | | |
| Prince Creek | Prince Creek | 1933-1949; RB, CT | Surprise Lake | CT | 1950 |

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|---|---|---|---|---|---|
| | | | Bernice | WCT<br>RBT | 1984<br>1993 |
| | | | Dry Lake | Brown Trout, EBT, RBT and CT | 1973-1981 |
| | | | Boiling | RB<br>CT | 1939, 1944<br>1953, 1977 |
| | | | Cub | CT | 1940, 1967 |
| Fish Creek | Fish Creek | 1937-1942; RB<br>1933-1934, 1949, 1972; CT | Star lakes | CT | 1953, 1967, 1979 |
| | | | Tuckaway Lake | CT, WCT | 1976, 1987 |
| | | | Round Lake | UNK | UNK |

[1]Eastern Brook Trout (EBT), Rainbow Trout (RBT), Cutthroat Trout of unknown origin (CT), Westslope Cutthroat Trout (WCT)
*not all years were stocked within the range of dates

The Forest Service, as part of the LCFF, conducted WCT spring spawning surveys from 2009-2011. Surveys were conducted within the adfluvial zone of tributaries to Lake Chelan in an attempt to determine the timing of spawning and to estimate numbers of adult WCT. These surveys were not highly successful due to several factors the most prominent being that surveys occur in the spring when stream flows are high making visibility poor. Very few redds were identified by the USFS during the 5 years of spawning surveys (. Follow up snorkel surveys in the fall identified the presence of RBT and CT within spawning survey reaches, indicating that spawning is occurring, but due to the small size of the fish and high flows redds are difficult to observe. Since 2011, the USFS has been un-able to complete tributary spawning surveys due to changes in staffing, the intensity of surveys (one per week during the 8-10 week spawning window) and the impacts of large wildfires in the Lake Chelan Basin in 2013, 2014 and 2015.

Therefore the US Forest Service is proposing to change the focus of our monitoring project to determine the extent of RBT and WCT distribution within tributaries to Lake Chelan that are located on lands managed by the USFS. This proposal would use eDNA analysis to develop baseline data regarding the distribution of potential pure populations of WCT that currently exist and where there are RBT and RBTxCT hybrids. The long term goal after baseline data has been collected would be to analyze and implement a Lake Chelan Westslope Cutthroat Trout Management Plan focused on potential eradication and re-introduction of native WCT. Due to budget constraints the baseline data collection would be a multi-year project, with one stream being surveyed each year. For the 2017 field season, the proposal below would begin with eDNA analysis of Fish Creek.


# Proposal: USFS Westslope Cutthroat Trout presence survey using eDNA

Working with the USFS Rocky Mountain Research Station and National Genomics Center for Wildlife and Fish Conservation to survey the potential westslope cutthroat trout habitat in the Fish Creek sub-watershed using eDNA.

Approximatly 45 samples will be collected within Fish Creek during low flow periods from July to August, 2017 by USFS staff following protocols developed by the USFS Rocky Mountain Research Station (see: http://www.fs.fed.us/research/genomics-center/docs/edna/edna-protocol.pdf). Equipment and supplies for collecting the samples will be provided by the Rocky Mountain Research Station and the genetic analysis and reporting will be completed by the National Genomics Center. Each sample will cost $100; $75 for the first species and $25 for each additional species. Due to the stocking history of Fish Creek and the lakes that drain into Fish Creek, both rainbow trout and westslope cutthroat trout would be analyzed for.

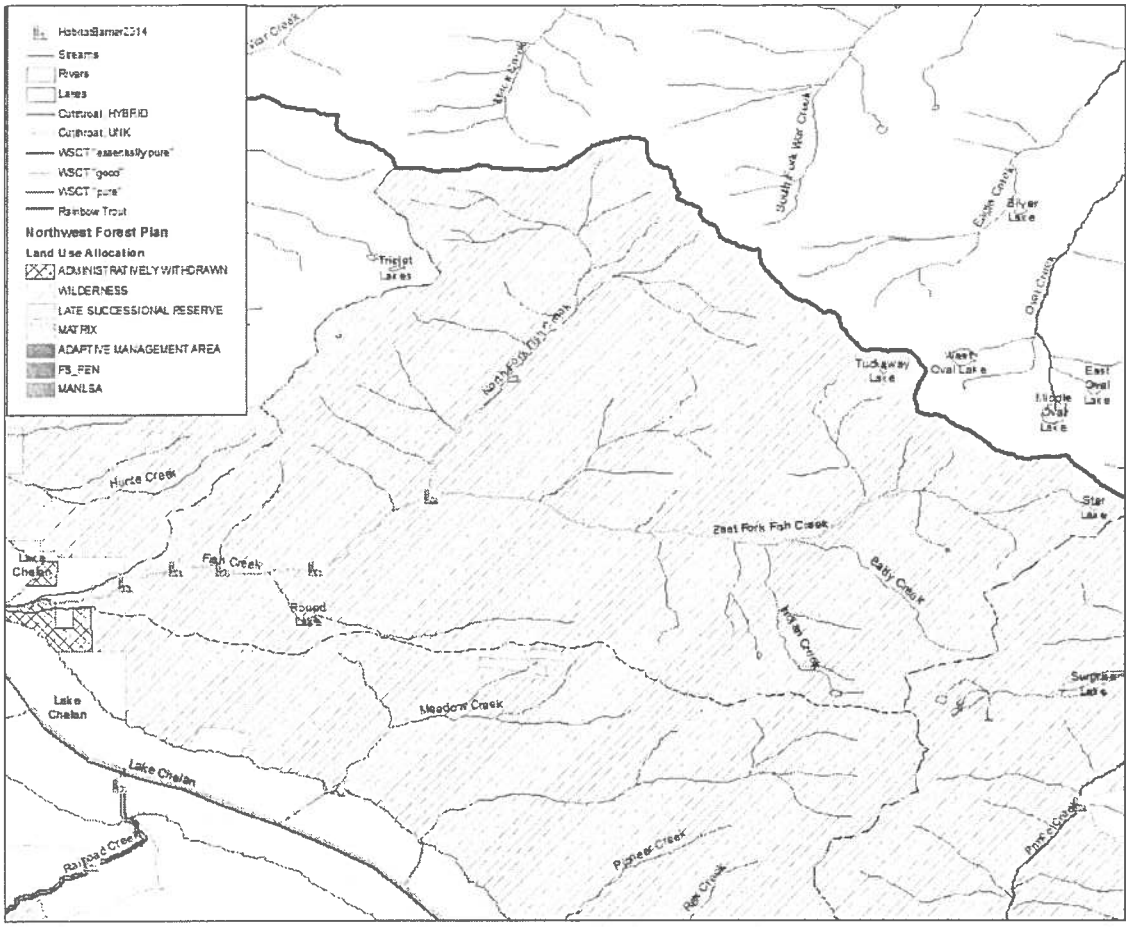


*Table 2. Estimated 2017 USFS Budget and Schedule for Westslope Cutthroat Trout eDNA study*

| Schedule | Task | Requested PUD Matching $ (LC06b2) | USFS Matching $ |
|---|---|---|---|
| July-August 2017 | Coordination and collection of water samples for eDNA analysis from 45 sites along Fish Creek (GS-11 and GS-9 for 10 days).<br><br>Per diem and USFS Boat and Operator expenses (2 trips). | $7,000 | <br><br><br><br>$500 |
| September-November 2017 (?) | USFS Rocky Mountain Research Station; National Genomic Center eDNA Sample Analysis (n=45) | | $4,500 |
| November-December 2017 | USFS coordination with RMRS, data management and report writing | | $2,000 |
| | Total | $7,000 | 7,000 |

# References

USDA Forest Service. 2009-2011. Lake Chelan tributaries spawning monitoring and evaluation. Report prepared by USDA Forest Service, Chelan Ranger District, for the Chelan PUD Lake Chelan Fishery Forum

Viola, A.E. and J. Foster. 2002. Lake Chelan Comprehensive Fishery Management Plan. Washington Department of Fish and Wildlife. 3860 Chelan Highway Wenatchee WA. 98801