



HERITAGE AND WILD TROUT FIELD REPORT Butte Lake, Lassen Volcanic National Park

Author: Sam Plemons, CDFW Environmental Scientist, Heritage and Wild Trout Program

Body of water: Butte Lake

County: Lassen

Tributary to: Butte Creek originates from Butte Lake and flows northward approximately 19 miles where it terminates at a sink near Butte Creek Rim in Shasta County.

Sampling Date(s): July 26, 2019 and September 26, 2019

Access/Directions: From Redding, take Hwy. 44 east toward Old Station. Continue past Old Station and stay on Hwy. 44. From the Hwy. 44/ Hwy. 89 junction, continue approximately 11.5 miles and then turn right (south) onto USFS Rd. 32N21 (Hat Creek Rd.) toward Lassen Volcanic National Park (LVNP) entrance at Butte Lake. Stay on 32N21 approximately seven miles where it ends at Butte Lake.

Survey Section Location (GPS):

Butte Lake is located at (N40.56491, W121.2910). For both surveys, much of the perimeter/shoreline habitat was surveyed where boat electrofishing is effective (approximately 2-15 ft. in depth).

Contacts: Sam Plemons-CDFW Environmental Scientist (Samuel.plemons@wildlife.ca.gov), Michael Dege-CDFW Senior Environmental Scientist (Michael.dege@wildlife.ca.gov), Mike Magnuson- LVNP Biologist (michael_magnuson@nps.gov).

History of Sampling (lake and outlet stream):

Butte Lake

- Butte Lake was stocked with different strains of Rainbow Trout by CDFG for over 60 years. Stocking ceased after 1990 when National Park Service Policy discontinued fish stocking in all its waters.
- In 1962, Butte Lake was chemically treated (rotenone) to remove a large population of undesirable fish. It was noted that the fish kill was not complete (not all the fish died), but the treatment was considered a success gauged upon the quality of fishing after the treatment. At the time, it was believed by the Department that, "Fisherman introduced the rough fish to Butte Lake while using them for bait. This practice is now illegal."
- The most comprehensive fish survey of LVNP, including Butte Lake, was conducted in 2017 by UC Davis in agreement with LVNP to develop a strategy to manage the fisheries and aquatic ecosystems within the Park (Moyle et al. 2017).

Butte Creek

- During the same time Butte Lake was chemically treated in 1962, Butte Creek was also treated to “prevent rough fish from entering the lake when water is flowing from the outlet.”
- Butte Creek was stocked with Rainbow catchables in 1966, and 1972-1978. It was stocked with 50 lbs. of Brook Trout (4.6/lb.) downstream of the LNVP boundary in 1973.
- Butte Creek from Hwy. 44 to the LNVP boundary was surveyed by the Forest Service in 1981. Brook Trout were found in high density and Rainbow Trout from 3”-10” were observed, but in much lower densities.

For more detailed information on the history of sampling, please see the Northern Region Fishery Files.

Field Sampling Objectives: The field sampling objectives for these surveys was to: 1) Collect genetic tissue samples on a minimum of 30 Rainbow Trout (*Oncorhynchus mykiss*); 2) document length and weight for Rainbow Trout collected, and; 3) document other fish species present.

Sampling Design:

July 26, 2019- This was the initial survey to complete the field sampling objectives above. This survey was conducted utilizing one Smith Root®, 16 ft. electrofishing boat and two netters during daylight hours (1050-1300). Electrofisher settings were direct current (DC), high voltage (100-1000 volts), 60 Hz, and 60% duty cycle to produce an output of four amps. These settings were maxed out for this electrofisher unit (Model GPP) due to the presumed low water conductivity (verified during the Sept 26, 2019 sampling) and was just enough to create galvanotaxis in fish, which enabled netting and capture without injury. Long handled dip nets were used by netters to capture fish. Focus was placed on capturing trout species, however, other species were captured for identification. Trout captured were placed into the electrofishing boat live well with fresh lake water. For processing, trout were anesthetized with Alka Seltzer Gold®, measured (total length) and weighed to the nearest millimeter (mm) and gram (g), respectively. Genetic samples (approximately a 2 mm x 2 mm upper caudal fin clips) were collected on Rainbow Trout sampled. Anesthetized trout were then released back into the lake. Other fish species were identified and released. Much of the shoreline habitat was sampled around the perimeter of the lake, with exception of approximately one mile of the west shore. The objectives were not met during this initial attempt; therefore, a second survey was scheduled.

September 26, 2019- The sampling design for this survey was similar to the previous survey, however, a second electrofishing boat (Smith Root®, 18 ft.) was used, the survey was conducted during the night (2000-2300 hrs.), and the entire lake perimeter was surveyed. Electrofisher settings, fish capture and handling were the same as the previous survey.

Survey Crew: July 26, 2019 (Sam Plemons- CDFW, Monty Currier- CDFW, Mike Magnuson-LVNP); September 26, 2019 (Sam Plemons, Monty Currier, Michael Dege-CDFW, Paul Divine-CDFW, Josh Faughn-CDFW).

Results:

July 26, 2019- Water and air temperatures were 18.5°C and 28.0°C, respectively. The water clarity was excellent (>10 ft.). Only two Rainbow Trout were captured, and genetic tissue samples were collected. Other species captured for identification, but not enumerated included Tahoe Sucker (*Catostomus tahoensis*), and Tui Chub (*Siphatales bicolor*). Both species were abundant.

September 26, 2019- Water and air temperatures were 14.9°C and 16.0°C, respectively. The water conductivity was very low, measured at 49 µS specific conductance and the water clarity was good (6-10 ft.). A total of 49 Rainbow Trout were captured (Figure 1), and genetic tissue samples were

collected on 32 of those as a subsample of the total. Average total length, weight, and Fulton's condition factor (Nash et al., 2006) of Rainbow Trout sampled was 373.5 mm, 589.3 g, and 1.07, respectively (Table 1). In addition, three Brook Trout (*Salvelinus fontinalis*) were captured during the survey. Other species captured for identification, but not enumerated included Tahoe Sucker, Tui Chub, Lahontan Redside (*Richardsonius egregius*), and Speckled Dace (*Rhinichthys osculus*). Tahoe Sucker and Tui Chub were abundant.

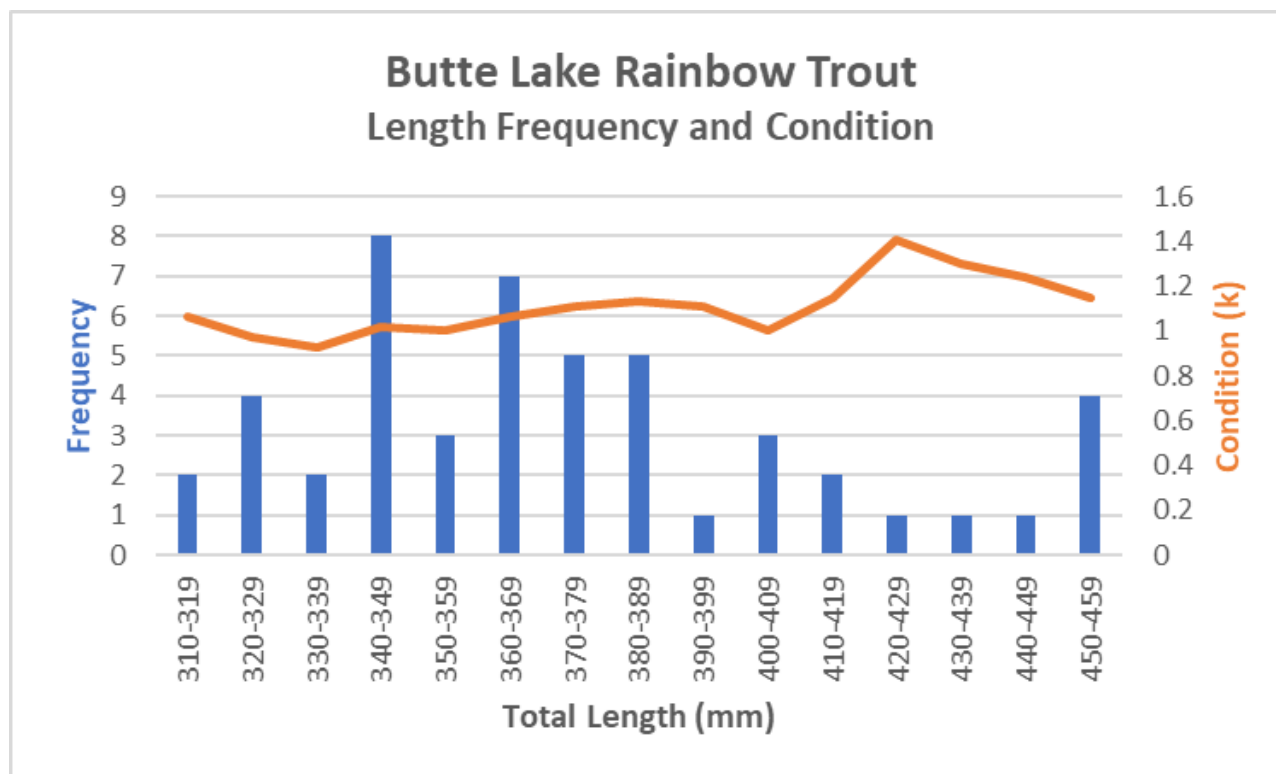


Figure 1. Length frequency bins and average condition for Rainbow Trout collected at Butte Lake on September 26, 2019.

Rainbow Trout			
N=49	TL (mm)	Weight (g)	Condition
Max	459	1182	1.41
Min	312	290	0.85
AVE	373.5	598.3	1.07
STDEV	39.3	244	0.12

Table 1. Statistics for Rainbow Trout collected at Butte Lake on September 26, 2019.

Discussion: As mentioned previously, UC Davis and LVNP have entered into an agreement to develop a strategy for managing the fishery and aquatic ecosystems within the park. With high elevation and high mountain lakes species receiving more notoriety recently, specifically Cascades frog (*Rana cascadae*), which was petitioned for listing and declared a candidate species by the California Fish and Game Commission in October 2017, there is an impending need to develop sound management practices for the aquatic resources within LVNP based upon science. More clarity on native/non-native trout interactions with amphibians and other aquatic species is at the forefront of information needed. Confounding the issue is the debate whether Rainbow Trout are native to the park. Wallis (1959) noted that for many years, thousands of Rainbow Trout were planted in the most accessible lakes annually. Butte Lake was stocked by CDFW with Rainbow Trout as recently as the early 1990's. However, Butte Lake also contains four native non-game fishes' more common to the Lahontan Basin (Tui Chub, Tahoe Sucker, Speckled Dace and Lahontan Redside)

and found in nearby Eagle Lake (a designated Heritage Trout water) watershed. These fish species suggest that Butte Creek drainage was likely historically connected to Pine Creek, the headwaters of Eagle Lake. That being said, Eagle Lake Rainbow Trout (*Oncorhynchus mykiss aquilarum*), the only Rainbow Trout endemic to Eagle Lake and found in upper Pine Creek, may have been native to Butte Lake via a historical hydrological connection. Therefore, it is possible, and based upon the current fish assemblage, likely that Rainbow Trout, specifically, Eagle Lake Rainbow Trout were native to Butte Lake prior to any hatchery Rainbow Trout introductions. The genetics collected during this survey may help shed some light on this topic.

Butte Lake is unique; it is a natural, spring fed lake with no robust surface flowing inlet. Its outlet, Butte Creek doesn't connect to any other waterways and sinks into the volcanic soils. With exception of Brook Trout and possibly some strains of Rainbow Trout, which were stocked into Butte Creek for angling opportunities, Butte Lake has a strong all-native fish presence and assemblage, similar to Eagle Lake. Brook Trout, also present in Pine Creek, are unable to persist in Eagle Lake due to high alkalinity. Fortunately, this attribute has kept the native Lahontan fish assemblage at Eagle Lake, despite stocking of numerous non-native species. However, Butte Lake does not have this attribute and Brook Trout were captured within the lake during our survey, which is the first documented capture, although anglers have reported catching Brook Trout in the past.

Butte Lake has not been stocked with domestic hatchery origin fish since the 1990's. Butte Lake has a wild, self-sustaining Rainbow Trout population that supports an excellent trophy trout fishery. However, no juvenile trout were collected during our boat electrofishing surveys (Figure 1), only a wide range of adult-sized trout were captured. This is most likely a product of sampling methodology in that electrofishing is biased toward capturing larger fish. UC Davis utilized seine and minnow traps for lake sampling. All of the Rainbow Trout they captured were under 150 mm standard length, therefore they did capture juvenile Rainbow Trout in Butte Lake. However, during the UC Davis sampling of Butte Creek, no Rainbow Trout were collected. That said, additional studies should be conducted to evaluate Rainbow Trout spawning, juvenile habitats, and recruitment.

Current angling regulations for Butte Lake are 5 trout per day, 10 in possession with no gear restrictions. In contrast, Manzanita Lake (a designated wild trout water), another popular fishery in the Park has a catch and release, artificial lure, single barbless hook policy imposed by LVNP. There are differences between the two lakes (fish assemblages, hydrology, size, access, use, etc.), and therefore difficult to directly compare, however, based upon our surveys there was a notable difference is trout density. During boat electrofishing surveys of Manzanita Lake in 2008, 2010, and 2015 the density of trout appeared to be much higher (relatively) than Butte Lake. It is difficult to discern whether the difference in management (angling regulations), or some other factors (spawning, recruitment, predation etc.) between the two lakes has affected trout density. More focused surveys would have to be conducted to answer that question.

Recommendations:

The Heritage and Wild Trout Program (HWTP) recommends continued assessment of the trout fishery at Butte Lake for possible inclusion into the Program as a designated "Wild Trout Water." Specifically, the HWTP recommends installing Angler Survey Boxes (ASB's) to obtain information on angler use, catch rates, gear types used, fish disposition (kept or released), size classes, species composition, and more angler related data. Additional surveys on Butte Lake and Butte Creek are warranted to gather life history information on the Rainbow Trout, including spawning locations, spawn timing, and juvenile habitat utilization. This information will help to guide management decision and serve as baseline data for future monitoring.

The HWTP concurs with UC Davis in that the present five fish limit on trout should be rescinded and replaced with the same regulation used on Manzanita Lake; catch and release, artificial lures with

single-barbless hooks. The HWTP believes that until further information is gathered on the fishery, including angler use and habits via ASB's, spawning surveys, genetics analysis, etc. a conservative approach shall be taken to protect this fishery.

References

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