

State of California
The Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE

Frenchman Lake



General Fish Survey 2016

Amber Mouser
Environmental Scientist

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ACRONYMS

CDFW	California Department of Fish and Wildlife
DFG	California Department of Fish and Game
DWR	California Department of Water Resources
SR-18	Smith-Root electrofishing boat

Fish Species

RT	Rainbow trout <i>Oncorhynchus mykiss</i>
LRS	Lahontan redbside <i>Richardsonius egregius</i>
BB	Brown bullhead <i>Ameiurus nebulosus</i>

Measurements

mm	millimeters
g	grams
TL	total length
FL	fork length
SL	standard length
CPUE	catch per unit effort

I. INTRODUCTION

Frenchman Lake is located in Plumas County, in the northeastern portion of the Plumas National Forest. Frenchman Lake is a 1,580 surface acre reservoir created in 1961 that sits at an elevation of 5,588 feet above mean sea level and is part of the Middle Fork Feather River watershed (USDA 2006). The dam is owned and operated by the California Department of Water Resources (DWR). It was created as part of the State Water Project to regulate Little Last Chance Creek for irrigation purposes in the Sierra Valley and to enhance recreation opportunities (Boyt 2010). The recreational fishery established at Frenchman Lake is primarily comprised of rainbow trout (RT) (*Oncorhynchus mykiss*) and brown bullhead (BB) (*Ameiurus nebulosus*).

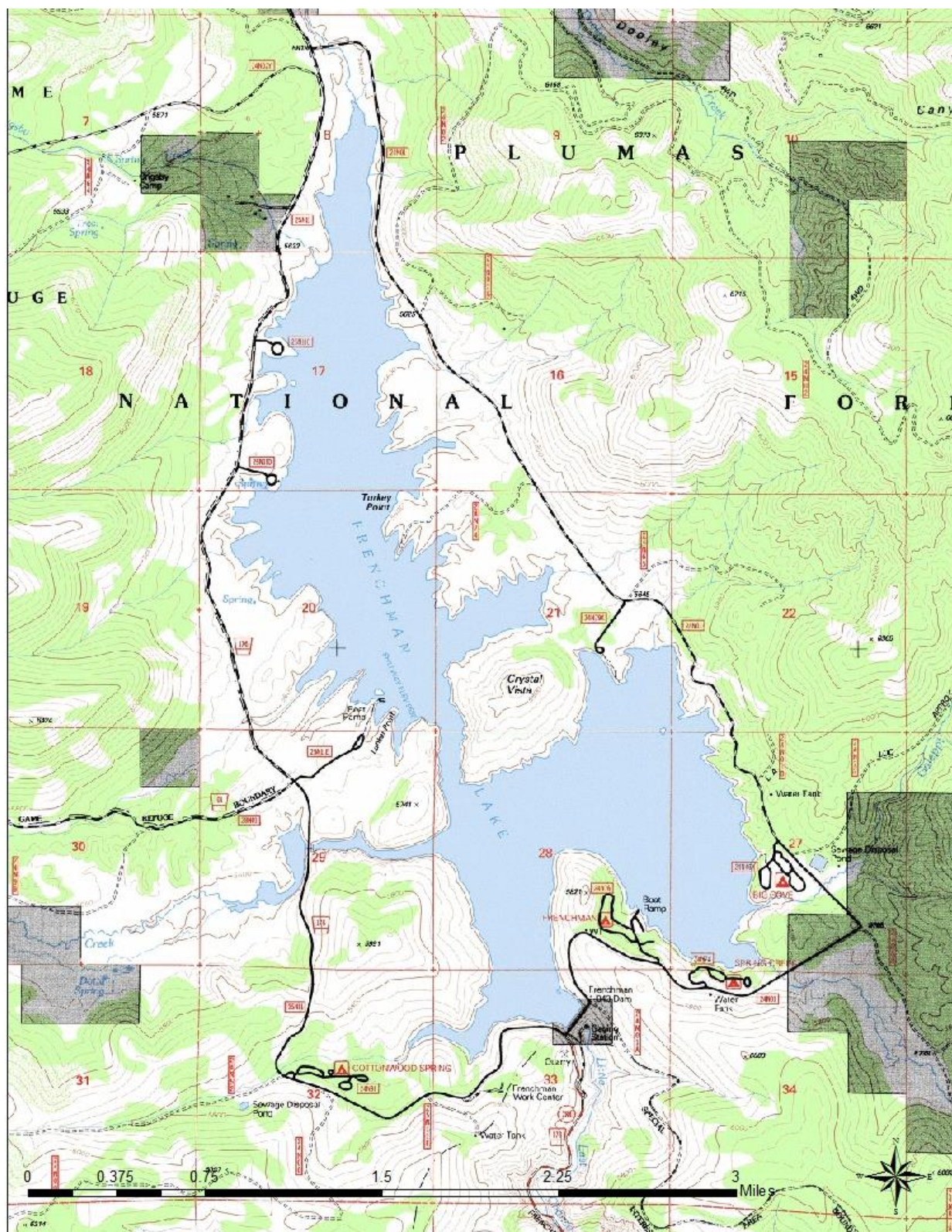
Northern pike (NP) (*Esox lucius*), are a non-native, invasive, predatory fish species that was illegally introduced to California. This highly invasive fish has the potential to seriously impact California's aquatic ecosystems. Northern pike were first discovered in California at Frenchman Lake, Plumas County, in 1989. Due to the potential harmful impacts to statewide water management, aquatic ecosystems, and recreational fisheries both in Frenchman Reservoir and throughout the waters of the state, California Department of Fish and Game (DFG) determined it was necessary to eradicate northern pike from Frenchman Lake. In June 1991, DFG successfully eradicated northern pike from Frenchman Lake using a commercial formulation of the piscicide rotenone (DFG 2007).

In an effort to evaluate the current fishery at Frenchman Lake, two general fish surveys were conducted during daytime hours on April 28, 2016 and July 28, 2016 by California Department of Fish and Wildlife (CDFW). Prior to this, the lake was last surveyed in 2008 as part of the effort to monitor other waters nearby Lake Davis for northern pike. Results of this effort can be found in the *2008 monitoring of other waters of Plumas County* (LaCoss and Rossi 2011b) paper. A boat electrofisher was used to complete the 2016 surveys. Fish species identified during these surveys were rainbow trout, brown bullhead, and Lahontan redbreast (LRS) (*Richardsonius egregius*).

II. METHODS

The lake was divided into two sections (north and south) separated by a narrow channel (Figure 1). Each section was sampled individually and included as much of the shoreline as possible in the designated survey area. One Smith-Root electrofishing boat (SR-18) was used during daytime hours on April 28, 2016 and July 28, 2016 to sample the shallow water around the perimeter of Frenchman Lake (Figure 1). On April 28, 2016 the northern portion of the lake was sampled. On July 28, 2016 the southern portion of the lake was sampled. The reservoir was electrofished a total of 3.97 hours in 2016. Boat output was generally set between 40%-60% DC Low at 120 pulses per second.

The survey efforts varied based on accessibility of sampling area and public safety. Portions of the shoreline that contained livestock, wildlife, fisherman, or other recreational activities were omitted. A minimum of 30 fish per species captured during each sampling event were randomly sub-sampled and measured to total length (TL) in millimeters (mm) and weighed in grams (g). Sampling events were defined as one monitoring period using a given area electrofished. If more than thirty fish per species per event were captured they were tallied by species. Capture rates for each method and species were calculated as catch per unit effort (CPUE), by dividing the number of fish captured by the hours sampled.



III. RESULTS

Frenchman Lake 2016

Frenchman Lake was sampled by boat electrofisher with a total of two sampling events in 2016. Surface water temperature was 54°F during the first sampling event in April and an average of 69.2°F during the second sampling event in July. A total of 3.97 hours of electrofishing occurred during these sampling events, resulting in the capture of a total of 230 fish, of which 137 were measured. The effort resulted in a CPUE of 57.93 fish per hour. Three species of fish were captured: rainbow trout, Lahontan redbreast, and brown bullhead (Table 1). Length frequency for fish measured during the electrofishing events is displayed in a length frequency histogram in Figure 2. Species composition is displayed in Figure 3.

Table 1. 2016 summary of fish captured in Frenchman Lake using boat electrofishing.

Species	Number Captured	TL Range	TL Mean	Percent of Capture	CPUE
Rainbow trout	73	240-501	341	31.7%	18.39
Lahontan redbreast	153	54-117	75	66.5%	38.54
Brown bullhead	4	94-315	156	1.7%	1.01
Total	230	-	-	99.9%	57.93

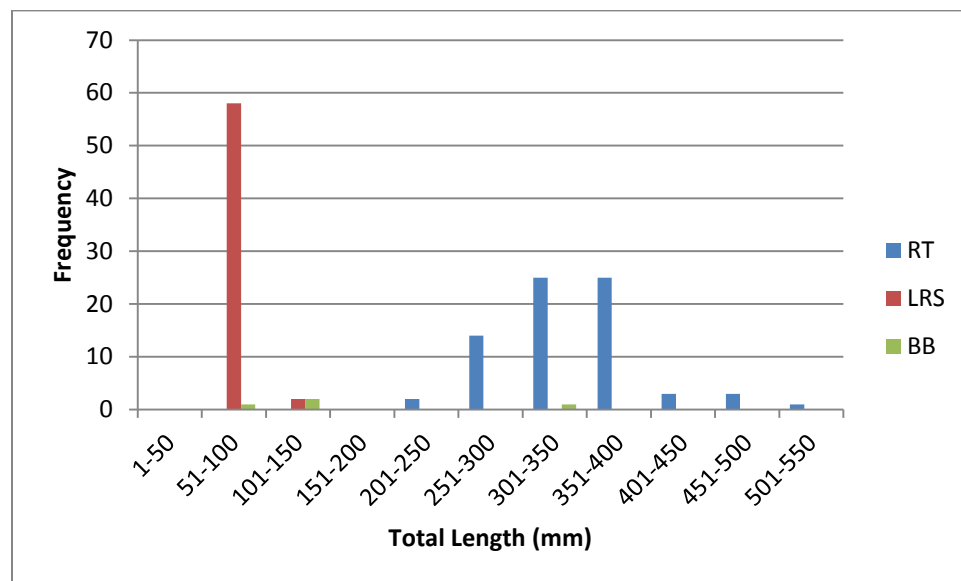


Figure 2. 2016 length-frequency histogram of Frenchman Lake fish species captured using boat electrofishing.

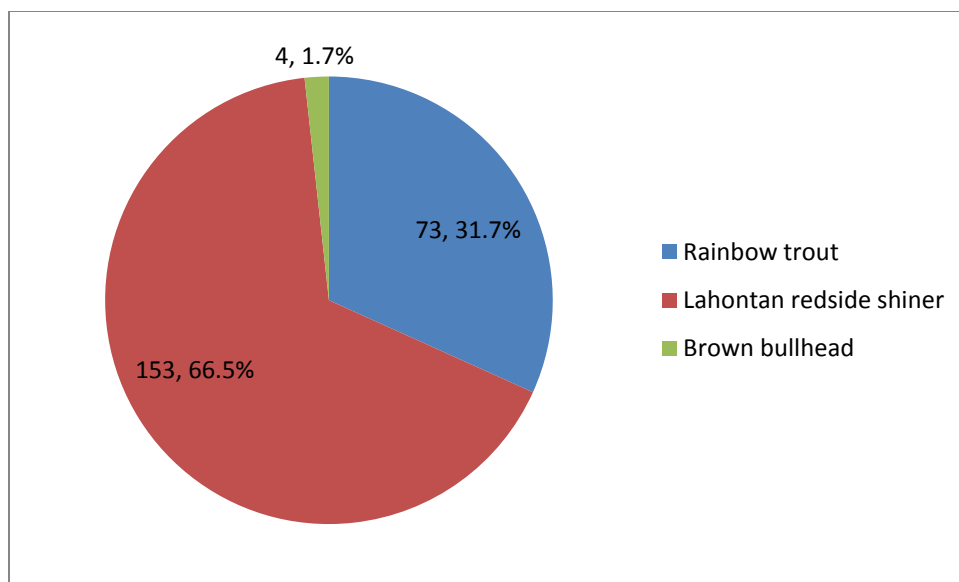


Figure 3. 2016 Frenchman Lake species composition.

Rainbow trout

Seventy-three RT were collected in 2016 ranging from 240-501 mm; mean TL 341 mm (Table 1). Length range data shows the RT sampled are in the fourth year (235 mm fork length (FL)) and above age classes (Moyle 2002). Seventy-one of the 73 RT collected were captured during the April electrofishing event. CPUE results showed 4.0 RT per hour in 2008 and 18.39 RT per hour in 2016 (Tables 1 & 2; Figures 2, 3, 4, & 5). The Fulton Condition Factor (K factor) of the RT sampled in 2016 ranged from 0.93 to 1.40, with an average of 1.21.

Lahontan redbside

One hundred and fifty-three LRS were collected in 2016 ranging from 54-117 mm; mean TL= 75 mm (Table 1). Length range data indicates that the LRS sampled are in the first year (34-55 mm standard length (SL)) to fourth year (75-80 mm SL) and above age classes (Moyle 2002). LRS results indicate an increase in CPUE from 3.2 LRS per hour in 2008 to 38.54 LRS per hour in 2016 (Tables 1 & 2; Figures 2, 3, 4, & 5).

Brown bullhead

Four BB were collected ranging from 94-315 mm; mean TL = 156 mm (Table 1). Length range data indicates that the BB sampled are in the first year (70-100 mm TL) to fourth year (190-280 mm TL) and above age classes (Moyle 2002). All of the BB collected were captured during the July electrofishing event. BB catch results indicate a decrease in CPUE from 39.3 fish per hour in 2008 to 1.01 fish per hour in 2016 (Tables 1 & 2; Figures 2, 3, 4, & 5).

Table 2. 2008 Summary of fish captured in Frenchman Lake using boat mounted electrofishing (LaCoss and Rossi 2011b).

Species	Number Captured	Number Measured	TL Range (mm)	Mean TL (mm)	Percent of Capture (%)	CPUE (fish per hour)
Rainbow trout	38	38	57-446	370	8.7	4.0
Lahontan redbreast	30	28	60-112	90	6.9	3.2
Brown bullhead	369	101	206-325	277	84.4	39.3
Total	437	167	-	-	100	46.5

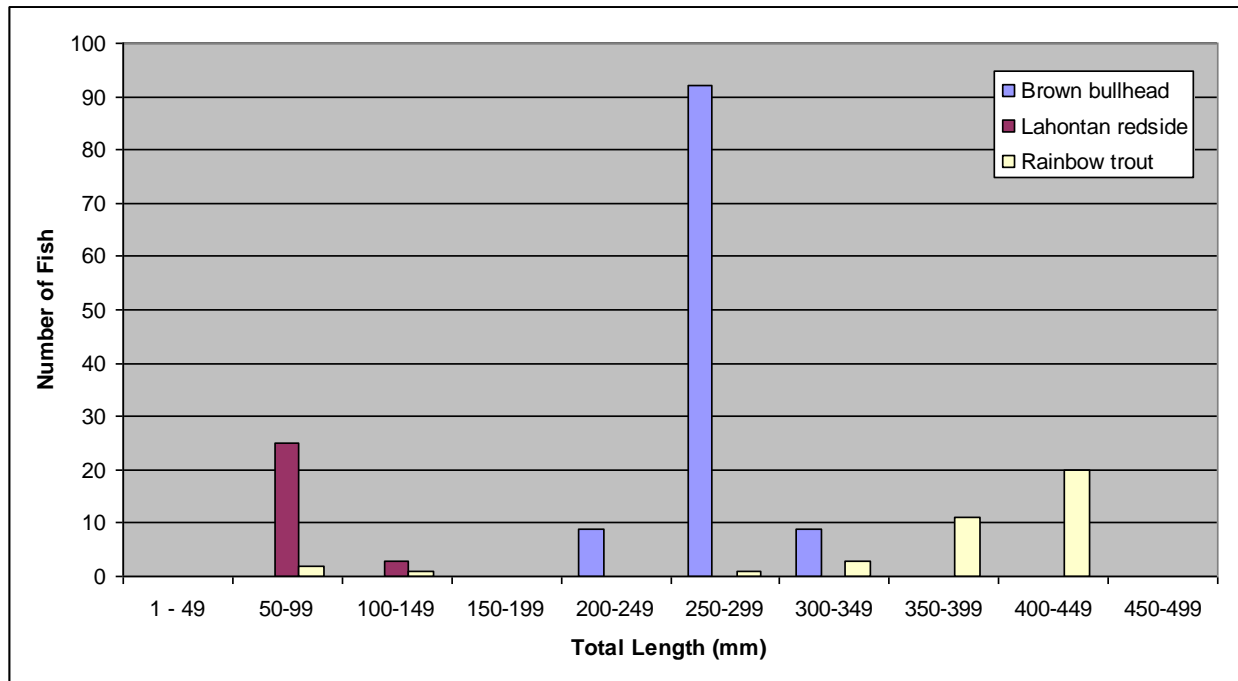


Figure 4. 2008 Length frequency histogram of Frenchman Lake fish species captured using boat mounted electrofishing (LaCoss and Rossi 2011b).

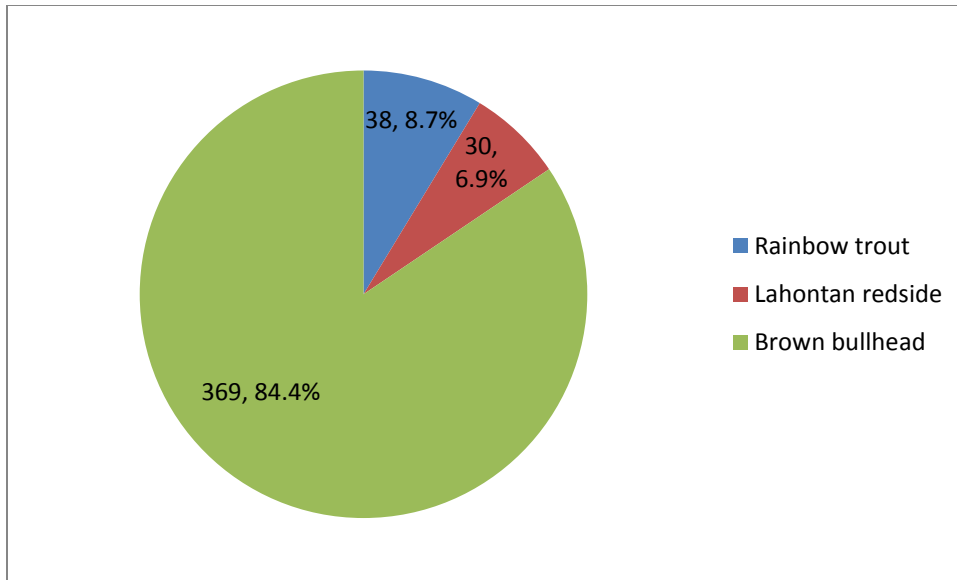


Figure 5. 2008 Frenchman Lake species composition (LaCoss and Rossi 2011b).

IV. DISCUSSION

Boat electrofishing surveys indicate that Lahontan redbreasts are the predominate species at Frenchman Lake (Figure 3). However, this result is not representative of the entire lake since electrofishing boats are better suited for sampling the littoral zone where warmwater species and species such as Lahontan redbreasts (“a shoaling littoral zone species” (Moyle 2002)) are generally more prevalent. Electrofishing boats are not designed to sample the limnetic zone where cold water pelagic species predominate. Coldwater species are mostly incidental catches, thus most of the deeper water remains unsampled. Possible options for sampling coldwater species include angling surveys, creel surveys, angler survey boxes, gill nets, or electrofishing during colder times of the year when coldwater species are more likely to find the shallow water tolerable.

A Recreational Use Survey conducted by DWR indicated that the angler catch rate was 0.31 fish per hour in 2010. Since 1988, catch rates have fluctuated between a high of 0.40 fish per hour in 1992 to a low of 0.17 fish per hour in 2000. In 2010 the catch rate was back up to 0.316 fish per hour. According to their creel data, the average length of rainbow trout caught in Frenchman Lake has progressively increased from 299 mm mean FL in 1988 to 376 mm mean FL in 2010 (Boyt 2010). CDFW electrofished rainbow trout (Figure 6) measurements decreased from 370 mm mean total length (TL) in 2008 to 341 mm mean TL in 2016.



Figure 6. Frenchman Lake rainbow trout (CDFW 04/28/2016).

2008 versus 2016

Frenchman Lake was surveyed in early June and late July during the 2008 sampling and in late April and late July during the 2016 sampling. The July sampling periods provided some consistency for the two sampling years, in regard to time of year. Two electrofishing boats were used during the 2008 survey, while one electrofishing boat was used in 2016. In 2008, sampling involved following the shoreline to cover as much of the perimeter of the lake as possible. In 2016, the same technique was used as in 2008, except that larger portions of the shoreline were skipped during the July electrofishing event due to recreationalists using the water and boat mechanical issues.

The overall CPUE was greater in 2016 (3.97 hours of electrofishing at 57.93 fish per hour) than the previous sampling effort in 2008 (9.4 hours of electrofishing at 46.5 fish per hour). The most noticeable fish capture result was the decrease in brown bullhead (Fig. 7) CPUE from 39.3 fish per hour in 2008 to 1.01 fish per hour in 2016. It is possible that the result is a natural population swing, an impact from the past couple years of drought conditions, or the result of variances in electrofishing conditions. There were also significant CPUE increases of rainbow trout and Lahontan reddsides from 2008 to 2016. This may have been a result of the different times of the year when sampling occurred. More fish were congregated in the shallow water due to cooler temperatures in April as well as the general breeding season. Evidence of breeding season for the Lahontan reddsides can be observed by the brilliant colors of the male fish captured during

sampling (Fig. 8).



Figure 7. Frenchman Lake brown bullhead (CDFW 07/28/2016).



Figure 8. Frenchman Lake Lahontan redbside in breeding colors (CDFW 04/28/2016).

V. CONCLUSION

Monitoring will be continued in subsequent years. A repeat springtime sampling may prove to find more consistency in the capture results across the years. Angling surveys, creel surveys, angler survey boxes, or gill netting may help to obtain more information on the salmonid populations inhabiting the lake. A cooperative effort with DWR during future Recreational Use Surveys may prove beneficial in collecting valuable creel data. These sampling timeframes and methods will be applied to future evaluations of the Frenchman Lake fishery.

VI. REFERENCES

Boyt, J., 2010 Draft RECREATION USE AND CREEL SURVEY OF FRENCHMAN LAKE RECREATION AREA, PLUMAS COUNTY, California Department of Water Resources, Northern Region. Red Bluff, CA.

Department of Fish and Game (DFG). 2007. Final fisheries management plan for Lake Davis, Plumas County, California. California Department of Fish and Game, Rancho Cordova, CA.

LaCoss, J. and A. Rossi. 2011b. Lake Davis pike eradication: 2008 post-project monitoring of other waters of Plumas County. California Department of Fish and Game, Rancho Cordova, CA. 19pp.

Moyle, P. B. 2002. *Inland fishes of California: revised and expanded*. University of California Press, Berkeley.

United States Department of Agriculture. 2006. Forest Service Pacific Southwest Region Plumas National Forest. Frenchman Lake Recreation Area Map.
https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fsm9_034849.pdf