

State of California
California Department of Fish and Wildlife
North Central Region

Summary Report of Roving Creel Surveys (2012 - 2013) and 2015-2016 Angler Survey
Box Analysis at Lower Bear River Reservoir, Amador County



By Ben Ewing
Fisheries Biologist
Alpine, Amador, Calaveras, and Lake Counties

January 2017

Introduction

Lower Bear River Reservoir (Lower Bear) is located in Amador County and situated in the Eldorado National Forest. Lower Bear is off Highway 88 (Carson Pass) and is approximately 40 miles east of Jackson (Figure 1). The reservoir is divided by a dam that creates upper and lower lakes, where Upper Bear is much more isolated and accessing it requires a significant hike, boat ride, or access through an adjacent Boy Scout camp. This results in Lower Bear receiving the majority of the fishing pressure. Lower Bear covers an area of 710 surface acres with approximately nine miles of shoreline, has a storage capacity of 48,750 acre feet of water, and is 5,824 feet above mean sea level (Ca. Dept. of Water Resources (DWR) 2012). Water levels at Lower Bear are managed by the Pacific Gas and Electric Company (PG&E) for hydroelectric uses (DWR 2012).

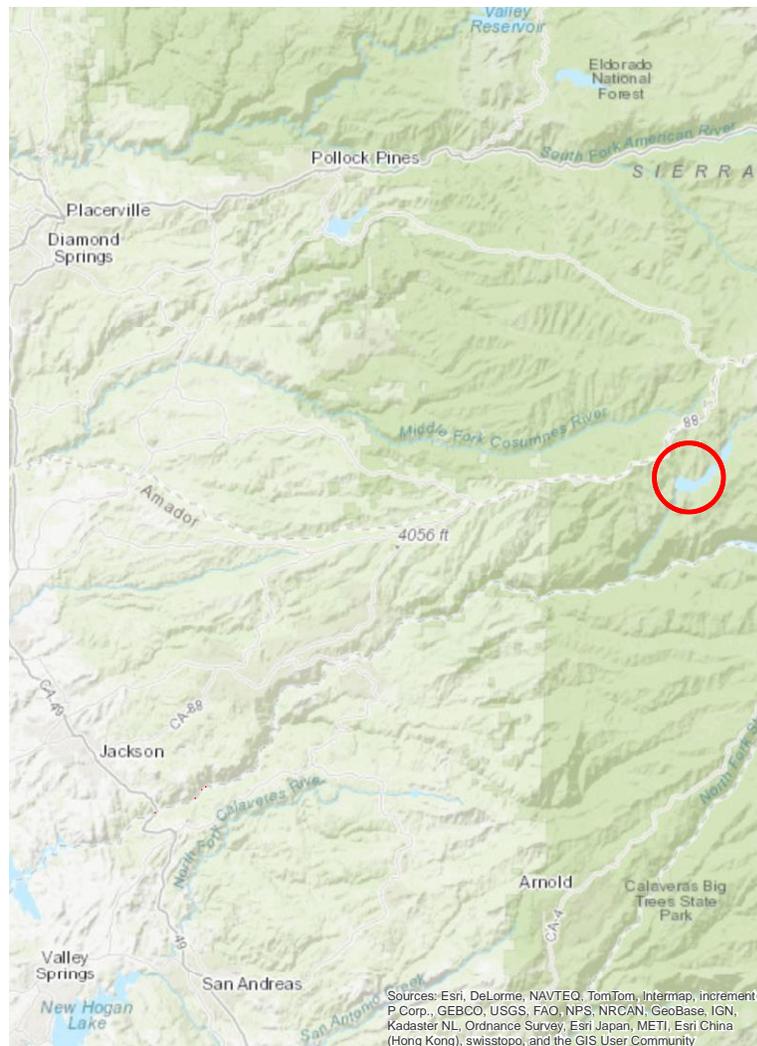


Figure 1. Lower Bear River Reservoir (Amador County).

There are two angler survey boxes (ASB) at Lower Bear. One is located at the main boat launch at the Bear River Lake Resort while the second is by the west side of the outlet dam (Figure 2). Campgrounds and cabins are located around the reservoir, which makes Lower Bear ideal for multi-day usage.

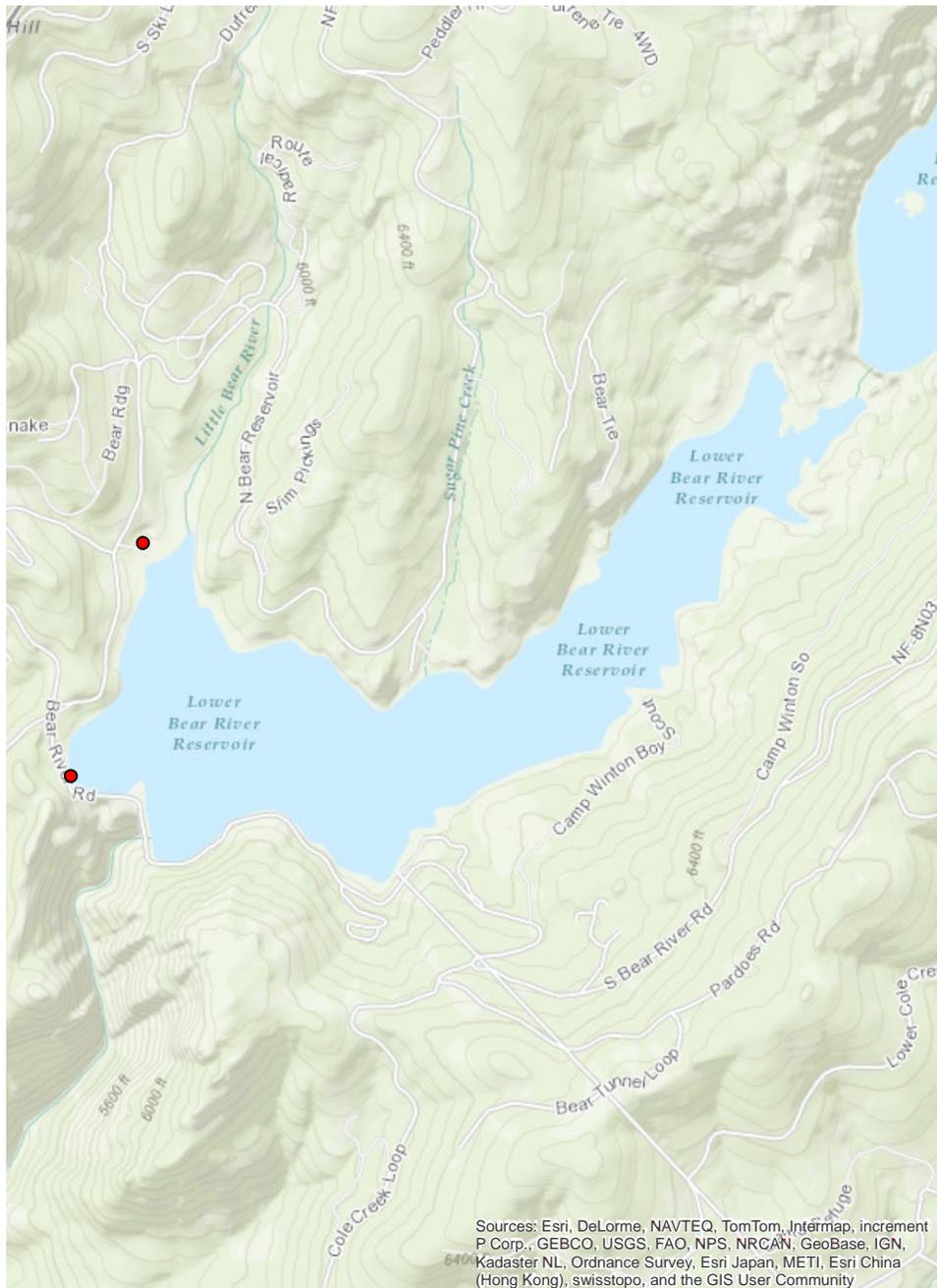


Figure 2. Lower Bear River Reservoir ASB locations.

In addition to fishing, the area surrounding the reservoir supports recreational activities including hiking, boat and all-terrain vehicle rentals, kayaking, canoeing, and swimming. Depending on road conditions, Lower Bear also provides terrain for snowmobiling, cross-country skiing, and ice fishing in the winter. Lower Bear is a well-known trout fishery, containing brown trout (*Salmo trutta*) (BN), rainbow trout (*Oncorhynchus mykiss*) (RT), and lake trout (*Salvelinus namaycush*) (LT). Lower Bear is regularly stocked by California Department of Fish and Wildlife (CDFW), PG&E, and the Bear River Lake Resort, with trout ranging in size from fingerling (2.5 to 5 inches) to trophy (> 18 inches).

Methods

Anglers were asked to fill out a voluntary survey form about their fishing experience at Lower Bear. The survey asks anglers for information regarding hours fished, type of gear used, and the number and species of landed fish. Anglers were also asked the size of the fish landed and whether they kept or released their catch. Finally, anglers were asked three questions pertaining to satisfaction with their overall angling experience, size, and number of fish. Answers were recorded on a scale of -2 to 2, with “2” representing most satisfied and “-2” representing least satisfied. The back of the survey form included space for anglers to provide any additional comments. The 2012 and 2013 data used for comparison in this report was gathered using the roving creel survey (RCS) technique (Hickey 2013 and Richardson 2014).

Results

In 2016, 35 anglers responded to the survey. In 2015 only five anglers responded to the survey. The four-year average, including anglers who responded to the 2012 and 2013 roving creel surveys was 255 (Hickey 2013 and Richardson 2014) (Table 1). Cumulatively, these anglers landed an average of 186 fish annually and averaged 695.2 hours of fishing (0.31 fish/hour). The catch per angler increased from a pre-2016 average of 0.71 to 2.37 in 2016. The catch per hour also increased from a pre-2016 average of 0.22 to 0.57 in 2016.

Table 1. Collection of average effort and catch statistics recorded from the roving creel surveys in 2012 - 2013 and the 2015 - 2016 angler survey box at Lower Bear River Reservoir, Amador County.

<u>Year</u>	<u>Respondents</u>	<u>Hours Fished</u>	<u>Fish Landed</u>	<u>Catch per Hour</u>	<u>Catch per Angler</u>
2012	447	1176.2	247	0.21	0.55
2013	533	1433.5	408	0.28	0.77
2015	5	25.0	4	0.16	0.80
2016	35	146.0	83	0.57	2.37
Average	255	695.2	186	0.31	1.12

In 2012 and 2016, the method of take that caught the greatest number of fish was bait (n = 180 and n = 50). In 2013 and 2015 multiple gear types caught the greatest percentage of fish (n = 189 and n = 4) (Table 2). The method of take that caught the least amount of fish in 2016 was multiple gear types (n=5).

Table 2. The number of fish landed by the type of gear used from 2012 -2013 (Creel method) and 2015 – 2016 (Angler Survey Box method).

Angling method	2012	2013	2015	2016
Bait	180	160	0	50
Lure	14	53	0	12
Fly	4	6	0	6
Multiple	49	189	4	5
Not recorded	NA	NA	NA	10
Total	247	408	4	83

In 2016, the number of anglers and number of fish reported caught was more than in 2015, but less than the 2012 – 2013 surveys. Thirty-one RT caught in 2016 were in the 6.0 – 7.9 in. length class, which also was the length class with the greatest number (Figure 3). Two LT caught in 2016 were in the 20.0 – 21.9 in. length class, which also was the length class with the greatest number. The 2012 – 2013, and 2015 length classes of fish caught at Lower Bear can be found in the 2013 and 2015 survey studies (Richardson 2014, Ewing 2016).

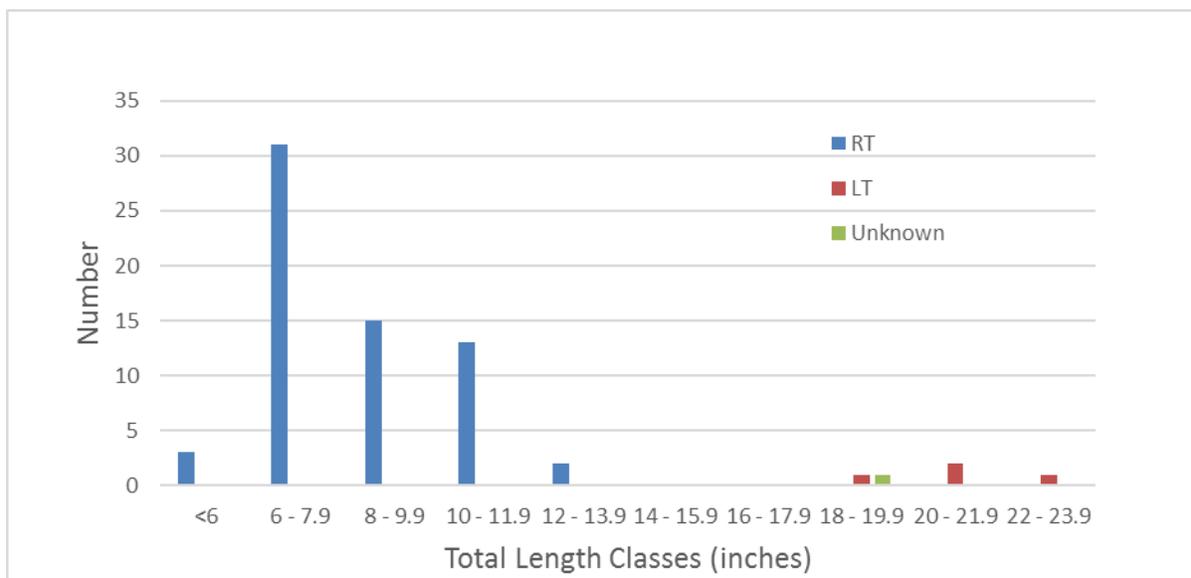


Figure 3. Frequency of only measured fish in each size class that anglers reported landing at Lower Bear River Reservoir in 2016.

In 2016, anglers reported being unsatisfied with their overall angling experience, however anglers were satisfied with size of the fish and the number of fish caught (Tables 3). In 2015, in addition to being unsatisfied with their overall angling experience, anglers were also unsatisfied with the number of fish caught, but neither satisfied nor dissatisfied with the size of their fish (Tables 3). The majority of anglers in both 2012 and 2013 had a satisfactory overall

angling experience. In 2013, anglers were satisfied with the size and number of fish caught. The majority of anglers in 2012 reported not being satisfied with the size and number of fish caught (Table 4).

Table 3. Angler Satisfaction Response Averages for the Lower Bear River Reservoir Fishery from 2015 and 2016(Angler Survey Box) (Based on -2 to 2 Rating Scale).

<u>Year</u>	<u>Overall Angling Experience</u>	<u>Size of the Fish</u>	<u>Number of Fish</u>
2015	-0.75	0.00	-0.67
2016	-0.72	0.10	0.50

Table 4. Percentage Satisfaction Averages for the Lower Bear River Reservoir Fishery from 2012 and 2013 (Creel-based surveys) (Based on Yes or No Satisfaction Question).

<u>Year</u>	<u>Overall Angling Experience</u>	<u>Size of Fish</u>	<u>Number of Fish</u>
2012	83.2%	30.2%	29.5%
2013	83.6%	62.3%	70.9%

Discussion

Data gathered from the 2016 Lower Bear ASB shows anglers caught more than two fish per day on average, which is a large increase from any prior years. Overall catch in 2016 was higher than in 2015, but lower than the 2012-2013 catch. CPUE in 2016 was far greater than any past years' surveys (n=35) (0.57 fish/hour). This increase may be the result of the large allotment of sub-catchable RT stocked in Lower Bear in 2015.

The 6.0 – 7.9 inch length size class had more RT than any other in 2016. These fish were likely the sub-catchable RT stocked in 2015. The smallest fish were RT (< 6.0 in.) and largest were LT (22.0 – 23.9 in.). This may correspond to why anglers were relatively neutral with a 0.1 average for “size” satisfaction. Anglers were satisfied with the number of fish they caught (0.50 average) in 2016. Both the size and number satisfaction numbers increased from 2015 to 2016.

The overall fishing experience in 2016 for anglers was negative for the second consecutive year and second time in four survey years. It is unclear why the overall angling experience was negative in 2016, since neither the number of fish nor size of the fish had negative values. It is possible the fish condition and/or lack of RT planted in 2016 may have played a role in the negative satisfaction. Alternatively, the negative experience may have been unrelated to the fishing itself, but instead be due to outside factors, such as weather, fishing access, or crowds.

The number of respondents in the 2016 survey was 35, which is a lot higher than the five respondents in the 2015 survey. Ideally, the more respondents, the more feedback the ASB provides CDFW on angler success at the fishery. It is essential CDFW maintain the trend of increasing angler participation in the ASB survey, partly because these surveys provide

information on complete fishing trips. In addition, CDFW staff should continue to inform anglers of the ASB locations at Lower Bear, and emphasize how helpful their responses and participation in the survey are.

CDFW, PG & E, and the Bear River Lake Resort stock Lower Bear (Appendix 1). Rainbow trout are stocked by all three entities. The sizes of fish stocked included fingerling, sub-catchable, catchable, and trophy-size fish. Fingerling and sub-catchable trout are stocked under a put and grow management strategy, while catchable and trophy-size trout are stocked under a put and take management strategy. CDFW is implementing a put and grow strategy with the sub-catchable RT, but it is not known how many of these fish grow to catchable size. Losee and Phillips (2017) found that RT in the 14 - 15 inch length-class were, on average, 12.5 times more likely to be caught by sport anglers than those in the smallest individual length-class (8 – 9 in.) CDFW staff will likely move to a trophy-trout fishery in 2018 in order to help survivability of RT planted in Lower Bear. Anglers may not be catching as many hatchery RT due to the presence of large, predatory BN and LT in Lower Bear.

Lower Bear has a history of growing large RT, LT, and BN in the trophy-size length classes. Only four LT were recorded in the 2016 survey with no trophy-size RT, even though Bear River Lake Resort planted 339 trophy-size RT. These trophy-size fish can be difficult to obtain information on. Gathering information on the trophy-sized component of fish populations can be challenging due to their rarity and their use of habitats unsuitable to traditional sampling techniques (Bayley and Austen 2002). Lower Bear though has a lot of boulder and bedrock structure with steep gradient. This allows shore anglers access to deep water for fishing. Being able to fish this deeper water from shore means boat anglers aren't the only ones able to fish greater depths.

Only four BN have been reported caught in four years of surveys. The last stocking of 15,000 fingerling-size BN in 2012 doesn't appear to be successful from the data collected. It is also possible that the smaller percentage of BN in Lower Bear are trophy-size and eating many of the RT resulting in fewer RT in the larger size classes. CDFW electrofishing surveys found that when large, piscivorous northern pike (*Esox lucius*) inhabited Lake Davis (Plumas County, CA) that more trophy-sized RT were caught compared to when the pike were removed (Rossi, Pers. Comm. 2016). One hypothesis for the presence of more trophy-sized RT in Lake Davis is that the smaller-size RT were being eaten and only larger RT could avoid northern pike predation. This same hypothesis could be also happening in Lower Bear.

It was easier to identify any overlying trends since the 2016 survey method was the second consecutive season of the ASB at Lower Bear. It is possible more anglers will fill out the survey forms in the future since many anglers may have not been aware of the recent installation and locations of the ASBs in 2015.

Recommendations

- Continue to survey Lower Bear using ASB procedures to form a standardized survey method of collecting data for and capturing trends and/or gathering year-to-year comparisons.
- Switch to stocking trophy-size RT.

- Educate the public and anglers about ASBs and their locations at Lower Bear.

References

1. Bayley, P. B., and D. J. Austen. 2002. Capture efficiency of a boat electrofisher. Transactions of the American Fisheries Society 131: 435 – 451.
2. California Department of Water Resources. 2012.
http://cdec.water.ca.gov/cgi-progs/stationInfo?station_id=LWB
3. Ewing, B. 2016. Summary Report of Roving Creel Surveys (2012 - 2013) and 2015 Angler Survey Box Analysis at Lower Bear River Reservoir, Amador County. California Department of Fish and Wildlife. Region 2 Fish Files. Unpublished.
4. Hickey, K. 2013. 2012 Lower Bear River Reservoir Creel Census and Catchable Trout Evaluation Study. California Department of Fish and Wildlife. Region 2 Fish Files. Unpublished.
5. Losee, J. P. and Phillips, L. 2017. Bigger is Better: Optimizing Trout Stocking in Western Washington Lakes. North American Journal of Fisheries Management 37:489 – 496. American Fisheries Society.
6. Richardson, L. 2014. 2013 Lower Bear River Reservoir Creel Census and Catchable Trout Evaluation Study. California Department of Fish and Wildlife. Region 2 Fish Files. Unpublished.
7. Rossi, Amber. 2016. California Department of Fish and Wildlife. Personal Communication.

Appendix 1. Stocking history at Lower Bear River Reservoir in 2015 and 2016.

Date	Species	Weight (lbs.)	Number	Agency
6/9/2016	RT	1,000	339	Bear River Lake Resort
5/27/2016	RT	350	525	CDFW
5/27/2016	RT	200	600	CDFW
5/27/2016	RT	450	1,530	CDFW
7/18/2016	RT	510.5	2,195	CDFW
5/18/2016	RT	1,500	3,000	PG & E
2015	RT	1,500	3,000	PG & E
2015	RT	1,000	2,000	Bear River Lake Resort
6/30/2015	RT	1,070	50,076	CDFW
6/22/2015	RT	1,800	4,680	CDFW
5/4/2015	RT	500	850	CDFW
5/4/2015	RT	1,500	2,700	CDFW

