

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

Indian Creek Reservoir, Alpine County

**Summary Report of Roving Creel Surveys (2009, 2011 – 2013) and 2015 Angler
Survey Box Analysis at Indian Creek Reservoir, Alpine County**



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Introduction

Indian Creek Reservoir (ICR) lies approximately three miles north of Markleeville off Highway 89 in eastern Alpine County (Figure 1). Indian Creek Reservoir is located within the East Fork Carson River watershed and was originally constructed between 1968-1970 to store tertiary treated wastewater exported from the Lake Tahoe basin by South Tahoe Public Utility District (STPUD). In 1989, the input of this treated wastewater ceased, but the lake is still a recreational sport fishing destination due to continued stocking efforts from California Department of Fish and Wildlife (CDFW) and the Alpine County Fish and Game Commission (Alpine County). The lake has a maximum estimated depth of 50 feet. The lake sits at an elevation of 5600 feet above mean sea level and in normal water years has 110 surface acres. ICR has no major tributaries, receiving most of its inflow from a diversion from the West Fork Carson River. ICR supports various fish species including: non-native rainbow trout (*Oncorhynchus mykiss*, RT) and brown trout (*Salmo trutta*, BN) as well as Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*, LCT) which are native to the eastern Sierra. Other native fish found in ICR include the Tui chub (*Gila bicolor*), mountain whitefish (*Prosopium williamsoni*), mountain sucker (*Catostomus platyrhynchus*), and the Tahoe sucker (*Catostomus tahoensis*). Brook trout (*Salvelinus fontinalis*, BK) were previously planted at ICR but have not been reported in the survey data covering the last five survey years. Largemouth bass (*Micropterus salmoides*, LMB) are also known to occur in ICR.

Methods

In 2015, anglers were asked to fill out a voluntary survey form describing their fishing experience at one of the three angler survey boxes (ASB) at ICR. The survey asks anglers for information regarding hours fished, type of gear used and the number of landed fish. They were also asked the size and species of the fish landed and whether they kept or released their catch. Finally, anglers were asked three questions, and their answers were recorded on a scale of -2 to 2, with “2” representing most satisfied and “-2” representing least satisfied. The questions pertain to satisfaction of overall angling experience, size, and number of fish. The back of the survey form is reserved for anglers who have any additional comments. The 2009, 2011-2013 data used for comparison in this report were gathered using the roving creel technique (Hood 2013).

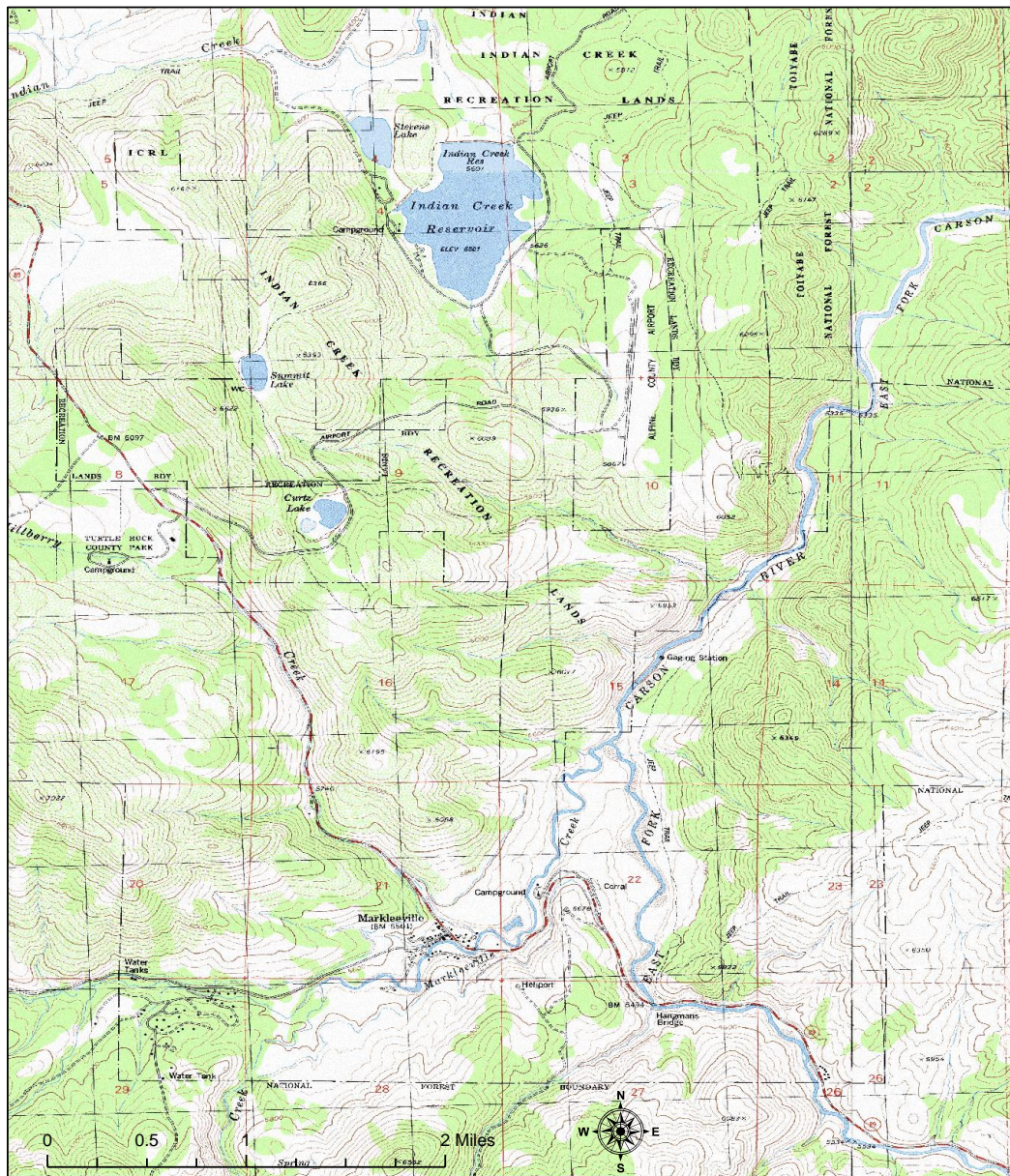


Figure 1. Indian Creek Reservoir (Alpine County).

Results

In 2015, a total of 81 anglers responded to the survey. The five year average, including anglers who responded to the 2009 and 2011 – 2013 roving creel surveys was 75 (Hood 2013) (Table 1). Cumulatively, these anglers landed an average of 151 fish annually and averaged 218.9 hours of fishing (0.56 fish/hour). The catch per angler increased from a 1.10 average prior to 2015, to 4.78 in 2015. Likewise, the catch per hour increased from 0.40 prior to 2015 to 1.22 in 2015, a 205% increase of fish per hour.

Table 1. Collection of average effort and catch statistics recorded from the roving creel surveys in 2009 and 2011-2013 and the 2015 ASB survey at Indian Creek Reservoir.

Year	Respondents	Hours Fished	Fish Landed	Catch per hour	Catch per angler
2009	143	361.5	242	0.67	1.69
2011	45	134.0	11	0.08	0.24
2012	10	32.5	14	0.43	1.40
2013	98	248.0	103	0.42	1.05
2015	81	318.5	387	1.22	4.78
Average	75	218.9	151	0.56	1.83

Prior to 2015, the method of take that caught the greatest number of fish was bait (37.8 %) (Table 2). In 2015, the method of take that caught the greatest number of fish was flies (49.9 %), which is an increase of 20 % from the prior years. The least frequent method in 2015 and prior years was the lure method (1.3 % and 4.6 %), respectively.

Table 2. The number of trout landed by the type of gear from 2009, 2011 - 2013, and 2015.

	2009, 2011 - 2013	2015
Angling method	Number of trout	Number of trout
Bait	140 (37.8%)	153 (39.5%)
Lure	17 (4.6%)	5 (1.3%)
Fly	107 (28.9%)	193 (49.9%)
Multiple	106 (28.6%)	15 (3.9%)
Not recorded	0	21 (5.4%)
Total	370	387

In 2015, anglers managed to catch more trout (n=387) than any previous year, even in 2009 and 2013, in which there were 143 and 98 respondents compared to 81 in 2015. Prior to 2015, 89% of trout

landed were RT, 6% were LCT, and 5% were BN, respectively. In 2015, anglers reported that 55% of trout landed were LCT, 43% were RT, 2% were BN, and less than 1% were reported as unidentified trout. The reported catch rates correspond with CDFW stocking records as 23, 154 LCT have been planted in ICR since 2013 compared to 21,667 RT by CDFW and Alpine County (Table 3).

Table 3. CDFW and Alpine County stocking events from 2009 - 2015.

CDFW						Alpine County	
RT			LCT			RT	
Year	lbs.	Number	Year	lbs.	Number	Year	lbs.
2015	580	1508	2015	174	87	2015	3600
	1000	1500		200	100	2014	3600
2014	1600	3040	2014	600	300	2013	3600
2013	1220	2806		71.1	1209	2012	2800
	610	2013		2200	6160	2011	4950
2012	317.5	6000	2013	300	150	2010	3800
	2000	6000		300	150	2010*	1000
	625	2000		1376	14998	2009	16800
2011	674	5999	2012	1149	9996	2009*	2200
	1000	2000		220	110		
	3000	5400		380	190		
2010	1000	1500	2011	300	150		
	970	6014		300	150		
2009	599.7	4618	2010	600	300		
			2009	300	200		
15196.2		50398	8470.1		34250	14084	42350

*Denotes brown trout plant

The 2015 ASB data showed that 47% (n = 78) of the landed RT measured were in the 10.0 – 11.9 in. length class (Figure 2). For LCT, 45% (n = 95) of the landed and measured fish were in the 14.0 – 15.9 in. length class. For BN, 75% (n = 6) of the landed and measured fish were in the 12.0 – 13.9 in. length class.

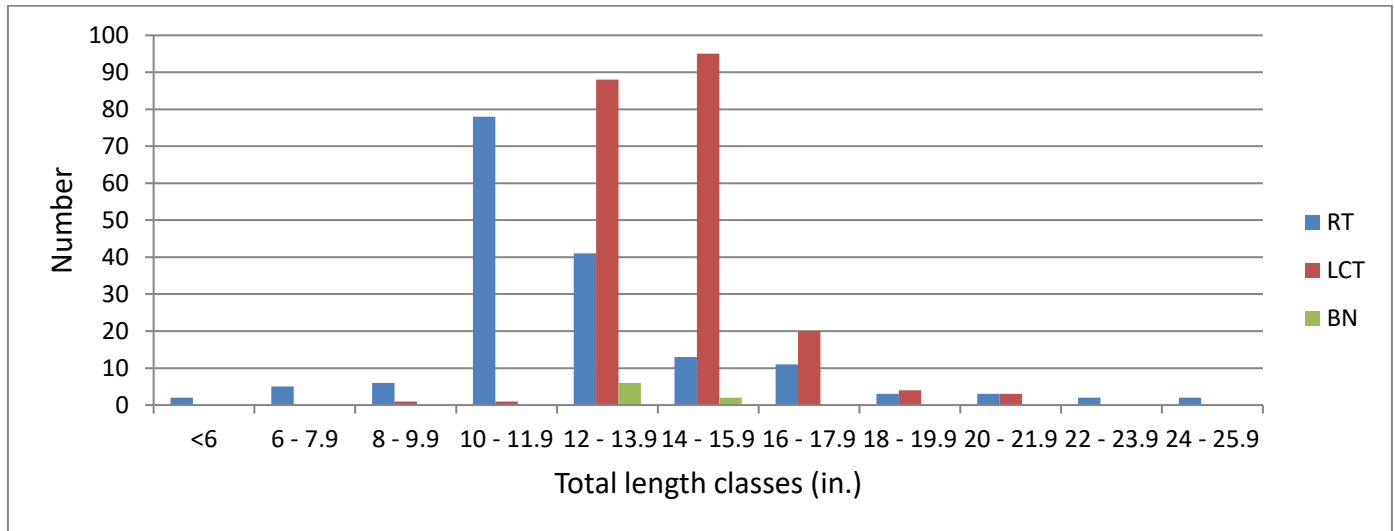


Figure 2. Frequency of identified trout in each size class that anglers reported landing at Indian Creek Reservoir in 2015.

The 2009 and 2011-2013 creel data showed that although more RT have been caught than any other species, the percentage of released trout for the three species are similar and separated by only five percent. The majority of all trout species caught were released. In 2015, ASB data showed that LCT were caught in the greatest numbers but of the 212 caught, 75.5% were released. The majority of BN and RT caught were kept compared to previous data from the creel surveys.

Table 4. Data on kept and released trout at Indian Creek Reservoir in 2009, 2011-2013, and 2015.

<u>Year</u>	<u>Species</u>	<u>Kept</u>	<u>Released</u>	<u>Total caught</u>	<u>Percent of total catch</u>	<u>Percent released</u>
2009, 2011 - 2013	BN	7	10	17	4.6%	58.8%
	LCT	8	14	22	5.9%	63.6%
	RT	136	193	329	88.9%	58.7%
	Unknown	0	2	2	0.5%	100.0%
		151	219	370		
2015	BN	6	2	8	2.1%	25.0%
	LCT	52	160	212	54.8%	75.5%
	RT	95	71	166	42.9%	42.8%
	Unknown*	0	1	1	0.3%	100.0%
		153	234	387		

*Unknown trout species

In 2015, anglers reported being less satisfied with their overall angling experience than the previous years (Tables 5). Anglers had a positive average angling experience response all five years

which is an indication that the fishery provides an above satisfactory experience. Anglers were also satisfied with the size and number of trout over the five year sampling period although the 2015 values decreased from the previous years' averages.

Table 5. Angler satisfaction response averages for the Indian Creek Reservoir fishery from 2009, 2011-2013(Creel-based surveys), and 2015 (Angler Survey Box).

<u>Year</u>	<u>Overall angling experience</u>	<u>Size of the fish</u>	<u>Number of fish</u>
2009, 2011-2013	1.43	1.03	1.01
2015	0.66	0.94	0.76

Discussion

The data gathered from the ICR ASB has shown anglers to have caught over four fish on average per trip which is very successful. Overall catch and CPUE in 2015 was the highest in five years (n=387) (1.22 fish/hour). The increase could be attributed to the large sub-catchable size LCT stocking in 2013.

The greatest number of LCT caught in 2015 were in the 14 - 15.9 in. size class. The greatest number of RT caught in 2015 were in the 10.0 – 11.9 in. size class. This corresponds with anglers being “satisfied” with the “size” of their catch and consistent with the prior years’ average of 1.03. It is possible that there is a sustainable balance between number of fish and available resources in ICR, thus allowing the trout that are in ICR to grow to larger sizes. The public has also been “satisfied” with the numbers of trout caught the last five years. CDFW has been putting allotments of broodstock (2lbs) LCT from Heenan Lake into ICR. However anglers are not reporting catching many of these larger fish, as only three LCT over 20 inches were caught and reported in 2015. The broodstock LCT could potentially be swimming downstream into the afterbay after they are planted due to the fact that they are planted during their spawning season. CDFW could monitor the afterbay after they plant the large LCT to document how many of them are swimming out of ICR but getting access to survey the private water could be difficult. It is often difficult to manage a fishery to satisfy both high catch rates and large size of fish caught, but this appears to be occurring at ICR.

Prior to 2015 the percentage of released species were very similar, ranging from 58.7% - 63.6%, but in 2015, 75.5% of the LCT were released compared to only 42.8% and 25.0% of RT and BN released, respectively. Determining if anglers preferred certain species of trout over another for human consumption could help explain the discrepancy in types of trout kept versus released. The 2015 ASB survey shows that significantly more LCT were caught rather than RT. More LCT could be being caught due to having better survivability in ICR and/or where in ICR anglers are catching their fish. ICR has a LMB population in which anglers have caught LMB over five pounds (Figure 3). It is possible that LMB

could be predating more on RT than LCT and/or LCT could be outcompeting RT for resources. In 2016, the ASB sheet will ask whether the angler caught their fish from shore, boat, or tube which might inform CDFW where certain species are being caught in the lake.



Figure 3. CDFW staff with LMB caught at ICR (M. Mamola).

The overall fishing experience for anglers has and continues to be positive at ICR. One of the reasons anglers are generally satisfied is likely due to the fact that most anglers are catching fish. After a complete trip anglers caught an average of over four fish per person in 2015.

The number of respondents in the 2015 survey was 81, which is a fair number for an ASB. Ideally, the more respondents, the more feedback it provides CDFW on angler success at the fishery. It is essential CDFW maintain the trend of increasing angler participation in the ASB survey, as it provides information on complete fishing trips. CDFW staff should continue to notify anglers of the ASB locations at ICR, and how helpful angler participation in the survey is.

Both CDFW and the Alpine County plant ICR. Rainbow trout are planted by both entities while LCT are planted only by CDFW. The sizes of fish planted included fingerling, sub-catchable, catchable, and super-catchable (trophy) fish. Fingerling and sub-catchable trout are stocked under a put and grow management strategy while catchable trout and trophy trout are stocked under a put and take management strategy. CDFW is implementing a put and grow strategy with the sub-catchable LCT, and

it appears that the fish are growing out to a catchable size, and showing up in large numbers. Many of the LCT caught in 2015 were greater than 12 inches. Rapid growth is expected from the fingerling and sub-catchable size trout due to the high productivity of ICR. CDFW staff could better evaluate the success of stocked sub-catchable LCT by clipping the fins of all stocked trout prior to release in order to identify them in future surveys and get a better estimation of their yearly growth.

Indian Creek Reservoir is a very productive lake that has large amounts of weed cover during summer months, which can impede fishing success for shore anglers. It is difficult to identify any overlying trends since the 2015 survey method was different from prior years as well as not having a box in the 2015 ASB sheet indicating the method of fishing used.

Largemouth bass are present in ICR but have not shown up in the surveys. Largemouth bass have the potential to alter the fishery drastically, but it is hard to identify their effects without further studies. Electrofishing ICR by boat would help get a better understanding of the size of the LMB fishery and the possible presence of other warm water species. A general fish survey would not only give us better insight to the LMB fishery but may also help CDFW evaluate the LCT fishery. It is possible that the introduced LMB are eating and competing with the small LCT resulting in fewer fish in the larger size classes.

Recommendations

- CDFW staff should install a species identification board on the ASB or kiosk at ICR, in order to minimize species misidentification by anglers.
- Have a standardized survey method of collecting data.
- Broodstock LCT are not being reported in the ASB surveys in high numbers. What can be done to understand the fate of these trophy fish and is stocking them in ICR effective?
- Conduct a general fish survey to determine the survivability of the sub-catchable LCT and possible effects of the LMB on the trout fishery.
- Continue stocking efforts for RT and LCT.

References

1. Hood, N. 2013. Indian Creek Reservoir Creel Report. California Department of Fish and Wildlife. Region 2 Fish Files. Unpublished.

