

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

Red Lake, Alpine County

2011-2018 Angler Survey Box Analysis



Ben Ewing  
Environmental Scientist

July 2019

## Introduction

Red Lake is an 85-surface acre reservoir in Alpine County that is situated at approximately 7,872 feet above mean sea level. Red Lake is located off Highway 88, roughly one mile south of the Carson Pass and about 25 miles south of Lake Tahoe (Figure 1). Red Lake drains into Red Lake Creek, which is a five-mile creek that flows into the West Fork Carson River. Red Lake is open all year to the public with a five trout bag limit with 10 in possession sport-fishing regulation.

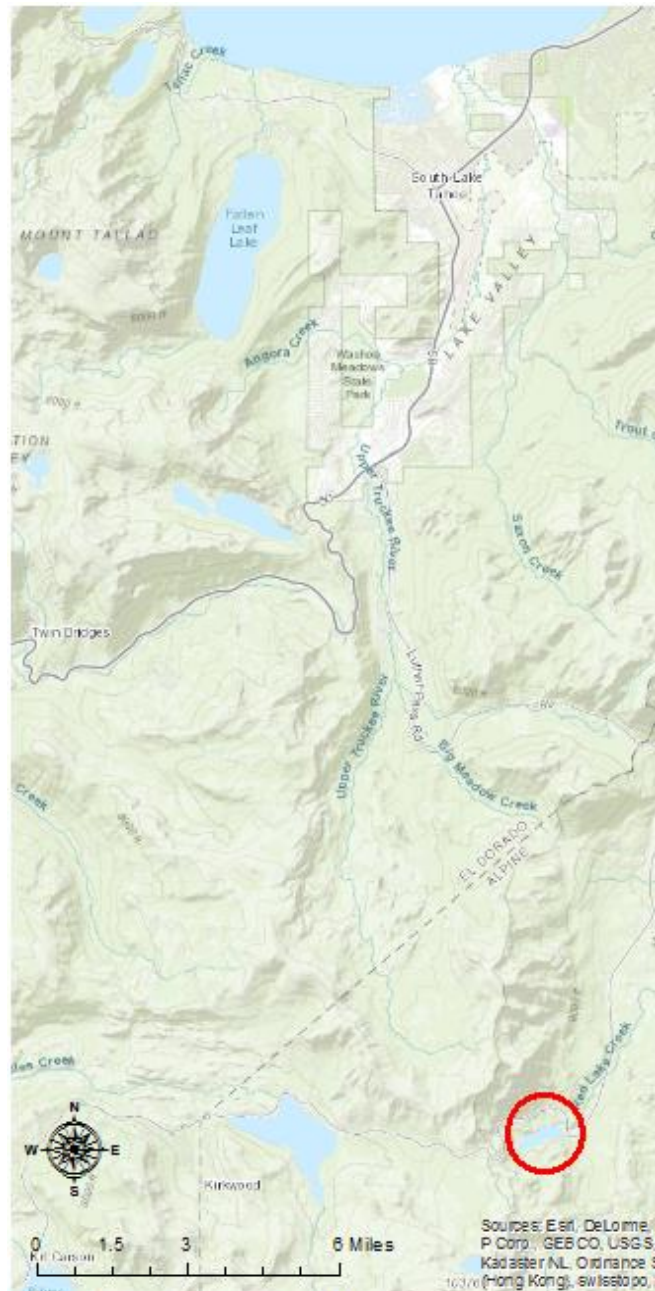


Figure 1. Red Lake, Alpine County.



Red Lake has been annually stocked since 1968 by the California Department of Fish and Wildlife (CDFW) for recreational fishing. Historically, Red Lake was a Brook Trout (*Salvelinus fontinalis*, BK) fishery. However, in 2011, CDFW shifted the fishery to native Lahontan Cutthroat Trout (*Oncorhynchus clarki henshawi*, LCT). CDFW stocks Red Lake with sub-catchable LCT in addition to catchable brood-stock LCT collected from Heenan Lake (Appendix 1). Along with LCT and BK, Red Lake currently supports populations of non-game fish including Tahoe Suckers (*Catostomus tahoensis*), Mountain Suckers (*Catostomus platyrhynchus*) and Tui Chub (*Gila bicolor*).

To assess the fishery, approximately 20 years ago, CDFW installed two angler survey boxes (ASB) at Red Lake (Figure 2). Anglers voluntarily complete a survey sheet after they complete their fishing trip, and deposit it in the box. CDFW uses this data to assess angler satisfaction, species composition, and general angler statistics at Red Lake. This report covers the data collected from Red Lake's ASB from 2011 - 2018.

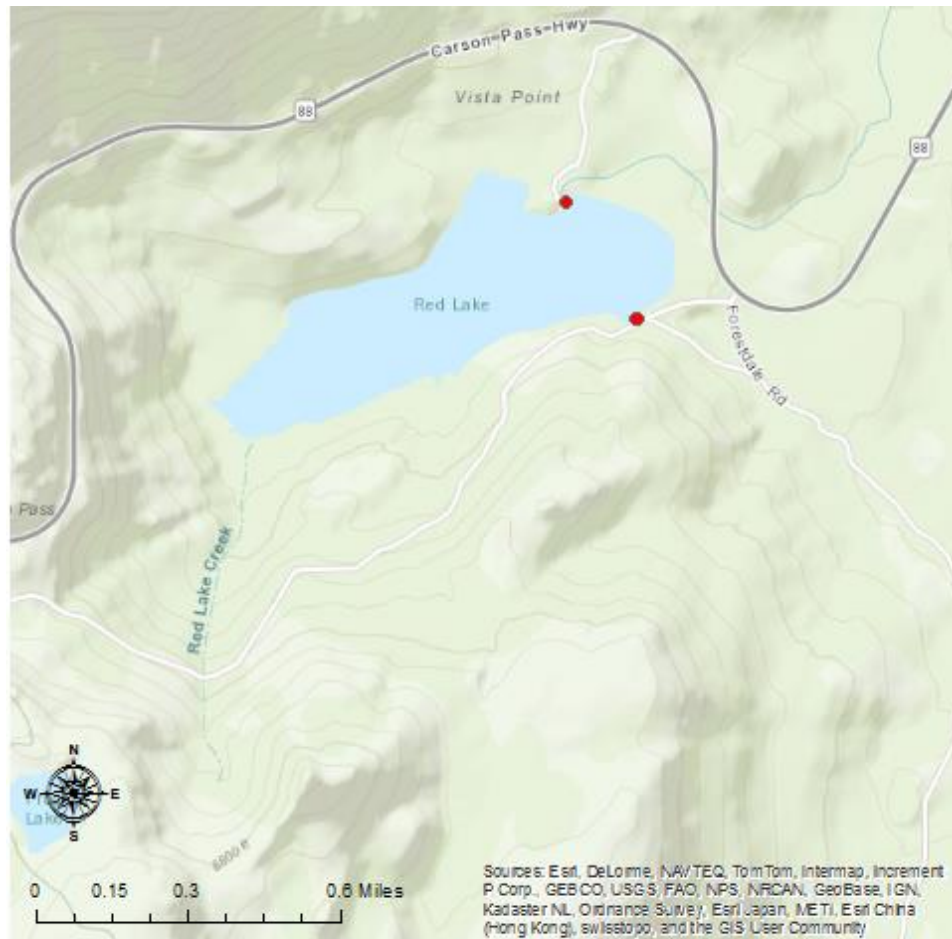


Figure 2. Red Lake ASB Locations, Alpine County.

## Methods

Anglers were asked to complete a voluntary survey form about their fishing. The survey asked anglers for information regarding hours fished, type of gear and method used, and the number of landed fish. Anglers 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 was reserved for anglers who had any additional comments (Appendix 2).

## Results

In 2018, Red Lake had 21 respondents, which was well below the 2011 – 2018 average of 52 (range: 19 - 116) (Table 1). It was also the second lowest angler total in the 2011 - 2018 survey period. Cumulatively, these anglers landed 39 fish and fished for 68.5 hours in 2018, which is also below the eight-year average of 173.70 hours and 144 fish landed. The catch per angler and catch per hour in 2018 of 1.86 and 0.57 decreased from the average of 3.09 and 0.94, respectively over the eight-year period.

Table 1. Collection of average effort and catch statistics recorded from the ASB 2011 - 2018 at Red Lake.

Year	Respondents	Hours Fished	Fish Landed	Catch per Angler	Catch per Hour	Hours per Angler
2011	37	141.13	98	2.65	0.69	3.81
2012	51	159.75	166	3.25	1.04	3.13
2013	61	181.50	224	3.67	1.23	2.98
2014	41	132.00	136	3.32	1.03	3.22
2015	66	220.25	170	2.58	0.77	3.34
2016	116	423.50	211	1.82	0.50	3.65
2017	19	63.00	105	5.53	1.67	5.53
2018	21	68.50	39	1.86	0.57	3.26
Average	52	173.70	144	3.09	0.94	3.61

One angler (4.8%) reported fishing from a boat, which resulted in the best success in terms of catch per angler (7.00) in 2018 (Table 2). Three anglers (14.3%) reported fishing from a float tube, which resulted in the second highest rate in terms of catch per angler (2.33) in 2018. Shore fishing was the most popular method of fishing for a fourth consecutive ASB year ( $n = 15$ ) and had a 1.53 catch per angler value. Anglers who did not record their method of fishing had a 1.00 catch per angler value.

Table 2. Number of anglers and catch per angler based on angling method at Red Lake, 2011 - 2018.

	2011 - 2014		2015		2016		2017		2018	
Method	Number of Anglers (%)	Catch per Angler	Number of Anglers (%)	Catch per Angler	Number of Anglers (%)	Catch per Angler	Number of Anglers (%)	Catch per Angler	Number of Anglers (%)	Catch per Angler
Boat	16 (8%)	2.38	2 (3.0%)	1.50	4 (3.4%)	2.50	1 (5.3%)	4.00	1 (4.8%)	7.00
Float tube	25 (13%)	3.92	1 (1.5%)	0.00	1 (1.0%)	0.00	NA	NA	3 (14.3%)	2.33
Shore/Wading	142 (75%)	3.04	58 (87.9%)	2.64	102 (87.9%)	1.81	14 (73.7%)	6.43	15 (71.4%)	1.53
Multiple	NA	NA	NA	NA	2 (1.7%)	0.00	1 (5.3%)	0.00	NA	NA
Not recorded	7 (4%)	4	5 (7.6%)	2.80	7(6.0%)	2.29	3 (15.8%)	3.67	2 (9.5%)	1.00
	190		66		116		19		21	

Anglers used bait, lures, and flies while fishing at Red Lake (Table 3). In 2018, eight anglers (38.1%) used multiple gear methods to catch fish, which was an increase from 2017. The least frequent identified method in 2018, similar to any previous year, was the fly method, in which two anglers strictly used flies. Fly anglers reported the highest catch rate (3.00 catch per angler) in 2018. Bait anglers reported the second highest identified catch rate in 2018 (2.50 catch per angler), which was a large decrease from 2017 (9.14 catch per angler). Although, it was a decrease from 2017, it was closer to pre-2017 years (1.79, 2016; 3.06, 2015; 2.38, 2011 – 2014). In 2018, both multiple gear anglers (n=8) and one angler who did not record the gear type used, both had a 1.0 catch per angler value.

Table 3. The frequency of anglers that used each angling method and their corresponding catch rates from 2011 - 2018.

	2011 - 2014	2015	2016	2017	2018
Angling method	Catch per Angler (Total Anglers)	Catch per Angler (Total Anglers)	Catch per Angler (Total Anglers)	Catch per Angler (Total Anglers)	Catch per Angler (Total Anglers)
Bait	2.38 (77)	3.06 (48)	1.79 (61)	9.14 (7)	2.50 (4)
Lure	3.63 (54)	1.45 (11)	2.59 (27)	5.00 (5)	2.33 (6)
Fly	6.31 (16)	0.00 (1)	0.80 (5)	NA	3.00 (2)
Multiple	2.78 (40)	0.75 (4)	1.18 (22)	2.67 (6)	1.00 (8)
Not recorded	1.00 (4)	2.00 (2)	2.00 (1)	0.00 (1)	1.00 (1)
Total Anglers	191	66	116	19	21

In 2018, anglers caught fewer fish (n = 39) than any sampling period (Table 1 and Figure 3). In 2011, 69% (n=68) of trout landed were LCT while only 29% (n=28) were BK. By 2013, anglers reported catching a higher percentage (55%) of BK (n=123) than LCT (45%) (n=101). In 2014, 65% of the fish landed were LCT (n=88) and 13% were BK (n=18). In 2015, 64% of identifiable trout landed were LCT (n=113), eight percent were BK (n=14), 24% percent were

unidentifiable trout (n=43), and three percent were unknown species (n=6). In 2016, 84% of identifiable trout landed were LCT (n=177), eight percent were BK (n=16), and eight percent were a combination of unknown species/trout (n=18). In 2017, 68% of identifiable trout landed were LCT (n=71), 18% were unknown species (n=19), 10% were Tui Chubs (n=11), three percent were suckers (n=3), and one percent were BK (n=1). In 2018, 74% of fish landed were LCT (n=29), 10% were unknown species (n=4), 10% were BK (n=4), and five percent were suckers (n=2). Brown Trout only appeared in 2011, when anglers reported catching two BN, one in the 10-11.9" size class and one in the 14-15.9" size class. The reported catch rates correspond with stocking records. BK were last stocked in 2010 and only LCT have been stocked in Red Lake since 2011 by CDFW.

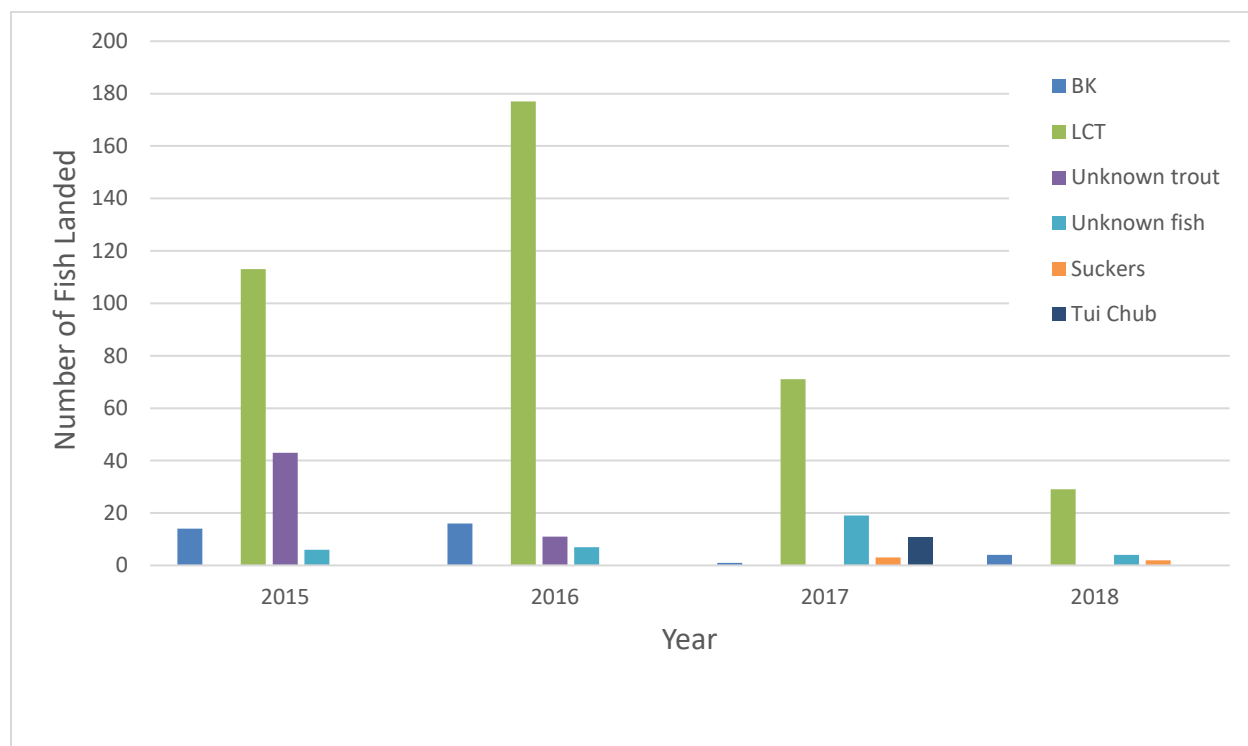


Figure 3. Number of each species of fish caught annually from Red Lake, 2015 - 2018.

In 2015, 24% (n = 31) of the landed trout measured less than 10 inches in total length, 22% (n=43) in 2016, 43 % (n=31) in 2017, and 67% (n=22) in 2018 (Figure 4). Fifty-four percent (n=68) of landed trout measured between 12 and 20 inches in 2015, 58% (n=112) in 2016, 21% (n=15) in 2017, and 24% (n=8) in 2018. Only two (n=2), and four percent (n=7) of fish caught were greater than 20 inches in 2015 and 2016 respectively, but increased almost seven-fold in 2017 to 26% (n=19). Unfortunately in 2018, this number dropped back down to three percent (n=1).

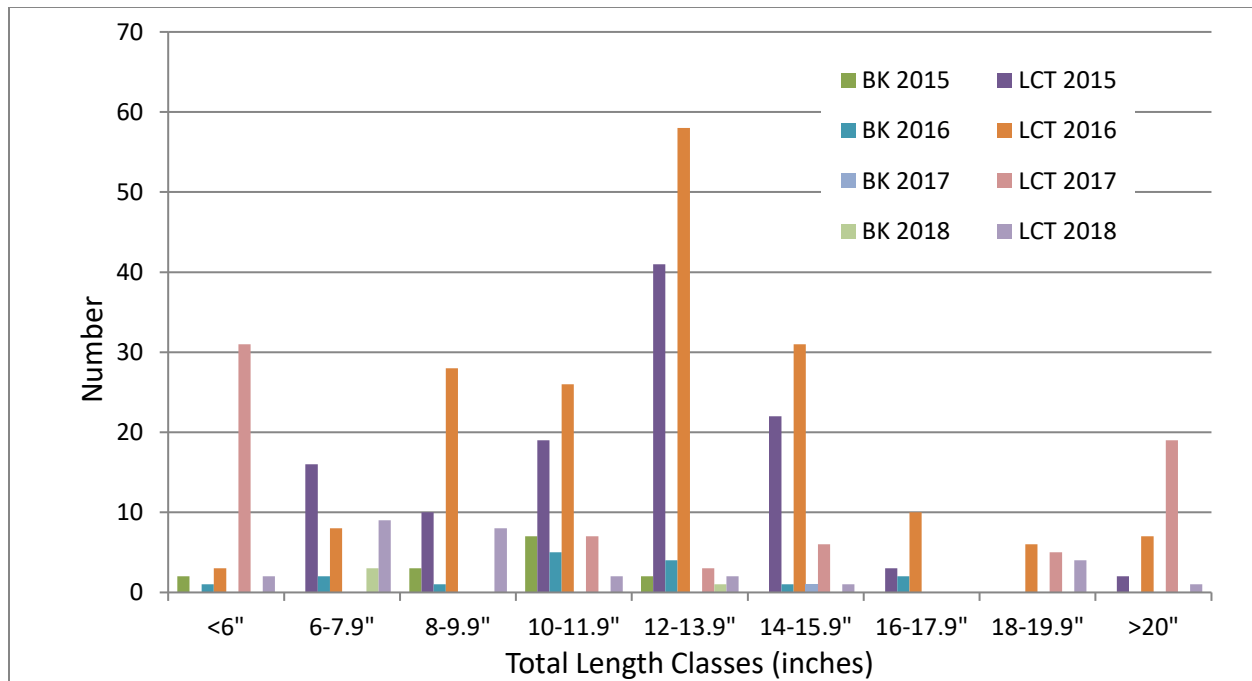


Figure 4. Frequency of identified trout in each size class that anglers reported landing at Red Lake, 2015-2018.

The 2011 – 2014 ASB data showed that although more LCT were caught than BK, the percentage released of each species was the same (71%) (Table 4). In 2015, 50% of BK were released compared to only 12% of LCT released. In 2016, anglers released 50% of BK while 38% of LCT were released. In 2017, no BK were released while 37% of LCT were released. Eleven percent of unknown fish, 100% of suckers, and no Tui Chubs were released in 2017. In 2018, 75% of BK were released while 83% of LCT were released. One hundred percent of unknown fish and no suckers were released in 2018.

Table 4. Kept and released fish in Red Lake from 2011 - 2018.

Year	Species	Kept	Released	Total Caught	Percent of Total Catch	Percent Released
2011 - 2014	BK	74	182	256	42.5	71.1
	LCT	99	245	344	57.1	71.2
	BN	0	2	2	0.0	100.0
		173	429	602		
2015	BK	7	7	14	8.0	50.0
	LCT	99	14	113	64.2	12.4
	Unknown trout	43	0	43	24.4	0.0
	Other	NA	NA	6	3.4	NA
		149	21	176		
2016*	BK	8	8	16	7.8	50.0
	LCT	109	68	177	85.9	38.4
	Unknown fish	11	2	13	6.3	15.4
		128	78	206		
2017	BK	1	0	1	1.0	0.0
	LCT	45	26	71	0.7	36.6
	Unknown fish	17	2	19	0.2	10.5
	Suckers	0	3	3	0.0	100.0
	Tui Chub	11	0	11	0.1	0.0
		74	31	105		
2018	BK	1	3	4	10.3	75.0
	LCT	5	24	29	74.4	82.8
	Unknown fish	0	4	4	10.3	100.0
	Suckers	2	0	2	5.1	0.0
		8	31	39		

\*In 2016, the disposition of 5 fish caught were not recorded.

In 2018, anglers reported being satisfied with their overall angling experience (Tables 5). Anglers had a positive average angling experience response all eight years, which is an indication that the fishery provides a satisfactory experience. Anglers were satisfied with the size of the trout for the fourth consecutive year in eight years. The 0.75 "size" value is the second highest of any previous year. Anglers were satisfied with the number of fish caught for a sixth consecutive year.



Table 5. Angler satisfaction response averages for the Red Lake fishery from 2011 through 2018.

Year	Overall Angling Experience	Size of the Fish	Number of Fish
2011	0.28	-0.33	-0.14
2012	0.34	-0.42	-0.15
2013	0.73	-0.16	0.49
2014	0.54	-0.16	0.38
2015	0.50	0.52	0.50
2016	0.08	0.43	0.10
2017	1.06	0.87	0.93
2018	0.53	0.75	0.42

## Discussion

Red Lake anglers average three fish caught per day in the last eight years. However, overall catch in 2018 was the lowest in eight years. Catch per hour and catch per angler were both the second lowest values in the eight years of surveys. In 2018, one angler fished from a boat. This angler also had the greatest catch per angler value. It is possible the lower overall catch per angler and catch per hour were a function of the many wildfires going on in 2018. The air quality was poor and air temperatures were higher than normal in Alpine County. The higher temperatures may have caused fish to occupy greater depths, becoming harder to access for shore anglers, which made up 71% of anglers. Although CDFW stocked the same amount of LCT brood stock in 2018 that they did in 2017, anglers reported landing fewer fish in 2018. It is possible anglers caught more fish, but did not report the catch. In June of 2019, CDFW contacted anglers catching LCT broodstock who did not fill out an angler survey sheet (Ewing Pers. Comm.).

The greatest number of fish caught in 2018 were in the 6 in. – 7.9 in. size class for the first time. The majority of LCT that were 6 in. – 7.9 in. were caught after June 22, 2018, which was after the 2018 LCT sub-catchable stocking. It is possible anglers caught wild LCT that were naturally spawning at Red Lake or from the recent LCT stocking. Before 2013, anglers were unsatisfied with the number of trout they were catching. For six straight years now, anglers have been satisfied with the number of trout caught. It is possible that the decrease in fish stockings over the years has decreased competition for food, increased LCT survivability in Red Lake, and allowed LCT in Red Lake to grow to larger, catchable sizes. The large number of angler-released fish may also contribute to fish growing to a larger size. Anglers have been satisfied with the size of trout caught the last four years. It is often difficult to manage a fishery to satisfy both high catch rates and large size of fish caught, but from 2015 - 2018 it was accomplished.

Most trout caught in 2018 were released. In recent years, fishing clubs and many outdoor writers have promoted the idea of catch and release fishing. Anglers are encouraged to release fish they catch, even though the fish may be large enough to keep under the prevailing fishing regulations (Clark Jr. 1983). Since 67% of the trout caught were less than 10 in., it is possible anglers released these fish, hoping to catch larger trout. Unlike creel surveys, ASB surveys have shown more LCT caught than BK. Historically, Red Lake was a BK fishery, but CDFW has not stocked BK into Red Lake since 2010. Red Lake has and continues to receive both sub-catchable LCT (when available) and Heenan Lake LCT broodstock. The continued stockings of LCT and discontinuation of BK stocking may explain the increase of LCT caught when compared to BK.

The overall fishing experience for anglers has been positive at Red Lake every year surveyed. This is consistent with what the roving creel survey provided (Onanian 2014). One reason anglers are likely satisfied is because most anglers are catching fish. Several studies have shown that angler satisfaction is positively related to fishing success (Hicks et al. 1983; Graefe and Fedler 1986; McMichael and Kaya 1991; Spencer 1993; Mostegl 2007; Hunt et al. 2012).

The number of respondents in the 2018 survey was the second lowest in eight years, which appears to be consistent with the decline nationally in trout fishing (USFWS and U.S. Census Bureau 2011). Ideally, the more respondents, the more feedback it provides CDFW of angler success at the fishery. Regardless, it appears the few anglers who did respond to the ASB in 2018 had a great season.

### **Literature Cited**

Clark Jr., R. D. 1983. Potential Effects of Voluntary Catch and Release of Fish on Recreational Fisheries. *North American Journal of Fisheries Management*. 3:3, 306 – 314.

Graefe, A. R., and A. J. Fedler. 1986. Situational and subjective determinants of satisfaction in marine recreational angling. *Leisure Sciences* 8:275-295.

Hicks, C. E., L. C. Belusz, D. J. Wittter, and P. S. Haverland. 1983. Application of angler attitudes and motives to management strategies at Missouri's trout parks. *Fisheries* 8(5):2-7.

Hunt, K. M., C. P. Hutt, J. W. Schlechte, and D. L. Buckmeier. 2012. Demographics, attitudes, preferences, and satisfaction of Texas freshwater catfish anglers. *Proceedings of the Annual Conference of Southeast Association of Fish and Wildlife Agencies* 66:94-101.

McMichael, G. A., and C.M. Kaya. 1991. Relations among stream temperature, angling success for Rainbow and Brown trout, and fisherman satisfaction. *North American Journal of Fisheries Management* 15:823-829.

Mostegl, N. M. 2007. Where is that catch? A closer look into the fishing surveys of British Columbia to reveal angler motivation and satisfaction. Master's thesis. Paris-Lodron Universitat, Salzburg, Austria.

Onanian, B. 2014. 2013 Red Lake Creel Survey. California Department of Fish and Wildlife. Fish Files. Unpublished. <http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=88904>

Spencer, P. D. 1993. Factors influencing satisfaction of anglers on Lake Miltona, Minnesota. *North American Journal of Fisheries Management* 13:201-209.

USFWS (U.S. Fish and Wildlife Service) and U. S. Census Bureau. 2011. National survey of fishing, hunting, and wildlife-associated recreation. USFWS and U.S. Census Bureau, Washington, D.C.

Appendix 1. Stocking history at Red Lake since 2011.

Date	Species	Weight (lbs.)	Number	Size
7/18/2011	LCT	201	3015	Sub-catchable
5/18/2012	LCT	378	189	Super-catchable
5/22/2012	LCT	322	161	Super-catchable
6/4/2012	LCT	785	6672	Sub-catchable
6/5/2012	LCT	1,532	13328	Sub-catchable
5/13/2013	LCT	460	5014	Sub-catchable
5/21/2013	LCT	360	180	Super-catchable
5/22/2013	LCT	304	152	Super-catchable
5/29/2014	LCT	218	109	Super-catchable
6/5/2014	LCT	218	109	Super-catchable
6/23/2014	LCT	100	1600	Sub-catchable
5/19/2015	LCT	300	150	Super-catchable
5/20/2016	LCT	375	150	Super-catchable
5/31/2016	LCT	150	1005	Sub-catchable
6/4/2017	LCT	290	145	Super-catchable
6/6/2017	LCT	430	215	Super-catchable
6/13/2017	LCT	125	1000	Sub-catchable
5/24/2018	LCT	720	360	Super-catchable
6/15/2018	LCT	134.14	1100	Sub-catchable

## Appendix 2.

### Red Lake

The California Department of Fish and Wildlife is conducting an evaluation of the trout fishery on Red Lake. We request your help in this evaluation by providing the following information in this survey. Please use this form for **one** day's fishing on Red Lake by **one** angler only.

Date Fished: \_\_\_\_\_ # Hours Fished: \_\_\_\_\_  
mm/dd/yyyy

Primary gear type used (check one):

☐ Bait ☐ Lure ☐ Fly

Primary method or location fished (check one):

☐ Shore or Wading ☐ Float Tube ☐ Boat

Enter the total number of fish caught by species and size class:

Size	brook trout		Lahontan cutthroat trout		Other:	
	Kept	Released	Kept	Released	Kept	Released
Less than 6"						
6"-7.9"						
8"-9.9"						
10"-11.9"						
12"-13.9"						
14"-15.9"						
16"-17.9"						
18"-19.9"						
20" and greater						

Please indicate your level of satisfaction with the following statements regarding your fishing experience today:

	Least satisfied		Neutral	Most satisfied	
Overall angling experience today:	-2	-1	0	+1	+2
Size of fish:	-2	-1	0	+1	+2
Number of fish:	-2	-1	0	+1	+2

Please use the back of this form for any additional comments. Thank you for taking the time to fill out this form.

