

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

Red Lake, Alpine County

2011-2020 Angler Survey Box Analysis



Photo by B. Ewing

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Introduction

Red Lake is an 85-surface acre reservoir in Alpine County situated at 7,872 feet above mean sea level. Red Lake is located off Highway 88, one mile south of Carson Pass and 17 miles south of Lake Tahoe (**Figure 1**). Red Lake drains into Red Lake Creek, 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 a 10 in possession sport-fishing regulation.

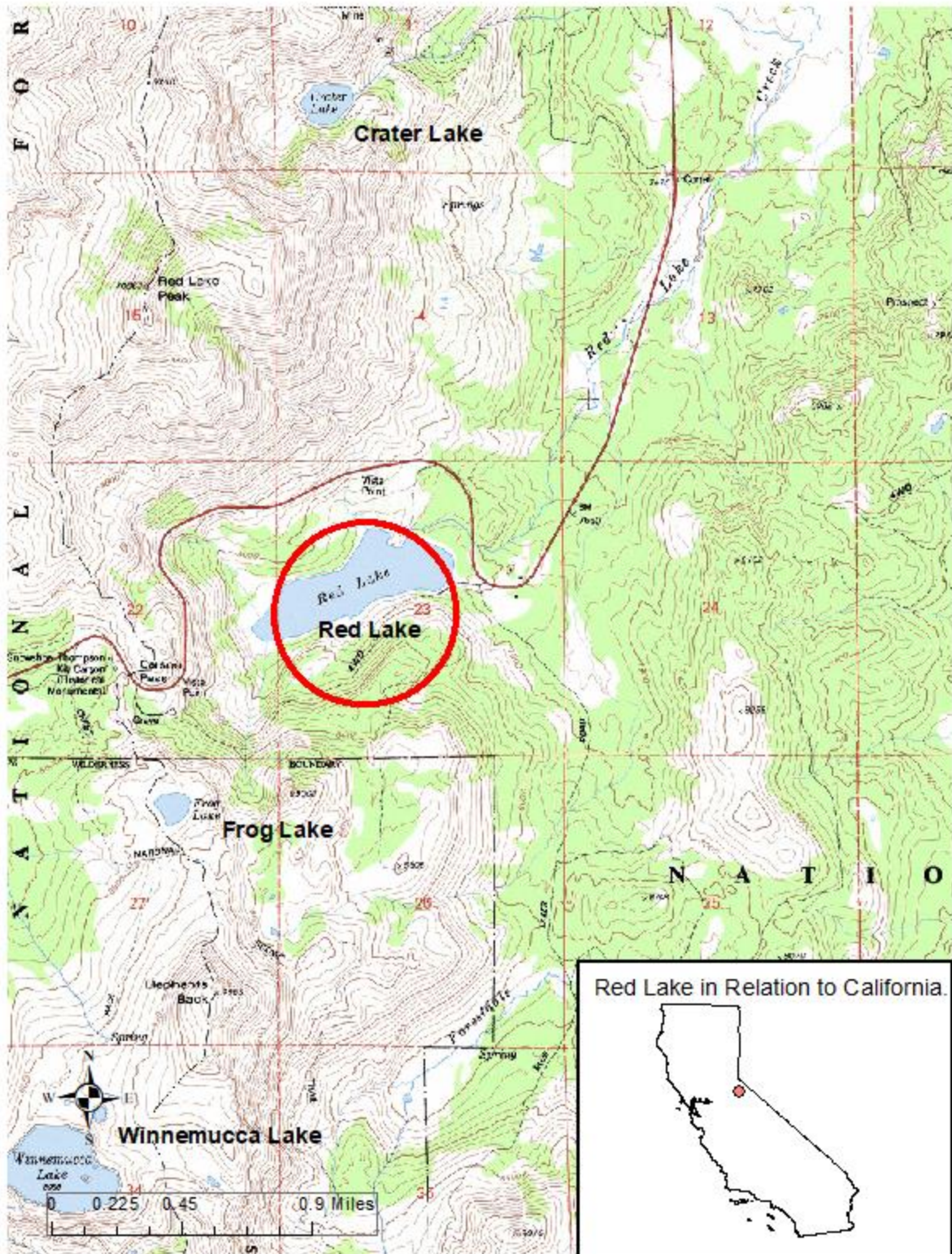


Figure 1. Red Lake, Alpine County.

California Department of Fish and Wildlife (CDFW) has stocked Red Lake for recreational fishing annually since 1968. Historically, Red Lake was a Brook Trout

(*Salvelinus fontinalis*, BK) fishery. However, in 2011, CDFW shifted the fishery to native Lahontan Cutthroat Trout (*Oncorhynchus clarkii henshawi*, LCT). CDFW stocks Red Lake with sub-catchable LCT in addition to catchable broodstock LCT collected from Heenan Lake (**Appendix 1**). Along with LCT and BK, Red Lake currently supports populations of non-game fish, including Tahoe Sucker (*Catostomus tahoensis*), Mountain Sucker (*Catostomus platyrhynchus*), and Tui Chub (*Gila bicolor*).

To assess the fishery, CDFW installed two angler survey boxes (ASB) at Red Lake approximately 20 years ago (**Figure 2**). Anglers voluntarily complete a survey form 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 2011–2020.

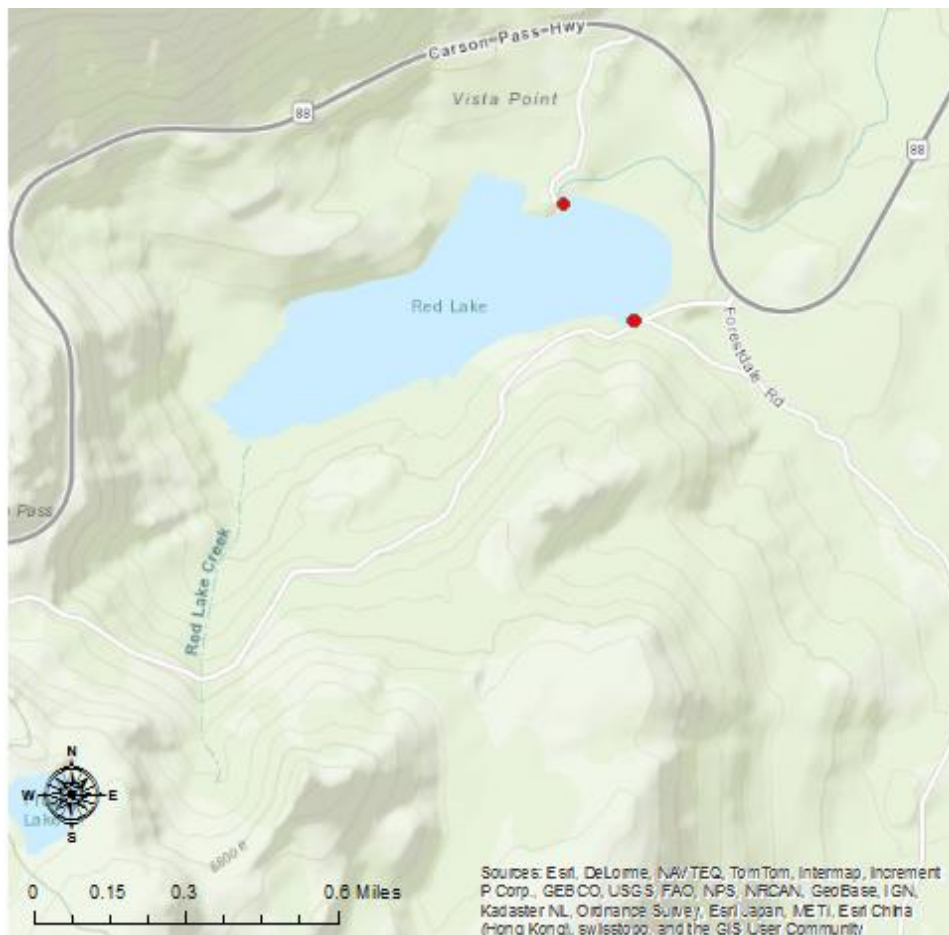


Figure 2. Red Lake Angler Survey Box (ASB) locations (Alpine County).

Methods

Participating anglers complete a voluntary survey form about their fishing. The survey asks anglers for information regarding hours fished, type of gear and method

used, and the number of landed fish. Anglers are also asked the size and species of the fish landed and whether they kept or released their catch. Finally, anglers are 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, fish size, and number of fish caught. The back of the survey form was reserved for anglers who had any additional comments (**Appendix 2**).

Results

In 2020, Red Lake had 30 respondents, which was well below the 2011–2020 average of 48 (range: 19–116) (**Table 1**). It was also the third lowest angler total in the 2011–2020 survey period. Cumulatively, 2020 anglers landed 70 fish and fished for 83 hours, which is also below the 10-year average of 128 fish landed and 156.86 hours fished. The catch per angler (2.33) and catch per hour (0.84) in 2020 decreased from the average of 2.88 and 0.90, respectively, over the 10-year period (**Table 1**).

Table 1. Collection of average effort and catch statistics recorded from the ASB 2011–2020 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
2019	36	96.00	63	1.75	0.66	2.67
2020	30	83.00	70	2.33	0.84	2.77
Average	48	156.86	128	2.88	0.90	3.44

Seven anglers (23.3%) reported fishing from a boat, which resulted in the best success in terms of catch per angler (4.43) in 2020 (**Table 2**). Nineteen anglers (63.3%) reported fishing from shore/wading, which resulted in the second highest rate in terms of catch per angler (1.79) in 2020. Shore fishing was also the most popular method of fishing for a sixth consecutive year. One float tube angler had a 1.00 catch per angler

value. Three anglers who did not record their method of fishing had a 1.33 catch per angler value.

Table 2. Number of anglers and catch per angler based on angling method at Red Lake, 2015–2020. NA=Not Applicable

	2015		2016		2017	
Method	Number of Anglers (%)	Catch per Angler	Number of Anglers (%)	Catch per Angler	Number of Anglers (%)	Catch per Angler
Boat	2 (3.0%)	1.50	4 (3.4%)	2.50	1 (5.3%)	4.00
Float tube	1 (1.5%)	0.00	1 (1.0%)	0.00	NA	NA
Shore/Wading	58 (87.9%)	2.64	102 (87.9%)	1.81	14 (73.7%)	6.43
Multiple	NA	NA	2 (1.7%)	0.00	1 (5.3%)	0.00
Not recorded	5 (7.6%)	2.80	7(6.0%)	2.29	3 (15.8%)	3.67
Total	66		116		19	

	2018		2019		2020	
Method	Number of Anglers (%)	Catch per Angler	Number of Anglers (%)	Catch per Angler	Number of Anglers (%)	Catch per Angler
Boat	1 (4.8%)	7.00	5 (13.9%)	2.60	7 (23.3%)	4.43
Float tube	3 (14.3%)	2.33	1 (2.8%)	0.00	1 (3.3%)	1.00
Shore/Wading	15 (71.4%)	1.53	27 (75.0%)	1.70	19 (63.3%)	1.79
Multiple	NA	NA	1 (2.8%)	2.00	NA	NA
Not recorded	2 (9.5%)	1.00	2 (5.6%)	1.00	3 (10.0%)	1.33
Total	21		36		30	

Anglers used bait, lures, and flies while fishing at Red Lake (**Table 3**). In 2020, 11 anglers (36.7%) used lures to catch fish, which has seen a steady increase from 2015 when 16.7% of anglers used lures. Lure anglers also reported the highest catch rate (3.00 catch per angler) in 2020. For the first time in the last six years, multiple-gear fishing was the least used gear in 2020. Multiple gear anglers also had a 1.75 catch per angler value, an increase from 2018 and 2019. Bait anglers reported the second highest identified catch rate in 2020 (2.25 catch per angler) for a second consecutive year, but still a large decrease from 2017 (9.14 catch per angler). Although, it was a decrease from 2017, it was closer to previous years' values (1.79, 2016; 2.50, 2018; 1.70, 2019). In 2020, one angler who didn't report a gear method had a 2.00 catch per angler value while fly anglers had the lowest catch per angler value of 1.67. This is the second consecutive year fly anglers had the lowest catch per angler values.

Table 3. The frequency of anglers that used each angling method and their corresponding catch rates from 2015–2020.

Angling method	2015	2016	2017	2018	2019	2020
	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)	Catch per Angler (Total Anglers)
Bait	3.06 (48)	1.79 (61)	9.14 (7)	2.50 (4)	1.7 (10)	2.25 (8)
Lure	1.45 (11)	2.59 (27)	5.00 (5)	2.33 (6)	2.38 (13)	3.00 (11)
Fly	0.00 (1)	0.80 (5)	NA	3.00 (2)	0.33 (3)	1.67 (6)
Multiple	0.75 (4)	1.18 (22)	2.67 (6)	1.00 (8)	1.40 (10)	1.75 (4)
Not recorded	2.00 (2)	2.00 (1)	0.00 (1)	1.00 (1)	NA	2.00 (1)
Total anglers	66	116	19	21	36	30

In 2020, anglers caught the third fewest fish ($n = 70$) on record (**Table 1** and **Figure 3**). In 2011, 69% ($n = 68$) of trout landed were LCT, while only 29% ($n = 28$) were BK. In 2015, 64% of identifiable trout landed were LCT ($n = 113$), 8% were BK ($n = 14$), 24% percent were unidentifiable trout ($n = 43$), and 3% were unknown species ($n = 6$). In 2016, 84% of identifiable trout landed were LCT ($n = 177$), 8% were BK ($n = 16$), and 8% 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 ($n = 11$), 3% were suckers ($n = 3$), and 1% 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 5% were suckers ($n = 2$). In 2019, 62% of fish landed were LCT ($n = 39$), 37% were BK ($n = 23$), and 2% were BN ($n = 1$). In 2020, 53% of fish landed were LCT ($n = 37$), 46% were BK ($n = 32$), and 1% were Rainbow Trout (*Oncorhynchus mykiss*, RT) ($n = 1$). It is the first time RT were reported caught at the Red Lake ASB. The number of BK caught was the greatest number of BK caught since 2013, when 123 BK were caught. CDFW last stocked BK in 2010 and has only stocked LCT in Red Lake since 2011.

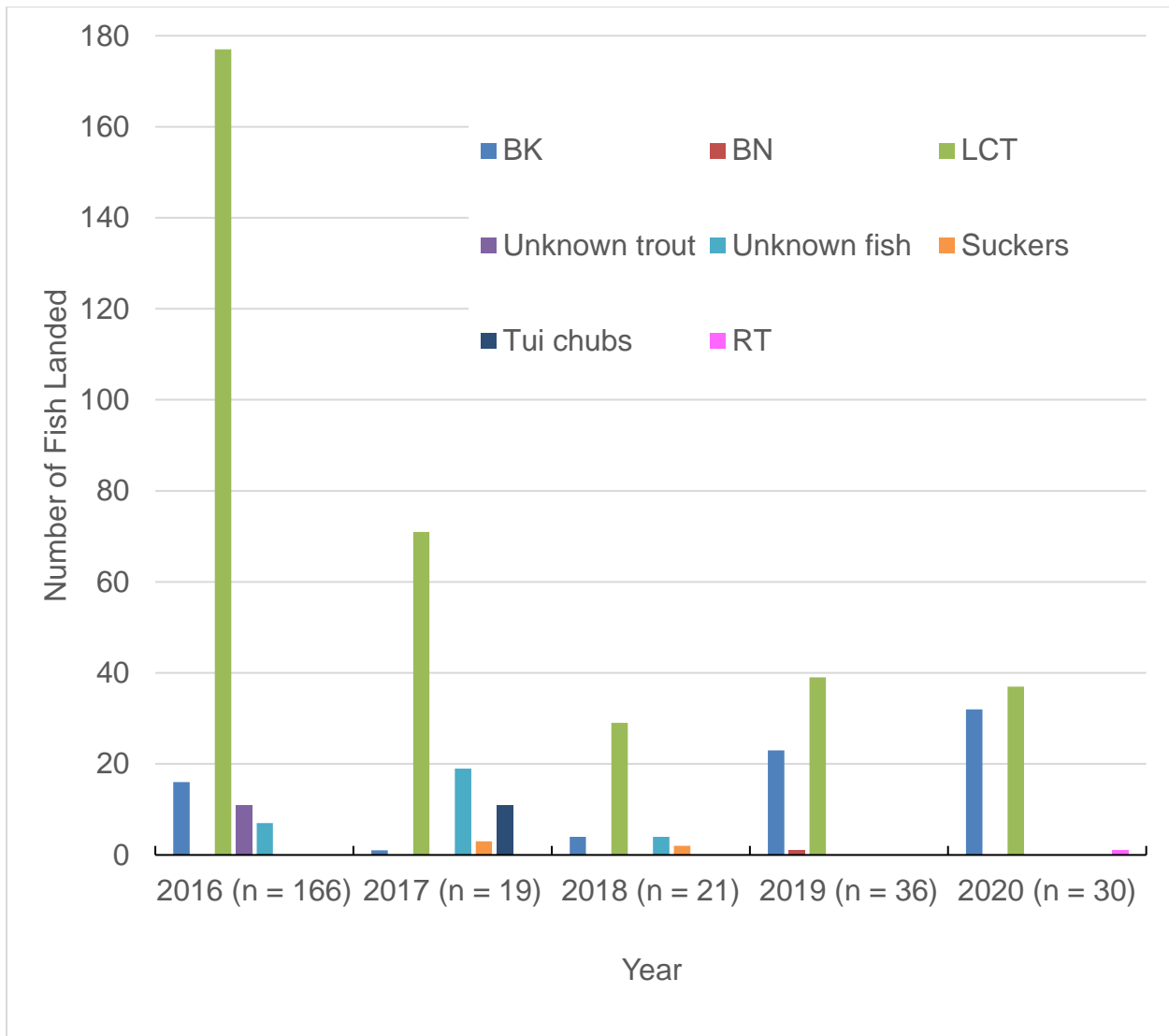


Figure 3. Number of each species of fish caught annually from Red Lake, 2016-2020 with number of anglers in parenthesis.

The number of landed trout that measured < 10 inches (in.) in total length was 22% (n = 43) in 2016, 43% (n = 31) in 2017, 67% (n = 22) in 2018, 38% (n = 24) in 2019, and 3.3% (n = 2) in 2020 (**Figure 4**) (Ewing 2020). The number of landed trout that measured between 12 and 20 inches was 58% (n = 112) in 2016, 21% (n = 15) in 2017, 24% (n = 8) in 2018, 40% (n = 25) in 2019, and 83% in 2020. Only 4% (n = 7) of fish caught in were greater than 20 inches in 2016. This number increased almost seven-fold to 26% (n = 19) in 2017. Unfortunately, in 2018, the number of fish greater than 20 in. dropped back down to 3% (n = 1). However, in the last two years this number rebounded to 16% of the total catch (n = 10) in 2019 and 13% of the total catch (n = 8) in 2020.

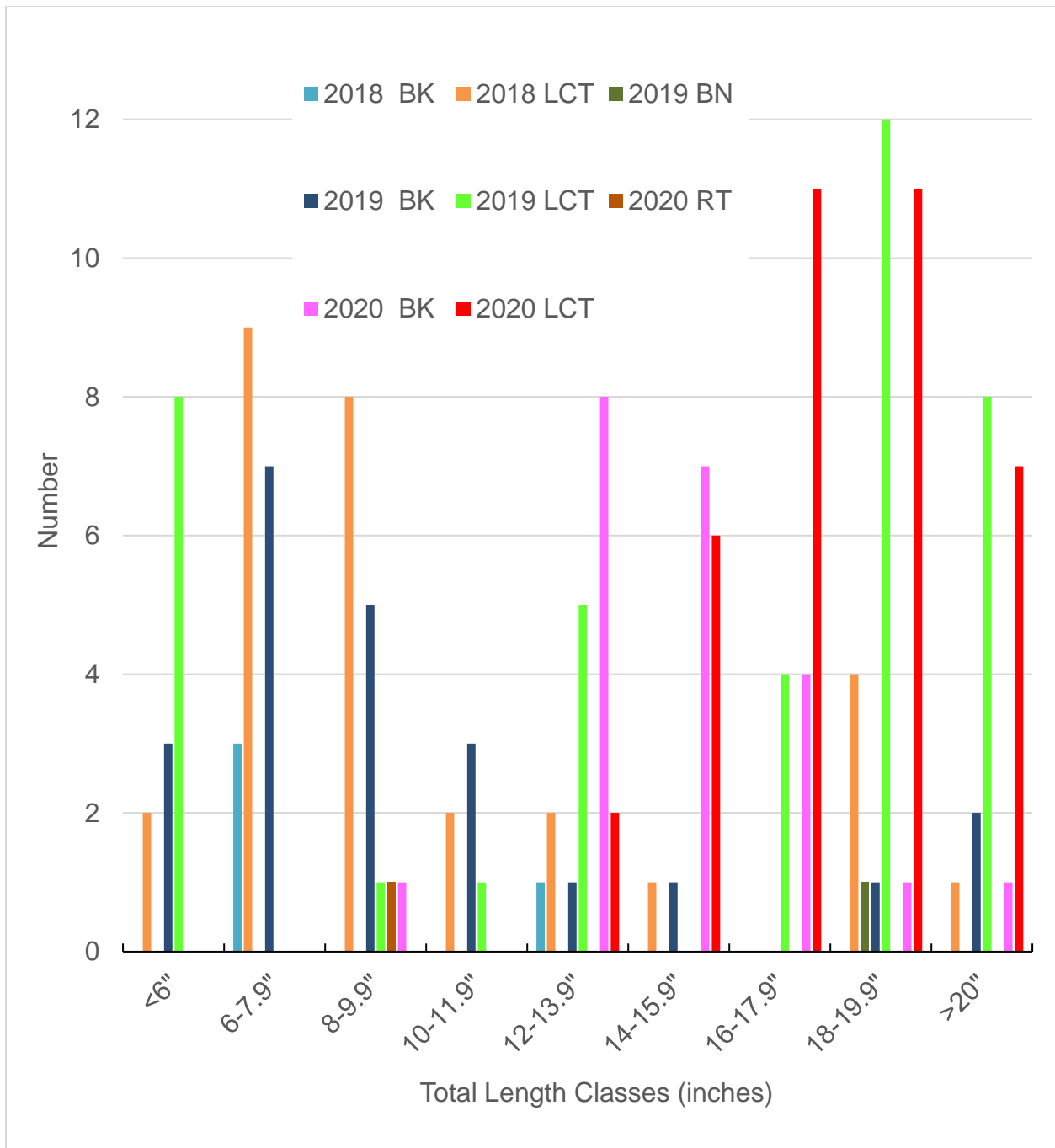


Figure 4. Frequency of identified trout in each size class that anglers reported landing at Red Lake, 2018–2020.

In 2016, anglers released 50% of BK and 38% of LCT (**Table 4**). In 2017, anglers kept all BK and released 37% of LCT. Anglers released 11% of unknown fish, 100% of suckers, but kept all Tui Chubs in 2017. In 2018, anglers released 75% of BK, 83% of LCT, all unknown fish, and zero suckers. In 2019, anglers released 83% of BK, 59% of LCT, and the one BN that was caught. In 2020, anglers released 84% of BK and 70% of LCT. The one RT caught in 2020 was kept.

Table 4. Kept and released fish in Red Lake from 2016–2020.

Year	Species	Kept	Released	Total Caught	Percent of	
					Total Catch	Percent Released
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	67.6	36.6
	Unknown fish	17	2	19	18.1	10.5
	Suckers	0	3	3	2.9	100.0
	Tui Chub	11	0	11	10.5	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		
2019	BK	4	19	23	36.5	82.6
	LCT	16	23	39	61.9	59.0
	BN	0	1	1	1.6	100.0
		20	43	63		
2020	BK	5	27	32	45.7	84.4
	LCT	11	26	37	52.9	70.3
	RT	1	0	1	1.4	0.0
		17	53	70		

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

In 2020, anglers reported being satisfied with their overall angling experience (**Table 5**). Anglers have reported a positive average angling experience in all 10 years, indicating that the fishery provides a satisfactory experience. Anglers were satisfied with the size of trout for the sixth consecutive year. The 1.31 “size” value in 2020 was higher than any previous year. Anglers were satisfied with the number of fish caught for the eighth consecutive year. The 0.88 “number” value in 2020 was the second highest reported in the last 10 years.

Table 5. Angler satisfaction response averages for the Red Lake fishery from 2011– 2020.

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
2019	0.64	1.06	0.82
2020	0.78	1.31	0.88

Discussion

Red Lake anglers have averaged almost three fish caught per day in the last 10 years. Overall catch in 2020 increased from the previous two years, but was the third lowest in 10 years. Catch per hour and catch per angler values also increased from the previous two years. It is possible the higher overall catch per angler and catch per hour were a function of better water quality conditions in the early part of the season compared to previous years as well as the increase of BK that likely moved into the lake. In 2019, there were large cyanobacteria blooms in Red Lake. Cyanobacteria blooms caused by eutrophication lead to serious impacts on aquatic ecosystems and human health (Jin et al. 2015). The water quality was poor, had a green color, and was a hazard to humans, pets, and wildlife. During bloom events, signs around the lake notified the public of the health hazards of cyanobacteria to humans and their pets. This likely deterred many potential anglers from recreating at Red Lake in 2019. In 2020, Red Lake experienced poor water quality conditions again, but not until later in the season. Red Lake spilled in 2018 and 2019, which may have allowed BK to ascend from Red Lake Creek, supplementing the BK population in Red Lake. If so, these immigration events would have increased the overall fish population in the lake available for anglers. It is likely the one RT reported in 2020 was a recent Red Lake Creek migrant and not part of an established RT population in Red Lake.

Although CDFW stocked the same amount of LCT brood stock in 2019 and 2020 as they did in 2018, anglers reported landing more ≥ 20.0 in. LCT the last two years. Local CDFW game warden Erick Elliott (Pers. Comm.), has observed or spoken with/contacted many anglers from the central valley, driving up to Red Lake for the opportunity to catch large trout.

In 2020, seven anglers fished from a boat. These anglers also had the greatest catch per angler value for a third straight year. It is possible these anglers were able to reach areas of the lake where the fish were congregating compared to the dam area, which is where most anglers fish. Unfortunately for those anglers fishing the dam, this area gets high angler pressure which may cause the fish to move to areas of the lake where shore anglers aren't willing to hike.

2020 was the first time the greatest number of fish caught were in the 16.0 in. – 17.9 in. size class. It is possible that most of the LCT caught in this size class were Heenan Lake broodstock that were recently stocked in the spring or holdovers from a previous year's sub-catchable stocking. However, a portion of the fish caught in this size class were BK, which haven't been stocked since 2010. In 2018 and 2019, Red Lake spilled into Red Lake Creek. It is possible that during these years the BK migrated up into Red Lake and grew into the larger-size classes seen.

Before 2013, anglers were unsatisfied with the number of trout they were catching. For eight consecutive years, 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 and now BK survivability and growth rates in Red Lake. This likely contributed to LCT and BK in Red Lake attaining larger-sizes, not previously available to anglers. The large number of angler-released fish may also contribute to larger size fish. During the last six years, anglers have been satisfied with the size of trout caught. It is often difficult for a fishery to satisfy both high catch rates and large size of fish caught, but these ideals were achieved at Red Lake from 2015–2020.

Similar to 2018 and 2019, anglers released most trout caught in 2020. 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). In 2020, 81% of the LCT caught were between 12 and 20 in. It is possible anglers released these fish, hoping to catch even 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. However, in 2020, anglers caught 22 BK, similar to 2019 (n = 23) and more than the 2016–2018 combined total of BK caught. It is possible the last three winters' precipitation enhanced the spawning opportunities for BK, not present before a five-year drought (2012–2016). It is also possible increased outflows gave BK in Red Lake Creek

more incentive and/or opportunity to migrate into the lake. Given the large sizes of BK caught in 2020, fish were likely able to take advantage of a larger forage base in Red Lake when compared with Red Lake Creek.

The overall fishing experience for anglers has been positive at Red Lake every year surveyed. This is consistent with a roving creel survey conducted by CDFW in 2014 (Onanian 2014). Anglers are likely satisfied because they are catching a satisfying number of big 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 2020 survey was lower than 2019 and a decrease from the average. However, forest closures related to the wildfires and algae blooms may have deterred some anglers from fishing Red Lake. Ideally, the more respondents, the more feedback it provides CDFW regarding angler satisfaction. Angler feedback is useful for making more informed management decisions at popular recreational fisheries. Overall, it appears the anglers who responded to the ASB in 2020 had a satisfactory time at Red Lake.

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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
5/31/2019	LCT	524	262	Super-catchable

6/5/2019	LCT	138.79	569	Sub-catchable
6/5/2019	LCT	40.78	369	Sub-catchable
6/5/2019	LCT	196	98	Super-catchable
5/27/2020	LCT	762.5	305	Super-catchable
6/3/2020	LCT	137.5	55	Super-catchable
6/11/2020	LCT	68	1008	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.