

State of California
The Resources Agency
Department of Fish and Wildlife

East Fork Carson River
2021 Angler Survey Box Analysis



CDFW Fish Files

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Introduction

During the 2021 fishing season, the California Department of Fish and Wildlife (CDFW) conducted an angler survey box (ASB) evaluation on the East Fork Carson River (EFCR) in Alpine County. The EFCR is an east-slope draining river originating in the Carson-Iceberg Wilderness in California, then flowing northward into Nevada. CDFW manages the EFCR as both a “put and take” trout water and a California Fish and Game Commission designated Wild Trout Water. The designated Wild Trout Water on the EFCR is located upstream from the confluence with Wolf Creek, excluding tributaries.

Wild Trout waters are defined as waters: (1) open to public angling; (2) able to support, with appropriate angling regulations, wild trout populations of sufficient magnitude to provide satisfactory trout catches in terms of number or size of fish; and (3) domestic strains of catchable-size trout shall not be planted but suitable hatchery-produced wild or semi-wild strains may be planted in designated waters, but only if necessary to supplement natural reproduction (CDFW website). This report pertains to the recently designated “put and take” fishery from Hangman’s Bridge to the Nevada State Line. “Put and take” trout waters are defined as lakes or streams which receive heavy fishing pressure and are unable to support self-sustaining trout populations. These waters are commonly referred to as catchable fisheries and provide the public with the opportunity to harvest their catch. Prior to April 2021, the section between Hangman’s Bridge and the Nevada State Line was a Wild Trout Water (**Figure 1**).

CDFW raises catchable-size Rainbow Trout (RT) (*Oncorhynchus mykiss*), and Lahontan Cutthroat Trout (LCT) (*Oncorhynchus clarkii henshawi*), in CDFW hatcheries, which are then stocked upstream of Hangman’s Bridge of the EFCR. Historically, LCT and Mountain Whitefish (MWF) (*Prosopium williamsoni*), were the native game fish found in the EFCR. Due to previous CDFW stocking events, Brook Trout (BK) (*Salvelinus fontinalis*), and Brown Trout (BN) (*Salmo trutta*), can also be found in the EFCR.

For the 2021 EFCR ASB survey and prior years, CDFW staff gathered data from anglers to determine angling method, catch per angler, catch per hour, species, lengths of fish caught, and angler satisfaction values. This information, combined with historical data, will assist the CDFW with future management decisions.

Methods

Participating anglers complete a voluntary survey form about their fishing. The survey asks anglers for information regarding hours fished 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 1**). Due to the regulations being changed on the last Saturday in April 2021, CDFW is including angler data collected from January 1 – April 23, 2021 along with the 2020 calendar year.

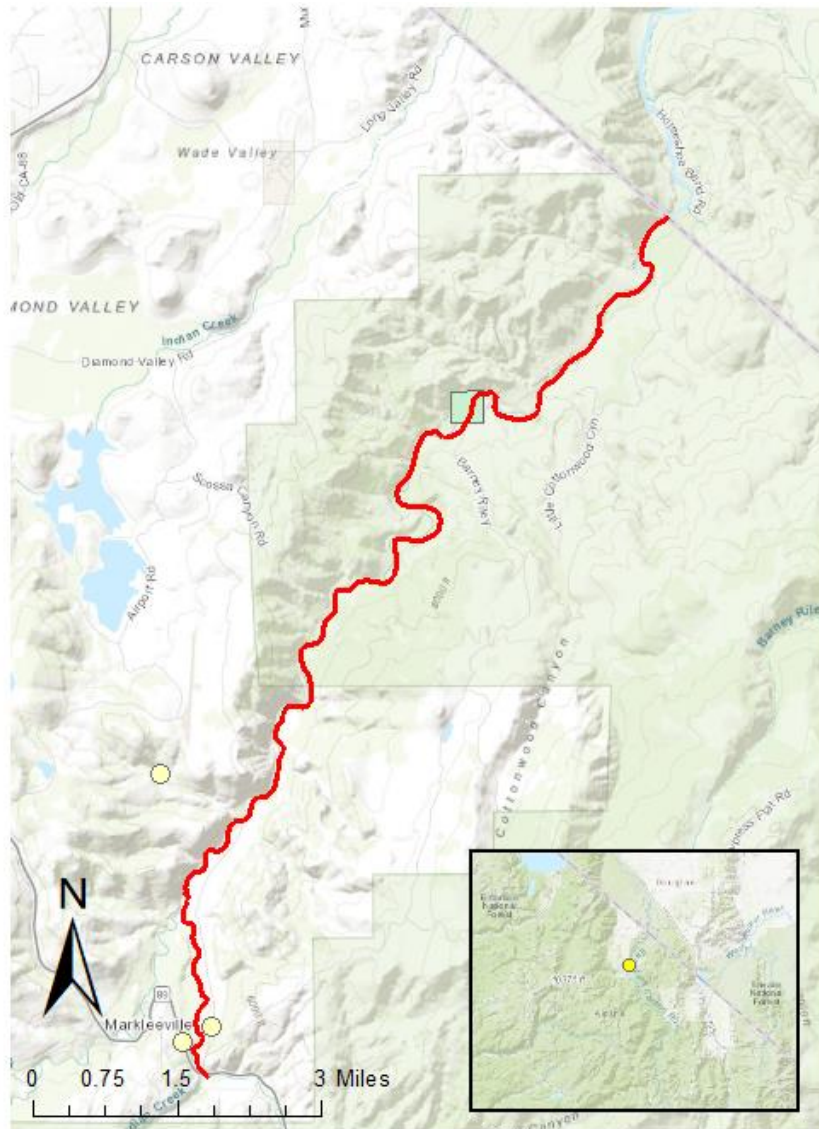


Figure 1. East Fork Carson River from Hangman’s Bridge to Nevada State Line (red line) Alpine County. Location of Angler Survey Boxes are indicated by the pale-yellow dots in the main map. The EFCR is also indicated by the yellow dot in the smaller data frame in relation to the California/Nevada State line as well as Lake Tahoe.

Results

From April 24 – December 31, 2021, hereafter referred to as: 2021, the EFCR ASB had 23 respondents, which was well below the 1993–2021 average of 191 (range: 18–517) (**Table 1**). It was also the second lowest angler total in the 1993–2021 survey period. Cumulatively, 2021 anglers landed 126 fish and fished for 93 hours, which is also below the 25–year average of 740 fish landed and 809.5 hours fished. However, the catch per angler (5.48) and catch per hour (1.35) in 2021 were large increases from the cumulative average of 3.73 and 0.90, respectively, over the 25–year period (**Table 1**).

Table 1. Collection of average effort and catch statistics recorded from the 1993–2000, 2003–2011, and 2013–2021 ASBs on the East Fork Carson River below Hangman's Bridge.

Year	Respondents	Hours Fished	Fish Landed	Catch per Angler	Catch per Hour
1993	107	452.5	417	3.90	0.92
1994	249	935.0	504	2.02	0.54
1995	116	512.0	370	3.19	0.72
1996	517	2278.5	1828	3.54	0.80
1997	472	2141.0	1650	3.50	0.77
1998	234	970.0	853	3.65	0.88
1999	340	1540.0	1318	3.88	0.86
2000	466	1856.8	2288	4.91	1.23
2003	181	734.0	636	3.51	0.87
2004	151	606.5	521	3.45	0.86
2005	176	711.5	645	3.66	0.91
2006	149	609.3	561	3.77	0.92
2007	196	818.5	1100	5.61	1.34
2008	226	1008.0	1291	5.71	1.28
2009	240	1099.0	1246	5.19	1.13
2010	163	749.5	498	3.06	0.66
2011	132	551.5	384	2.91	0.70
2014	18	50.0	27	1.50	0.54
2015	63	209.5	194	3.08	0.93
2016	86	348.6	291	3.38	0.83
2017	106	379.2	255	2.41	0.67
2018	155	655.3	698	4.50	1.07
2019	89	360.5	407	4.57	1.13

2020 - 4/23/21	132	568.8	390	2.95	0.69
4/24/21 - 12/31/21	23	93.0	126	5.48	1.35
Average	191	809.5	740	3.73	0.90

In 2021, anglers caught the second fewest fish (n = 126) on record (**Table 1**). The species composition has not varied much over the survey years, including 2021, in which RT made up almost 100% of the fish species collected (**Figure 2**).

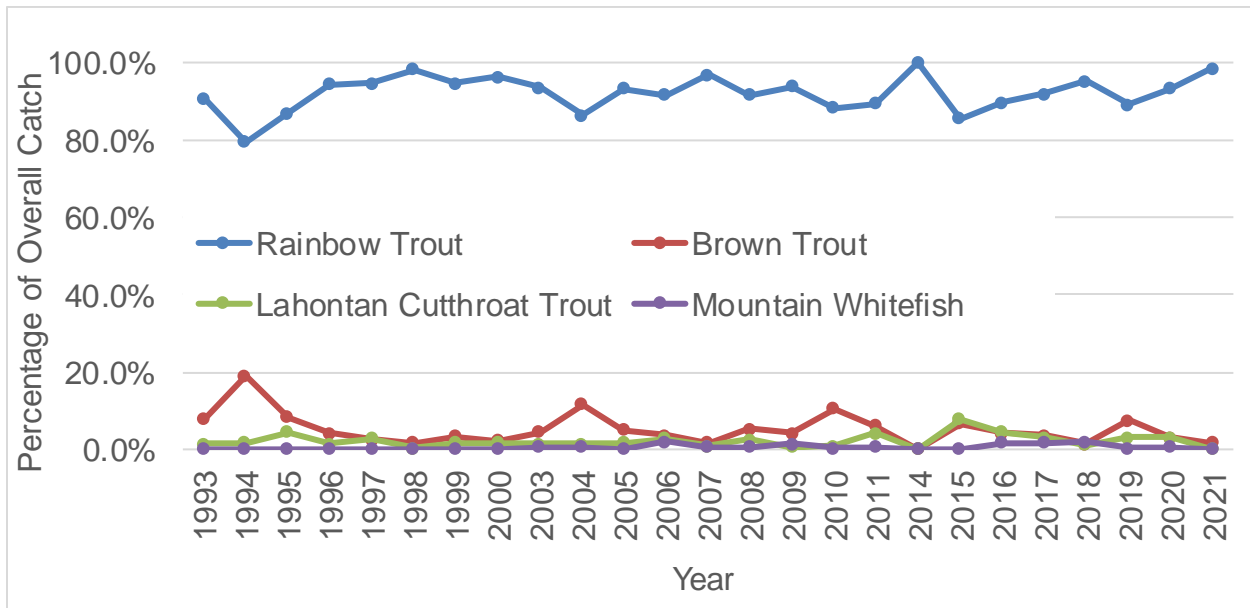


Figure 2. Fish species composition of reported fish species caught in the East Fork Carson River from 1993–2021.

The number of landed RT from late April 2021 through the end of 2021 was 124, which is an 83% decrease from the 1993 – early April 2021 average of 713 RT (**Figure 3**).

The modal length class for RT in 2021 was 10.0–11.9 inch (in.) (**Figure 4**). This is the third time in the last eight sample seasons that this range was the modal length class.

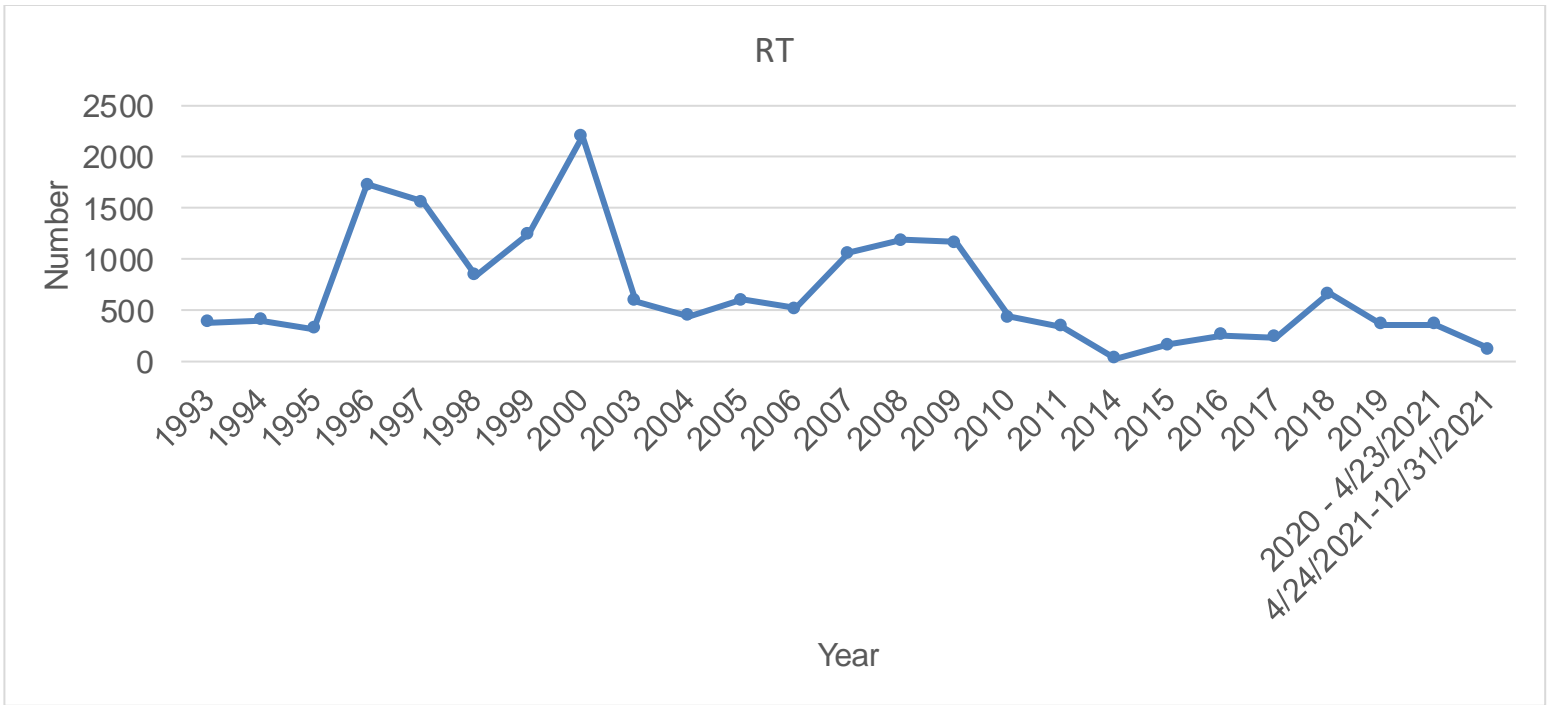


Figure 3. The number of RT reported caught in the East Fork Carson River from Hangman's Bridge to the Nevada State Line from 1993–2000, 2003–2011, and 2014–2021.

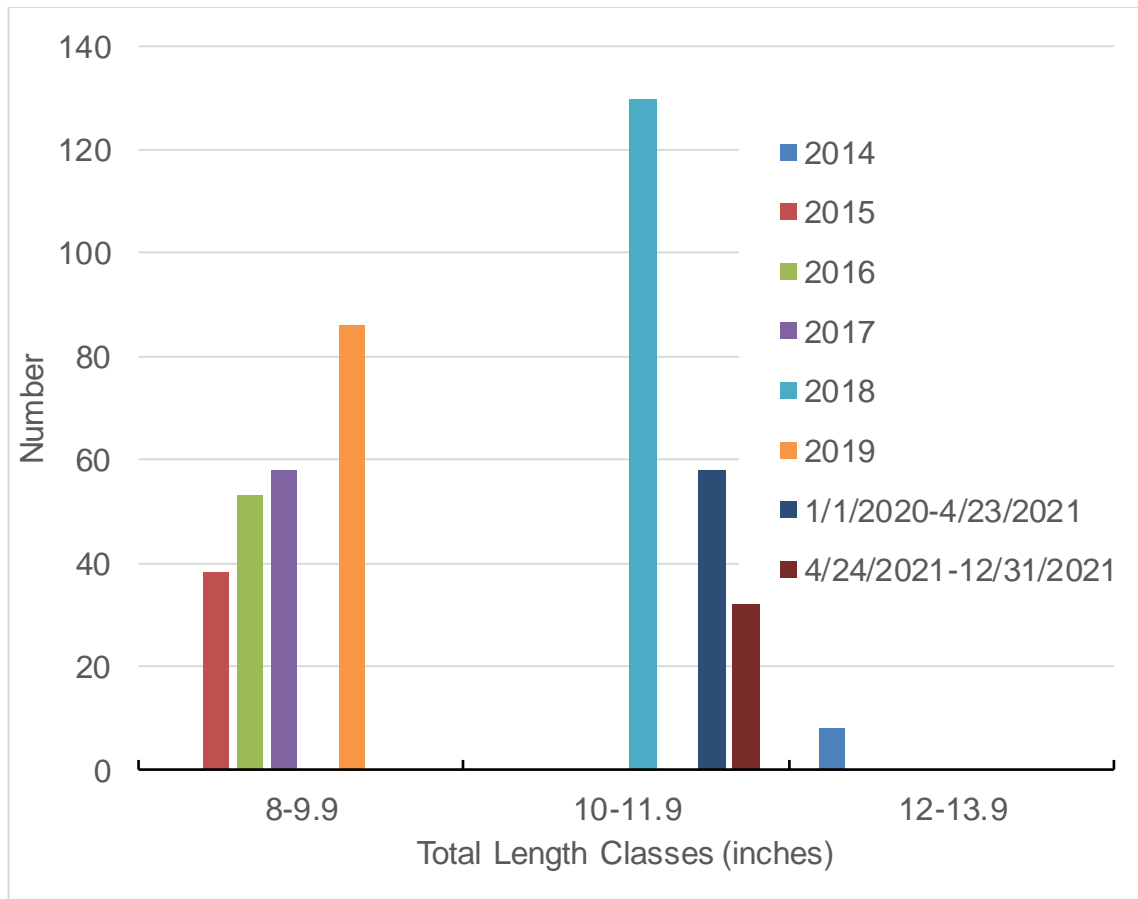


Figure 4. Modal length classes for Rainbow Trout caught in the East Fork Carson River from 2014–2021.

The number of landed BN from late April through the end of 2021 was two, which is a 96% decrease from the 1993 – early April 2021 average of 36 (**Figure 5**).

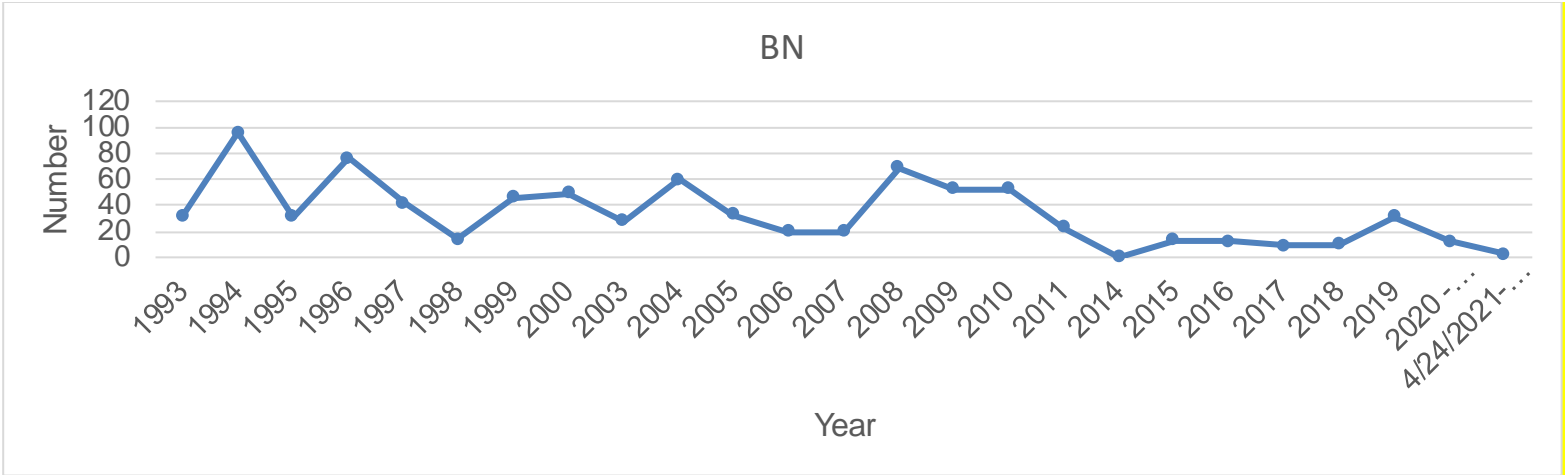


Figure 5. The number of BN reported caught in the East fork Carson River from Hangman’s Bridge to the State Line from 1993–2000, 2003–2011, and 2014–2021.

The modal length classes for BN in 2021 were both the < 6 in. and 6.0–7.9 in. length classes (**Figure 6**). In 2016, one of the modal classes was also in the < 6 in. class and in 2018, the modal length class was also in the 6.0–7.9 in. length class.

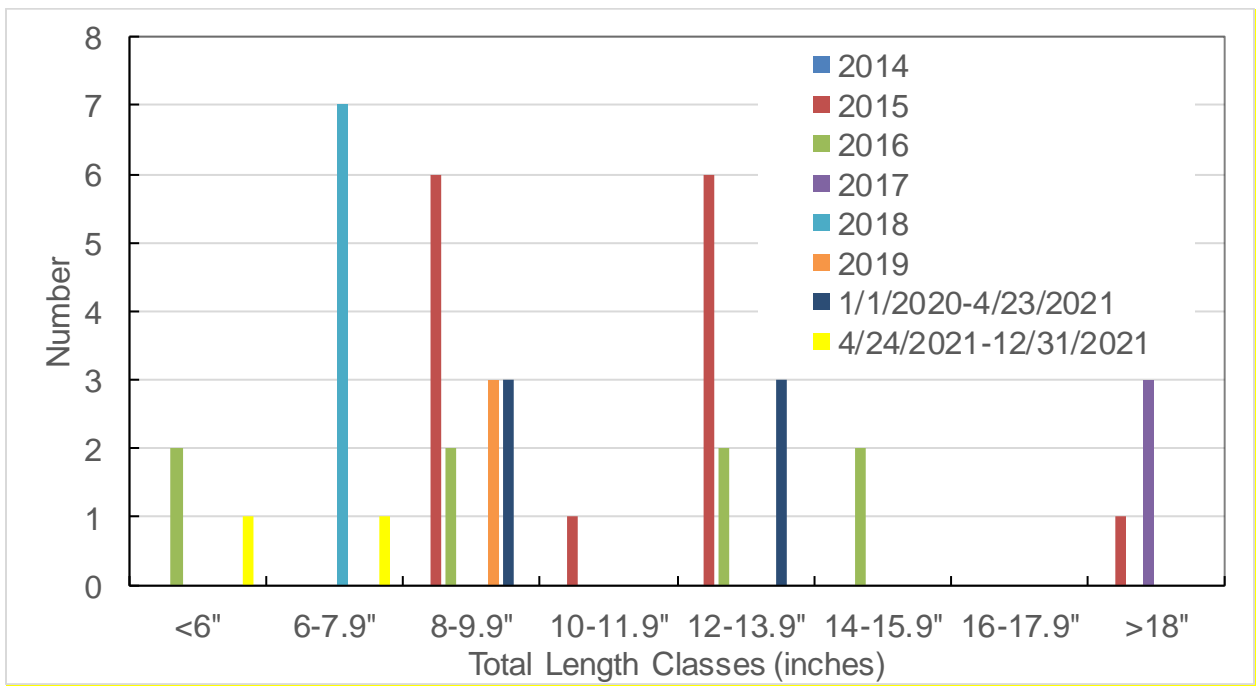


Figure 6. Modal length classes for Brown Trout caught in the East Fork Carson River from 2014–2021.

No LCT were landed from late April through the end of 2021, which is a 100% decrease from the 1993 – early April 2021 average of 15 (**Figure 7**).

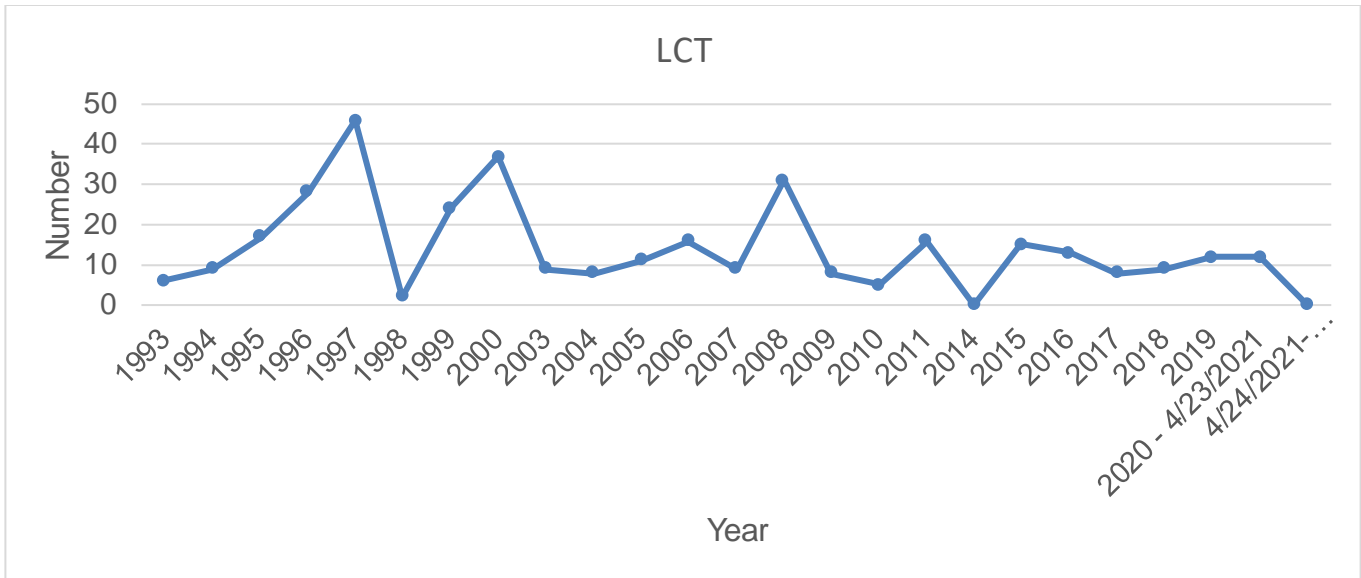


Figure 7. The number of LCT reported caught in the East Fork Carson River from Hangman’s Bridge to the Nevada State Line from 1993–2000, 2003–2011, and 2014–2021.

There were no modal length classes for LCT in 2021 since no LCT were reported caught. The modal length class that has the greatest frequency is the >18 in. class (**Figure 8**). The LCT in this size class caught in 2019 and 2020 were likely Heenan Lake broodstock that were stocked by CDFW.

The number of landed MWF from late April through the end of 2021 was zero, which is a 100% decrease from the 1993 – early April 2021 average of six (**Figure 9**).

There were no modal length classes for MWF in 2021 since no MWF were reported caught. The modal length class that has the greatest frequency is the 16.0–17.9 in. (**Figure 10**).

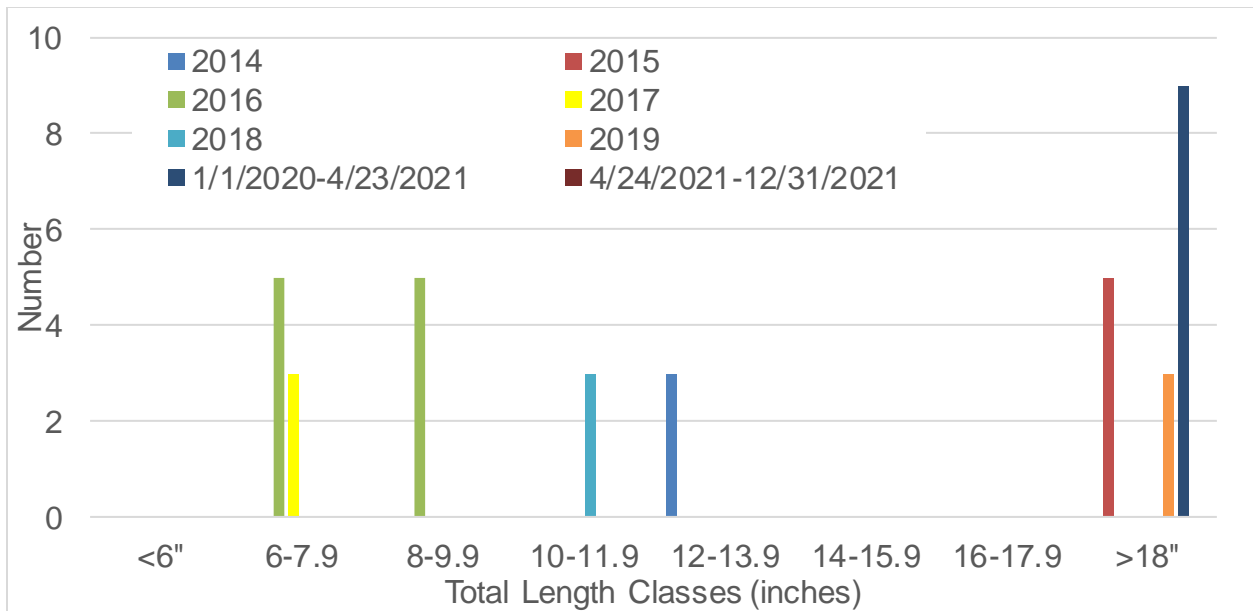


Figure 8. The number of LCT reported caught in the East Fork Carson River for each modal size class from 2014–2021.

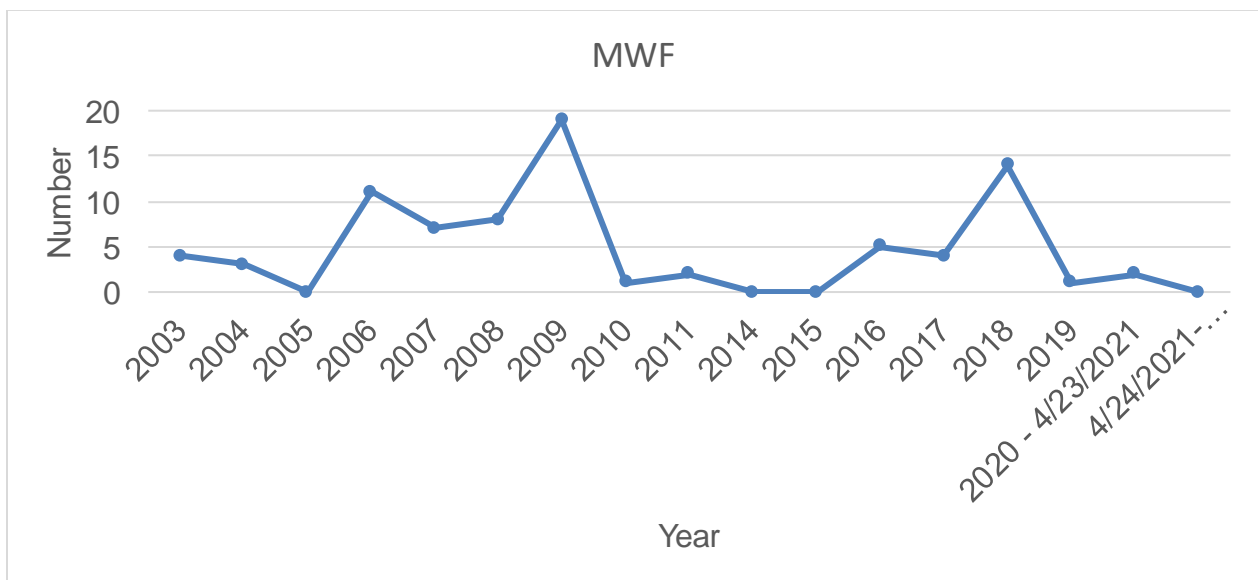


Figure 9. The number of MWF reported caught in the East Fork Carson River from Hangman's Bridge to the Nevada State Line from 2003–2011, and 2014–2021.

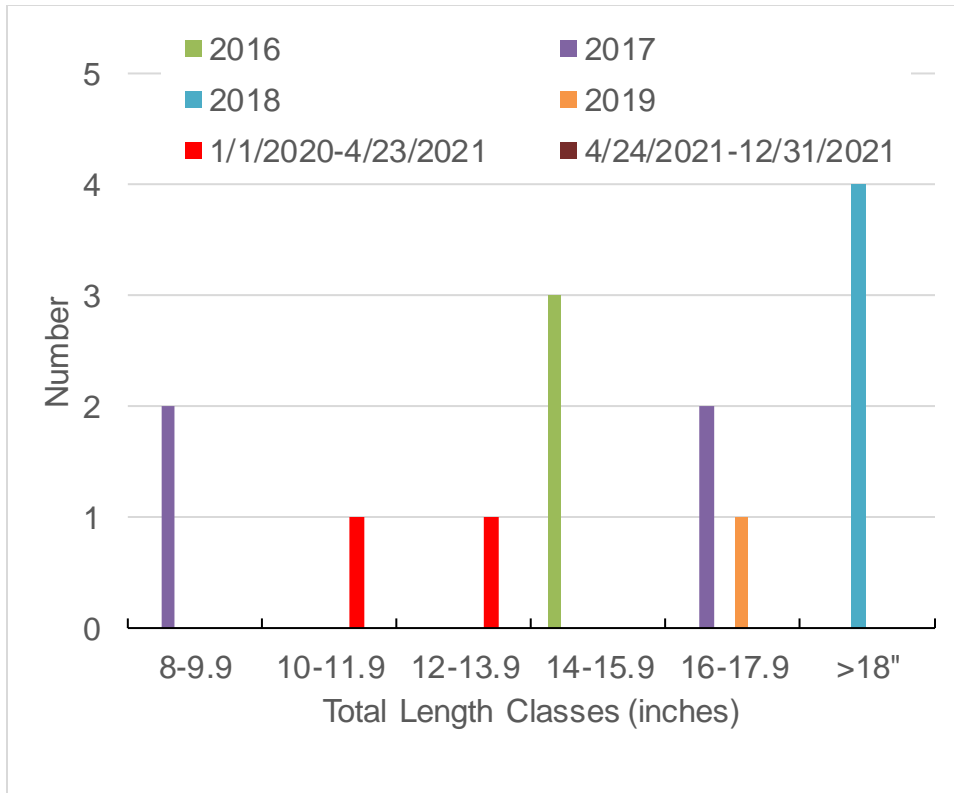


Figure 10. The number of MWF reported caught in the East Fork Carson River for each modal size class from 2014–2021.

In 2021, anglers released 99.2% of fish caught, even though the new regulations allowed harvest.

From late April 2021 through the end of 2021, anglers reported being satisfied with their overall angling experience (1.19) (**Table 2**), the highest in the last eight years. Anglers have reported a positive average angling experience in all eight years, indicating that the fishery provides a satisfactory experience. Anglers were satisfied with the size of fish caught for the fifth consecutive year. The 1.19 “size” value in 2021 was higher than any previous year. Anglers were satisfied with the number of fish caught for the fourth consecutive year. The 1.19 “number” value in 2021 was the highest reported in the last eight years.

Table 2. Angler satisfaction response averages for the East Fork Carson River fishery from 2014 through 2021.

Year	Overall Angling Experience	Size of the Fish	Number of Fish
2014	0.35	-0.40	-0.47
2015	0.52	0.14	-0.24
2016	0.36	-0.04	-0.18

2017	0.63	0.33	-0.02
2018	0.74	0.65	0.23
2019	0.96	0.52	0.26
2020 - 4/23/21	1.14	0.94	0.75
4/24/2021 - 12/31/2021	1.19	1.19	1.19
Average	0.74	0.42	0.19

Discussion

East Fork Carson River anglers have averaged almost four fish caught per day in the last 25 survey years. Overall catch (n = 126) in 2021 was the second lowest in 25 survey years and well below the 25-year average of 740. Although overall catch was down from previous years, catch per hour and catch per angler values had record highs and near record highs, respectively. Catch per hour in 2021 was 1.35 fish/hr., a record high, while the catch per angler was 5.48, the third highest in 25 years. It is possible the higher overall catch per angler and catch per hour were a function of the large number of fish stocked compared to anglers fishing. From early July through the end of October 2021, the Tamarack Fire burned much of Alpine County, including sections of the EFCR close to the California/Nevada border. With the fire, came a forest closure for the Humboldt-Toiyabe National Forest, which prevented anyone from legally fishing the EFCR. It is also possible that the overall decrease in fishing pressure due to the fire closure contributed to the success of the relative few anglers that did fish the EFCR after the forest closure ended.

In 2021 the greatest number of fish caught were in the 10.0 in. – 11.9 in. size class. A portion of the RT caught in this size class may have been previously stocked by CDFW. No LCT were reported caught, which is disappointing since CDFW stocked 226 Heenan Lake broodstock above Hangman’s Bridge on May 18, 2021. In 2020, anglers caught nine LCT broodstock. In 2021, low flow levels may have caused most LCT broodstock to remain upstream of Hangman’s Bridge, limiting the number of LCT available for anglers in the restricted-fishing regulations section and where the ASBs were.

The primary objective when managing recreational fisheries is often to improve the quality of fishing or optimize human benefit (Pollock et al. 1994; Weithman 1999). The overall fishing experience for anglers in the last eight years was positive on the EFCR. This is consistent with a roving creel survey conducted by CDFW in 2013 (Onanian 2014). Anglers are likely satisfied because they are catching a satisfying number and size of 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).

For four consecutive years, anglers have been satisfied with the number of trout caught. It is possible the relatively high number of hatchery and wild trout available relative to the number of anglers has increased the number of fish caught. During the last five years, anglers have been satisfied with the size of trout caught. The large number of angler-released fish may also contribute to larger-sized fish 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 on the EFCR from 2017–2021.

Similar to before the regulation change that allowed anglers to harvest trout caught, anglers released 99.25 of trout caught in 2021. 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). Additionally, catch and release fishing can allow an increased number of anglers to benefit from a fishing experience (Wallmo and Gentner 2008). It is also possible anglers released fish greater than 14 inches (legal take size) in hopes to catch even larger trout.

More RT were reported caught than any other species. The EFCR has and continues to receive both catchable-sized RT (when available) and Heenan Lake LCT broodstock. Historically, CDFW also stocked fingerling-size LCT into the EFCR, but since 1993, fingerling LCT have never ended up making a large contribution to the number of total trout caught. One of the main reasons for this may be due to competition with RT. Seiler and Keeley (2009) cite introduced RT as having a great impact on native cutthroat trout through hybridization and competition. The continued stockings of LCT broodstock will occur, but due to fingerling-size LCT holding over and being reported caught, CDFW will remove them from upcoming allotments.

Historically, angling success on the EFCR between Hangman's Bridge and Nevada is heavily reliant on the wild trout population in that section. To a lesser extent, it is also affected by CDFW and Alpine County stocking that occurs above Hangman's Bridge. Recruitment in the section below Hangman's Bridge is thought to be high, with large numbers of fish less than 14 inches. However, the section immediately below Hangman's Bridge likely receives some of the larger hatchery fish that are stocked upstream. The change in regulations was put in place in hopes of protecting many of the wild trout, but allowing harvest of hatchery fish, which likely are 14 inches and greater.

The number of respondents in the 2021 survey ($n = 23$) was well below the average of 191. However, forest closures related to the Tamarack wildfire prevented

anglers from fishing the EFCR for many weeks. The fact that data from these weeks were omitted from calculations pose a challenge for comparison to previous years.

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, especially given the recent regulation changes. Overall, it appears the anglers who responded to the ASB in 2021 had and continue to have a satisfactory time fishing the EFCR.

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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 helping us manage and protect California's wild trout resources.