Williams Fork Reservoir

Fishery Management Report

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Introduction

Williams Fork Reservoir (WFR), a 1600-acre storage reservoir near Parshall, is owned and operated by the Denver Water Board. It provides good fishing for Lake Trout, Northern Pike, Brown Trout, and the occasional Rainbow Trout and Kokanee salmon. Boats need to pass an Aquatic Nuisance Species inspection prior to launch. To expedite this process, be sure your boat is clean, drained and dry when you arrive. No overnight beaching of boats is allowed. In the winter, no motorized vehicles are allowed on the ice. For more information on recreational access, see https://www.denverwater.org/recreation/williams-fork-resevoir

Figure 1. Aerial view of Williams Fork Reservoir.

Fishing Regulations

a. Snagging of Kokanee salmon is permitted from September 1 through December 31.
b. All Northern Pike between 26 and 34 inches in length must be returned to the water immediately upon catch.
c. From the buoy line at the Williams Fork River inlet upstream to the first county road bridge, fishing and snagging are prohibited from September 15 through November 30.
d. Use of spearfishing, archery, slingbows and gigs for the take of Northern Pike is prohibited.
e. The bag and possession limit for Lake Trout is eight fish, only one of which may be greater than 30 inches in length.

Northern pike were stocked by Colorado Parks and Wildlife (CPW) multiple times, most recently in 1976, to control the sucker population. . Regulation (b) has been in place for many years, with the purpose of maintaining a trophy Northern Pike fishery and protecting the size range of pike that most effectively controls suckers. In more recent years, we have kept the regulation in place because of the possibility that maintaining a population of fish in this size range may create a self-regulating dynamic, preventing overpopulation and stunting. It is rare to capture juvenile Northern Pike in our gillnet surveys.

CPW collected Kokanee eggs at the inlet of the reservoir from 2001-2018. This effort has not occurred since 2018 for reasons discussed later in this report. The purpose of regulation (c) is to establish a closed area that protects the spawning Kokanee.

In recent years, CPW has enacted statewide regulations allowing for spearfishing, archery, and other methods of take for Northern Pike. The purpose of regulation (d) is to bring CPW regulations into agreement with Denver Water Board policy, which restricts activities involving bodily contact with the water in this and other reservoirs.

Regulation (e) was enacted in 2011 to encourage harvest of the prolific Lake Trout while protecting trophy fish. In recent years the lake has produced an abundance of small Lake Trout and increased harvest of these fish can improve the overall quality of that fishery.

Stocking

Table 1. Williams Fork Reservoir stocking history, 2015-2022.

	10” Catchable Rainbow	3-5” Fingerling Rainbow	1.5” Kokanee
2015	13,700	56,600	350,000
2016	16,500	50,000	350,300
2017	15,700	86,900	350,700
2018	15,000	50,000	118,000
2019	15,200	118,000*	350,300
2020	NO FISH STOCKED		
2021	NO FISH STOCKED		
2022	NO FISH STOCKED		

*68,000 of the fingerlings stocked in 2019 were Rainbow-Cutthroat hybrids

Gill lice parasites appeared in the Rainbow Trout and Kokanee at WFR in approximately 2008. We experimentally reduced Kokanee stocking densities in 2012-2014 in an attempt to reduce prevalence of the parasite by temporarily reducing host densities. However, this reduction in stocking densities yielded no recovery of the Kokanee population or reduction in parasite loads. Gill lice remained present on 100% of the Kokanee examined with extremely high rates of infection on fish in the spawning run. Therefore, in 2020 we ceased all stocking of fish that are susceptible to gill lice in an attempt to reduce prevalence of the parasite in the lake by depriving it of hosts for a period of time. We plan to refrain from stocking for a period of five years, resuming in 2025.

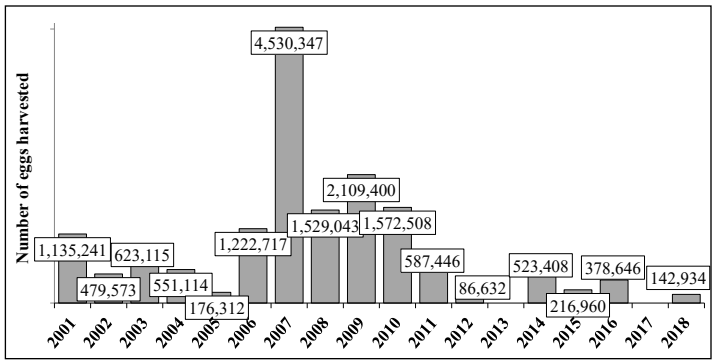

Figure 2. Kokanee eggs harvested at Williams Fork inlet by year, 2001-2018

Figure 3. Ice formation on Williams Fork Kokanee fence, 2008.

Kokanee Spawn Operation

From 2001-2018, CPW harvested eggs from spawning Kokanee which ran up the Williams Fork River at the inlet to the reservoir. This egg collection effort reached a high point in 2007 when we collected 4.5 million eggs (Figure 2). This was a highly labor-intensive effort which required the construction of a fence-like barrier in the river to hold the Kokanee as they attempted to move upstream. Managing ice formation on this barrier was always a challenge (Figure 3). Beginning in 2009 we devised an electric barrier that allowed for a gap to be left in the fence. This reduced the need for clearing of ice and other debris, but still required constant maintenance and the hiring of additional personnel. After the Kokanee became heavily infected with gill lice, the spawn run declined to the point that it rarely produced enough eggs to make the effort and

Figure 4. CPW staff collecting a large seine haul of Kokanee during the record-setting 2007 egg collection effort.

Figure 5. Electric barrier incorporated into Williams Fork Kokanee trap, 2011.

Figure 7. Large spawning male Kokanee, Williams Fork River, 2010

expense of this spawn operation worthwhile. The last egg collection effort occurred in 2018, and WFR is not currently considered a viable Kokanee egg source. This decline in the spawning run was the main factor in the decision to cease stocking discussed above.

In fall 2021 and 2022, we closely observed the Williams Fork inlet for spawning kokanee to check for gill lice infection. In 2021 we collected 18 spawning kokanee (8 males and 9 females) averaging 16.9" and carrying an average of 18 gill lice. Only one of the fish we collected did not have any visible lice. In 2022, despite several visits to the inlet area we were only able to collect ten kokanee (3 males and 7 females), averaging 18.3" and carrying an average of 17 lice. All ten fish collected had lice. The difficulty that we had locating spawning kokanee in 2022 suggests that there are few of them remaining in the lake.

Gillnet surveys

From 2011 – 2022, we conducted eight gillnet surveys of the fish population in WFR. We set gillnets for six hours each in randomly selected locations distributed throughout the surface of the reservoir (Figure 6). All gillnets were set perpendicular to the nearest shoreline. From 2011-2014, we set 24 nets over three days annually. After assessing the statistical properties of the data, beginning in 2016 we increased the number of net sets to 40 over the course of four or five days biennially. The main purpose of this survey is to monitor trends in the Lake Trout population over time, and to sample the lake in a way that provides a direct comparison with other Lake Trout fisheries in the area, in particular Granby and Green Mountain reservoirs (see Fishery Management Reports for those waters). In 2015 we adopted a strategy of sampling Williams Fork and Green Mountain in alternating years, in order to allow enough time to accomplish 40 net sets.

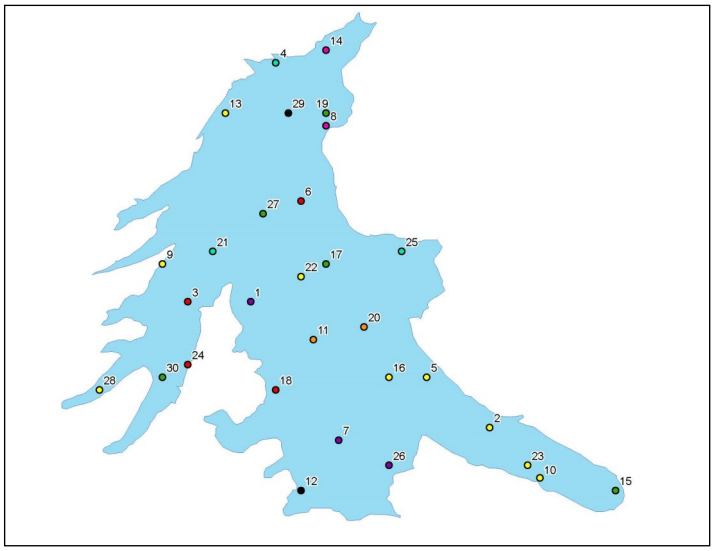

Figure 6. Randomized gillnet locations used in WFR surveys.

Lake Trout have been by far the dominant species in these gillnet surveys, averaging 81% of the total catch (Figure 8, following page). In contrast to most reservoirs in the area, suckers contribute a relatively small percentage to the catch, due to the high density of predators in the lake. Northern Pike catch has also been relatively small. These surveys probably under-sample this species, which are notoriously difficult to survey in a quantitative manner. However, even if a bias in these surveys is accounted for, we do not believe the density of Northern Pike in WFR is particularly high and in the 2022 survey we only captured one. It is rare for us to capture small pike, and these observations are corroborated by angler reports of the fishery. It appears that Northern Pike reproduction is currently suppressed in WFR, possibly as a result of poor spawning habitat. In addition, it is possible that the protective slot limit may serve to maintain some amount of predation pressure on smaller pike through cannibalism, especially during the current period of low prey availability.

Despite the liberalization of the bag limit for Lake Trout in 2011, the catch rate of the species in our gillnet surveys has increased (Figure 9, following page). The 2022 survey produced the highest catch rate in the history of these surveys. The increased bag limit appears to have had no detectible effect on Lake Trout densities to date.

Figure 10 pools the size distribution of all Lake Trout

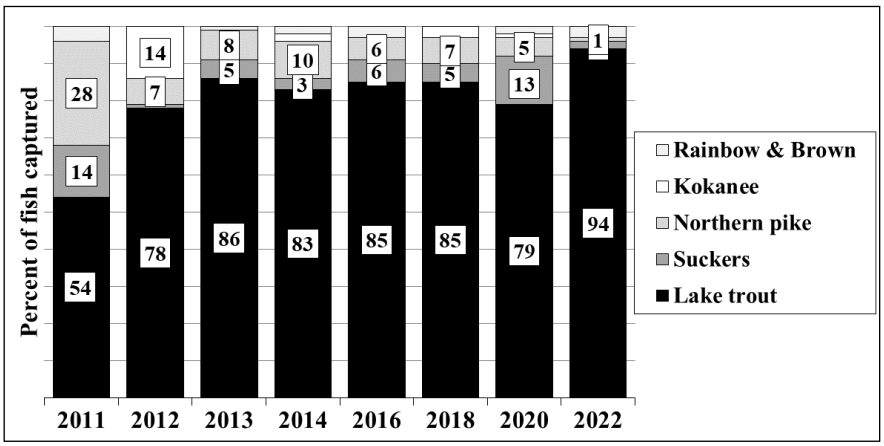

Figure 8. Species composition by percent catch in randomized gillnet surveys of WFR fishery, 2011-2022.

captured from 2011-2020 in order to display what is "normal" or "expected" in these surveys. Overlaying the 2022 data reveals what sizes of fish were less or more common than expected in the most recent survey. In prior years, fish in the 14"-20" size range made up 35% of the total catch. In the 2022 survey, this size group only contributed 18%. Conversely, large (>24") Lake Trout contributed 12% of the total catch from 2011-2020 and 17% of the catch in 2022. Interestingly, we have also seen an increase in large Lake Trout capture at nearby Green Mountain reservoir during a similar period of poor prey availability due to declines in Kokanee populations and cessation of stocking (see Green Mountain Reservoir Fishery Management Report). This supports the theory that the reason we capture more large Lake Trout during these times is that in order to find adequate prey, these fish must move farther distances and more often, which increases the probability that they may encounter our nets while they are set.

In the 2020 and 2022 surveys, it was common to find freshly eaten small Lake Trout in the stomachs of both Lake Trout and Northern Pike. The reduction in catch of fish in the 14"-20" range may be a reflection of increased predation pressure, because these are now the most common prey item of that size in the lake due to the absence of Kokanee and Rainbow Trout. This is a positive sign, because a decrease in overall density of Lake Trout, and particularly large ones, will be beneficial in order to maintain good growth and body condition in the fish that remain and to facilitate an eventual recovery of the Kokanee population and reestablishment of a prey base.

In the surveys from 2011-2016, large (>24") Lake Trout had better body condition on average (measured as Relative Weight, an index of "plumpness") than Lake Trout smaller than 24" (Figure 11, following page). In 2018, body condition of large Lake Trout declined significantly. This was likely a response to the decline in the Kokanee population caused by gill lice, because at that time we had not changed stocking rates yet. In 2020 this decline continued and for the first time large Lake Trout had poorer body condition than smaller Lake Trout. In 2022 the large Lake Trout had the poorest body condition that we have seen to date at Williams Fork. This corresponds very closely to the changes we observed in Green Mountain Reservoir with the cessation of stocking and decline in the Kokanee fishery there.

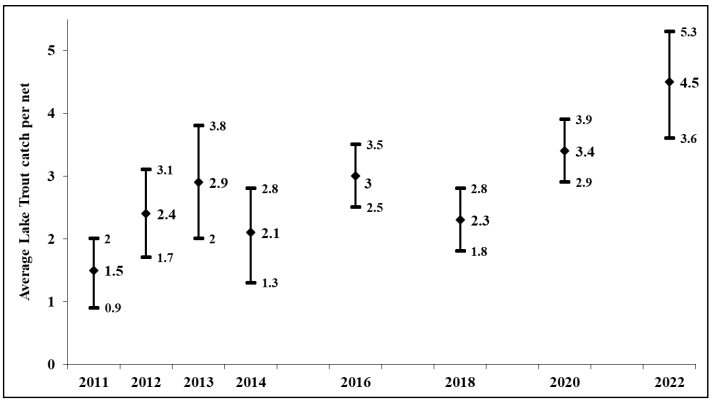

Figure 9. Average Lake Trout catch per net in WFR gillnet surveys, 2011-2022 with 80% confidence intervals displayed.

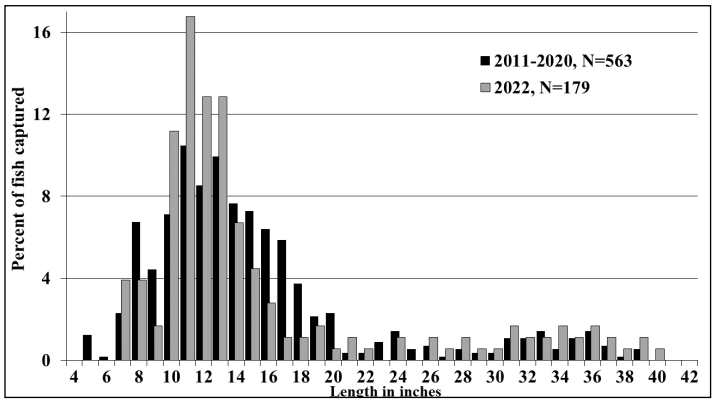

Figure 10. Lake Trout size distribution in Williams Fork gillnet surveys in 2011-2020 (black bars, pooled) and 2022 (grey bars).

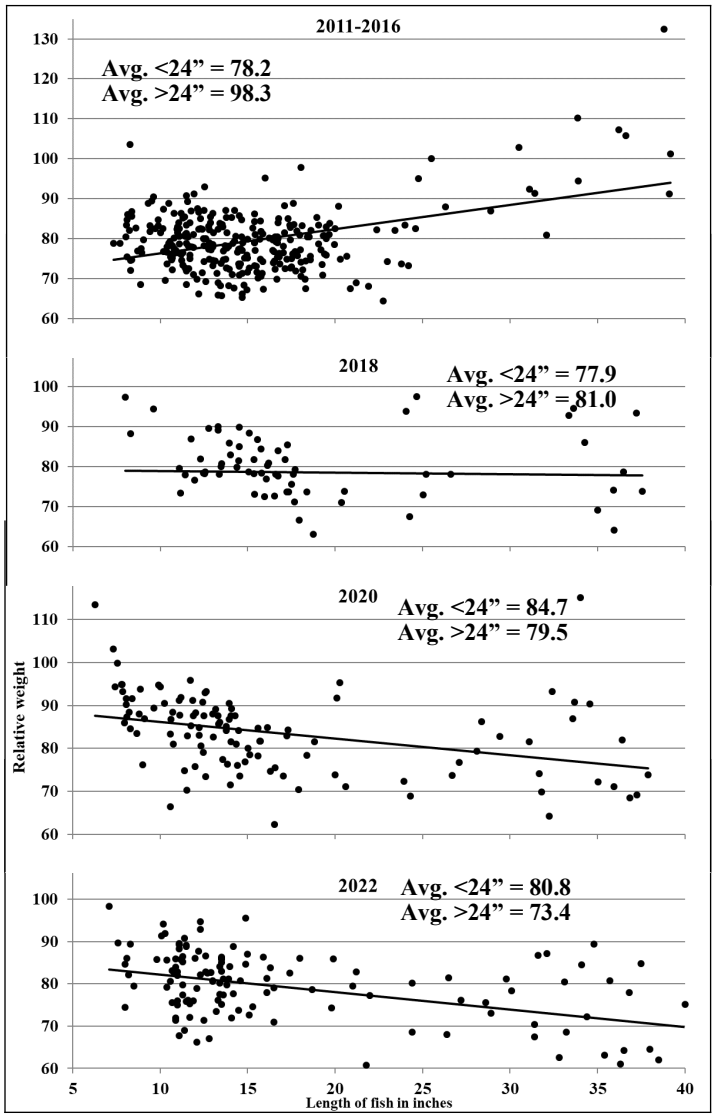

Figure 11. Relationship between Lake Trout size and body condition, Williams Fork Reservoir 2011-2022.

Figure 13. The largest Lake Trout captured in the 2013 survey, measuring 39" and weighing 36.0 lbs. Relative weight = 131.

Figure 14. Angler submitted photo of a large Lake Trout in very poor body condition caught through the ice, December 2022.

Figure 12. This large Lake Trout captured in 2016 had recently eaten two smaller Lake Trout. One of those partially-digested Lake Trout had a stomach that was still intact and full of crayfish.