Dillon Reservoir

Fishery Management Report
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Introduction

Dillon Reservoir is a 3,233- acre storage reservoir owned and operated by the Denver Water Board. Located adjacent to I-70 in the heart of Summit County, this is one of the most easily accessible and highly visible mountain reservoirs in the state. Recreational use is managed by a combination of Denver Water, Summit County, the US Forest Service, and the towns of Dillon and Frisco. For more information see http://www.denverwater.org/recreation/dillon.html.

With an average depth of 79 feet and a full-pool surface elevation of 9,017 feet, Dillon is high, deep, and cold. These characteristics make it a relatively unproductive reservoir and managing a fishery there has always been a challenge. However, its ease of access, amenities and large size create the conditions for the fishery to have huge public and economic benefit. Rainbow and Brown Trout, Kokanee Salmon and Arctic Char are the four species being managed for recreational angling. Dillon also hosts a population of introduced Mysis shrimp, which can be a benefit or a detriment to a fishery depending on the circumstances.

Fishing Regulations

All Arctic Char less than 20" in length must be returned to the water immediately upon catch. The bag and possession limit for Arctic Char larger than 20" is one fish. The purpose of this regulation is to allow Arctic Char the opportunity to spawn multiple times before being available to harvest. Statewide standard fishing regulations apply to all other species.

Stocking

Rainbow Trout (and Rainbow-cutthroat hybrids) are currently the only species that CPW stocks in Dillon. All fish stocked are produced in CPW's State Fish Hatchery system. Two sizes are stocked annually: catchable fish averaging 10" that are available for immediate recreational catch and fingerlings averaging 2-5" which are intended to make a longer-term contribution to the fishery (Table 1). Due to poor recruitment into the fishery, stocking of fingerling Rainbows in Dillon did not occur from 2002-2010. However, we resumed stocking small Rainbows in

Figure 1. Dillon Reservoir. Dillon Bay and the Town of Dillon is in the foreground. Photo looks southwest toward Frisco. Photo courtesy Town of Dillon.

Table 1. Number of catchable and subcatchable Rainbow Trout stocked by CPW in Dillon Reservoir, 2018-2022.

Year	Catchable (>10") Rainbow Trout	Subcatchable (2-5") Rainbow Trout
2018	20,040	427,184
2019	32,528	341,622
2020	44,318	310,434
2021	47,798	360,815
2022	44,913	370,471

Table 2. Distribution of catchable Rainbow Trout stocking by month, Dillon Reservoir 2017-2022. Numbers presented are percentages of that year's total number of catchables stocked.

	2017	2018	2019	2020	2021	2022
February					24	
March						40
April				16		10
May	11	46	9	12		
June			31			
July	18					
August	31			13	38	9
September	2			25		31
October	25		35	8	38	10
November	14	54	25	18		
December				8		

2011 as a response to the lack of availability of catchable Rainbows at the time. Furthermore, the strains of Rainbow Trout that are available now are entirely different than the strains that were available when fingerling stocking ceased in past decades, so it may be possible for these newer strains to more effectively contribute to the fishery.

Due to difficulties in obtaining an adequate number of catchable Rainbows to stock in Dillon, we have experimented with stocking a large percentage of the annual allotment in the fall when there is less demand on hatchery production (Table 2, page 1). We have seen some evidence that Rainbows stocked late in the fall in Dillon can make use of Mysis shrimp, grow through the course of the winter, increase opportunities for ice fishing, and potentially contribute to the following spring's recreational catch. Our intention is to stock these fall fish as close to, or after, fall destratification of the reservoir because prior to that time, the Mysis are sequestered in deeper waters where these stocked Rainbows are unlikely to find them.

In fall 2022 we initiated an additional stocking strategy which we plan to continue for the foreseeable future. We stocked 5,629 8" Rainbow-cutthroat hybrids on October 17. While categorized as "subcatchable" trout because they are smaller than 10", in reality they are an intermediate size that has the potential to strike a balance between cost and contribution to the fishery.

Arctic Char (Figure 2) were stocked annually from 2008 through 2015 (Table 3, above). The purpose of stocking this species in Dillon is that, aside from the Mysis shrimp, the reservoir is notoriously unproductive in terms of prey availability for sport fish. Arctic Char have been found to be successful preying on Mysis in cold, deep lakes elsewhere that resemble Dillon. Stocking was intended to establish a population that would sustain itself over time through natural reproduction, which is the reason why stocking ceased after 2015, along with enacting the conservative harvest regulation. Dillon is currently the only reservoir in Colorado with an Arctic Char fishery.

Table 3. Arctic Char stocking in Dillon Reservoir, 2008-2015.

Date	Number	Avg. length
6/3/2008	20,478	3.5"
6/11/2009	17,237	3.6
7/1/2010	24,932	3.5
7/14/2011	16,857	3.5
8/2/2012	16,683	4.2
7/31/2013	21,321	4.1
7/10/2014	32,770	3.3
9/1/2015	18,153	2.9

Fishery Surveys

Since 2008 we have conducted two types of gillnet surveys at Dillon Reservoir to monitor fish populations. In even-numbered years, we set six gillnets overnight in the same locations and as close to the same date as possible

Figure 2. State record Arctic Char caught in 2017 by Lindsay Regali, which measured 23.4" and weighed 4.15 pounds. This state record stood until it was broken in 2023. Photo by Randy Ford.

(during the third week of June) on each occasion. In order to increase our sample size, in 2018 we added two sites for a total of eight overnight net sets (Figure 3). The purpose of these surveys is to observe changes and trends in the overall fish population of the lake, and Brown Trout in particular. In 2010, 2015, 2017, 2019, and 2021 we conducted randomized gillnet surveys to monitor the Arctic Char population specifically. These surveys are discussed on pages 5 and 6.

The Brown Trout fishery is one of Dillon's greatest assets, and some fish of trophy size are produced. We do not stock this species and they are entirely self-sustaining through natural reproduction. Densities are relatively high at Dillon for a large lake with no stocking. We attribute this to the lake having multiple high-quality inlet streams that host Brown Trout spawning activity in the fall.

Like many reservoirs in Colorado, the most common type of fish by far in Dillon are suckers (Figure 4). This is detrimental to a trout fishery through competition for food and other resources. One of our management goals at Dillon is to encourage production of Brown Trout that reach a size large enough to prey on the numerous suckers. The sucker population is currently dominated by fish in the 12-14" size range (Figure 5). Brown Trout will consume other fish up to 2/3 of their own length. The Brown Trout in Dillon may be exerting some amount of predation pressure on suckers smaller than 12"; however it does not appear that there are enough Brown Trout larger than 18" to exploit the vast biomass of suckers in Dillon larger than 12".

Brown Trout typically switch from a diet dominated by invertebrates to other fish when they grow beyond 14-16". Historically, it has been common to see a sharp drop in

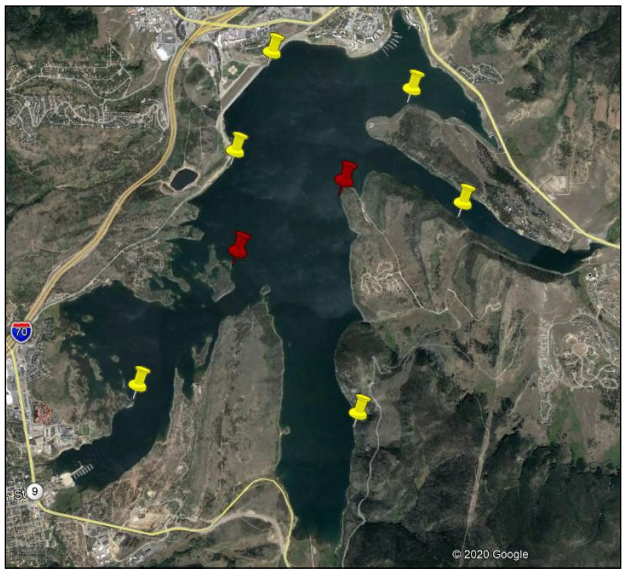

Figure 3. Locations of overnight gillnet sets, Dillon Reservoir. The six sites with yellow markers were sampled in even numbered years since 2008. The red markers are the two sites that we added in 2018 for a total of eight sets.

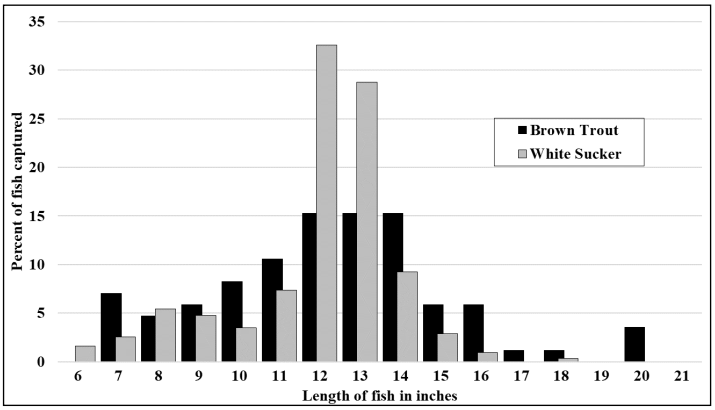

Figure 5. Size distribution of Brown Trout and White Sucker captured in Dillon Reservoir gillnet survey, 2022.

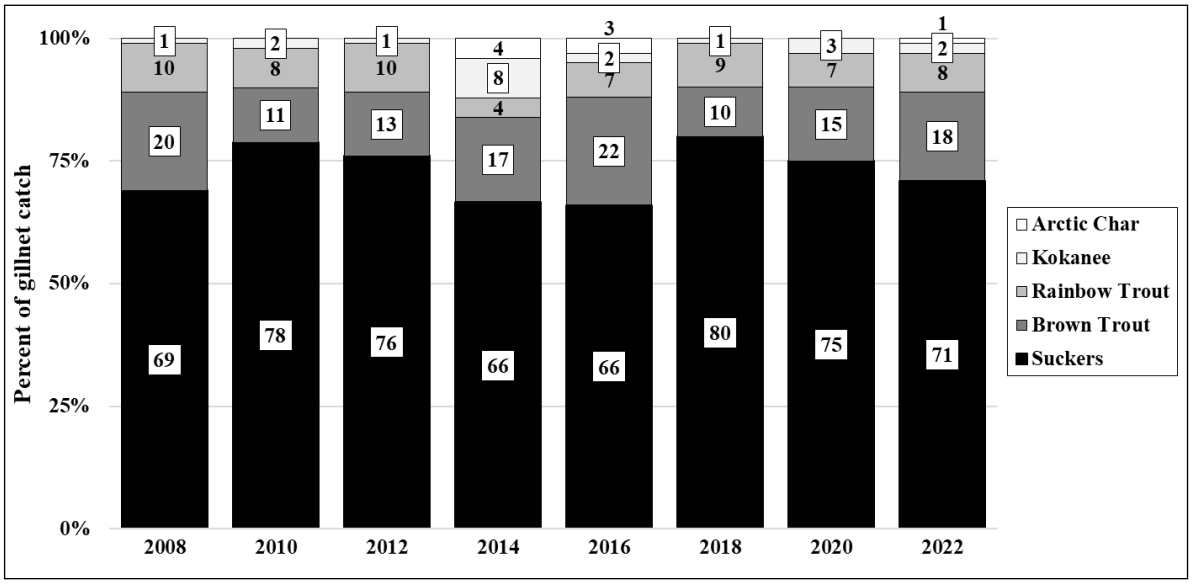

Figure 4. Species composition of fish captured in overnight gillnet surveys, Dillon Reservoir 2008-2022.

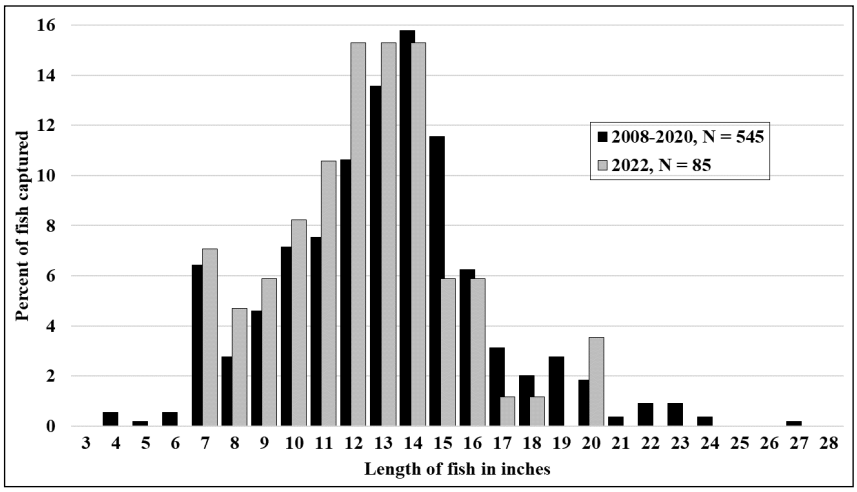

Figure 6. Size distribution by percent of Brown Trout captured in Dillon Reservoir gillnet surveys, 2008-2020 pooled (black bars) and 2022 (grey bars).

Table 4. Relative weight (a measure of body condition or plumpness on a scale of 100) of Brown Trout <15", >15", and the difference between the two groups. Differences in bold are statistically significant at the 0.05 level.

	<15"	>15"	difference
2008	82.8	82.8	0
2010	75.4	73.5	-1.9
2012	80.2	103.4	**23.2**
2014	83.3	90.5	**7.2**
2016	79.5	86.6	**7.1**
2018	81.9	90.8	**8.9**
2020	83.5	85.4	1.9
2022	81.8	93.3	**11.5**

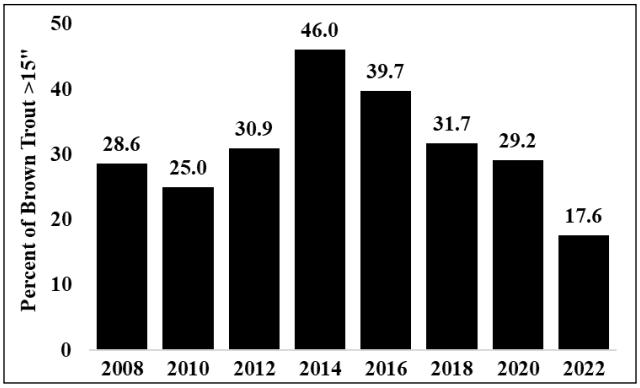

Figure 7. Percent of Brown Trout >15" in the catch of standard overnight gillnet surveys, Dillon Reservoir 2008-2022.

Brown Trout beyond that size in our surveys here (Figure 6). When we resumed fingerling Rainbow stocking in 2011, we observed a sharp increase the percentage of Brown Trout >15" in our catch (Figure 7) and an increase in body condition of these larger fish (Table 4). At the time we were concerned that the Brown Trout may overexploit the stocked fingerling Rainbows. If this were to occur, an indicator would be a consistent increase in the occurrence of Brown Trout >15" and a concurrent decline in their body condition as an ever-increasing number of larger fish compete for a finite prey supply. As of 2022, this does not appear to have occurred. While body condition of Brown Trout >15" did decline from the high point it reached in 2012 following the resumption of stocking, by 2022 it had rebounded significantly. The 2022 survey also produced the smallest percentage to date of Brown Trout >15" in the total Brown Trout catch (Figures 6 and 7). Prior to 2022, Brown Trout >15" had averaged 33% of the total catch of the species, while the 2022 survey yielded about half of that. Compared will all prior years pooled, the 2022 survey captured a lower percentage of every inch class of Brown Trout from 14" and larger, except for 20" fish (Figure 6). Due to this apparent decline in the occurrence of larger Brown Trout, CPW is considering instituting a more restrictive harvest regulation to ensure that excessive angler harvest is not a playing a role in this decline. Restoration of trophy Brown Trout production in Dillon is currently the highest management priority.

Kokanee Salmon are known to be difficult to capture and monitor with gillnet surveys. Neither of our two sur-

Figure 6. Two views of a large Brown Trout captured in the 2015 survey which measured 27" and weighed 6.9 lbs.

vey approaches on Dillon are effective in monitoring their trends. We know that they are self-sustaining in the reservoir because the last time they were stocked here was in 1978, and it is not uncommon for us to collect multiple size-classes of Kokanee. The recreational fishery for these fish is popular, particularly during ice fishing season, and anecdotal reports from anglers are valuable in verifying that Kokanee continue to persist in healthy numbers. They also have value as a prey base for larger Brown Trout and Arctic Char.

In 2014 we captured Arctic Char in all six overnight nets for the first time. We had not found them so widely distributed throughout the lake prior to this survey, and combined with consistent reports of greater angling success, this suggested that 2014 may have been a "turning point" year in the development of the Arctic Char population in Dillon. However, Arctic Char catch declined thereafter, and none were captured in the 2018 or 2020 surveys (Figure 4). The 2022 survey produced three Arctic Char in two nets. While these results do not appear encouraging, two of the three Arctic Char that we captured were juveniles measuring 8", providing evidence that some amount of successful natural reproduction is occurring.

Arctic Char use different habitat than other trout, so a different survey approach is necessary in order to more closely monitor the status of this species in the reservoir. In mid-June 2010, 2015, 2017, 2019, and 2021, we conducted a survey consisting of gillnets set for six hours apiece in random locations throughout the reservoir, including many deep water sites (Figure 7, right). We set 16 nets in 2010, which was a pilot year, and increased the number to 24 nets over three days in 2015 and 2017, and 26 nets in 2019 and 2021. These surveys are designed in a

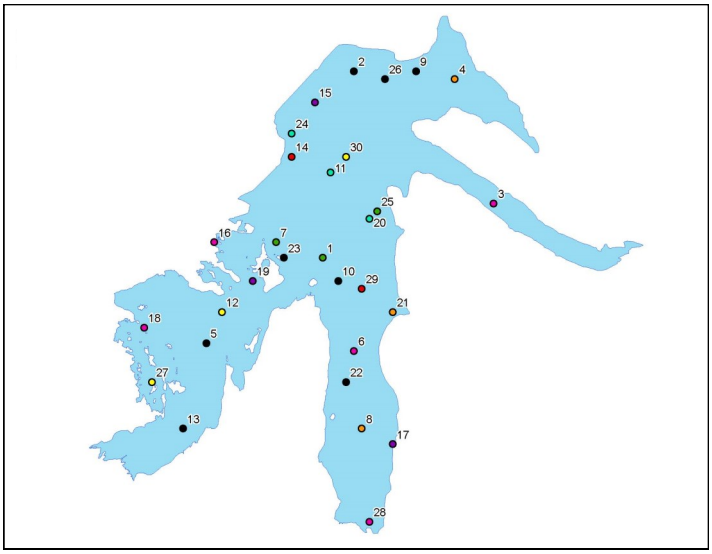

Figure 7. Locations for randomized gillnet survey conducted on Dillon Reservoir in 2010, 2015, 2017, 2019, and 2021.

manner that our catch rates and their trends serve as an index of the density and trends of Arctic Char in the lake. We use this same method to survey Lake Trout populations at Green Mountain, Williams Fork, and Granby reservoirs, and catch rates for Lake Trout in those waters can be viewed in comparison with these surveys for context.

This approach has produced more Arctic Char than the traditional overnight shoreline net sets, but it has still proven to be somewhat difficult to capture them in large numbers. The 2010 survey produced extremely low catch rates, suggesting that the char stocked since 2008 had not yet grown to sizes vulnerable to capture in our gillnets. Catch rates increased in 2015 and 2017. In those surveys, we confirmed for the first time that small (<8") Arctic Char could be found in deep water (100 feet and deeper), presumably pursuing Mysis as prey. Angler reports also continued to improve during these years. A state record

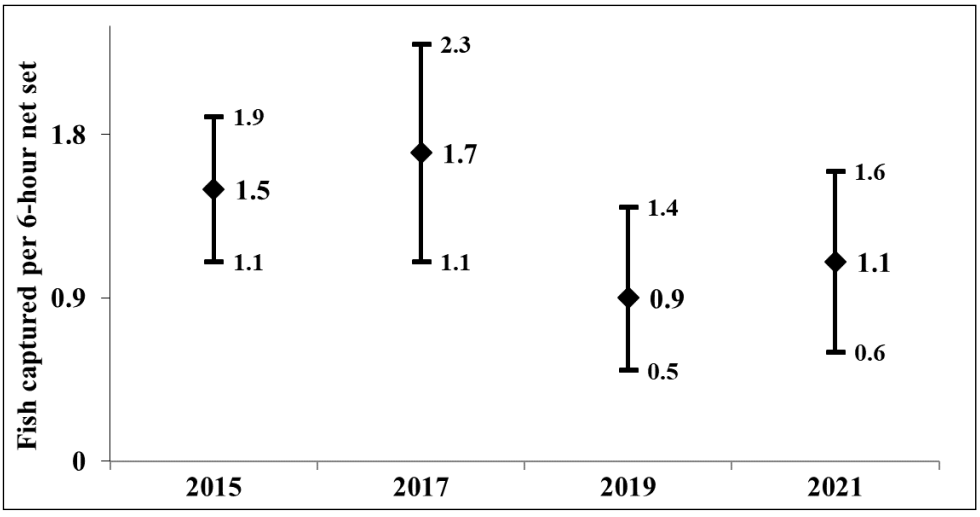

Figure 9. Catch rates of Arctic Char per 6-hour net set for 17 common locations in four randomized gillnet surveys in Dillon Reservoir with 80% confidence intervals. Surveys were conducted between June 7 and 20 of years listed.

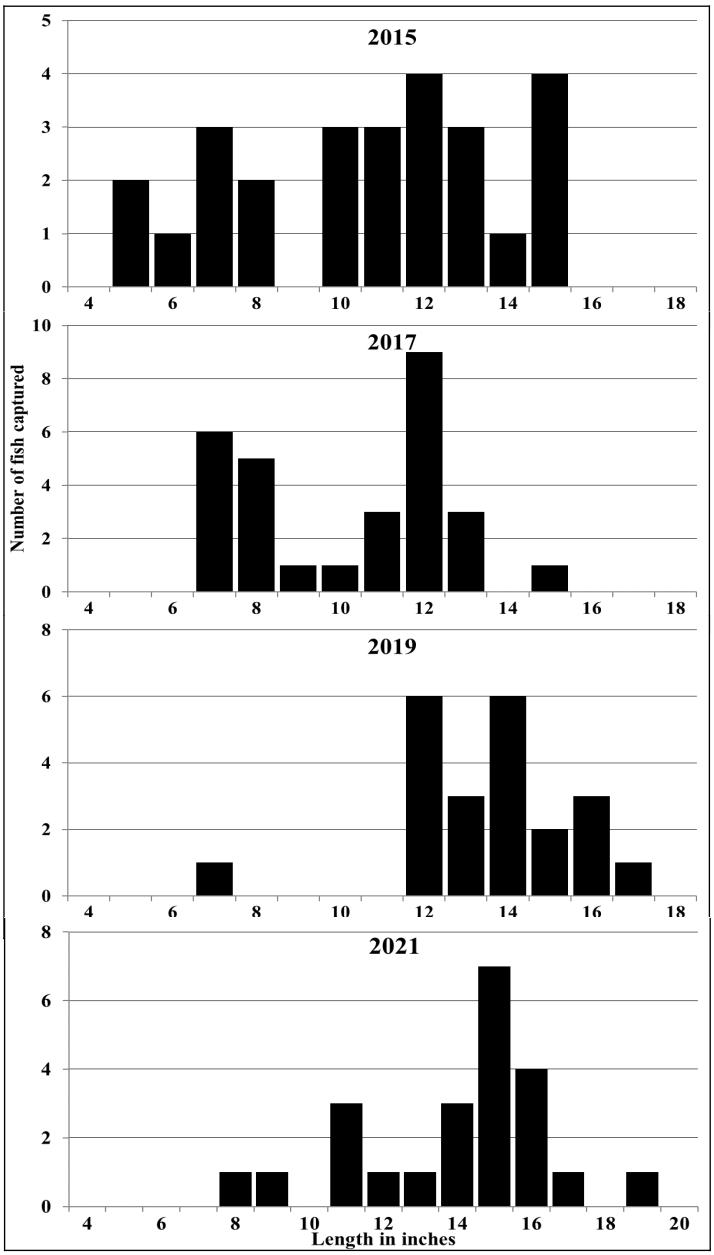

Figure 10. Size distribution of Arctic Char captured in randomized gillnet surveys, Dillon Reservoir, 2015-2021.

caught by Lindsay Regali on November 6, 2017 (Figure 2, page 2), which was broken on January 1, 2023 by Pete McDowell (Figure 11, below).

This survey approach is still considered experimental and there are many locations that we have set nets and not captured any char. There are 17 net locations that we have fished on four occasions from 2015-2021 and that have caught char. Within this subset of 17 net sets, the catch rate of Arctic Char in the 2019 survey declined by 47% from 2017. (Figure 9, previous page). Perhaps more concerning than the 2019 decline in catch rate was the size distribution (Figure 10, left). The last year we stocked Arctic Char was 2015. That year's survey captured fish as small as 5". In 2017 no fish smaller than 7" were caught, and in 2019 we only captured one fish smaller than 12". The abrupt drop in fish smaller than 12" in that sample is highly unusual in these types of gillnet surveys. While the number of char larger than 14" appeared robust in 2019, the lack of small fish suggested that the Arctic Char in Dillon may not be adequately maintaining their numbers through natural reproduction. The 2021 survey captured a wider size range of char, including smaller fish that were born in the lake. Given growth rates that may be as slow as 2" per year, the fishery may only now be reaching a point of having enough spawning adults to sustain it. CPW is exploring the possibility of stocking more Arctic Char in the lake to ensure the fishery persists. However, Arctic Char eggs are rare and difficult to obtain.

Figure 11. State record Arctic Char caught on January 1, 2023 by Pete McDonnell which displaced the 2017 record. 26.8", 7.48 lbs.