



## Blue River Above Dillon Reservoir

2019 fishery survey report

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### Introduction

Colorado Parks and Wildlife (CPW) aquatics crews, with assistance from Summit County, U.S. Forest Service and Colorado Water Quality Control Division personnel and local volunteers, have conducted a series of seven fish population surveys on a section of the Blue River near Breckenridge biennially since 2007. The exact location of the survey reach, located on Summit County Open Space property, is displayed in Figure 1 (right). The black lines indicate the locations of the downstream (at the top of the photo) and upstream ends (bottom) of the reach. The downstream end of the survey reach lies approximately 2.7 river miles upstream of the point where the Blue River enters Dillon Reservoir. The survey reach measures 581 feet in length and 31.8 feet in average width at base flows.

The purpose of these surveys is to monitor the success of the habitat restoration project undertaken by Summit County and partners that was completed in 2006, and to monitor the health of a biologically valuable reach of river which hosts multiple species (Brown Trout, Kokanee Salmon, Rainbow Trout, possibly Arctic Char) undertaking spawning movements from Dillon Reservoir. This reach of river exhibits excellent spawning habitat characteristics — beds of clean gravel, numerous apparent spring water inputs, and high-quality pools created by the habitat project for resting and cover. These conditions probably allow this reach of river to contribute a significant portion of the wild populations of both Kokanee and Brown Trout that live most of their lives in Dillon Reservoir. Due to the self-sustaining nature of the wild trout fishery here, CPW does not stock this reach. Willow plantings that occurred as part of the 2006 habitat restoration have matured and are among the most successful in the area.

### Methods

We conducted two-pass depletion population estimates of the reach by using a bank-based electrofishing array with 5 electrodes (Figure 2). Effort has been made to survey the reach as close to the same date as possible on each occasion if flows allow.

### Results and Discussion

Rainbow Trout have not made up a significant portion of the trout population estimates; therefore this report fo-

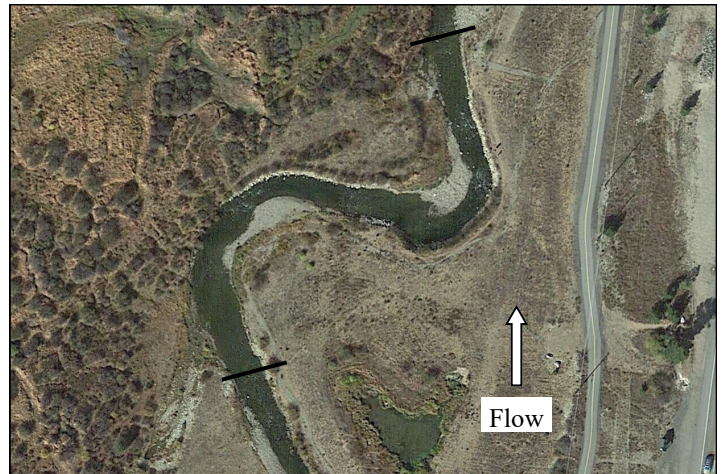


Figure 1. Location of Fourmile Bridge survey reach on Summit County Open Space property. The Summit County recreational path and Tiger Run bust stop can be seen at right in the picture.



Figure 2. Electrofishing crew.

cuses on the Brown Trout population. Figure 3 (following page) contains Brown Trout biomass density estimates for all of the surveys. There is an obvious and significant decline occurring in this fishery. In each of the past four surveys, the biomass estimate has fallen outside the 95% confidence interval of the previous estimate. The 2019 survey yielded the lowest estimate to date, which is less than half of the peak values observed in 2009 and 2011. The consistency and repeated observations of this downward trend over a period of several years make it a virtual certainty that this is not an artifact of sampling error.

We believe that the majority of the fish occupying this

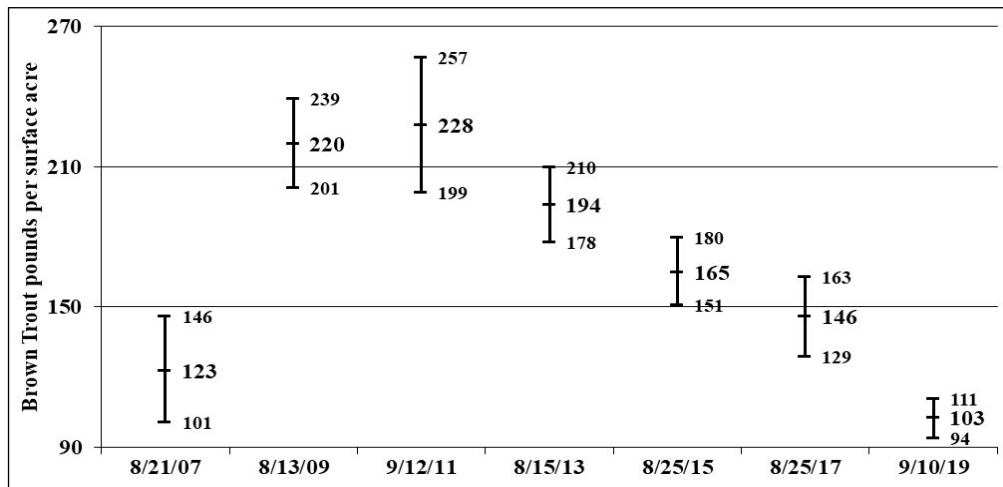


Figure 3. Brown Trout biomass estimates in pounds per surface acre, Fourmile Bridge reach, 2007-2019. Error bars display 95% confidence intervals.

section of river in late summer and fall are migrants from Dillon Reservoir. Anecdotal evidence suggests that these fish are not present in the winter or spring, but start moving into the river at some point in the summer after peak runoff and occupy the reach until sometime after they spawn, when they move back down into the reservoir. CPW has conducted trout movement studies in nearby South Park waters and found that Brown Trout started moving upstream out of Spinney Mountain Reservoir as early as July. Fall population estimates in known spawning reaches such as this can be highly variable because of these movements; this is the reason that it is important to survey as close to the same date as possible. 2011 was a high water year, forcing us to delay the survey until September (Figure 3, see dates). The similarity in the estimates between 2009 and 2011 provides reassurance that the 2011 estimate is not an anomaly caused by the late date. Flows in 2019 also delayed the survey; however if the later date were to create sampling error, it would be expected to be in the positive direction as spawning activity typically increases until its peak in early October.

Table 1 (following page) contains density estimates of Brown Trout larger than 14" (considered "quality trout" by CPW) as well as the number of sculpin, an important native small fish, captured in the surveys. The abundance of sculpin can be an indicator of habitat or water quality factors, so the decline observed is also of concern, but not statistically significant. Due to their small size and cryptic behavior, sculpin are notoriously difficult to sample in a truly representative way. However, rivers of this size with robust sculpin populations produce hundreds in similar reaches.

It is important to note that despite the ongoing decline that we have observed, this is still an excellent fishery that

exceeds the criteria set for Gold Medal designation in Colorado (at least 60 lbs./acre biomass and at least 12 fish larger than 14" per surface acre). While this section has not been designated a Gold Medal water (in part because it does not meet the access criteria of at least 2 contiguous miles of public water), these criteria nevertheless provide a good benchmark for reference. If the current decline continues, this section of the Blue may slip below these benchmarks.

Figure 5 (following page) contains the size distribution of all Brown Trout captured in the past four surveys. The decline over time of all size classes of fish is evident.

Reasons for the declines that we have observed are currently unknown, but a number of factors could be investigated. If the population of mature Brown Trout in Dillon Reservoir was in decline, it would follow that there would be fewer fish making spawning movements into this area. On the contrary, current CPW surveys in Dillon Reservoir suggest that the Brown Trout population is at least remaining stable if not increasing. For more information, see CPW's Dillon Reservoir report.

It is possible that the physical carrying capacity of this reach has declined from the level reached immediately following the habitat improvement project, although this does not visually appear to be the case. It would be instructive to conduct a physical survey of this reach consisting of multiple cross-sections and a longitudinal profile, in order to assess whether or not physical habitat features are filling in or degrading over time.

The Blue River between this reach and Dillon Reservoir passes through a mix of private and public property that is heavily developed and hosts a large amount of human activity. CPW has not closely examined the entire reach for barriers to fish movement. It would be useful to



Figure 4. The largest fish captured in 2011, a 23" Brown Trout weighing 5.7 lbs.

inspect the entire reach in order to ensure that some aspect of the morphology of the river has not changed in recent years and created either partial or complete barriers to fish movement. However, if a new barrier was the culprit, one would expect a more sudden change in the fishery, rather than the slow-and-steady decline that is occurring.

The headwaters of the Blue River in the vicinity of Breckenridge has a history of water quality problems resulting from historic mining activity. Monitoring for contaminants such as metals would be valuable in ruling out this possibility. In particular, French Gulch, a major tributary entering the Blue approximately 3.4 river miles upstream from this site, is laden with enough mine runoff pollution that it is devoid of fish in its lower section as it flows through Breckenridge. If water quality from this or other tributaries has been steadily degrading over time, it is possible that we are now seeing those effects in the fishery in the mainstem of the Blue.

This section of the Blue River is a unique and important fishery in Summit County, both because of its value as a spawning area and contribution to the Dillon Reservoir fishery, and as a recreational fishery itself. A high priority should be placed on identifying and remediating the causes of the current decline.

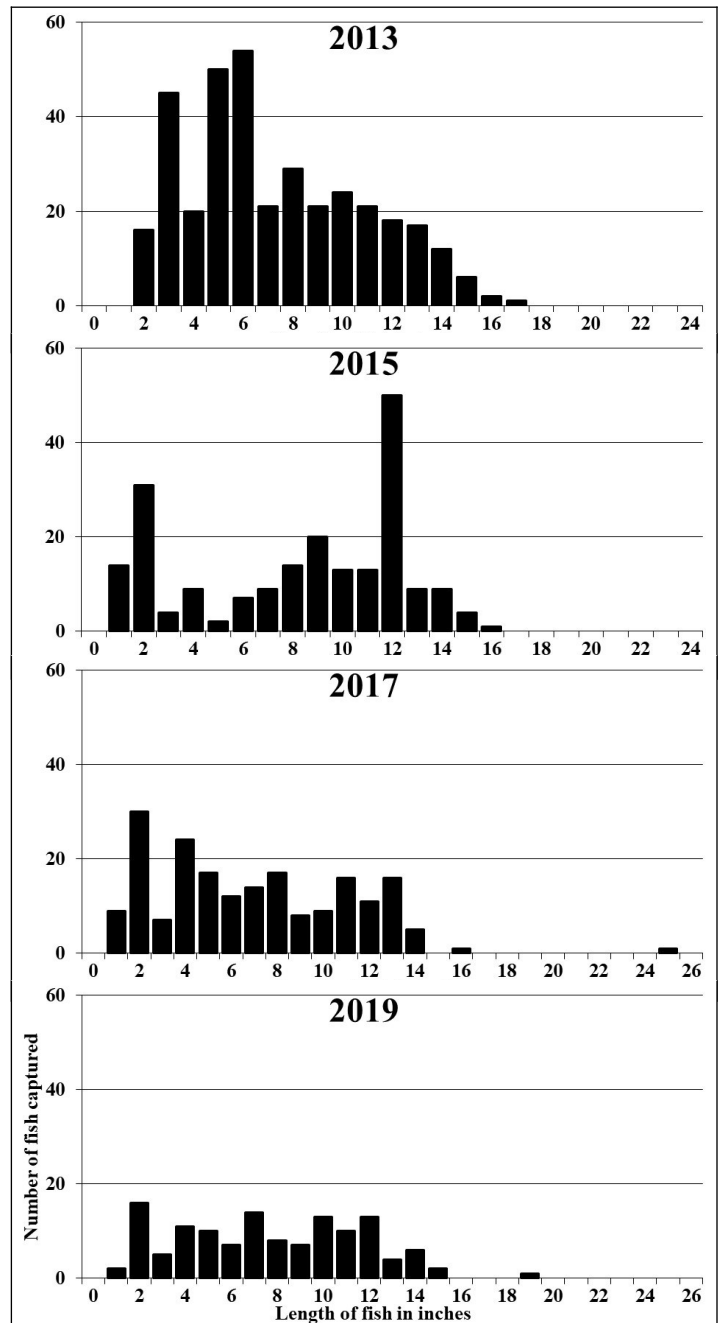


Figure 5. Size distribution of Brown Trout captured in the last four surveys of the Fourmile Bridge reach.

	Brown trout per acre >14"	# sculpin captured
2007	10	2
2009	27	13
2011	32	11
2013	22	29
2015	34	29
2017	17	10
2019	21	10

Table 1. Density estimates of Brown Trout larger than 14" per surface acre (left column) and total number of sculpin captured (right column)



Figure 6. The largest fish captured in 2017, a 25" Brown Trout weighing 6.0 lbs.



## 2019 Survey of Valley Brook Road Station

On September 10, 2019, we also conducted a fish population survey on a reach in Breckenridge known locally as “the steps” based on the configuration of stream stabilization structures that have been constructed there. The station was located immediately downstream of Valley Brook Road, adjacent to Upper Blue Elementary School (Figure 7, right). The surveyed reach measured 634 feet in length and 33 feet in average width. The downstream end of the station was located at the top of one of the step-like rock structures. The station encompassed three of the structures, and ended at the base of a structure. Due to its location in town, this area of the Blue receives heavy angler traffic, mostly from visiting tourists.

## Stocking

Contrary to the Fourmile Bridge reach, the self-sustaining fishery here is known to be poor and CPW stocks catchable-sized Rainbow Trout annually (see Table 2, right). The majority of fish that are stocked are 10” standard catchable Rainbows; however on occasion we have stocked brood culls that are larger. The intent of the timing of stocking has been to stock one batch of fish prior to runoff and one batch after, although coordinating that timing with hatchery production and availability can be difficult. Stocking locations are spread out over a larger area than the survey reach discussed here, but all fish are stocked in the reach between French Street and Coyne Valley Road.

## Results and Discussion

The biomass estimate for both Brown and Rainbow Trout was 27 pounds per surface acre. One Brown Trout greater than 14” was captured, which yielded a population estimate of 2 fish greater than 14” per acre. No sculpin were captured.

Figure 8 (following page) contains the size distribution of Brown and Rainbow Trout that we captured. Based on their size range, all of the Rainbow Trout appeared to have originated from stocking occurring in 2019. We found no evidence of either successful reproduction of Rainbows or holdover and growth of fish stocked in previous years.

CPW does not stock any Brown Trout in this area and thus all fish captured are the product of wild reproduction. Brown Trout larger than 9” were rare.

This information suggests that the fishery of this reach of the Blue is exceptionally poor. There may be several contributing factors to this, but the chief limiting factor is



Figure 7. Location of Valley Brook Road station. Downstream (top) and upstream (bottom) terminus marked by black lines.

Date	# Catchable Rainbows stocked
6/1/17	700
6/26/17	700
4/24/18	700
5/2/18	700*
6/29/18	700
5/28/19	500
6/19/19	900

Table 2. Recent stocking history for “the steps” reach. All fish were 10” in average length except for (\*), which averaged 14”.

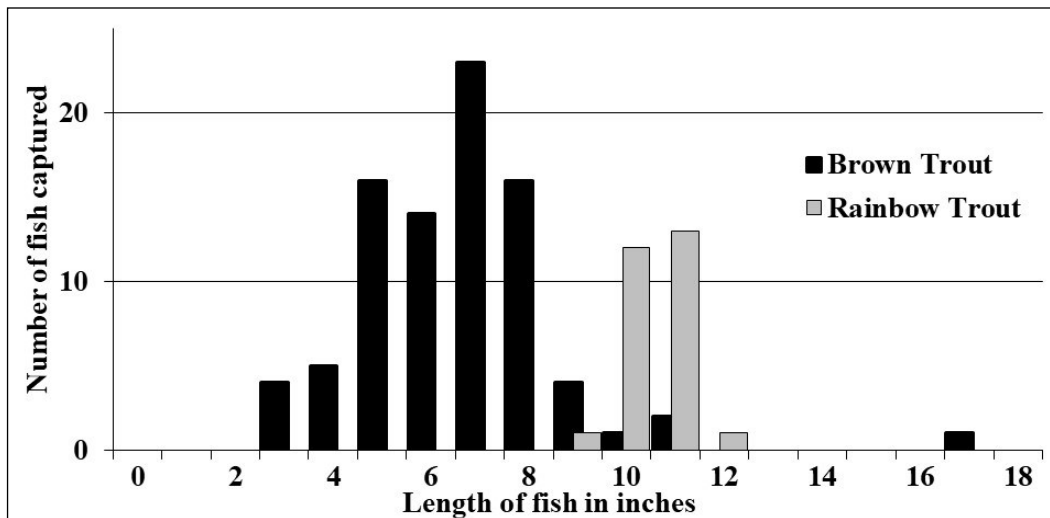


Figure 8. Size distribution of trout captured in the Valley Brook Road station, 2019.

most likely the configuration of the rock structures that were built here. CPW has not conducted a technical analysis of these structures but they appear to be barriers to fish movement. This creates highly fragmented habitat in which each section in between two structures functions as a partially or completely isolated, small fish population. Adult trout have varying habitat needs throughout the year and actively seek out diverse habitat. If fish move downstream over these rock structures, they do not have the option of moving back upstream at any point. Instead, they are permanently lost from the population. This is probably occurring with both the Rainbow and Brown trout. Any hope of establishing a truly sustainable recreational fishery here would inevitably require a project to redesign and rebuild these structures to accommodate fish movement.

This section of the Blue suffers from multiple environ-

mental stressors in addition to the rock structures. The absence of sculpin may be an indicator of water quality impacts. This station is located approximately 2,500 linear feet downstream of the French Gulch confluence, and mine runoff water entering the Blue at that point may preclude sculpin from persisting in this reach. In the future, it would be instructive to survey for sculpin immediately upstream of the French Gulch confluence.

There are multiple street crossings of the Blue River in Breckenridge that also likely act as barriers to fish movement, in the same way that the rock structures do. These contribute to further habitat fragmentation.

Due to its ease of access, this reach of the Blue River has high potential as a valuable recreational fishery. However in order for it to fulfill this potential, the shortcomings discussed here, as well as possible others not yet known, would need to be addressed.