Swan River

Fishery Survey Report

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This report summarizes the results of seven fish population surveys that CPW staff and Summit County personnel have conducted on the Swan River near Breckenridge in coordination with the Swan River Restoration Project.

Surveys have been conducted at two sites. The lower reach (Figure 1) is on Summit County Open Space property downstream of the restoration reach. The upstream terminus of this site is approximately 500 feet downstream of the Muggins Gulch Road crossing. This reach is a free-flowing section bounded on both ends by beaver pond complexes, measuring 464 feet in length and 15.8 feet in average width. The upstream terminus of the reach is a beaver dam. This site serves as a "control" reach to compare with the restored section upstream and help to inform reasonable expectations for the biological potential of the restored reach.

The upper site is within the Restoration Project area and lies approximately 0.5 miles upstream of the lower reach (Figure 1). This reach measures 567 feet in length and 18.9 feet in average width and encompasses multiple newly constructed riffle-pool-run sequences. Restoration work on this section was completed in November of 2016. This is a unique stream restoration project in the sense that due to the history of dredge mining, there was no functional stream channel prior to completion of the project. The purpose of the project was to reestablish approximately 4,800 linear feet of stream channel in a manner that restores natural stream functions, floodplain connection, riparian community vegetation, and instream habitat diversity.

For all surveys discussed in this report, we used two backpack electrofishers to conduct a two-pass depletion estimate of the fish population within that reach. All fish were measured. A subset of the fish were weighed, and all fish were returned to the water immediately upon completion of data collection. Aside from incidental occurrence of other species (we captured one Cutthroat in 2017 on the lower reach, and one Brown Trout in both reaches in 2019) Brook Trout comprise the entire trout population of these reaches, and no stocking has occurred.

Population estimates for all surveys are displayed in Table 1 (following page). The 2016 estimates derived from the lower reach differ significantly from 2017 and 2018. The size distribution of Brook Trout captured in the lower reach (Figure 2, following page) offers some insight as to why the estimates were so different. In 2016, few

Figure 1. Location of lower (left) and upper (right) survey sites on the Swan River discussed in this report. Red bars indicate downstream and upstream terminus of the two sites.

	Date	Brook trout #>6"/ mile	Brook trout Lbs./surface acre	# sculpin captured
Lower reach	9/20/2016	308	31	152
	10/4/2017	1,295	148	73
	10/3/2018	1,432	123	131
	10/2/2019	1,923	178	92
Upper reach	10/4/2017	505	59	3
	10/3/2018	1,127	117	6
	10/2/2019	1,872	226	20

Table 1. Population estimates

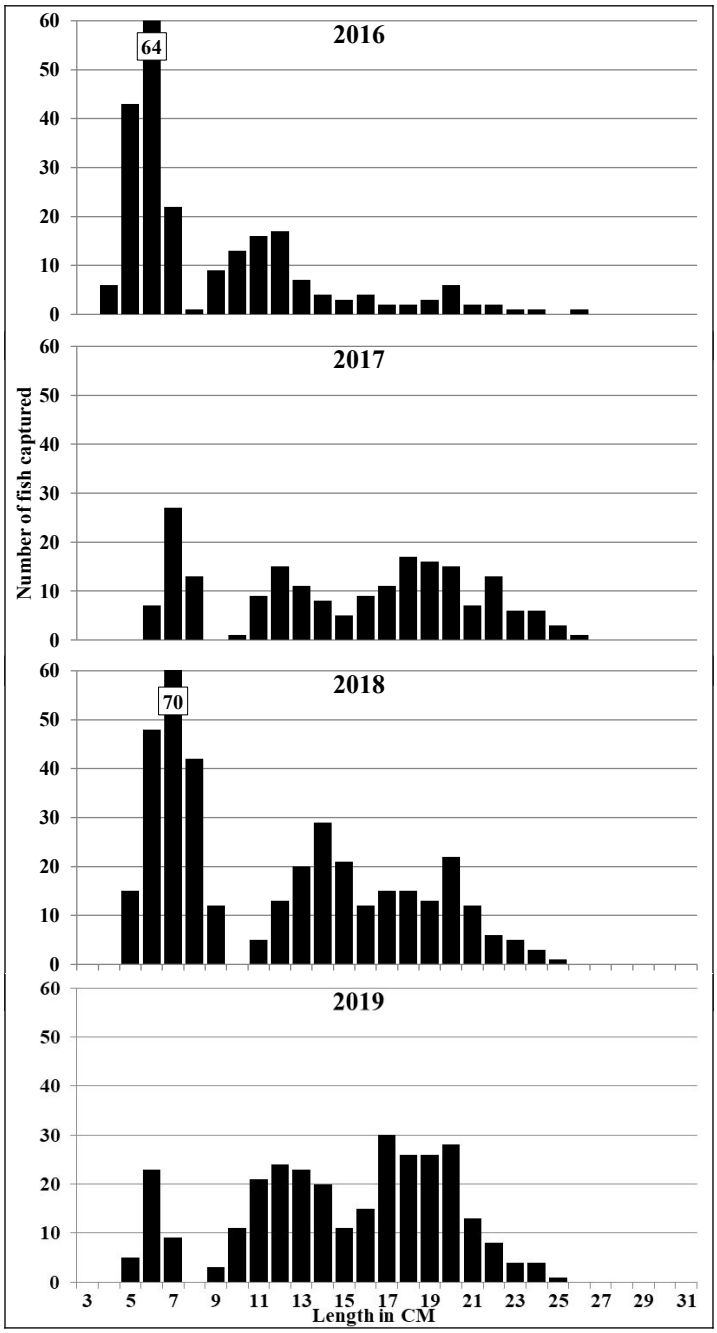

Figure 2. Size distribution of brook trout captured in lower reach

adult fish (>15 cm) occupied the reach, while in 2017 and 2018 adult fish were more plentiful. This is likely a function of the dates of the surveys. Being a fall-spawning fish, adult Brook Trout probably move upstream out of the nearby beaver ponds in search of spawning habitat. In 2016, the adult fish had probably not made this movement yet, but the subsequent surveys took place approximately two weeks later. In subsequent years, we standardized the sampling date to the first week of October to avoid this source of variability to the greatest extent possible, and plan to continue doing so in the future.

The 2017 survey at the lower site found significantly fewer small fish—both juvenile Brook Trout (averaging 5-8 cm) and Mottled Sculpin. Mottled Sculpin are a small native fish species and are an important indicator of stream health. This reach contains the highest density of this species that we have found to date anywhere upstream of Dillon Reservoir. It is possible that short-term disturbance upstream which may have been caused by construction of the Restoration Project had some stressful effect on the downstream fish population in 2017, but if this was the case, by 2018 numbers of both Brook Trout and Mottled

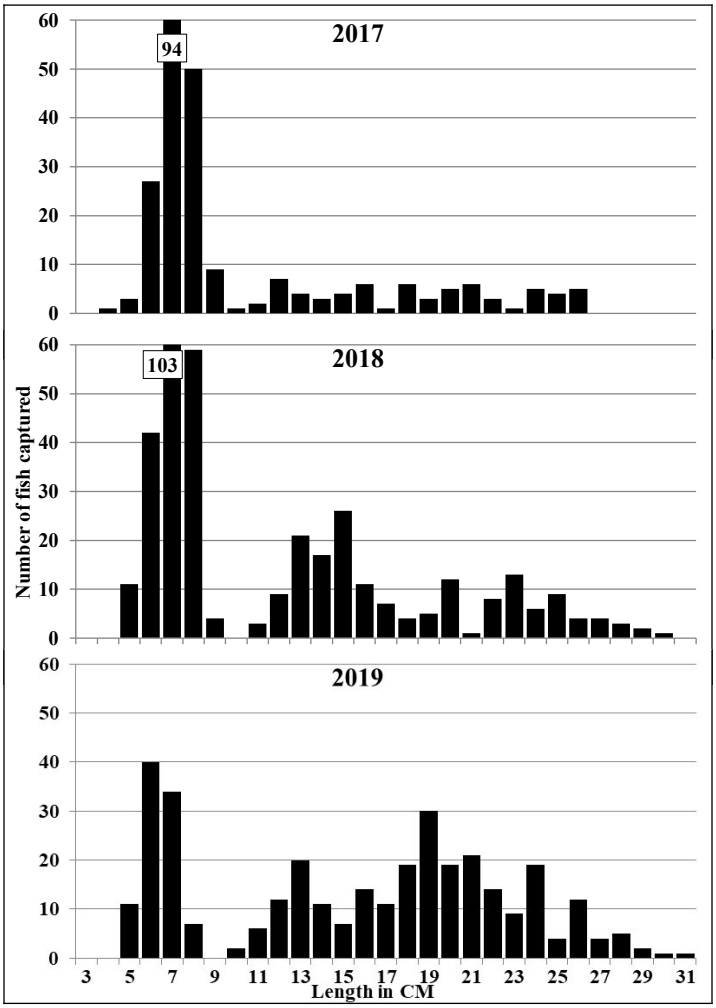

Figure 3. Size distribution of brook trout in the upper reach.

Figure 4. Electrofishing crew on the upper reach. Photo by Jason Lederer

Figure 5. Mottled sculpin. Photo by Corey Lewellen.

Sculpin had fully recovered.

Because the restoration project constructed an entirely new channel, all fish occupying the upper reach (Figure 3) in 2017 had to be migrants from either upstream or downstream. The three Mottled Sculpin that we captured probably migrated from downstream because the species is not known to occur upstream of this point in the Swan River drainage.

The very prolific juvenile Brook Trout population found in 2017 (Figure 3, previous page) most likely drifted in from upstream locations during the previous runoff season, which is a common dispersion route for young trout. It is unlikely that adult Brook Trout successfully spawned here in fall 2016 because in-channel construction concluded in early November, and the stream channel was connected at this time — approximately a month later than we estimate the peak of Brook Trout spawning activity to have occurred. By 2018, we found many intermediate-sized (12-20 cm) Brook Trout which were sparse a year earlier. Many of these fish were likely the product of the prolific 2017 juvenile year class. The 2018 sample revealed for the first time that the full range of sizes and ages of Brook Trout were now present in expected numbers in the Restoration Project area, and that the population in this reach now resembled that of the lower reach very closely.

The 2019 surveys produced the highest population estimates of Brook Trout to date in both sampling reaches. In the upper reach, the biomass estimate was nearly double the 2018 estimate. The size distribution (Figures 2 & 3, previous page) reveals that we found significantly more adult-sized (>15cm) fish in both reaches than in any of the previous surveys.

The main difference remaining between the two sites is the density of Mottled Sculpin. Because they are a small-bodied fish with a relatively small home range, it is likely that they are slower to colonize new habitat. We are hopeful that future surveys of the upper site will continue to document increasing numbers of this species commensurate with the densities that we have found at the lower site.

CPW plans to monitor these reaches again in 2020 in order to document the continued success of restoration efforts. This area would also be a good candidate for water quality monitoring through Colorado's River Watch program, if there is interest among a local volunteer group to do so.