



Colorado River from Kremmling to Dotsero

Fishery management report

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Introduction

The Colorado River from Kremmling downstream to Dotsero is one of the most popular and largest trout rivers in the state. Over the course of approximately 70 river miles between the confluence with the Blue River near Kremmling to the Eagle River at Dotsero, the Colorado flows through a stunning diversity of habitats, from deep, rugged canyons with challenging rapids to slow, winding pools and braided channels. Float fishing is very popular on this reach as well as whitewater rafting in certain sections. Public access is good throughout, with much of the river accessible and managed by the Bureau of Land Management (BLM).

Fish populations are prolific and diverse, with Brown and Rainbow Trout dominating the sport fishery, supplemented by Mountain Whitefish and incidental occurrences of Brook and Cutthroat trout. Native species such as Blue-

head and Flannelmouth suckers and Roundtail Chub are present, and small-bodied native fish such as Mottled Sculpin and Speckled Dace contribute to a prolific prey base. Aquatic invertebrates are equally abundant, with excellent hatches of the giant stonefly, *Pteronarcys californica*, occurring annually in the spring. An array of other stonefly species as well as mayfly, caddis, and midges provide ample hatch activity most months of the year.

Colorado Parks and Wildlife (CPW) participates in the Upper Colorado Wild and Scenic Stakeholder Group (W&S SG). This stakeholder group was formed in 2007 and is made up of representatives from more than 20 organizations ranging from government natural resource agencies, water providers, local governments, and non-profit advocacy groups. The purpose of this group is to protect and enhance the Outstandingly Remarkable Values (ORVs) of the Colorado River, one of which is the excel-

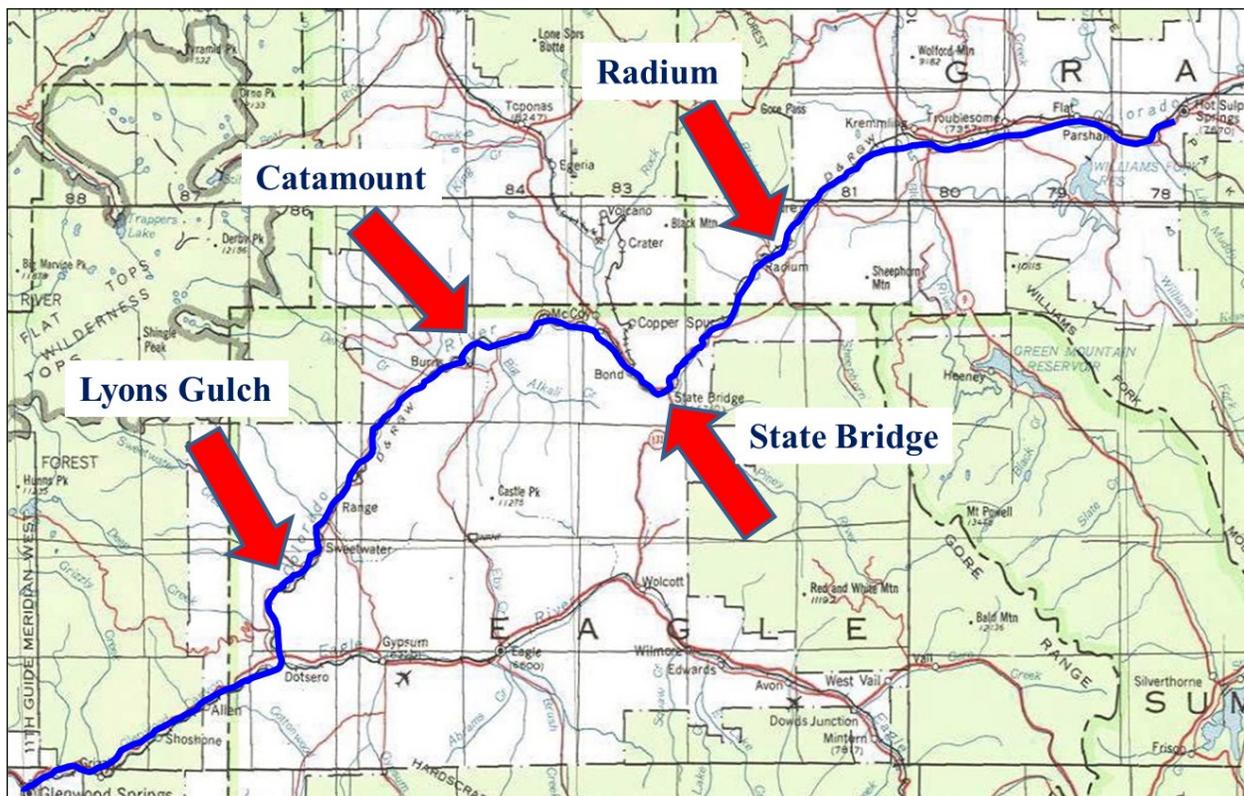


Figure 1. Colorado River from Kremmling to Dotsero. The locations of the four survey reaches discussed in this report are indicated by the arrows.

lent fishery, while also maintaining water project yield and flexibility for water users.

For the past decade, CPW aquatics crews, along with BLM personnel and many volunteers, mostly W&S SG participants, have monitored fish populations on four reaches within this section of the Colorado River (Figure 1). The survey reaches are 2 miles in length and evenly distributed through the 70-mile section through representative habitats, providing confidence that fish population characteristics and trends observed in these reaches are representative of fish population dynamics in the entire section. CPW uses this information to make fishery management decisions, inform fishing regulations, and make recommendations to the W&S SG. The purpose of this report is to describe the information that has been collected in these surveys to date. Results and discussion for these survey reaches will be presented in this report from upstream to downstream.

Based on the information collected in these surveys, in March 2016 the CPW Commission designated 32 miles in this river section, from the confluence of Canyon Creek at the mouth of Gore Canyon to the confluence of Rock Creek near McCoy, as a Gold Medal fishery.

In general, fisheries management on this section has focused on production of wild trout. However, some stocking has occurred on occasion and is discussed in the report. The fishing harvest regulation on this section is a limit of two trout of any size. The W&S SG has conducted river user surveys as part of their monitoring work, and these surveys have documented very low rates of fish har-

vest, with the vast majority of anglers practicing catch-and-release angling (For more information see W&S SG Annual Monitoring Reports and other documents at www.upcowildandscenic.com).

Methods

In the surveys discussed in this report, we used two electrofishing rafts with boom-mounted electrodes working in tandem (Figure 2). Traditional mark-recapture methodology was followed, with at least one day in between mark and recapture runs to allow fish to redistribute in the survey reach. Surveys are run in the spring, prior to runoff, typically during the last half of April or the first half of May. Every effort is made to conduct the surveys at flows of less than 2,000 cubic feet per second (CFS) at the Kremmling USGS gage.

Mark-recapture models are used to estimate fish population parameters. Abundance is estimated as number of fish per mile >6" by species. Biomass is estimated as pounds per acre (lbs/acre) of fish >6" for each species, as well as for all trout species combined. Quality Trout density is estimated as fish per acre >14" by species and for all trout combined. Total trout estimates for Quality Trout density and trout biomass are reported to the W&S SG to monitor the Fishing ORV and to compare to the Gold Medal Trout standard of 12 Quality Trout and 60 pounds of trout per acre.

This report includes all surveys completed through 2019. Due to schedule cancellations as a result of the COVID pandemic, no surveys were conducted in 2020.



Figure 2. Electrofishing raft with two netters, a rower, boom-mounted electrode, live-well, and generating equipment.

Radium

The farthest upstream monitoring reach that CPW crews survey is the Radium station. The downstream terminus of this reach is the Grand County Road 11 bridge over the river at Radium (Figure 3, below). The station encompasses the Radium hot spring and the Blacktail and Sheephorn Creek confluences. This reach of river contains a wide variety of habitat including canyon-type water with large boulders, large riffles, deep pools, long runs, and braided channel. It is the most heavily used section in this report by both recreational boaters and anglers. We surveyed this reach annually for four years from 2010-2013, and switched to a biennial schedule after 2013.

CPW has stocked whirling disease-resistant Rainbow Trout in this reach on five occasions since 2010 (Table 1, following page). This was done on an opportunistic basis when there was excess hatchery production. The principal reason for stocking was to introduce the genetics of whirling disease resistance into this section of river. The stocked fish were generally divided between the Pumphouse and Radium boat ramps and stocked directly from the ramps.

In general, Rainbow Trout population estimates have been highly variable (Figures 4, 5, & 6). This is most likely a function of the timing of our surveys, which take place immediately prior to or during Rainbow spawning activity. Our catch rates are likely affected by movement among Rainbow Trout as they prepare to spawn. On average, Rainbows contribute 13.2% of total trout biomass, 10.6% of total trout >6" per mile, and 14.1% of Quality Trout. These averages are probably a more accurate reflection of the contribution of Rainbow Trout to the total trout population than individual estimates from any given year.

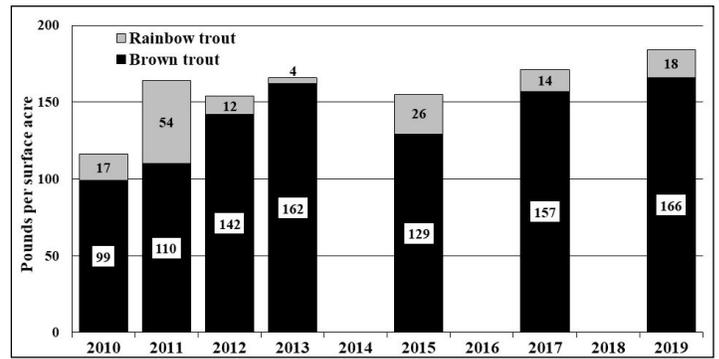


Figure 4. Biomass estimates for Brown and Rainbow Trout in pounds per surface acre, Radium station.

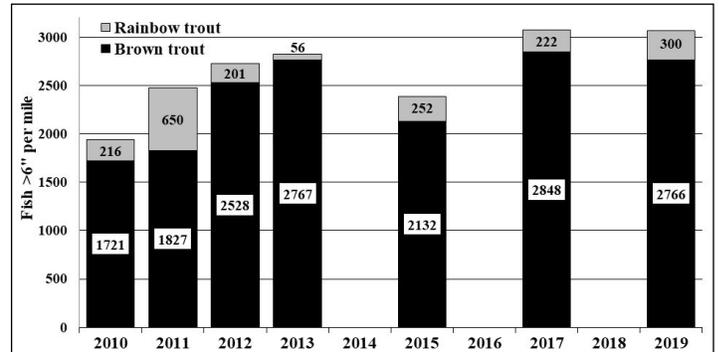


Figure 5. Estimates of fish >6" per mile for Brown and Rainbow Trout, Radium station.

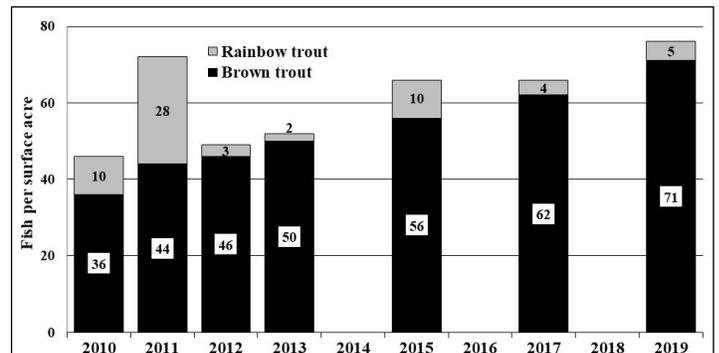


Figure 6. Density estimates of Quality Trout (>14") in fish per surface acre, Radium station.



Figure 3. Location of the Radium survey reach.

Brown Trout population estimates are more consistent, and show an upward trend since 2010. Notably, trout abundance and biomass in 2019 were estimated at their highest levels observed to date. Trout biomass and Quality Trout density (Figures 4 & 6) have always far exceeded the minimum Gold Medal criteria of at least 60 pounds of trout biomass and 12 trout larger than 14” per surface acre. Reasons for the increase are unknown, other than the fact that this has been a relatively drought-free period with some years of extremely high runoff (2011 and 2014). Two years, 2012 and 2018, had particularly low flows as a result of poor snowpack. It is possible that the trends observed in this reach are a long-term positive response to good water years, and this trend may not be sustained if a prolonged multi-year drought or extended period of low flows were to occur.

The size structure of this trout population has been consistently ideal, with the median length of Brown Trout above 13” in all surveys (Figure 7). This is exceptional for Brown Trout populations in this area.

Figure 7 also identifies average body condition (relative weight) for Brown Trout. Relative weight is a descriptor of a fish’s weight relative to its length, converted to a scale of 100 based on a standard weight equation. We have observed consistently excellent body condition (>90) in all our surveys to date.

The fish population in this section of the Colorado River is comprised of a diversity of species of non-native and native fish including desirable sportfishes, native non-game fishes, and undesirable invasive species. One notable fish that has not historically occurred upstream of Gore Canyon but is actively expanding its range upstream in the Colorado River is the Mountain Whitefish. In our monitoring reaches, we do not typically capture enough Mountain Whitefish to generate population estimates; therefore we simply report number captured (Table 2). These numbers suggest a stable population.

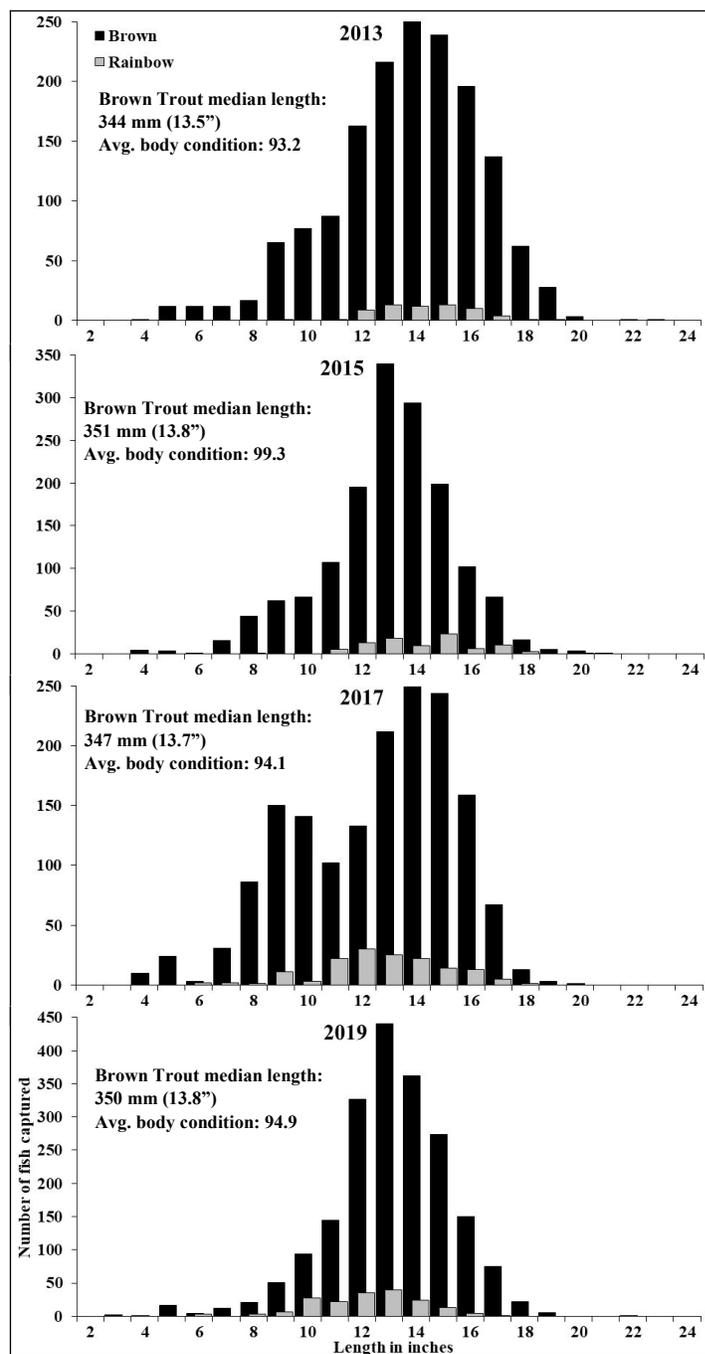


Figure 7. Size distribution in inches of Brown and Rainbow Trout captured in the Radium station, 2013-2019.

Table 1. Stocking history of whirling-disease resistant Rainbow Trout for the time period covered in this report. The 2018 plant were Rainbow-Cutthroat hybrids.

Date	# stocked	Avg. size
7/30/2015	187,426	2.1”
10/19/2017	51,057	3.5
10/31/2018	42,900	5.8
8/19/2020	20,000	3.0
9/9/2020	20,000	3.3

Table 2. Number of Mountain Whitefish captured by year

Year	# captured	Year	# captured
2010	307	2015	219
2011	162	2017	232
2012	273	2019	272
2013	248		

State Bridge

The State Bridge monitoring reach is located from the Colorado Highway 131 bridge over the river and extends downstream 2 miles (Figure 8).

CPW surveyed this reach on six occasions beginning in 2013. However, difficult flow conditions in 2013 impacted our capture efficiency for fish; therefore, the precision desired to produce reliable estimates was not attained. Capture efficiency has been good (>10%), thus ensuring the reliable estimates generated from CPW's annual surveys from 2015 to 2019 (Figures 9, 10 & 11).

The State Bridge reach is truly a wild trout reach and hosts a naturally robust Rainbow Trout population. On average they have contributed 22.4% of the trout biomass, 23.9% of trout >6" per mile and 18.6% of the Quality Trout estimates. This is the highest proportion of Rainbows in any of our survey reaches. Trout populations naturally vary from year to year depending upon environmental influences. Rainbows notably increased in this reach during the 2015-2019 period. It is possible that some of the fish stocked above and below the monitoring reach moved into this area. However, this would not account for all of the Rainbow Trout present in the size distributions depicted in Figure 15 (next page), as the presence of the smallest trout are not traceable to any stocking event and are therefore juvenile fish recruited naturally from wild reproduction. Natural recruitment is likely occurring from spawning areas locally in the mainstem or in tributaries like the Piney River that hosts spawning fish seasonally.

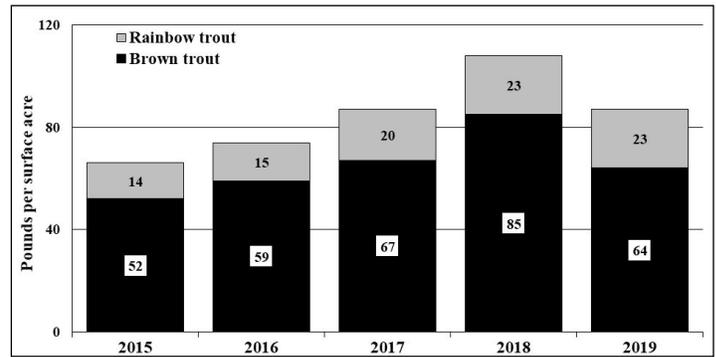


Figure 9. Biomass estimates (lbs/acre) for Brown and Rainbow Trout estimated in the State Bridge monitoring reach.

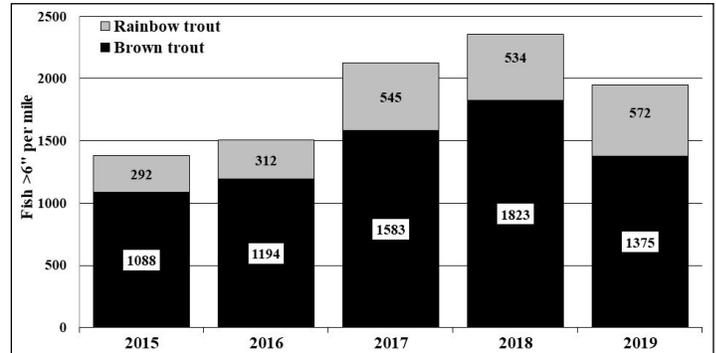


Figure 10. Estimates for number of fish >6" per mile for Brown and Rainbow Trout in the State Bridge monitoring reach.

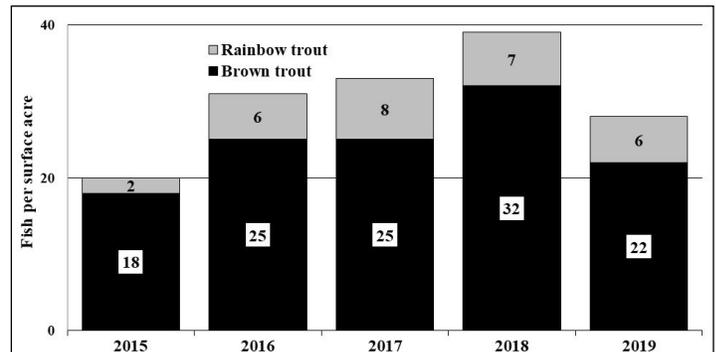


Figure 11. Density estimates of Quality Trout (>14") in fish per surface acre in the State Bridge monitoring reach.



Figure 8. Location of State Bridge survey reach.

Median length of Brown Trout in this reach are slightly lower than the Radium reach, but still excellent at around 13" (Figure 13). The average body condition (relative weight) of Brown Trout is also slightly lower than the Radium reach, but also still good at just below 90. A high quality prey base characterized by abundant macroinvertebrates and forage fish serve as part of the foundation of this Gold Medal reach. Giant stoneflies (*Pteronarcys californica*) inhabit the reach around State Bridge and can produce spectacular fishing. Because this species has a multi-year life cycle in its larval form, nymphs are present virtually year-round and fish-

ing with large salmonfly nymphs can be productive nearly any time. Along with stoneflies, abundant native sculpin and juvenile salmonids are voraciously consumed by trout as documented in the photos below of fish collected during our monitoring surveys. Indeed, trout feeding frenzies have been known to occur around spring snow storms.



Figure 12. Stomach contents from Brown Trout collected in monitoring surveys at State Bridge. (A.) juvenile Mountain Whitefish in the trout's mouth, (B.) a partially digested sculpin and giant stonefly nymph, (C.) a male and female (gravid) sculpin from the large trout on the measuring board.

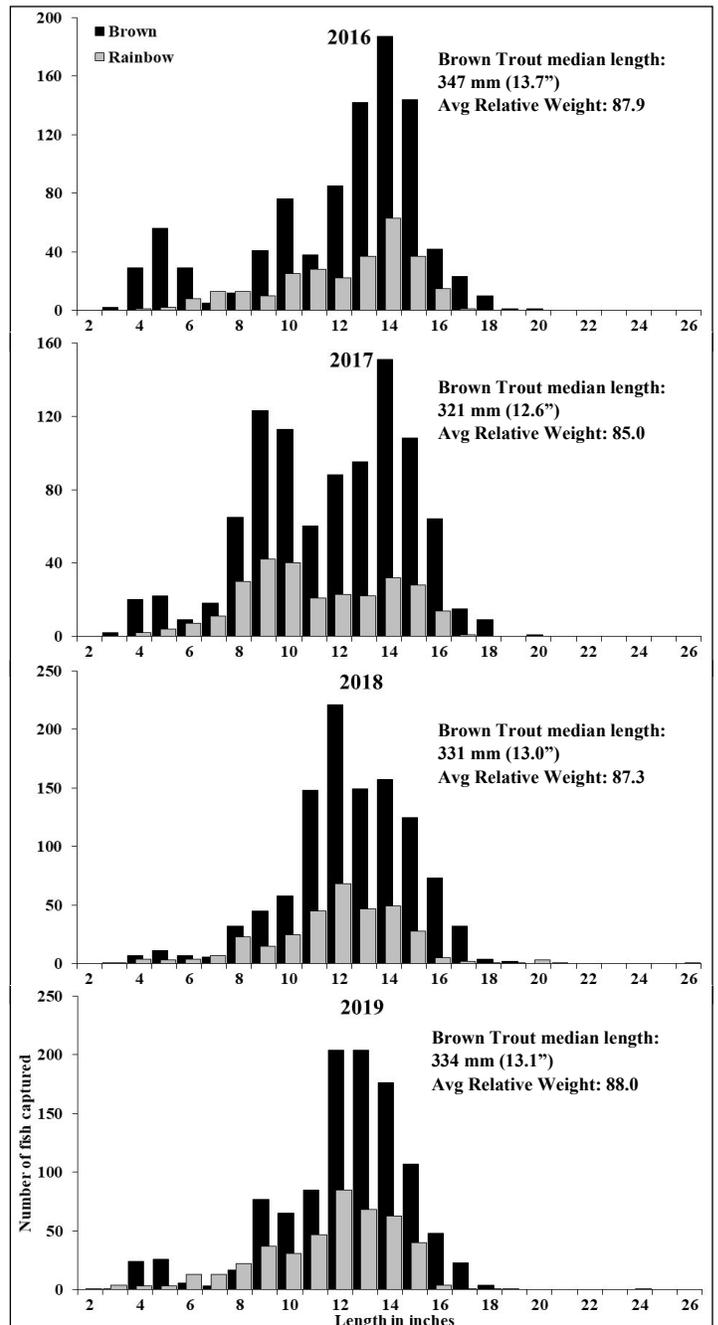


Figure 13. Size distribution in inches of Brown and Rainbow Trout captured in the State Bridge reach, 2016-2019.

Catamount

The Catamount monitoring reach has its upstream terminus at the riffle immediately below the Catamount boat ramp and extends downstream for two miles (Figure 14).

Until 2019, the Catamount reach had the least amount of variability in the Brown Trout population estimates of our four monitoring reaches (Figures 15, 16, & 17). The 2019 survey revealed significant increases in all of the Brown Trout population parameters. The reasons for this are unknown.

Our Catamount population estimates reflect the general trend of declining trout populations as one progresses downstream. Though this section of river is not designated Gold Medal as trout biomass does not regularly attain the Gold Medal standard (60 lbs/acre), the density of large trout is still excellent and often exceeds Gold Medal criteria (12 trout >14" per acre). Rainbow Trout have contributed less than 10% of the biomass, abundance and density on average; however, recent surveys have documented a modest increase in numbers, similar to our findings on the State Bridge reach.

Rainbow populations in the Colorado River crashed when whirling disease (WD) was introduced to the river in the late 1980's. Now, WD-resistant Rainbow Trout are providing new opportunities to catch wild-type Rainbows. WD-resistant trout were stocked in this reach on two occasions, in 2014 and 2015 when extra 2" fish were available from CPW's hatcheries. It is possible that these two batches of fish have contributed resistant genetics, enabling the increased Rainbow numbers that we have recently seen. These WD-resistant Rainbow Trout are aggressive fish that fight hard when caught.

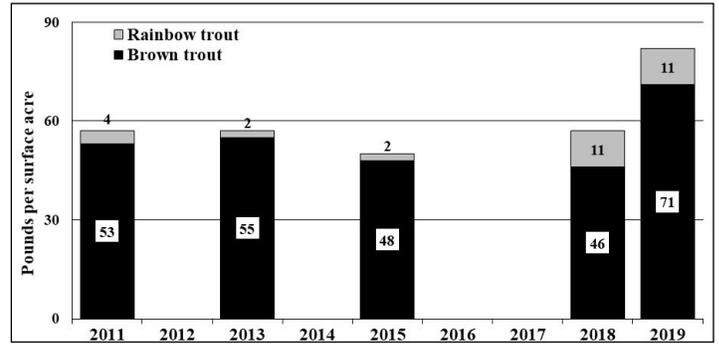


Figure 15. Biomass estimates (lbs/acre) for Brown and Rainbow Trout in the State Bridge monitoring reach, 2011-2019.

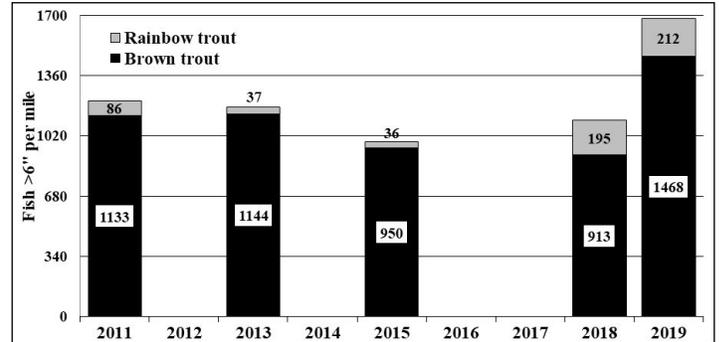


Figure 16. Estimates for number of fish >6" per mile for Brown and Rainbow Trout in the Catamount monitoring reach.

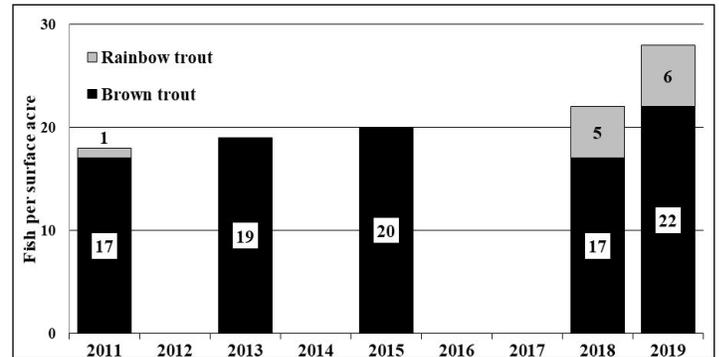


Figure 17. Density estimates of Quality Trout (>14") in fish per surface acre in the Catamount monitoring reach.



Figure 14. Location of Catamount survey reach.

Median lengths of Brown Trout captured in the past four surveys are slightly smaller than the State Bridge reach, while relative weights were approximately the same (Figure 21). One contributing factor to the smaller median length of fish is the prolific juvenile population in some years— which is a positive sign of good natural recruitment.

Angling use is moderated in the Catamount stretch of the Colorado River due to the difficulty of the downstream “Rodeo Rapid” near Burns and private property flanking access to both sides of the river. This limits float anglers and virtually eliminates wade anglers. Therefore, for anglers wanting a reach a high density of large trout that experience less angling pressure, this reach offers outstanding opportunity.



Figure 18. Adult Mountain Whitefish in the Catamount reach.



Figure 19. A native Mottled Sculpin in the Catamount reach.



Figure 20. A wild-type Rainbow Trout in the Catamount reach.

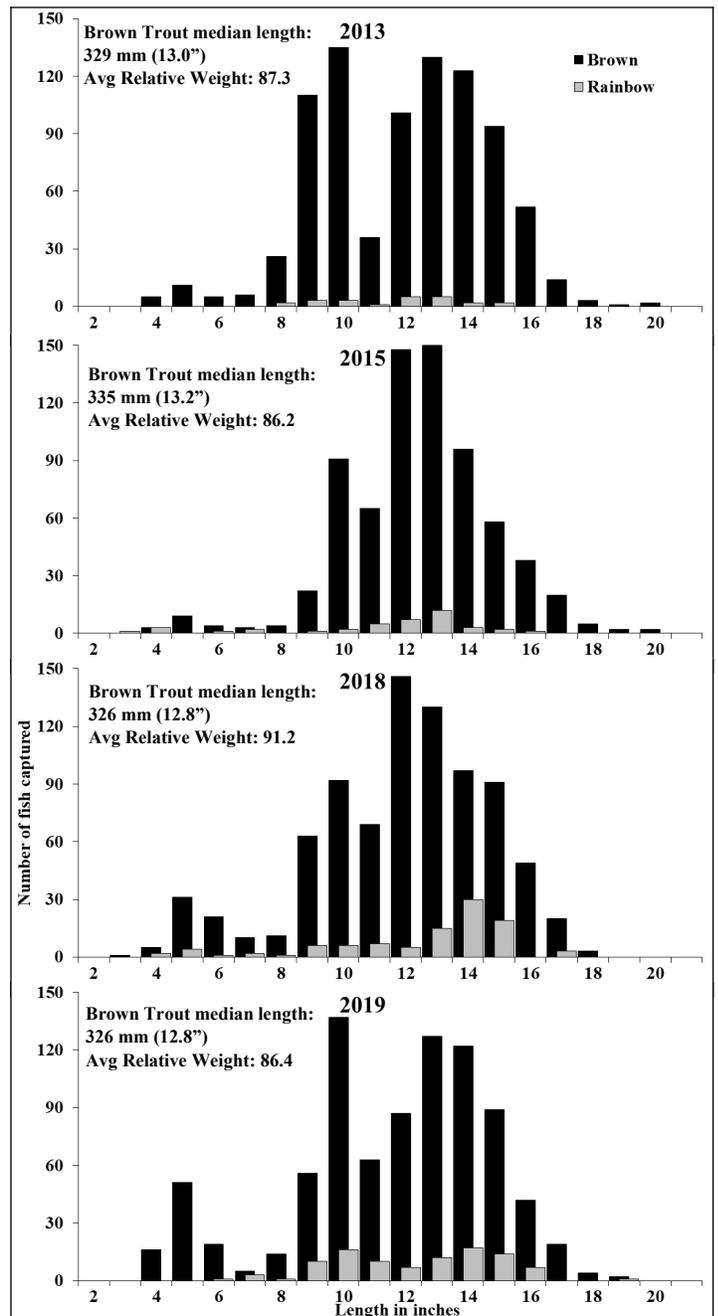


Figure 21. Size distribution in inches of Brown and Rainbow Trout captured in the Catamount reach, 2013-2019.

Lyons Gulch

The Colorado River below the Cottonwood Boat Ramp is an interesting reach where the gradient and velocity decreases and waters warm, especially in the summer. These changes in habitat and temperatures are not conducive to a high quality year-round trout fishery (Figures 23 & 25). Despite the lower density of Quality Trout, the overall abundance of Brown Trout can be high, exceeding 1000 fish per mile in 2012 (Figure 24). The median length of Brown Trout is significantly smaller than in the upstream reaches (Figure 26). Despite their smaller size, Brown Trout in this reach continue to exhibit good body condition on average with relative weights around or exceeding 90 (Figure 26).

In July 2012 there was a major rain event which triggered flash flooding and debris flows into the river (Figures 27 & 28). This event more than tripled the flow of the Colorado River at Dotsero in a short period of time (Figure 28). Because we had surveyed the reach in spring 2012 prior to the flood event, we elected to survey again in spring 2013 to determine if there were quantifiable impacts. We found that the flood had severely impacted the fish population, reducing Brown Trout biomass estimates by 81%, fish per mile by 86%, and Quality Trout by 90% (Figures 23, 24, & 25).

In fall 2012, in anticipation of these impacts to the trout fishery, CPW stocked this section of the river with whirling disease-resistant Rainbow Trout to take advantage of the significant decrease in predatory Brown Trout (Table 4, next page). The effects of this stocking are apparent in the increased Rainbow population estimates beginning in 2013. Contrary to the upstream reaches which rely primarily on natural reproduction, CPW con-

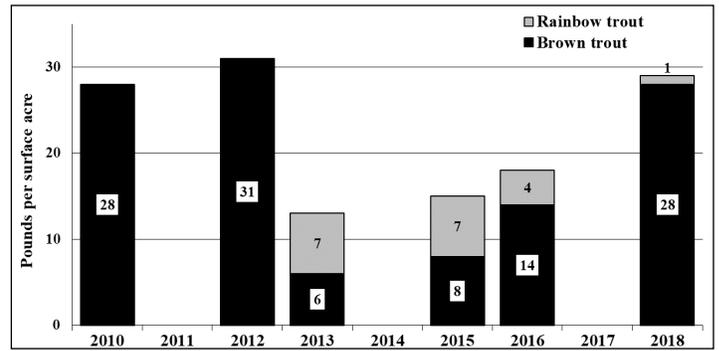


Figure 23. Biomass estimates (lbs/acre) for Brown and Rainbow Trout estimated in the State Bridge monitoring reach.

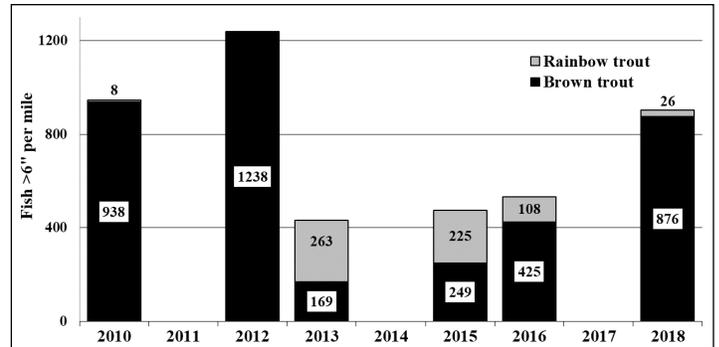


Figure 24. Estimates for number of fish >6" per mile for Brown and Rainbow Trout in the Catamount monitoring reach.

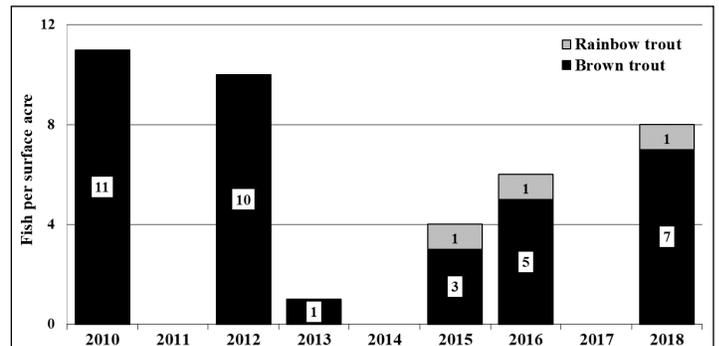


Figure 25. Density estimates of Quality Trout (>14") in fish per surface acre in the Catamount monitoring reach.



Figure 22. Location of Catamount survey reach.



Figure 27. The turbid Colorado River on July 25, 2012 in Glenwood Springs after a major rain event occurred upstream. The sediment from the mudslides closed the Colorado River road and scoured the river from Sweetwater Creek to the Eagle River and heavily impacted the fishery above Glenwood Canyon.

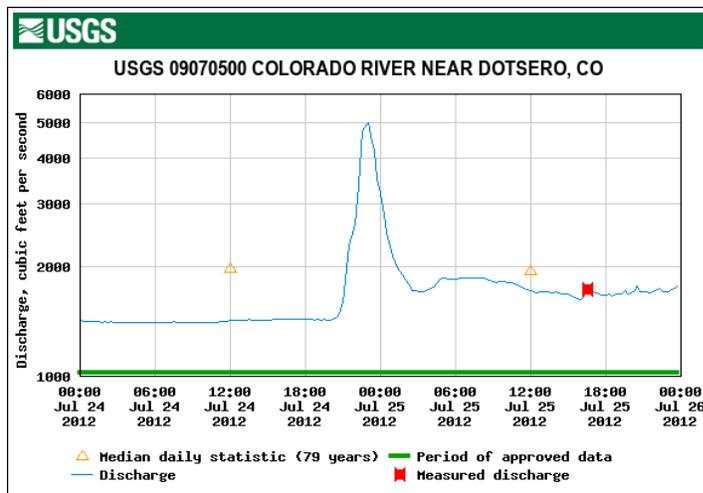


Figure 28. The USGS flow gauge at Dotsero documented the flood event of July 25, 2012.

tinues to pursue a relatively aggressive stocking program on this reach in the hopes of establishing a whirling disease-resistant Rainbow population. Native Cutthroat Trout fingerlings have also been stocked opportunistically when they have been available; however these fish have not been successful. In recent surveys, larger Brown Trout have returned to the reach and appear to be limiting recruitment of the juvenile Rainbow Trout to the population.

The generally high abundance of small trout in the Lyons Gulch reach suggests that aside from the comparatively limited sport fishery found here, the section offers good rearing conditions that probably benefit other sections of

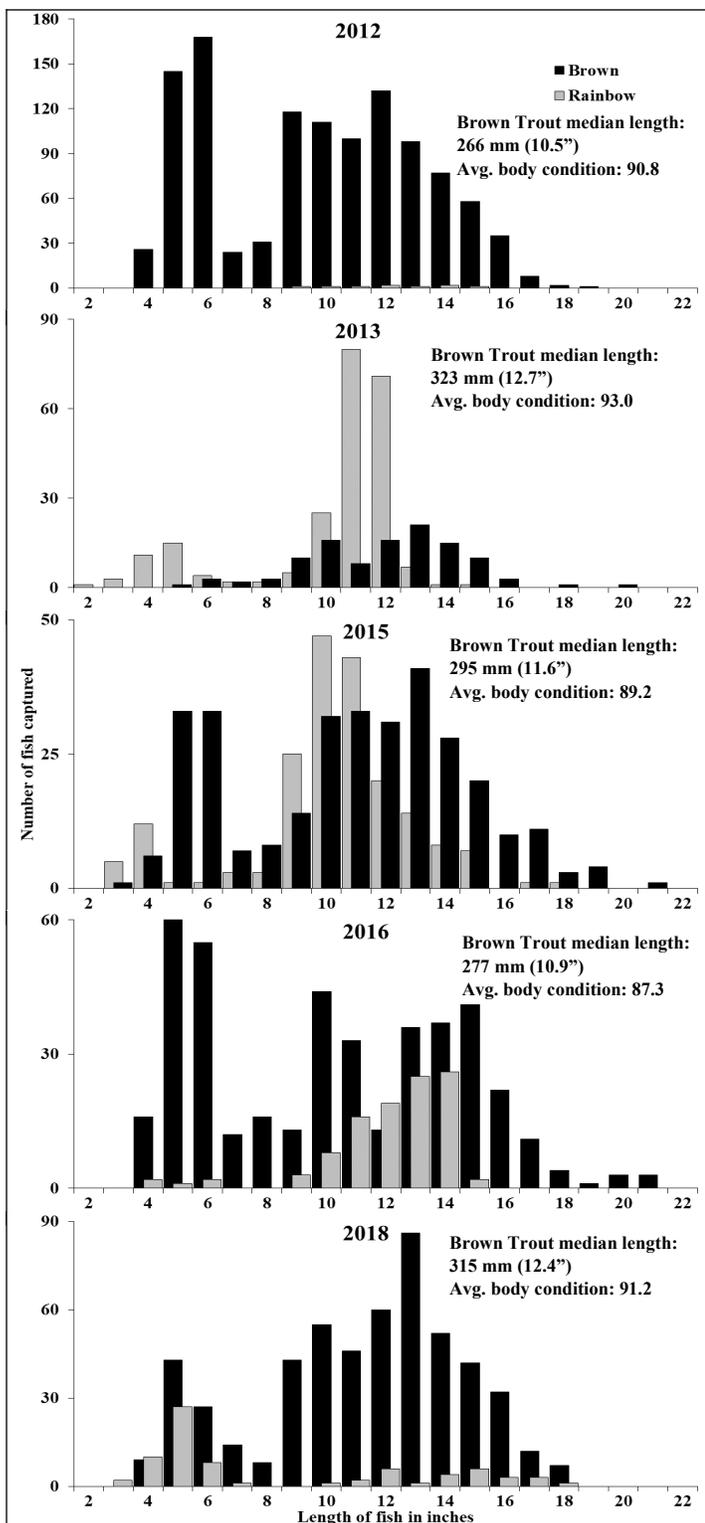


Figure 26. Annual length distributions in inches of Brown and Rainbow Trout captured in the Lions Gulch reach 2012-2018. An annual index of trout body condition is described averaging trout Relative Weights of captured brown trout.



Figure 29. A native Flannelmouth Sucker from the Lyons Gulch survey reach.

the river if larger fish migrate out. We have also observed a similar dynamic in the Mountain Whitefish population, discussed below. This can be attributed to higher growth rates in the warmer waters and limited abundance of large predatory adult trout. The milder conditions in this area may also provide beneficial over-winter habitat for fish that move in seasonally.

Another unique aspect of the Lyons Gulch reach is the presence of nongame native river fishes including Flannelmouth (Figure 29) and Bluehead Suckers, and Round-tail chub—referred to as “The Three Species”. These fish prefer the conditions in the Lyons Gulch reach. Unfortunately, one of the biggest threats to our native suckers is hybridization with non-native suckers, a common occurrence in this reach. Prior to the 2012 flood event, this section was home to a major spawning aggregation of Flannelmouth Sucker. Unfortunately, these fish have struggled to rebound (Table 3).

Table 3. Number of Flannelmouth Suckers captured by year, Lyons Gulch survey reach.

Year	# captured	Year	# captured
2010	68	2015	13
2012	65	2016	6
2013	9	2018	5

Table 4. Rainbow Trout stocking by CPW in the Lyons Gulch reach, 2012-2019.

Year	Size	Number
2012	10”	10,500
	5”	19,000
2013	11”	1,700
	7”	10,100
2014	3”	40,000
	10”	9,800
	5”	19,700
2017	2”	38,900
	4”	1,465
	3”	10,140
2018	11”	2,100
	4”	3,000
2019	1”	57,000
	7”	4,300
	2”	59,500

Mountain Whitefish Dynamics

Mountain Whitefish are indigenous to northern rivers in North America including the White and Yampa rivers in northwestern Colorado. Historically, it is thought that thermal barriers prevented their distribution downstream through the Green River to the Colorado River. In the late 1930s, Colorado biologists transplanted Mountain Whitefish from the Yampa River to the lower Roaring Fork River with the idea that Shoshone Dam in Glenwood Canyon would prevent their upstream expansion. However, Mountain Whitefish are well established in the monitoring reaches above Glenwood Canyon (Figure 30). These wild populations contribute to the quality and diversity of angling opportunity available in this reach of the Colorado River. It is unclear whether whitefish were able to invade the river upstream through the dam in Glenwood Canyon or if they were transported through trans-basin diversions from the upper Yampa River to the Colorado River. Whitefish are continuing to advance upstream, recently invading new habitat above Gore Canyon.

These western salmonids exhibit a unique spawning strategy that is in contrast to spring-spawning Rainbow and Cutthroat Trout. Mountain Whitefish often aggregate in large spawning groups in the fall in major tributaries immediately upstream of their confluences with the mainstem Colorado. They broadcast spawn in pools and their eggs settle into the streambed and then hatch in the turbulence of increasing spring runoff the following year.

Throughout the history of these surveys, we have observed an interesting continuum of size distributions in the Mountain Whitefish population (Figure 30). In the Lyons Gulch reach, juvenile whitefish are abundant while adults are nearly nonexistent. The opposite is true for Radium. We have found intermediate size distributions in the middle two survey reaches that correspond with the progression between the extremes of Lyons Gulch and Radium.

The Lyons Gulch area likely provides ideal nursery conditions, as discussed previously. It is thought that high spring flows flush hatching whitefish downstream to lower elevation waters that may provide better conditions for growth. They then migrate back upstream in the mainstem of the river to live out most of their lives. Evidence for this is provided by the size distributions which shift to larger fish upstream. Because Mountain Whitefish have not been a priority target for anglers, little formal research has focused on understanding and describing their life histories, but this information suggests a highly migratory life history, likely more so than trout.

Despite being a lesser desired sportfish, anglers appre-

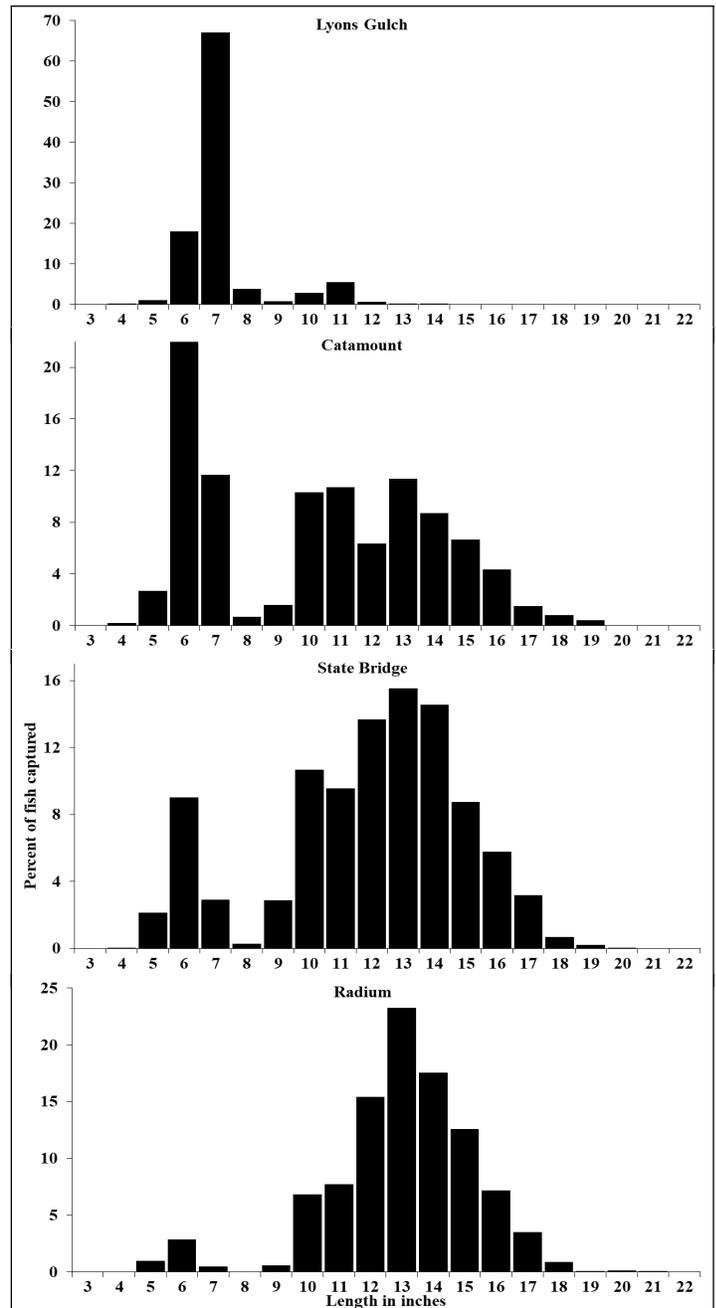


Figure 30. Length distributions in inches of Mountain Whitefish captured in Colorado River in monitoring reaches between Glenwood Canyon and Gore Canyon. All years of data collection are combined.

ciate their contribution to the diversity of angling opportunity. Declines of whitefish have been documented in a number of waters throughout the west, and in these cases angling experience has diminished. These declines are associated with disease outbreaks, high water temperatures, excessive harvest especially during spawning aggregations, and handling stress. In addition to existing fall closures of spawning areas along the middle Colorado and Roaring Fork rivers and limited harvest on the Yampa River, CPW enacted a statewide bag limit for harvest of 4 Mountain Whitefish per day and a possession limit of 8 in 2021.