



Fraser River

Fishery Management Report

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Introduction

This report summarizes fish population surveys and fisheries management activities undertaken over the past decade by Colorado Parks and Wildlife (CPW) on the Fraser River in Grand County, Colorado.

From its headwaters at Berthoud Pass to its confluence with the Colorado River near the town of Granby, the Fraser is a highly diverse, small high-elevation river that passes through many transitions in habitat type through the course of its relatively short length. There are multiple environmental stressors that occur along the course of the Fraser, nevertheless most reaches of it harbor a productive trout fishery. Mottled Sculpin, a small native fish species, are prolific throughout nearly the entire river. This species is critically important to the ecology of the Fraser, both as a highly valuable prey source for trout populations as well as an indicator of habitat and water quality. These fish are the Fraser's greatest biological asset.

CPW, along with several other East and West Slope water stakeholders, is a partner in Grand County Learning By Doing (LBD), a cooperative effort in part designed to address environmental stressors on the Fraser and other Grand County waterways and improve river health. LBD has implemented multiple successful projects. For more information, see www.grandcountylearningbydoing.org.

Property ownership along the Fraser is highly fragmented. Public access for fishing is available on U.S. Forest Service (USFS), Bureau of Land Management (BLM), Grand County, and various municipal properties. Care should be taken by anglers to avoid trespass problems as not all private reaches are marked. Guided fishing is available on some privately held reaches.

Stocking

CPW stocked Whirling Disease-resistant strains of Rainbow Trout for 6 years in the Fraser River (Table 1, following page). Generally, stocking took place from the Highway 40 crossing upstream of Idlewild Campground downstream to the County Road 8 bridge in the Town of Fraser, and at Kaibab Park in Granby. Stocking was ceased after 2015 because these strains established themselves successfully and appeared poised to sustain themselves through natural reproduction. However, by 2019 it became evident that Rainbow Trout numbers were dwindling and additional stocking would be required. CPW plans to stock 50,000 2" Whirling Disease-resistant Rainbow Trout again in 2020. This is discussed in more detail later in this report.

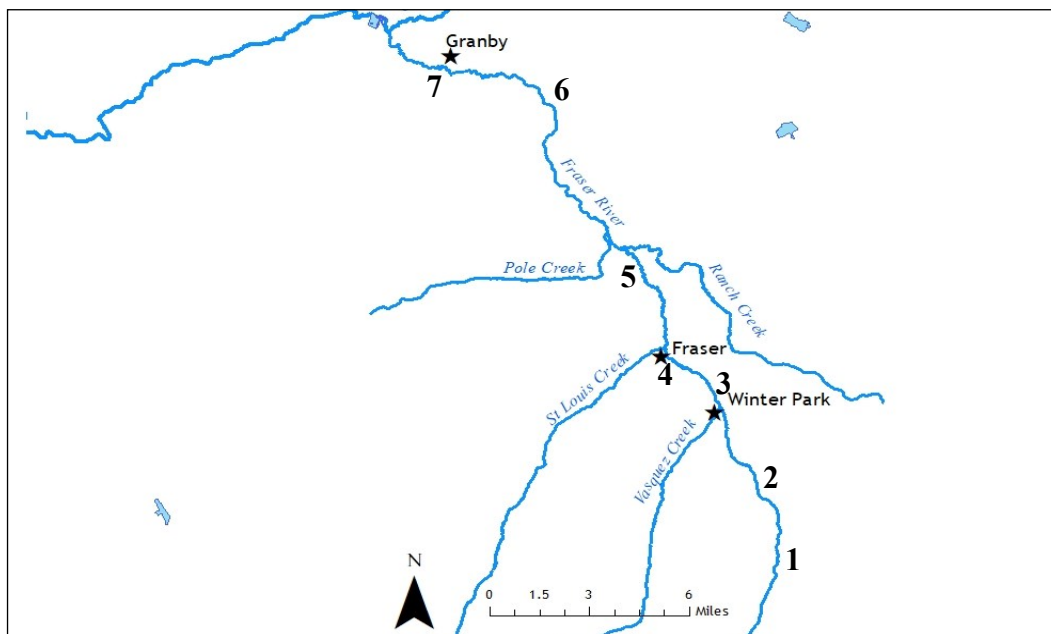


Figure 1. Fraser River, Grand County, Colorado. Survey stations discussed in this report are listed by number as follows: 1. Robber's Roost, 2. Idlewild Campground, 3. Confluence Park, 4. Safeway, 5. Fraser Flats, 6. Behler Creek Upper & Lower, 7. Kaibab Park.

Date	# stocked	Avg. size (inches)
10/29/08	10,000	4.9
9/13/10	50,000	3.6
8/4/11	44,251	1.1
7/17/12	55,000	0.9
8/1/13	47,610	3.7
7/14/15*	68,715	1.9

Table 1. Stocking history of whirling-disease resistant Rainbow Trout in the Fraser River. *The 2015 plant was made entirely at Kaibab Park in Granby.

In 2019 CPW also stocked 10,000 native Colorado River Cutthroat Trout averaging 2.7” in the area of the Robbers’ Roost survey reach, discussed on page 3.

Fishing Regulations

From the headwaters of the Fraser to the confluence with Saint Louis Creek, fishing is by artificial flies and lures only and all Rainbow Trout must be returned to the water. From Saint Louis Creek downstream to the confluence with the Colorado River, 2 trout may be kept and standard statewide regulations on method of take apply.

Methods

For all fish population surveys discussed in this report, standard electrofishing methods were used to generate depletion estimates of the trout populations. Mottled Sculpin are especially difficult to capture and we typically do not achieve enough of a depletion to generate a population

estimate. Therefore, the total number of sculpin captured is reported as an index of population status and trend.

We have established standard locations (“stations,” Figure 1) that we believe to be representative of that area of the river, and we return to these reaches annually, biennially, or less frequently depending on the circumstances. When we observe trends occurring in these reaches, it is reasonable to assume these trends are occurring over a larger reach of river. Stations are generally approximately 600 feet in length and encompass multiple pool-riffle-run complexes.

In all cases except for the Robber’s Roost station, a bank rig electrofisher with five electrodes was used. At Robber’s Roost, the river is much smaller and two backpack electrofishers were used. Sampling has generally taken place during the first ten days of September unless otherwise noted. Every effort is made to survey these stations as close to the same date as possible in order to control for seasonal movements of fish.

These electrofishing surveys typically require a crew of 10 or more, the majority of whom are dedicated local volunteers and members of various stakeholder groups (Figure 2, below). Without their willing assistance, the collection of the information appearing in this report would not be possible. CPW extends its sincerest thanks to these volunteers.

The remainder of this report consists of a discussion of each station surveyed, in order from upstream to downstream.



Figure 2. Electrofishing crew consisting mostly of local volunteers at Confluence Park station.

Robber's Roost

We surveyed this station for the first time on September 6, 2019, to address a lack of current information on this farthest upstream portion of the Fraser. The station is actually not immediately adjacent to the Robber's Roost USFS campground, but is approximately 0.75 mile downstream of the campground, adjacent to an unnamed dispersed camping area (Figure 3, right). The station measured 611 feet in stream length and 15.4 feet in average wetted width and the downstream terminus is at approximately 9,550 feet in elevation.

The site is on USFS land approximately 1.25 miles upstream of the sediment retention pond that was constructed by a partnership of stakeholders to collect highway sand and enable its removal from the river. Due to its location upstream of that structure, this station provides an example of a portion of the Fraser near its headwaters that undergoes the stresses of excess bedload in the form of highway sand input. The highway sand is obvious in this reach in small gullies across the forest floor leading to the river and in the pool tails and other slow-water depositional features of the station. Aside from the highway sand, the physical habitat on this reach was in good condition for a forested reach of this type, featuring drop pools formed by large wood recruited into the stream channel, among other typical features.

We captured 46 Brook Trout in this reach, averaging 5.7" in length and a maximum length of 10" (Figure 4, right). No other species of fish were captured. This yielded relatively sparse population estimates of 26 pounds of trout biomass per surface acre and 191 fish >6" per mile. It appears likely that this population is suppressed by the condition of the substrate in this reach. Annual recruitment of fry may be lower than would otherwise be expected. Brook Trout are fall spawners, and their eggs overwinter in the gravel before hatching in the spring. It is possible that each year's input of highway sand with the first melt-out periods of early spring may cause some smothering of Brook Trout eggs that have not yet hatched.

22 of the fish we captured were large enough to weigh, and their body condition was actually quite good, averaging 123 on the relative weight (plumpness) scale. High average relative weight is an indicator that food availability is not a limiting factor. This is not surprising in a sparse population, as competition for available food is minimized even if invertebrate production is relatively poor.



Figure 3. Location of Robber's Roost electrofishing survey station. DS = downstream terminus; US = upstream terminus.

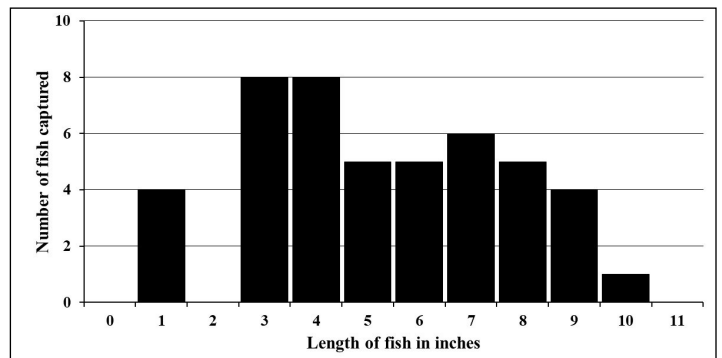


Figure 4. Size distribution of Brook Trout captured at Robber's Roost electrofishing station, 9-6-2019

Partially in response to the results of this survey, on September 26, 2019, we stocked 10,000 native Colorado River Cutthroat Trout averaging 2.7" in length. This was an opportunistic stocking occasion as these were excess fish available from our hatchery system. It is possible that spring-spawning Cutthroat may have a competitive advantage over Brook Trout in this reach. When mature, the Cutthroats will deposit their eggs after the peak of runoff and after the bulk of the highway sand for the year has entered the stream. Therefore, potential smothering of developing eggs may be reduced. We will revisit this site again in the coming years to ascertain whether the Cutthroats appear to have such a competitive advantage in recruitment. We will also likely continue stocking Cutthroat fingerlings here in the short term as they are available.

Idlewild Campground

This site is located adjacent to the Forest Service campground just upstream of the town of Winter Park at an elevation of approximately 8,895 feet. This station is 675 feet in length and averages 20.2 feet in width. Table 2 (below) contains population estimates collected on the three occasions we have surveyed this reach. The fish population here is dominated by small Brook Trout which rarely exceed 10” in length (Figure 5, below and Figure 6, right). This is the farthest-upstream of our established Fraser River stations where Mottled Sculpin are present.

Every parameter of the trout population in Table 1 experienced significant declines from 2014 to 2016, and the estimate of total trout biomass declined by 49.6%. The decline in Brook Trout biomass can likely be attributed to the absence of a 2014 year class (which would have appeared at the 2” mark), which by 2016 had resulted in a suppressed adult population. Brook Trout in high-elevation mountain streams such as this are relatively short-lived (4-5 years), and therefore a missing year class can have a strong short-term effect on the adult population in the future. Sculpin capture declined only slightly, and this was

not by a significant margin. 2018 estimates improved somewhat but not to the level seen in 2014. Sculpin capture declined again. Continued declines in sculpin capture at this site could be cause for concern, as they are strong indicators of water and habitat quality.

2013 was the last year that we stocked Rainbow Trout fingerlings in this portion of the Fraser. The decline in their population here can be attributed to this change. The Rainbows in the 5-10” range in 2014 are the result of past stocking. The two small Rainbows we captured in 2014, 1-2” in length, are evidence of successful natural reproduction that year. By 2018 it was apparent that despite some successful reproduction, Rainbow Trout will not sustain themselves on this reach without additional stocking.

We were surprised to capture two Brown Trout larger than 18” in 2018 at this site, which contributed a large portion of the increased Brown Trout biomass estimate. These were far larger than any fish we had captured here before, and were obviously not resident fish, but rather migrants from downstream that were preparing to spawn. This is evidence an apparent recent trend of upstream expansion of Brown Trout.



Figure 6. Brook Trout from the Idlewild reach. Photo by Kevin Birznicks.

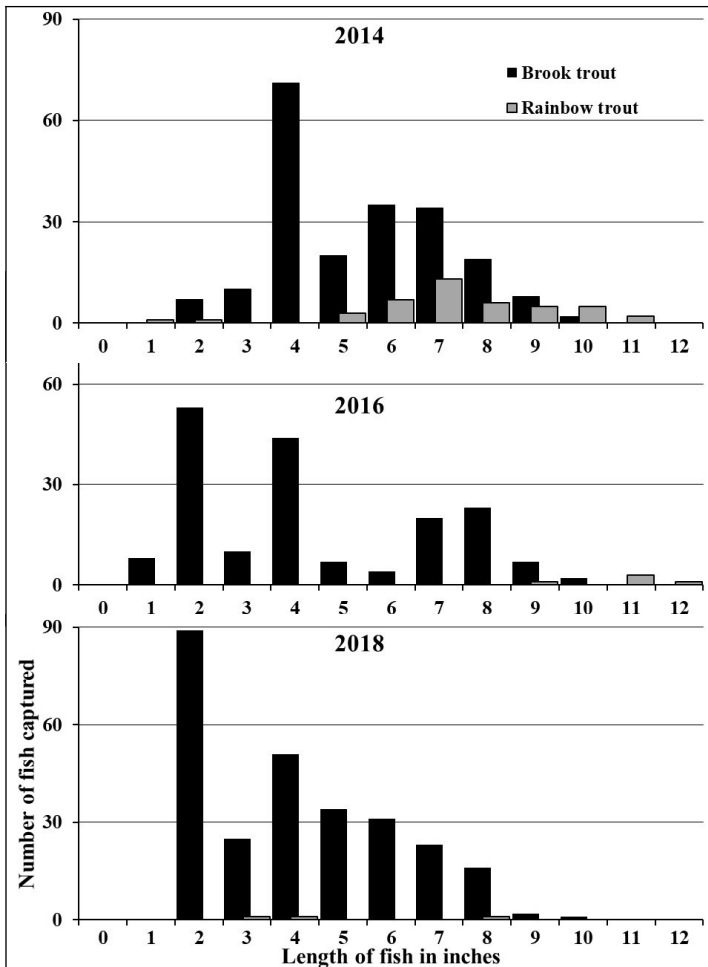


Figure 5. Size distribution of trout at Idlewild Campground.

Year	2014	2016	2018
Date of survey	9/3	8/31	9/6
Brown trout			
Biomass (pounds per surface acre)	40 lbs./acre	11	28
Fish > 6” per mile	150/mile	55	39
Rainbow trout			
Biomass	33	16	1
Fish > 6” /mile	297	55	8
Brook trout			
Biomass	58	39	43
Fish > 6” /mile	794	443	671
Total trout biomass	131 lbs./acre	66	72
Total sculpin captured	69	60	52

Table 2. Population estimates, Idlewild Station.

Confluence Park

The Confluence Park station is located in the town of Winter Park at an approximate elevation of 8,725 feet. The surveyed reach measures 640 feet in stream length with an average width of 28.0 feet. The upstream end of the station is the pool where Vasquez Creek joins the Fraser. We have surveyed this reach on nine occasions since 2006. Trout populations here have been highly dynamic, with 2017 and 2018 revealing an unprecedented influx of Brown Trout, but also (in 2017) the lowest total trout biomass estimates to date (Figure 7, right). These recent low total biomass estimates can be mostly attributed to the cessation of Rainbow Trout stocking. This is a higher-gradient, forested reach with a cooler temperature regime, which explains the relative scarcity of Brown Trout to date.

Fingerling Rainbow Trout stocking in 2010-2013 was very successful at this site. By 2012 the data suggested that our Rainbow stocking may be overpopulating the reach, which was one of the factors that led to the decision to cease stocking as discussed previously. The 2017 and 2018 data suggests that Rainbow Trout biomass has declined rapidly here after the cessation of stocking and that Rainbows will apparently not sustain themselves here without resumption of stocking.

Figure 8 (right) displays the size distribution of the trout captured in the last four surveys. These data reflect a dynamic situation with regard to competition between Brook Trout and stocked Rainbows. During the period of 2012-2014, the high density of Rainbows in the 5-12" range appeared to be suppressing the adult Brook Trout population, resulting in suppressed biomass estimates for Brook Trout in 2012 and 2013. By 2015 after stocking ceased, Brook Trout began regaining the upper hand, with multiple age classes in the smaller sizes outnumbering juvenile Rainbows, which were nonexistent in that survey. Two distinct size-groups of Brown Trout appeared for the first time in 2017, as well as an 18" Brown, the largest ever captured here. It is unlikely that the influx of Brown Trout was due solely to spawning movements, because the survey has occurred close to the same date on every occasion and multiple size-groups of Browns have been collected, not only sexually mature fish. At this site there appears to be a current trend of increasing Brown Trout biomass and possible expansion of their range upstream in the Fraser. The 2018 survey also found weak groups of Age-0 (2" avg.) and Age-1 (5" avg.) Brook Trout, which will likely result in lower biomass estimates in coming years.

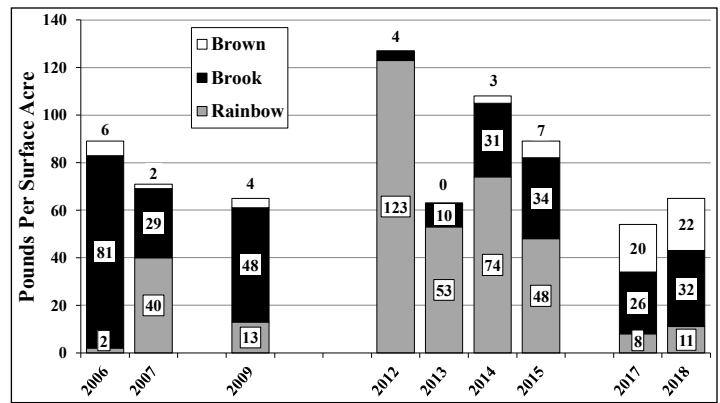


Figure 7. Biomass estimates at Confluence Park.

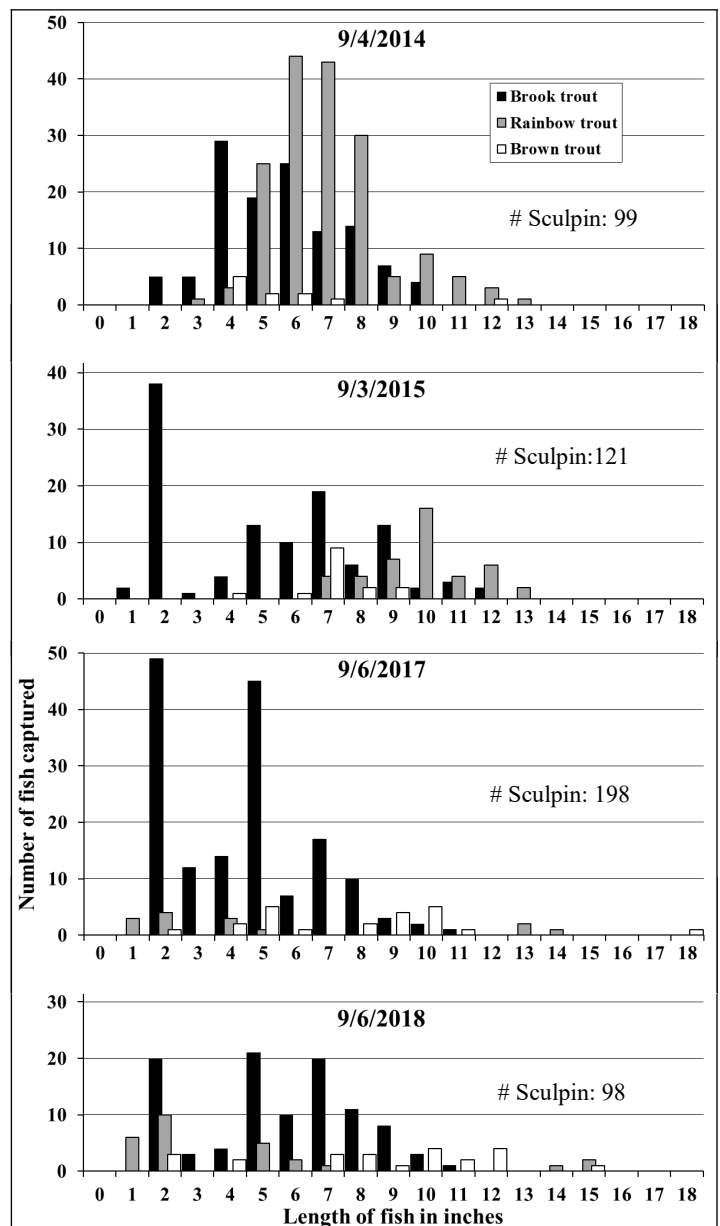


Figure 8. Size distribution of trout and number of Mottled Sculpin captured at Confluence Park

Safeway

The Safeway station is located immediately behind the Safeway store in the town of Fraser (Figure 9, right). This station has the longest and most consistent history of fish population surveys. The Town of Fraser, in partnership with other entities including Trout Unlimited and the Colorado Division of Wildlife (now CPW), completed a habitat improvement project in this area in 2005. These surveys show that the habitat project has proven to be overwhelmingly successful. This station measures 621 feet in length and 25.0 feet in average wetted width.

2003 was the only year that this station was surveyed prior to habitat project construction. The survey that year yielded population estimates that were quite poor in all parameters of the trout population. All subsequent sampling occasions have produced estimates that are many times greater than the 2003 values. Biomass estimates for all trout combined (Figure 10, below) have been following a general upward trend over the past decade.

Despite its location in relatively heavily urbanized surroundings, We have consistently found this to be one of the most productive reaches on the Fraser. This section lies on the downstream end of the Cozens Ranch Open Space, owned by the Town of Fraser. The property extends upstream to the Rendezvous Road bridge. We believe this station to be representative of conditions throughout the property. The great foresight of the planners who were involved in protecting this reach has resulted in this highly robust fishery. It is impossible to over-



Figure 9. Safeway Station location. Arrows indicate downstream and upstream terminus of survey reach.

state the importance of the mature willow riparian community and its contributions to the ecological processes that maintain this fishery. While physical habitat improvement projects in the channel have proven to be highly beneficial, it is the combination of such projects with a healthy and functioning riparian zone that produces excellent results.

Most of the changes in the Rainbow population can be directly attributed to stocking patterns. Soon after the habitat project was completed, we stocked Rainbows in this reach at high densities in order to quickly occupy habitat

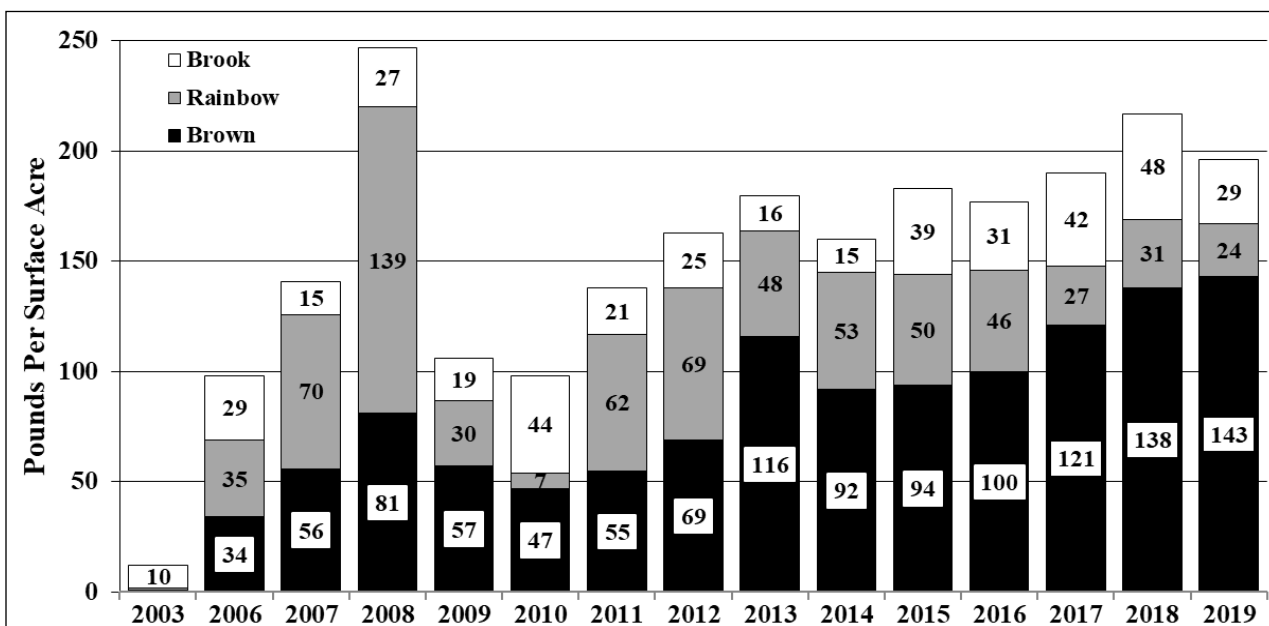


Figure 10. Biomass estimates in pounds per surface acre of Brook, Rainbow, and Brown Trout, Safeway.

Dates of surveys
9/30/2003
10/21/2006
8/23/2007
10/03/2008
9/3/2009
9/7/2010
9/6/2012
9/4/2013
9/3/2014
9/2/2015
8/31/2016
9/5/2017
9/4/2018
9/5/2019

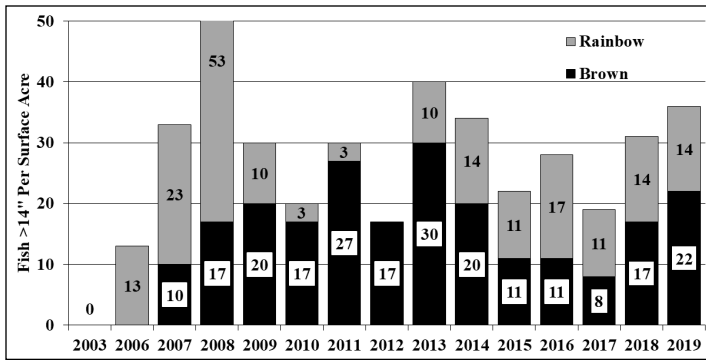


Figure 11. Quality trout (>14”) density estimates, Safeway. We have never collected a Brook Trout >14” at this site.

and possibly gain a competitive advantage over the Brown Trout. In 2007 and 2008, we stocked several hundred large brood fish, averaging 14-15”, which produced artificially elevated Rainbow biomass and quality fish density estimates in those years. The intention of stocking those fish was to “kick start” the Rainbow population in the newly-improved habitat. These fish occupied the stream for a couple of seasons but did not accomplish natural reproduction. From 2010-13, we stocked an average of 49,215 whirling-disease resistant Rainbow fingerlings from 1-4” in length, for a total of 196,861 fish stocked over the four-year period. The fish were stocked in various locations from the U.S. Highway 40 crossing upstream of Idlewild Campground downstream to the County Road 804 crossing near this station, and at Kaibab Park in Granby. These stocked fish had good success, leading

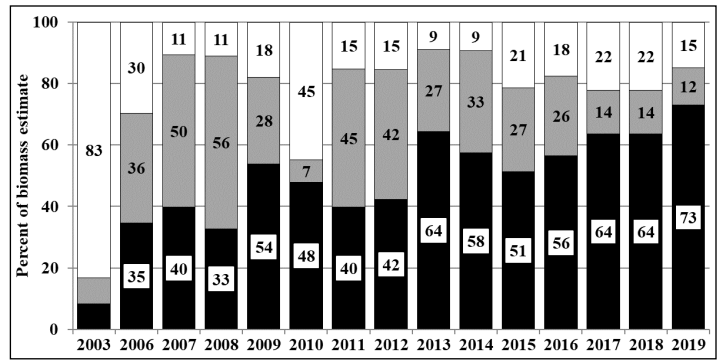


Figure 12. Percent contribution of each trout species to the biomass estimates appearing in Figure 10 (previous page). Bar colors are as follows: Brook—white; Rainbow—gray; Brown—black.

to the cessation of Rainbow fingerling stocking after 2013. We were concerned about overstocking, and we also wanted to observe whether or not the Rainbows would begin sustaining themselves through natural reproduction. The contribution of Rainbows to the overall trout population has slowly dwindled in recent years (Figure 12, above). 2019 produced the lowest biomass estimate for Rainbows since fingerling stocking ceased. These trends indicate that a resumption of Rainbow fingerling stocking is warranted, and we plan to stock again in 2020.

Densities of trout >14” increased in 2018 and ’19, reversing an apparent downward trend from 2013-’17 (Figure 11, above). These changes have been driven primarily by variation in numbers of larger Brown Trout, as Rainbows have remained more consistent during this time.



Figure 13. A sculpin from the Fraser River. Photo by Kevin Birznieks

2003	159
2006	178
2007	260
2008	191
2009	176
2010	431
2011	292
2012	550
2013	355
2014	122
2015	249
2016	148
2017	235
2018	233
2019	176

Table 3. Number of Mottled Sculpin captured by year.

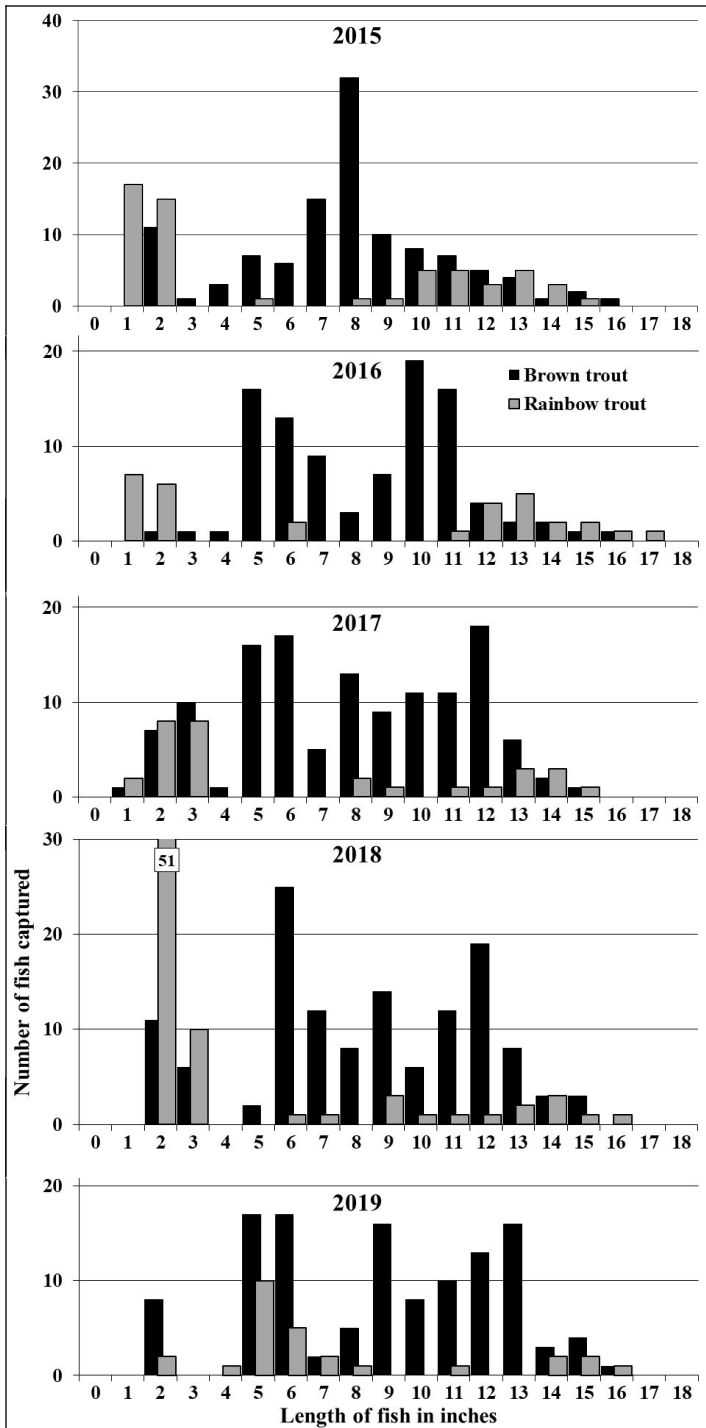


Figure 14. Size distribution of Brown and Rainbow Trout captured in the Safeway reach.

All Rainbows >14" appearing in the surveys from 2013 onward were produced from the stocked fingerlings, demonstrating the success of these stocked fish here.

Sculpin capture in 2019 was lower than average but not the lowest that we have observed here (Table 3, previous page). However, this provides another piece of evidence that Mottled Sculpin numbers in 2019 were generally down.

The size distribution of all Brown and Rainbow Trout captured in recent surveys is presented in Figure 14 (left). In 2013 we caught a large number of 2" Rainbows which were not explained by stocked fish and were likely the result of wild reproduction. Because of this, and the success of these stocked fish that we have observed here and at Confluence Park, after 2013 we ceased the stocking of Rainbows in order to observe whether or not they will sustain themselves through natural reproduction. The group of rainbows visible in 2015 at 8-12" in length represent the last of these stocked fish.

For most of the recent years, age-0 Rainbows (1-3" in length) produced by natural reproduction have outnumbered age-0 Brown Trout. We found roughly equal numbers of age-0 fish of the two species in 2017. In 2018 we found the strongest year class of Age-0 rainbows to date in the post-stocking period, far outnumbering Brown Trout. However, recruitment of Rainbows from age-0 to age-1 to date has been poor, which is evident in the scarcity of Rainbow Trout in the 5-10" range from 2015 onward. If wild Rainbows are going to persist in this reach, better survival to Age-1 is imperative. The 2018 year class represented the best chance to date to form a strong Age-1 year class in 2019. We did find the strongest Age-1 year class to date, yet even with such a strong 2018 cohort, they were outnumbered by Brown Trout in the same size range in 2019. We plan to stock Rainbow fingerlings again in 2020.



Figure 15. A wild Rainbow Trout from the Safeway site.

Fraser Flats

This reach is on property owned by Grand County Water and Sanitation District 1 immediately outside of Tabernash. In 2017 an in-stream physical habitat improvement project was constructed on the site, a cooperative effort by the Learning By Doing stakeholder group and was opened to public access for the first time in 2018. Prior to the habitat project, this reach had relatively poor trout habitat characterized by a high width-to-depth ratio, poor thalweg definition, sparse and shallow pools, and excessive riffles. All of these deficiencies were addressed in the design of the project. This location is also the site of a large willow planting effort undertaken by LBD stakeholders and local volunteers in an effort to restore the willow riparian community. This effort appears to have been initially successful, and the results will develop over the coming decade as the planted willows mature. The fishery surveys discussed here were obtained on a reach measuring 600 feet in length and 35.9 feet in average wetted width (Figure 18).

Prior to the habitat project (2007 and 2016), this site produced poor population estimates, among the lowest ever obtained in any location on the Fraser (Figures 16 & 17, below). We observed an immediate benefit after completion of the project, with greatly increased numbers of adult fish and a nearly four-fold increase in total trout biomass from 2016 to 2017. However, this was followed in



Figure 18. Two views of the Fraser Flats site. The intersection of US Highway 40 and Grand County Road 83 is visible at left in both photos. The upper photo was taken on 9/7/2016 prior to construction of the Fraser Flats Habitat Improvement Project. The flow on that date was approximately 35 CFS. The lower photo was taken on 9/13/19 after construction of the project. Flow was approximately 26 CFS. Channel narrowing with point bar enhancements, thalweg definition and channel-within-a-channel design is clearly visible. The arrows in the lower photo indicate the downstream (top) and upstream (bottom) ends of the fish population survey reach. The red lines indicate the approximate location of the two surveyed cross-sections discussed on page 11.

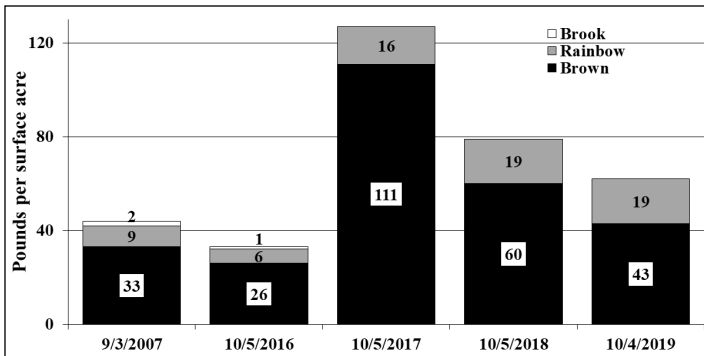


Figure 16. Biomass estimates in pounds per surface acre, Fraser Flats site.

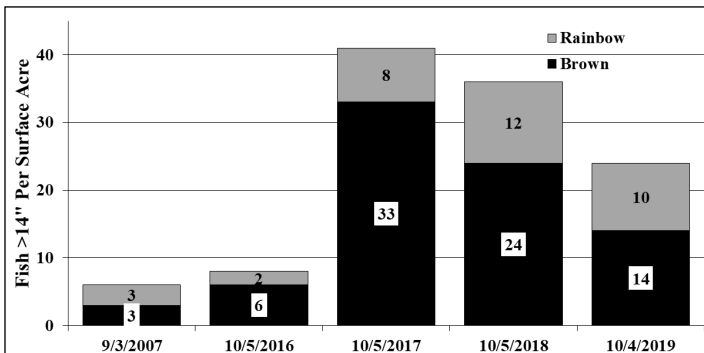


Figure 17. Quality trout (>14") density estimates, Fraser Flats site.

2018 by a 38% decline in total biomass, and a further decline of 12% in 2019, or a total decline of 51% from the 2017 estimate. The 2019 estimate still represented an 88% increase over the pre-project biomass estimate in 2016. We believe that this decline is most likely attributable to the high level of public fishing pressure that this section has experienced since opening to the public. The public river reach measures approximately 1,500 feet in length. It is bounded on both ends by private land and there are no natural impediments to fish movement on either end. It is possible that heavy pressure on this limited reach is causing fish to vacate the area in favor of more lightly fished waters in either direction. In 2019, the LBD partners agreed to institute a voluntary fishing closure of this reach on Tuesdays and Thursdays in order to “rest” the fishery. Results of this approach are not yet known.

Prior to the habitat project, we found high numbers of juvenile trout in their first two years of life, but by age 3 (10” and larger) the fish appeared to have mostly vacated the reach in search of more suitable habitat (Figure 19, right). This no longer appeared to be the case after completion of the project. Interestingly, on all occasions we collected a number of age-0 Rainbow fry, with especially good numbers collected in 2018, which corresponds with the strong age-0 group that we also observed at Safeway that year. These fish were not stocked and are the product of wild reproduction. However, as at the Safeway site (see discussion on pages 6-8), we have seen a lack of recruitment of Rainbows from age-0 (2-4” in this survey) to age-1 (6-10”). The Rainbows that we most recently stocked in the Fraser were resistant to whirling disease, however these fish may be losing resistance over successive wild generations. Therefore, we plan to stock 50,000 whirling-disease resistant Rainbow fingerlings again in 2020.

The sharp decline in Mottled Sculpin numbers captured in 2017 (Table 4, following page) is most likely due to the fact that our electrofishing survey took place approximately two weeks after the habitat work was completed, which is a short amount of time for sculpin to recolonize after a high level of disturbance to the stream bed. We collected an increased number of sculpin in 2018, suggesting a recovery from the disturbance. However, in 2019 we collected the lowest number of sculpin to date. There is no immediately apparent reason for this decline. It is worth noting that Mottled Sculpin capture was low in three of our long-term monitoring reaches (Safeway, Fraser Flats, and Kaibab Park) in 2019. This is a difficult species to reliably capture, so it is currently unknown whether the reduced catch in 2019 is a reflection of a trend in actual

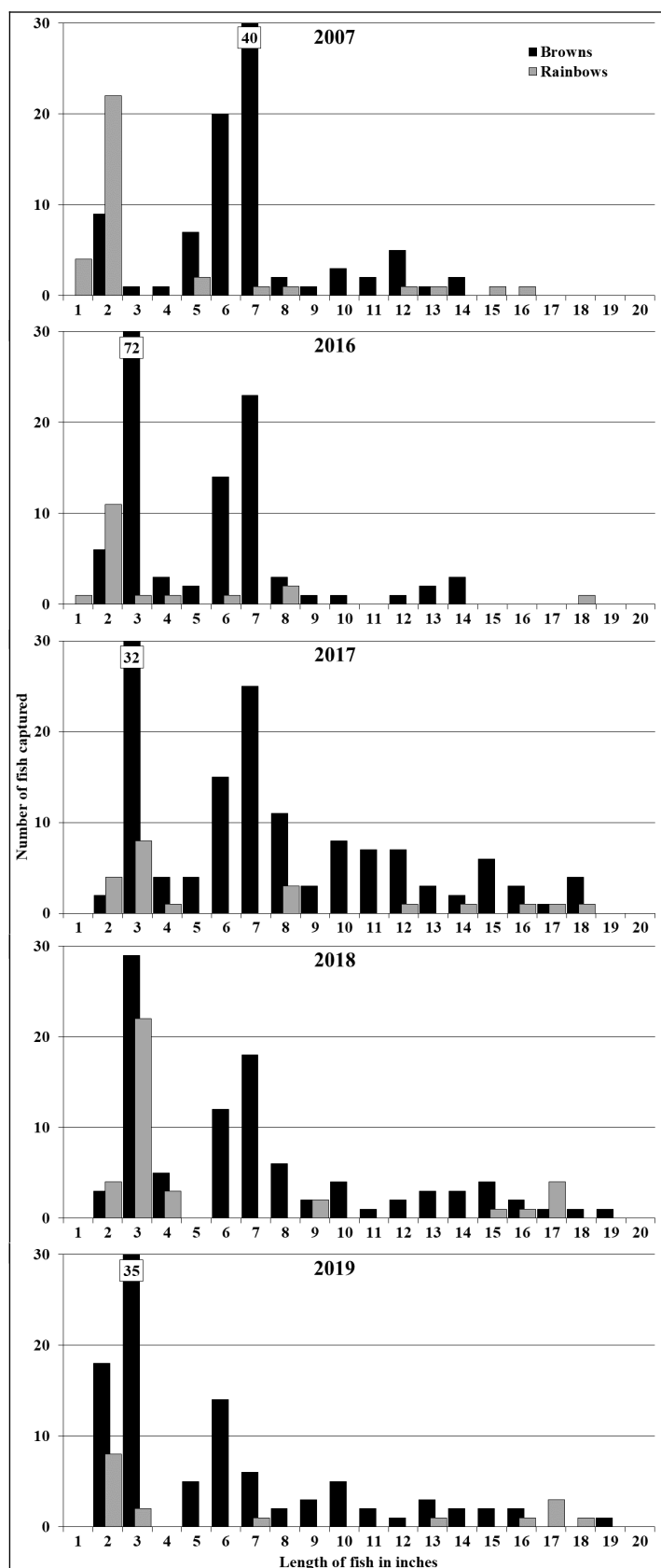


Figure 19. Size distribution of Brown and Rainbow Trout captured in the Fraser Flats reach.

numbers or a reflection of the ability of our crews to efficiently capture them. We will expend extra effort in our 2020 surveys to attempt to answer this question. If this negative trend continues, it may be cause for concern.

One explanation for the decline in trout population that we have observed since construction of the habitat project here could be that the project was not successful in creating and sustaining an increase in physical habitat for adult trout. In order to attempt to answer this question, we conducted simple cross-section surveys with a laser level, tape and stadia rod in 2016 prior to construction and in 2019 after the project had been in place through two runoff cycles. Results of two of these cross-section surveys are displayed in Figure 20 (below). These surveys appear to demonstrate that the project has performed as intended using the width:depth (W:D) ratio as an indicator. Both surveys documented a high W:D ratio before construction, which is an indicator of poor trout habitat. The 2019 surveys found that the W:D ratios in these two locations remains at less than half of the pre-project ratios. This lends additional support to the hypothesis of angling pressure being the determining factor in reduced trout numbers.

An interesting comparison can be drawn between this site and Safeway. Both sites have had habitat work projects and see heavy angling pressure. However the Safeway site has a far more robust riparian vegetation commu-

nity. This illustrates how important the riparian community is to a small river such as the Fraser. The highly complex overhead cover, undercut bank habitats, and organic inputs to the stream that are provided by mature willows cannot be replicated by construction of in-channel features, and are likely the most important element in maintaining a fishery of this type that is resilient to angling pressure as well as other types of disturbances.

2007	726
2016	971
2017	264
2018	377
2019	204

Table 4. Number of Mottled Sculpin captured in each survey by year at Fraser Flats site.



Figure 21. 2018 survey crew, Fraser Flats station. Photo by Dave Showalter.

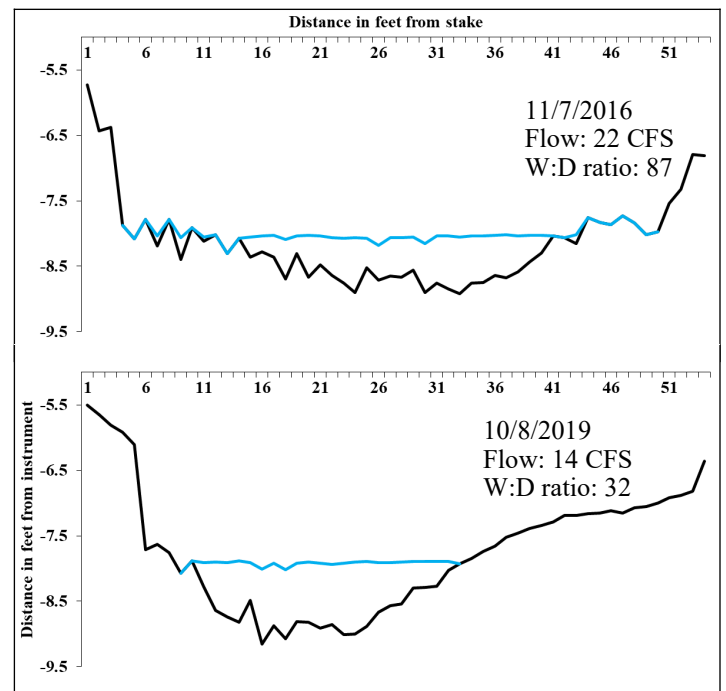
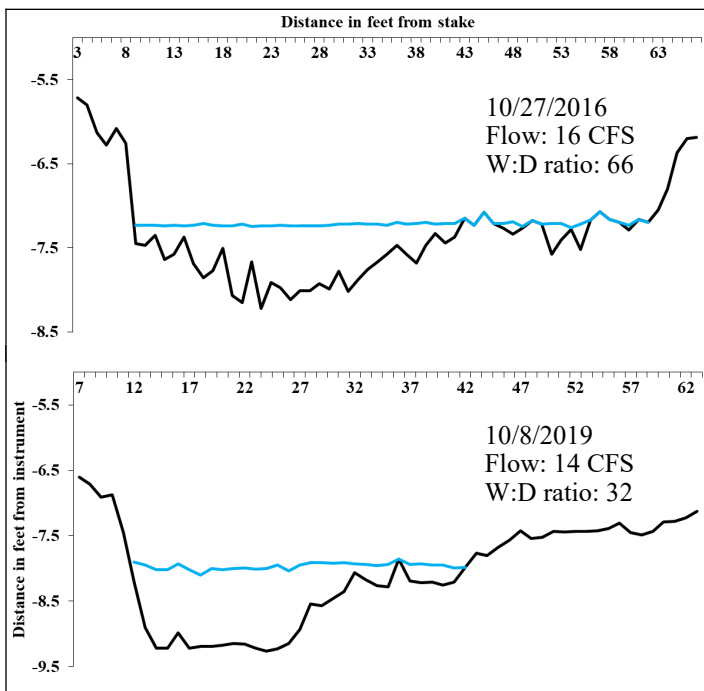


Figure 20. Simple cross-section surveys collected at two sites within the Fraser Flats Habitat Improvement Project reach (for locations, see Figure 18 on Page 9). Blue lines indicate water surface elevation at the time of the survey, and black lines indicate ground elevation. Cross-section #1 before (top) and after (bottom) habitat work is at left, and Cross-section #2 is at right.

Angler survey

In 2018 and 2019 we conducted a simple angler survey here to obtain information about use rates and success. The survey consisted of a voluntary paper questionnaire for anglers to complete at the end of their trip. Results are presented in Tables 5 (right) and 6 (below). The proportion that each species contributed to the reported catch is similar to the proportions that these species contributed to our population estimates. There were minimal differences in the results between the two years. Minor declines in catch rates and anglers' subjective rating of the fishery are likely reflections of the declines in trout populations that we observed.

	2018	2019
# surveys completed	40	36
# anglers represented	58	59
Total hours fished	123.25	114.25
Avg. time of trip	2.1 hrs.	2.0 hrs.
Brown trout caught	51	46
Rainbow trout caught	24	19
Brook trout caught	2	2
Avg. catch per hour	0.62	0.59
Residence - Grand County	19	10
CO Front Range	14	17
Out of state	4	3
Other Colorado	1	2

Table 5. Angler survey results, Fraser Flats.

Why did you fish here today?	2018 2019		How often do you fish here?	2018 2019		Will you fish here again?	2018 2019		How would you rate this fishery?	2018 2019	
	Not crowded	15		14	First time		22	19		Yes	38
Small stream type	15	10	Once a month	7	8	No	1	4	Good (3)	15	17
Wild fishery	8	16	Once a week	4	2				Fair (2)	9	7
Fish size	4	3	Once a year	4	4				Poor (1)	2	2
Easy access	2	0	More than once/week	2	1				Avg. response	3.0	2.9
Number of fish	1	1									

Table 6. Angler survey results, Fraser Flats.



Figure 21. A large Brown Trout from the Fraser Flats reach.

Upper and Lower Behler Creek

At the downstream end of the Fraser River canyon between Tabernash and Granby, over 1 mile of the river flows across public land held by the BLM. However, due to its landlocked position surrounded by private parcels, there is currently no public access to this section. Our two sampling sites are located on BLM property immediately upstream of Granby Ranch and downstream of the confluence with Behler Creek, which joins the Fraser from the east (Figure 23, below). We have surveyed these two sites on one occasion each — the upper site in 2015 and the lower site in 2019.

Physical habitat conditions in the upper site are far more ideal than the lower site, which is reflected in the survey results. The lower site is part of an approximately 1,200-foot section at the downstream end of BLM property that has been identified by stakeholders as a candidate for habitat improvement, if public access to this reach were ever to be secured.

Similar to the Fraser Flats site prior to the habitat project, the lower Behler Creek site held large numbers of juvenile trout but fish larger than 8” were rare, due to a lack of quality adult trout habitat (Figure 22, below).

	Upper Behler Creek (2015)	Lower Behler Creek (2019)
Site length	530 feet	574 feet
Site average width	46.6 feet	64.7 feet
Brown Trout: pounds per acre	148	34
> 14” per acre	39	4
> 6” per mile	1,529	895
Rainbow Trout: pounds per acre	9	—
>14” per acre	4	—
>6” per mile	50	27
Total trout biomass	157	34
Total sculpin captured	452	101

Table 7. Population estimates for Brown and Rainbow Trout, Behler Creek Upper and Lower sites.

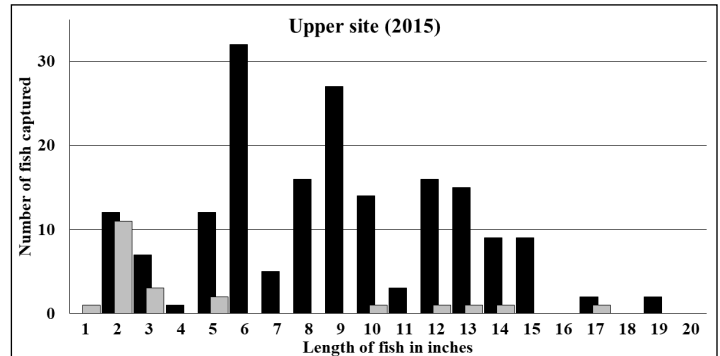
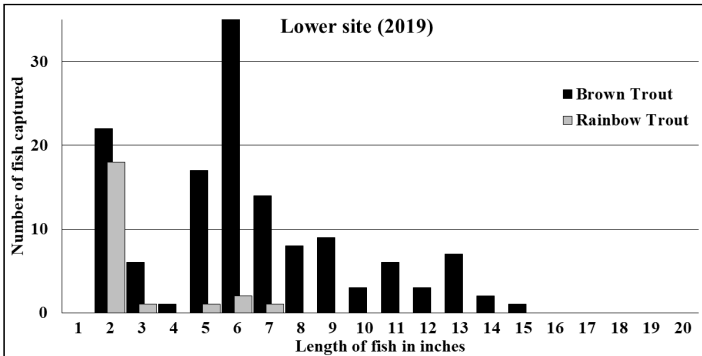


Figure 22. Size distribution of Brown and Rainbow Trout, Behler Creek Upper (right) and Lower (left) stations, Fraser River.

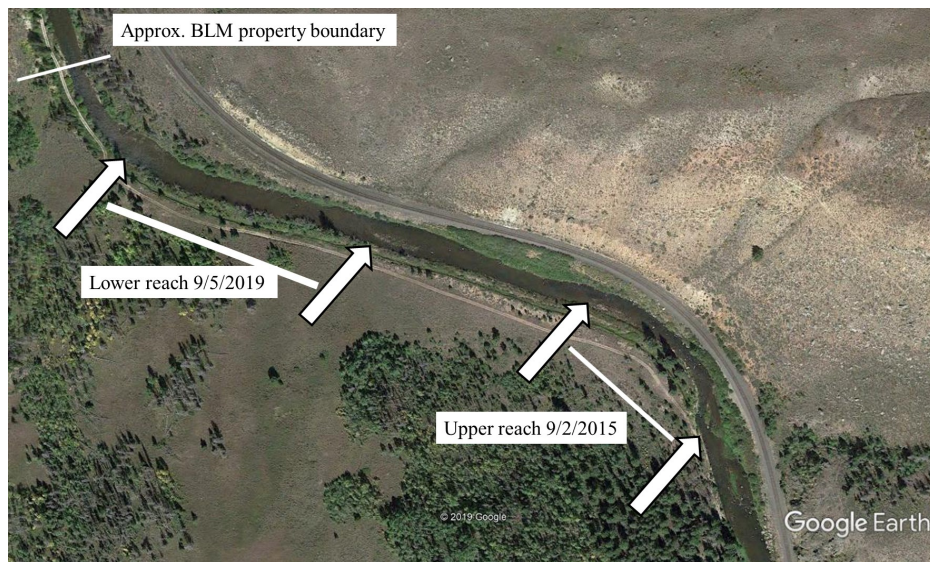


Figure 23. Location of Behler Creek Upstream and Behler Creek Downstream stations, Fraser River.

Kaibab Park

The Kaibab Park station is located in the town of Granby where the Fraser flows between the park and the fire station, immediately downstream of the Highway 40 crossing (Figure 26, below). The site measures 650 long by 33.4 feet in average width. This is the farthest downstream site on the Fraser that we survey regularly. Only Brown Trout population estimates are presented (Figures 24 & 25, right) because Rainbow Trout have not constituted a significant portion of the fish population, despite the fact that Rainbows have been stocked here on the same occasions that were successful farther upstream.

Biomass estimates for Brown Trout in this reach have remained relatively stable over time, with 2017 and 2012 producing the highest and lowest estimates, respectively. Extreme high-water years such as 2014 (Table 8) likely have a flushing effect on juvenile Brown Trout here, while drought years such as 2012 see decreases in adult fish density estimates, likely due to lack of habitat during low flows. 2017 conditions probably represented a “happy medium” situation in which the river benefitted from the flush of recent high water years, yet the 2017 runoff was not high enough to displace juveniles. At the same time, flows did not become so low that adult fish vacated the section.

The 2019 survey produced the second-lowest density estimates of fish >14” (Figure 25), which was a surprise because 2019 flows were generous. Reasons for this drop are not obvious, aside from the observation that other than the plunge pool at the base of the diversion structure, this reach is generally lacking in habitat for larger fish.

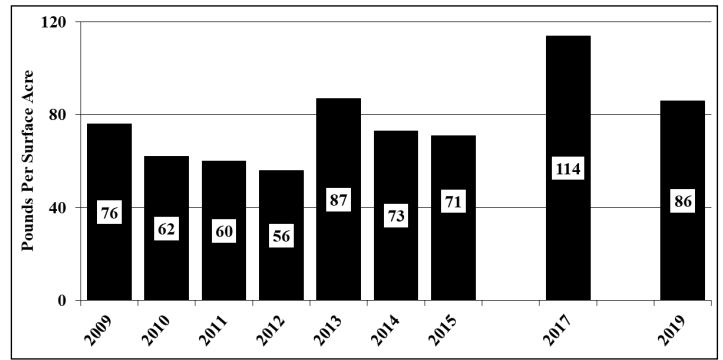


Figure 24. Biomass estimates in pounds per surface acre, Kaibab Park site.

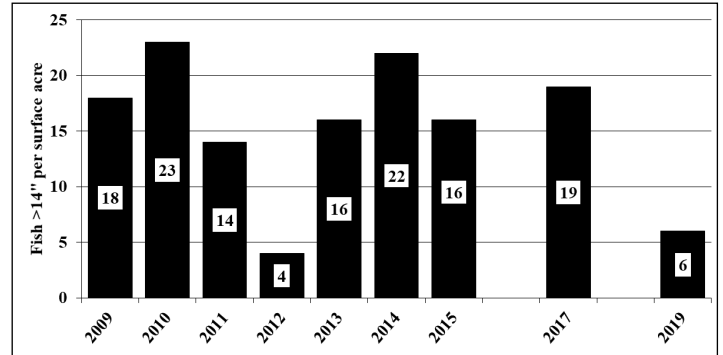


Figure 25. Quality trout (>14”) density estimates, Kaibab Park site.

Date	Flow (cfs)	Date	Flow (cfs)
6/4/09	991	6/12/15	1425
6/8/10	1767	6/13/16	1351
7/1/11	1519	6/11/17	1027
4/27/12	157	6/1/18	781
5/18/13	651	7/1/19	1142
5/31/14	2256		

Table 8. Annual peak flows in the Fraser River at Granby.



Figure 26. Location of Fraser River Kaibab Park survey station. US Hwy 40 bridge is visible at right.

This was the only location on the Fraser that we stocked Rainbow Trout fingerlings in 2015. The Rainbow Trout appearing in the 2015 sample (Figure 27, right) were the result of the stocking that year. The 2017 and 2019 samples revealed that similar to our past experiences here, the Rainbows stocked in 2015 did not recruit into the population in any significant number. This is the warmest reach of the Fraser in late summer and early fall, and it is possible that this section of the river simply becomes too warm on an annual basis for wild Rainbow Trout to flourish here. Due to this lack of past stocking success, when we stock the Fraser in 2020 we do not plan to stock the Kaibab Park reach.

As discussed previously, we captured low numbers of Mottled Sculpin here in 2019, and in fact this was the lowest number we have ever captured here (Table 9, right). We plan to pay particularly close attention to Mottled Sculpin numbers in future surveys to determine whether or not this is a consistent trend.

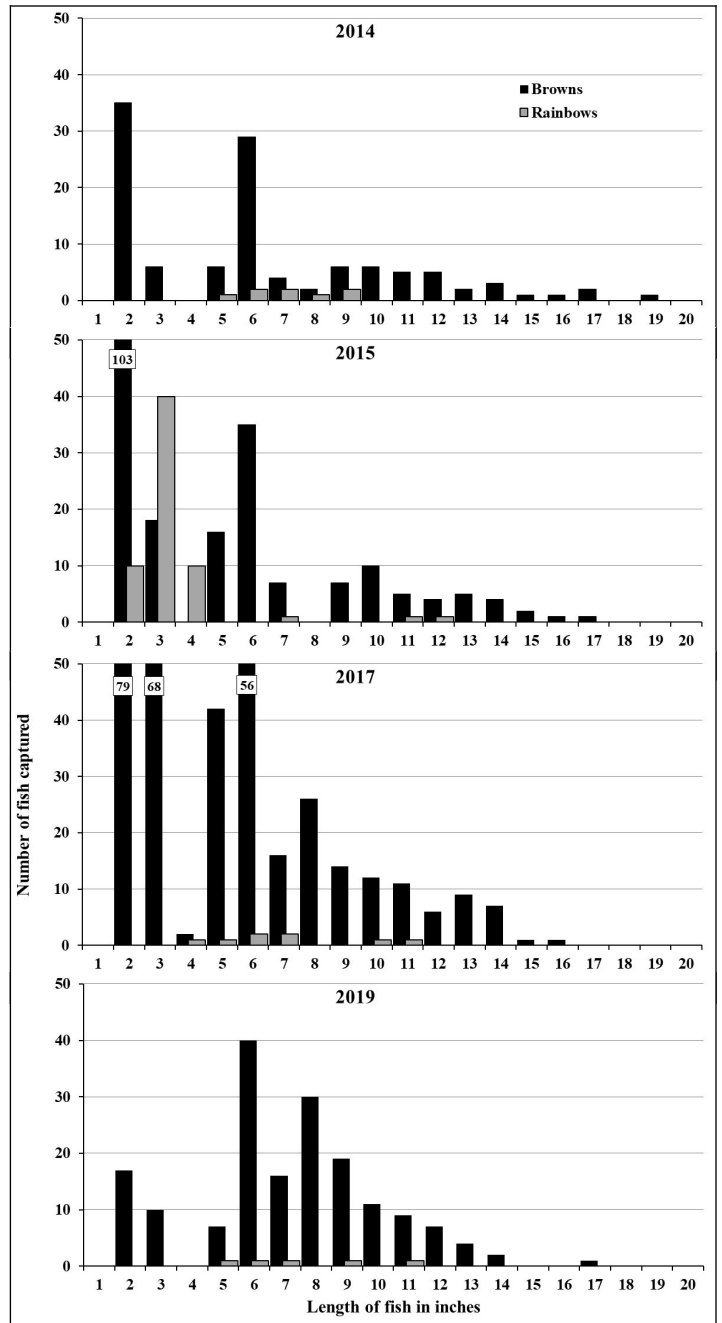


Figure 27. Size distribution of trout captured in Kaibab Park reach.



Figure 28. In 2014 we examined a 5" Mottled Sculpin that had recently consumed a 3" dace, another native small fish species common in the Fraser. This is the only time we have documented sculpin piscivory in this area.



Figure 29. In the same 2014 survey we examined this Brown Trout that had recently eaten a Mottled Sculpin.

2009	256
2010	466
2011	533
2012	1,279
2013	521
2014	262
2015	469
2017	249
2019	98

Table 9. Number of Mottled Sculpin captured by year, Kaibab Park site.