Montana Fish, Wildlife & Parks

Fisheries Division
Federal Aid Job Progress Report

Montana Statewide Fisheries Management

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Project Title: Montana Statewide Fisheries Management

Job Title: Bitterroot Drainage Fisheries Management

Abstract: This report summarizes fish sampling and fisheries related surveys conducted in waters of the Bitterroot basin during the 2019 and 2020 field seasons. Sampling was carried out as part of the fisheries management duties of the Bitterroot fisheries responsibility area located in administrative region 2.

Results from sampling of the lower Bitterroot River in 2019 and 2020 indicate trout populations are below the long-term average for the reaches sampled. This is likely related to below average flow conditions from 2015 through 2017. The lower Bitterroot River between Hamilton and Stevensville is the most heavily impacted by drought conditions. Sampling results for the West Fork of the Bitterroot River in the upper part of the basin show that trout populations continue to be relatively stable. Electrofishing surveys of all species throughout the Bitterroot River indicate that Mountain Whitefish are the most abundant species collected.

Fish population monitoring in tributary streams, many of which are on the Bitterroot National Forest, indicates that population trends vary throughout the drainage. In general, Westslope Cutthroat Trout populations tend to be stable or increasing, while many Bull Trout populations are declining.

Sampling in Burnt Fork Reservoir produced several Bull Trout for genetic testing. However, results from the analysis were not available at the time this report was completed.

Bitterroot Basin

Fisheries Sampling

2019 & 2020

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PURPOSE

This report summarizes fish sampling and fisheries related surveys conducted in waters of the Bitterroot River basin during the field seasons of 2019 and 2020. Sampling was carried out as part of the fisheries management duties of the Bitterroot fisheries responsibility area located in administrative region 2.

BACKGROUND

The Bitterroot River is a relatively large Western Montana stream that originates at the confluence of the East and West Forks of the Bitterroot near Conner, Montana. From this location, the river flows in a northerly direction for over 80 miles through irrigated crop and pastureland before joining the Clark Fork River near the city of Missoula. There are five major diversions and numerous smaller canals that remove substantial amounts of water from the river during the irrigation season (Spoon 1987). In addition, many of the tributaries that originate on the Bitterroot National Forest (BNF) are diverted for irrigation during the summer months and contribute relatively little if any streamflow to the river during that time. Therefore, many tributaries and the mainstem of the Bitterroot River are considered chronically dewatered during the irrigation season. Streamflow characteristics vary along the Bitterroot River, with the most critically dewatered reach being between Hamilton and Stevensville (Spoon 1987). To help lessen mainstem dewatering, Montana Fish, Wildlife & Parks (FWP) annually oversees the release of 15,000 acre-feet of water from Painted Rocks Reservoir on the West Fork of the Bitterroot River, and 3,000 acre-feet of water from Lake Como located near Darby. The most dewatered section of the river north of Hamilton is the target reach for the Painted Rocks water. In addition to dewatering, urbanization and associated development of the floodplain is also increasing in the Bitterroot Valley putting further pressures on the Bitterroot River (Javorsky 1994). These pressures come primarily in the form of bank stabilization and armoring, and woody riparian vegetation clearing.

The fishery of Bitterroot River is comprised of both native as well as introduced species. Native species common to the drainage include Bull Trout, Westslope Cutthroat Trout, Mountain Whitefish, Largescale Sucker, Longnose Sucker, Northern Pikeminnow, Slimy Sculpin, Longnose Dace, and Redside Shiner. Non-native species common to the Bitterroot include Rainbow Trout and Brown Trout, with Brook Trout also present but to a lesser extent. Northern Pike have also established self-sustaining populations in the river primarily downstream of Stevensville but have been documented as far upstream as Hamilton. Other introduced species such as largemouth bass may also be encountered in select habitats in the lower portion of the drainage. The Bitterroot River is an important sport fishery for anglers in western Montana. Annual pressure estimates from the statewide angler survey indicate that the Bitterroot River and its upper forks routinely exceed 100,000 angler days per year. The most recent survey results showed the highest pressure on record at approximately 135,000 angler days (FWP 2020). Due to the intense fishing pressure, fishing regulations became more restrictive in the 1980's and 1990's. Fish population estimates on the Bitterroot River have primarily been done in the fall

(September and October) and focus only on trout. Due to the length of the study sections and the large number of fish required to calculate population estimates, other species of fish present in the river were not included. However, beginning in 2011 we began sampling all species in the river using more limited techniques. While this sampling does not provide population estimates, it does provide a sense of relative abundance and allows us to monitor major changes in a particular species. It is most beneficial for the more common species such as Mountain Whitefish, which happen to be the most abundant fish in the river.

Tributaries to the Bitterroot River, many originating on the BNF, support widespread populations of native Westslope Cutthroat Trout and Bull Trout. Westslope Cutthroat Trout are classified as a Species of Concern in Montana due to declining numbers, and Bull Trout are Federally listed as a Threatened Species under the Endangered Species Act. Due to the importance of these native fish species, monitoring has been conducted on many tributary streams to assess fishery health through time. Sections are sampled on a rotating basis with a frequency typically between 1 and 5 years.

Burnt Fork Lake is a 43-acre irrigation reservoir that sits at the head of the Burnt Fork Drainage. The lake has no significant inlet streams and sees substantial annual variation in lake levels due to irrigation withdrawal. The outlet structure is a long, angled pipe through the dam that does not appear to support easy upstream fish passage. Despite the lack of traditional spawning habitats, the lake supports self-sustaining populations of non-native Rainbow Trout as well as native Bull Trout. While shoreline spawning by Rainbow Trout has been observed in the past, it is poorly understood how the Bull Trout population in Burnt Fork Lake is able to sustain itself given the absence of typical spawning habitats utilized by the species. Gaining a basic understanding of the life history of this population, including the genetic relationship to other Bull Trout in the Burnt Fork drainage, is important from a conservation standpoint.

METHODS

Fish Sampling

Rivers:

The focus of sampling was to assess species composition and relative abundance at select reaches along the Bitterroot River and its upper forks. Study reaches were selected based on historical data, streamflow patterns, and fishing regulations. Figure 1 contains a map of the sections. Many of the sample sites were previously established and have been periodically monitored over the last 30 years. In 2019 and 2020 we utilized two distinct sampling efforts to assess fish populations. Mark and recapture estimates that focused on trout were completed in early fall, while single-pass catch-per-unit-effort sampling, focused on all species, was conducted in the spring. Sampling on the Bitterroot mainstem and lower West Fork was done using a 14-foot drift boat electrofishing unit with fixed booms. The system was powered by a 5,000-watt generator and current was modified with a Smith-Root VVP-15B rectifying unit. Smooth direct current was used at all times. Crews consisted of two or three people, one controlling the boat and the other(s) standing in the bow capturing fish with a dip net. Typically, estimates were generated using three marking passes completed over approximately a one-week period, and two recapture passes completed about one week later. For the spring, all-species sampling, a single electrofishing pass was made through the sections. All fish encountered, which could be caught by 2 netters, were collected and included in the sample. For smaller, shallower reaches (e.g. East Fork Bitterroot River and upper West Fork Bitterroot River) a small barge (Coleman Crawdad) electrofishing unit was utilized. This system was powered by a 4500-watt generator and current was modified with a Smith-Root VVP-15B rectifying unit. Again, smooth direct current was used at all times. Crews consisted of four people, one controlling the barge, one throwing and retrieving a mobile electrode, and two people dip netting fish. Estimates were made using one marking run and one recapture run completed approximately one week apart. All fish captured during electrofishing efforts were identified to species, measured, weighed, given a small fin clip (if part of an estimate), and then released. In each sample reach, multiple stops were made to process fish and make sure they were well distributed throughout the section. Estimate reaches varied in length from 0.95 to 4.2 miles, with barge sampled sections being shorter than boat sampled ones. Section length for all of the spring, single-pass sections was 2 miles.

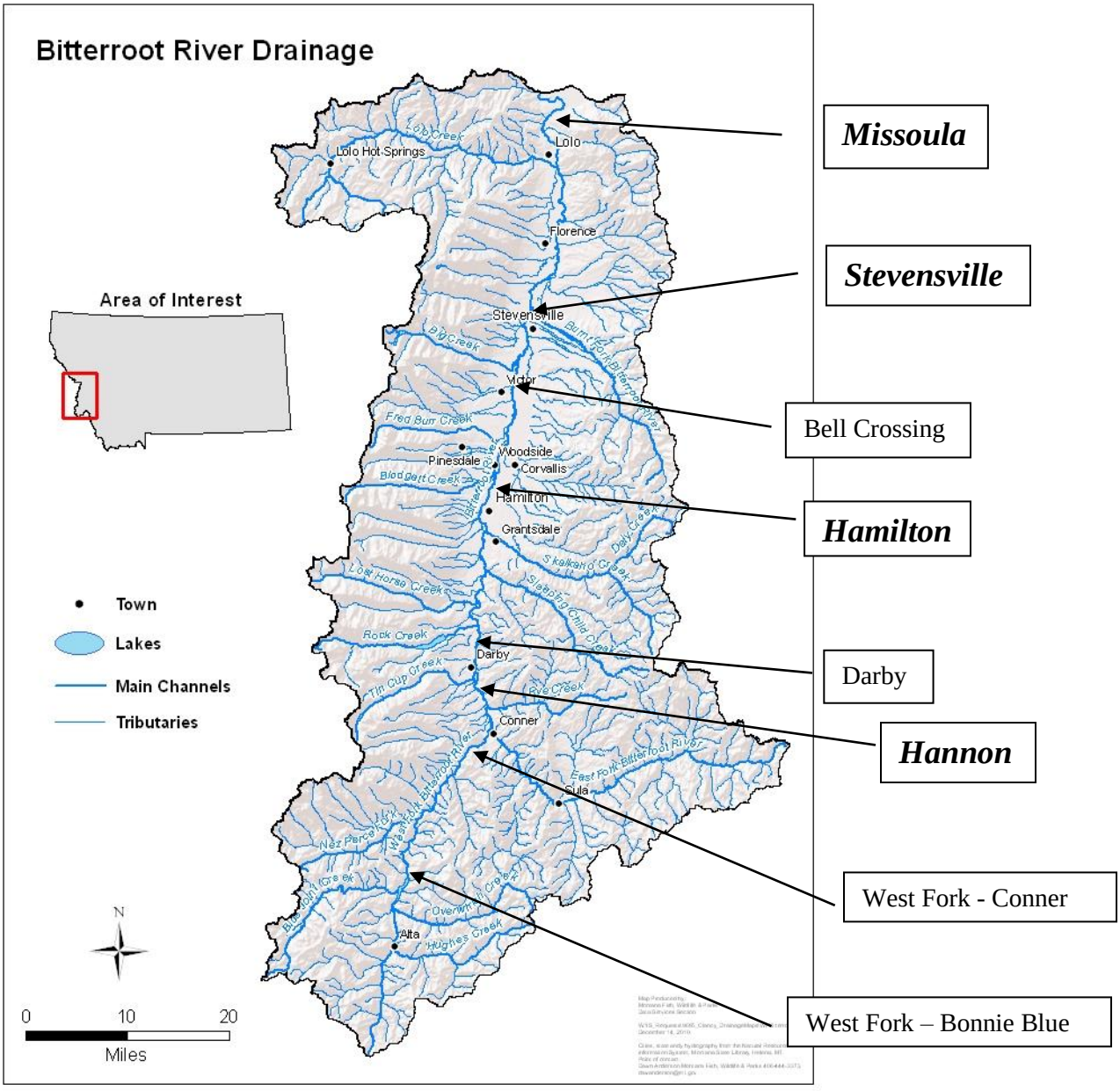

Figure1. Map of Bitterroot basin with Bitterroot River study sections labeled. The bolded, italicized reaches are sampled during routine population estimates as well as single pass sampling for all species.

Tributaries:

The primary focus of tributary sampling was to assess species composition and relative abundance at a number of sites throughout the basin. Many of the sample sections were long-term sites on the Bitterroot National Forest established to monitor trends in native trout populations. Sampled reaches varied in length but were typically 500 to 1000 feet long. At most long-term sections a bank electrofishing setup was utilized. This consisted of a 4500-watt generator (placed at the midpoint of the section), a Smith-Root VVP-15B rectifying unit, and a 500-foot spool of coated wire connected to a mobile, throwable electrode. This setup required four to five people to sample effectively. In smaller streams, a backpack electrofishing unit (Smith-Root LR-24 and/or Coffelt Mark 10) was used to collect fish. Crew size was typically limited to two or three people in these instances. Mark and recapture population estimates were completed at many of the sample sites. Estimates were generally made using one marking run and one recapture run completed approximately one week apart. All fish captured during electrofishing efforts were identified to species, measured, weighed, given a small fin clip (if part of an estimate), and then released.

Lakes:

Monofilament gillnets (125 ft long by 6 ft deep, experimental design) and angling were utilized in Burnt Fork Reservoir in 2020 to collect bull trout genetic samples. Nets were set mid-morning and retrieved in the early afternoon. Anglers fished from shore and from float tubes using spinning rods with spinners, spoons, and jigs with artificial bait. All fish captured in these efforts were identified to species, measured, and released. A small fin clip was taken from all captured bull trout for genetic purposes. Fin clips were preserved in non-denatured alcohol for later analysis.

Data Summary

Rivers:

For estimate sections, the population estimate (standardized to the number of fish per mile), capture efficiency, the total number of fish handled during mark and recapture runs (not including recaptured fish), mean and range of fish lengths, and percent of species composition were all calculated. Population estimates were generated using a modified Peterson estimator (Bailey 1951). Estimates and capture efficiencies were only reported for trout greater than 175 mm (~7 in) in length due to low capture efficiency of smaller size classes. For single-pass sections, total number of fish handled by species, mean and range of fish lengths, and percent of species composition were all calculated.

Tributaries:

Fish data was summarized for each sample location by species and included the number of fish captured (marking run or first pass only), catch per effort standardized to 1,000 feet of channel length, mean and range of fish lengths, and percent of species composition. Trout were the only species considered in these data summary efforts. At sites where population estimates were made, an estimate value with a 95% confidence interval was reported. Population estimates were calculated using a modified Peterson estimator (Chapman 1951). Estimates were produced for fish 100 mm in total length and larger, and values were reported as the number of fish per 1,000 feet of channel length. Sample locations were identified and named according to the closest river mile using a GIS and a US Forest Service routed stream layer.

RESULTS & DISCUSSION

Bitterroot River Trout Populations

Bitterroot River

Population estimates were conducted on the Stevensville and Bell Crossing sections in the fall of 2020 and 2019, respectively. Table 1 contains the summary for the Stevensville section, while Table 2 contains data from Bell Crossing. At both sections, Rainbow Trout and Brown Trout numbers were below long-term averages but were within the range of variability previously recorded (Figures 2, 3, 4 and 5). Reduced trout populations in the lower Bitterroot observed in 2019 and 2020 were likely related to relatively poor flow years from 2015 through 2017. In all three of these years, mean August flow at the USGS gauge station at Bell Crossing was well below the long-term average (1989-2020). This likely resulted in poor spawning and recruitment success during this time period, ultimately leading to the reduction in catchable fish numbers observed in 2019 and 2020.

Table 1. Electrofishing data collected on the Bitterroot River at the Stevensville Section during fall 2020. Population estimates and capture efficiencies are for trout greater than 175 mm (~7") in total length. Number following the population estimate (in parentheses) represents the 95 % confidence interval. Rainbow Trout estimate includes Rainbow x Westslope Cutthroat Trout hybrids.

Trout Species	Population Estimate (fish/mile)	Capture Efficiency (%)	Total Fish Handled	Mean Length (mm)	Length Range (mm)	Species Composition (%)
Bull	-	-	0	-	-	-
Cutthroat	n/a	n/a	1	262	n/a	< 1
Rainbow	265 (+/- 84)	20	379	296	72-535	77
Brown	57 (+/- 23)	28	112	365	96-565	23
Brook	-	-	0	-	-	-

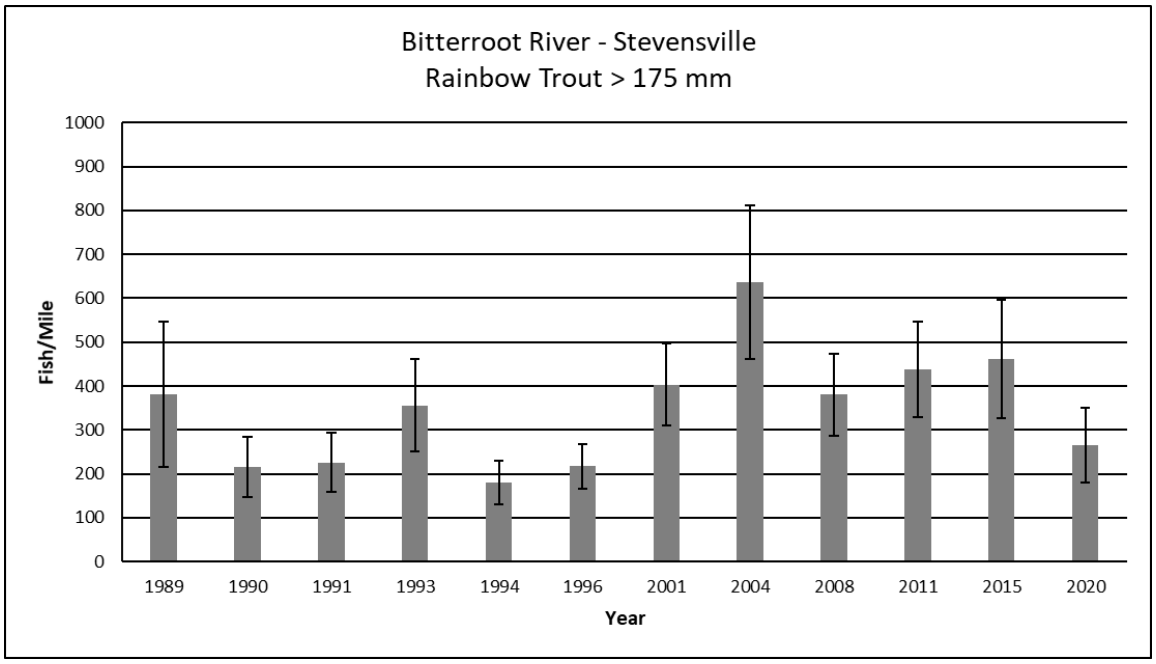

Figure 2. Population estimates for Rainbow Trout greater than 175 mm (~7") in total length in the Stevensville section for the period of record. Estimates include Rainbow x Westslope Cutthroat hybrids.

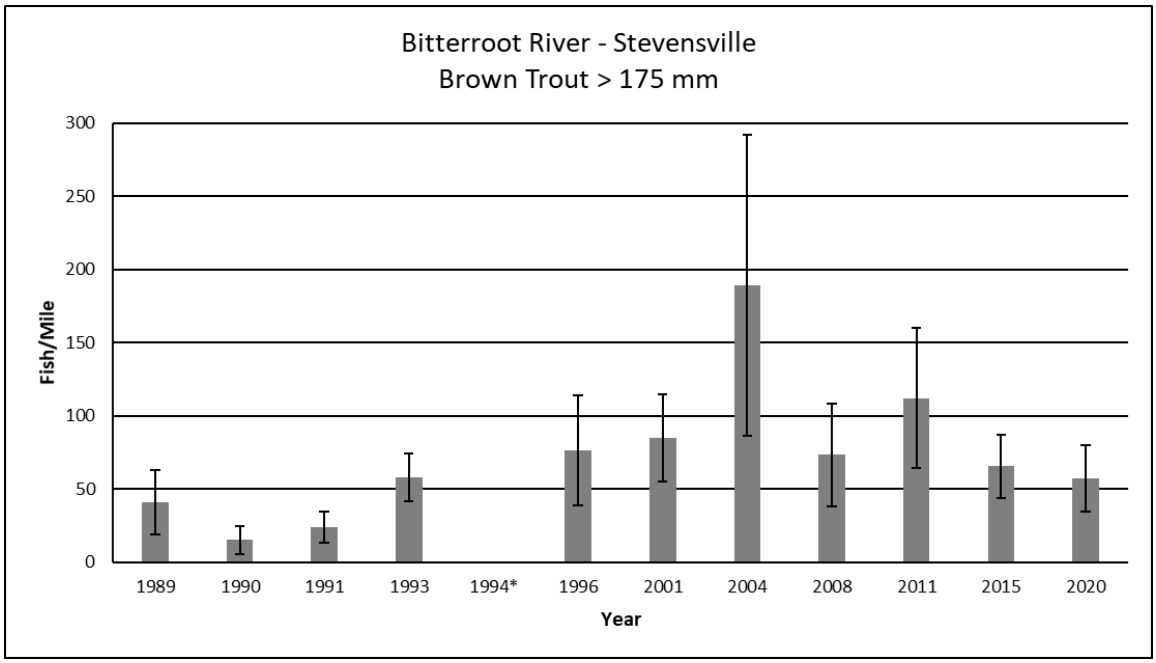

Figure 3. Population estimates for Brown Trout greater than 175 mm (~7") in total length in the Stevensville section for the period of record. Asterisk following year denotes estimate not reported due to poor capture efficiency.

Table 2. Electrofishing data collected on the Bitterroot River at the Bell Crossing Section during fall 2019. Population estimates and capture efficiencies are for trout greater than 175 mm (~7") in total length. Number following the population estimate (in parentheses) represents the 95 % confidence interval. Rainbow Trout estimate includes Rainbow x Westslope Cutthroat Trout hybrids.

Trout Species	Population Estimate (fish/mile)	Capture Efficiency (%)	Total Fish Handled	Mean Length (mm)	Length Range (mm)	Species Composition (%)
Bull	-	-	0	-	-	-
Cutthroat	n/a	n/a	12	373	260-445	3
Rainbow	214 (+/- 104)	16	214	299	69-460	61
Brown	108 (+/- 55)	17	126	367	117-530	36
Brook	-	-	0	-	-	-

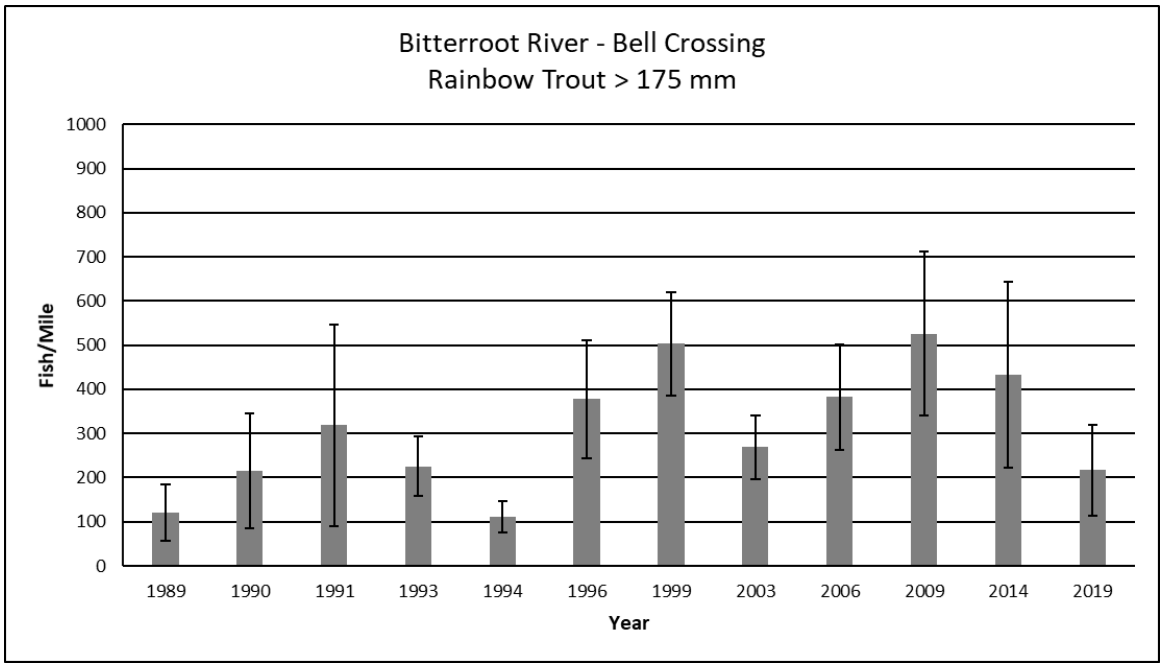

Figure 4. Population estimates for Rainbow Trout greater than 175 mm (~7") in total length in the Bell Crossing section for the period of record. Estimates include Rainbow x Westslope Cutthroat hybrids.

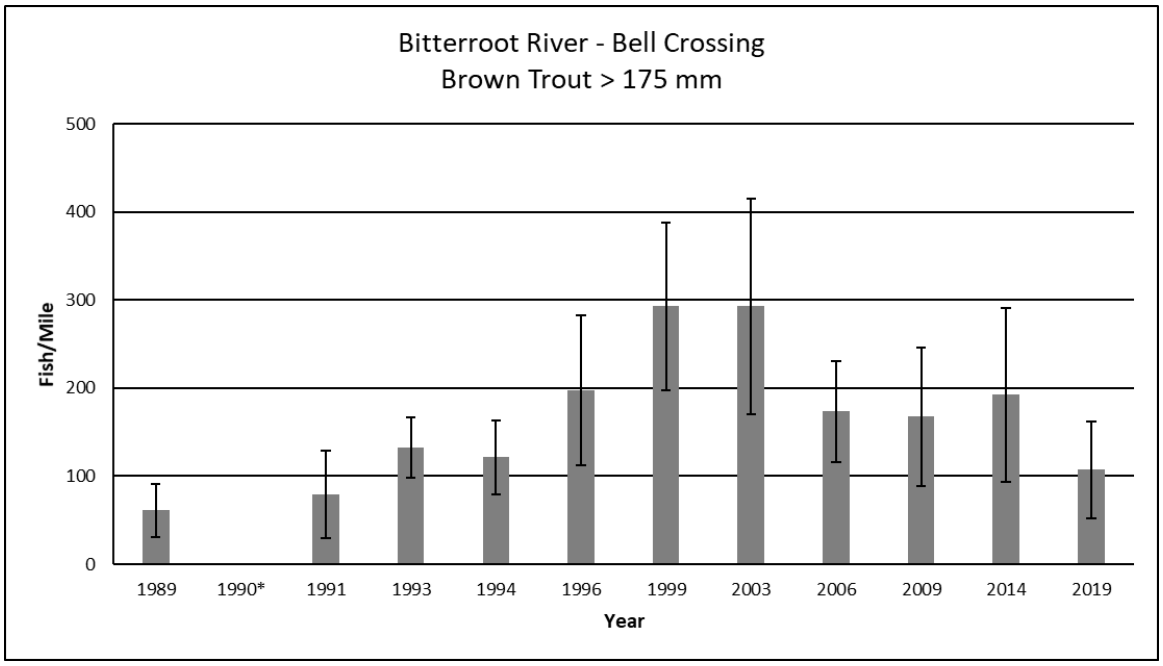

Figure 5. Population estimates for Brown Trout greater than 175 mm (~7") in total length in the Bell Crossing section for the period of record. Asterisk following year denotes estimate not reported due to poor capture efficiency.

West Fork Bitterroot River

In 2020, population estimates were completed at two sections on the West Fork. The reaches sampled included the Conner long-term site as well as a new section named "Bonnie Blue", which was located downstream of Painted Rocks Reservoir. The Bonnie Blue section was established to expand our knowledge of species composition and abundance in this reach of the river. Relatively little fish data existed for the West Fork between Painted Rocks Reservoir and the confluence with the Nez Perce Fork.

Table 3 contains a summary for the Conner section. In general, Westslope Cutthroat Trout, Rainbow Trout, and Brown Trout numbers have continued to be relatively stable over the last several sample periods (Figures 6, 7, and 8). However, the number of Bull Trout handled in 2020 was a record low for the section. Bull trout presence has been trending downward since the section was first sampled in 1986 (Figure 9).

Table 3. Electrofishing data collected on the West Fork Bitterroot River at the Conner Section during fall 2020. Population estimates and capture efficiencies are for trout greater than 175 mm (~7") in total length. Number following the population estimate (in parentheses) represents the 95 % confidence interval. Rainbow Trout estimate includes Rainbow x Westslope Cutthroat Trout hybrids. Brook Trout numbers include Brook x Bull Trout hybrids.

Trout Species	Population Estimate (fish/mile)	Capture Efficiency (%)	Total Fish Handled	Mean Length (mm)	Length Range (mm)	Species Composition (%)
Bull	n/a	n/a	1	232	n/a	< 1
Cutthroat	368 (+/- 158)	14	265	273	113-424	45
Rainbow	204 (+/- 97)	17	198	261	98-585	34
Brown	117 (+/- 65)	17	117	269	126-458	20
Brook	n/a	n/a	3	285	270-311	< 1

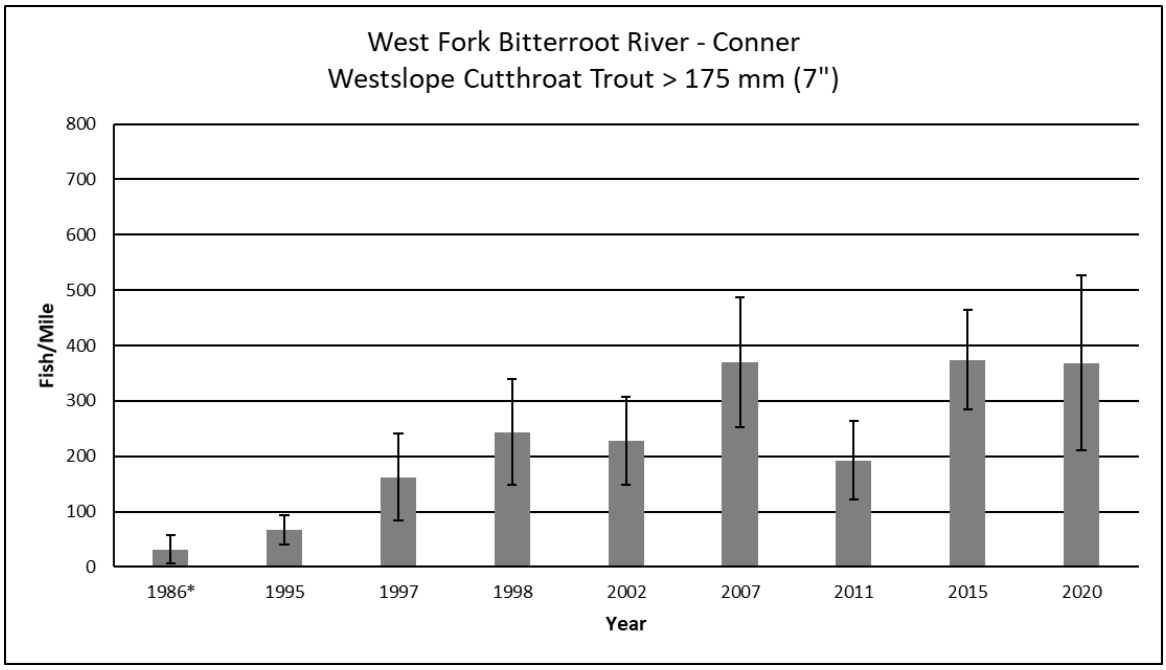

Figure 6. Population estimates for Westslope Cutthroat Trout greater than 175 mm (~7") in total length in the Conner section for the period of record.

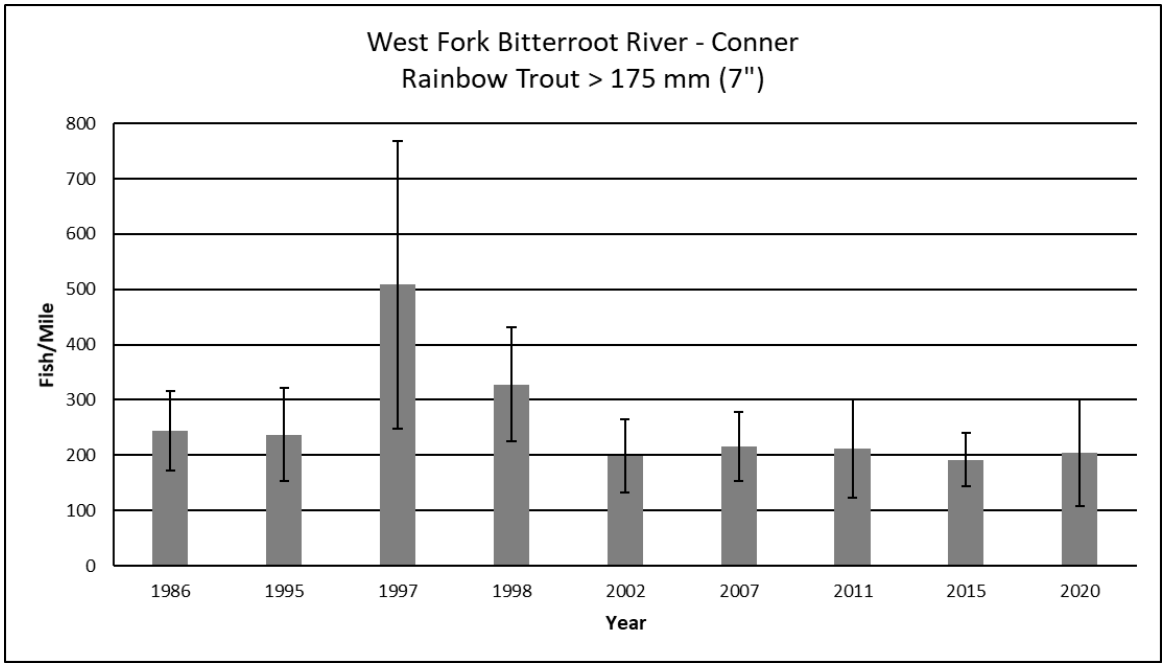

Figure 7. Population estimates for Rainbow Trout greater than 175 mm (~7") in total length in the Conner section for the period of record. Estimates include Rainbow x Westslope Cutthroat Trout hybrids.

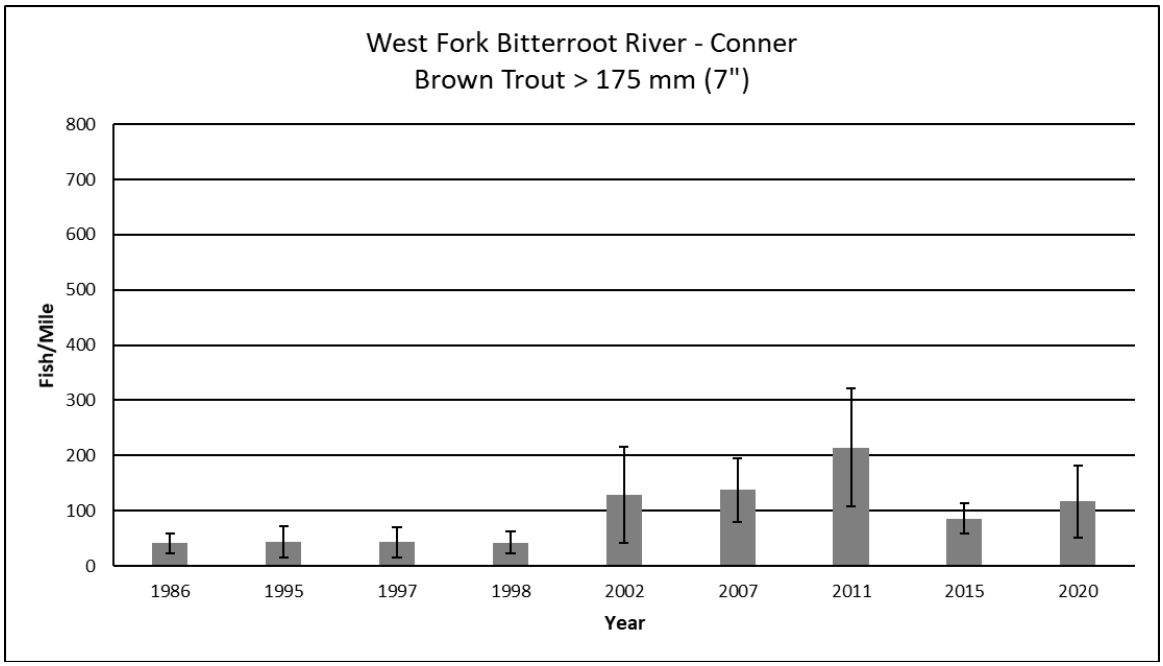

Figure 8. Population estimates for Brown Trout greater than 175 mm (~7") in total length in the Conner section for the period of record.

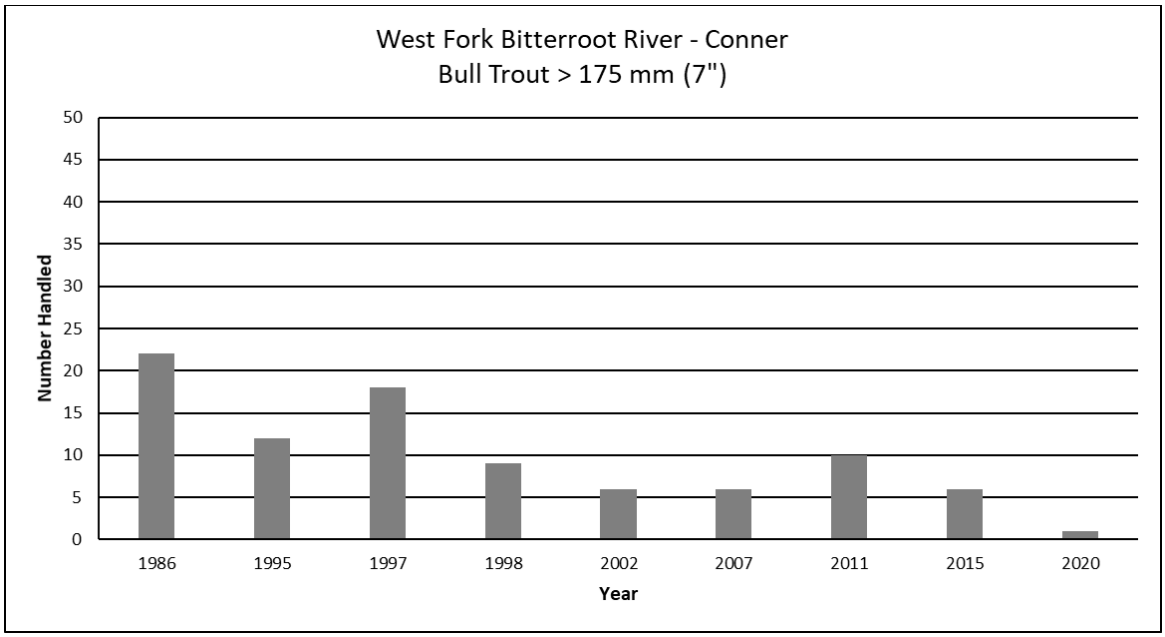

Figure 9. Number of Bull Trout greater than 175 mm (~7") in total length handled in the Conner section for the period of record.

Table 4 and Figure 10 contain data from the new Bonnie Blue section established in 2020. Unfortunately, sampling conditions during the marking run proved difficult. Flows were too high to be efficient using our barge electrofishing unit. Flows had dropped by the recapture run and electrofishing was more effective, but unfortunately, we did not have enough fish marked to produce good population estimates. Nevertheless, the sampling proved valuable in the sense that it gave us a general understanding of fish abundance, species composition, and size structure in the reach. Rainbow and Brown Trout comprised much of the trout community at the Bonnie Blue section, with Westslope Cutthroat Trout and Bull Trout also present, but in noticeably fewer numbers. Brook Trout were also observed in low densities in the reach.

Table 4. Electrofishing data collected on the West Fork Bitterroot River at the Bonnie Blue Section during fall 2020. Population estimates were not generated due to poor recapture numbers. Rainbow Trout numbers include Rainbow x Westslope Cutthroat Trout hybrids.

Trout Species	Population Estimate (fish/mile)	Capture Efficiency (%)	Total Fish Handled	Mean Length (mm)	Length Range (mm)	Species Composition (%)
Bull	-	-	7	352	210-440	3
Cutthroat	-	-	32	311	122-436	11
Rainbow	-	-	125	233	70-486	44
Brown	-	-	112	264	77-490	40
Brook	-	-	6	153	137-170	2

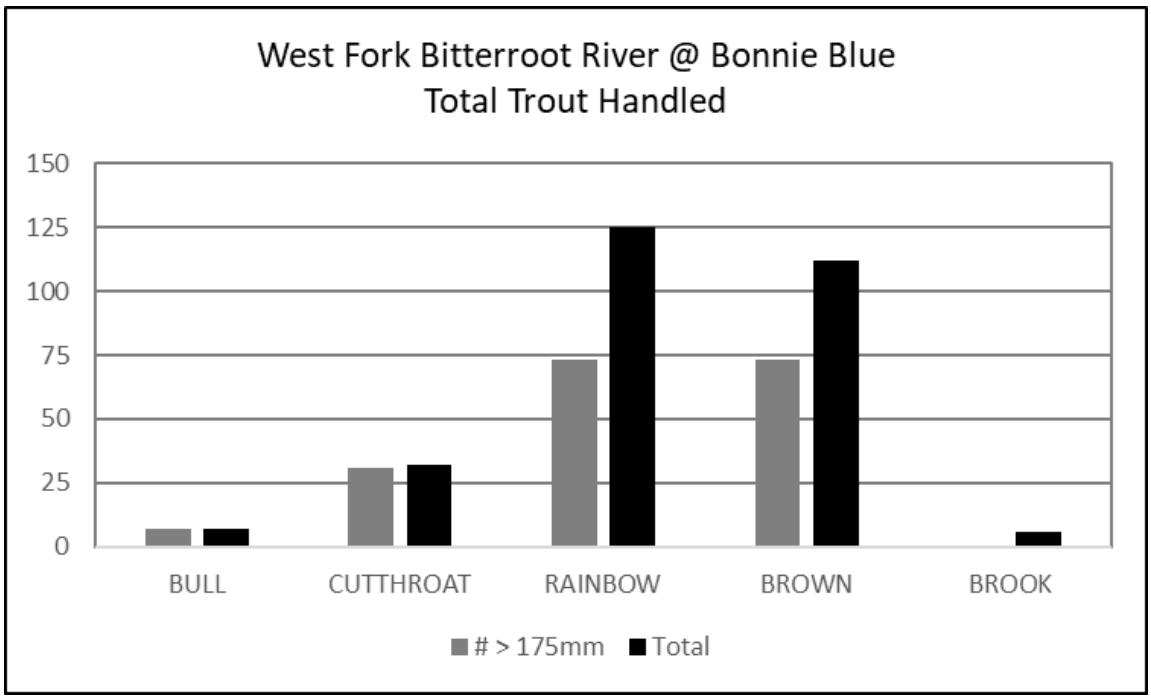

Figure 10. Number of trout handled in the Bonnie Blue section in 2020.

Bitterroot River Multi-Species Single-Pass Sampling

During spring of 2020 three of the four established Bitterroot River single-pass sections were sampled. These included the Stevensville, Hamilton, and Hannon sections. Mountain Whitefish were the most common fish captured at all sites, comprising between 86% and 93% of the total catch (Table 5). The number of whitefish captured in 2020 increased in all sections compared to the previous sampling period, and was the highest number ever recorded in the Stevensville and Hannon sections (Figures 11, 12, and 13). Other species captured in 2020 showed no clear population trends. This may be due to the low number of individuals collected. Low intensity, single-pass sampling is best suited for monitoring species that are relatively abundant such as Mountain Whitefish.

Table 5. Electrofishing data collected at the Stevensville, Hamilton, and Hannon single-pass sections in the spring of 2020. Small bodied species (Redside Shiner, Longnose Dace, and Slimy Sculpin) are not included due to the inherently poor capture efficiency of these fish with a boat electrofisher. Species abbreviations are as follows: MWF = Mountain Whitefish, RB = Rainbow Trout, LL = Brown Trout, WCT = Westslope Cutthroat Trout, BULL = Bull Trout, EB = Brook Trout, LSSU = Largescale Sucker, and NPM = Northern Pikeminnow. Rainbow Trout numbers include Rainbow x Westslope Cutthroat Trout hybrids.

Section	Species	Total Fish Handled	Mean Length (mm)	Length Range (mm)	Species Composition (%)
Stevensville	MWF	1021	281	90-435	93
	RB	33	363	120-465	3
	LL	17	412	296-575	2
	WCT	1	275	275-275	< 1
	BULL	0	-	-	-
	EB	0	-	-	-
	LSSU	23	496	160-595	2
	NPM	7	403	355-454	< 1
Hamilton	MWF	527	287	106-434	86
	RB	21	380	110-522	3
	LL	16	343	103-515	3
	WCT	2	357	345-368	< 1
	BULL	0	-	-	-
	EB	0	-	-	-
	LSSU	19	507	308-600	3
	NPM	28	441	365-560	5
Hannon	MWF	410	319	89-448	88
	RB	15	388	196-510	3
	LL	14	252	95-434	3
	WCT	15	382	333-466	3
	BULL	1	660	660-660	< 1
	EB	1	187	187-187	< 1
	LSSU	11	497	435-554	2
	NPM	0	-	-	-

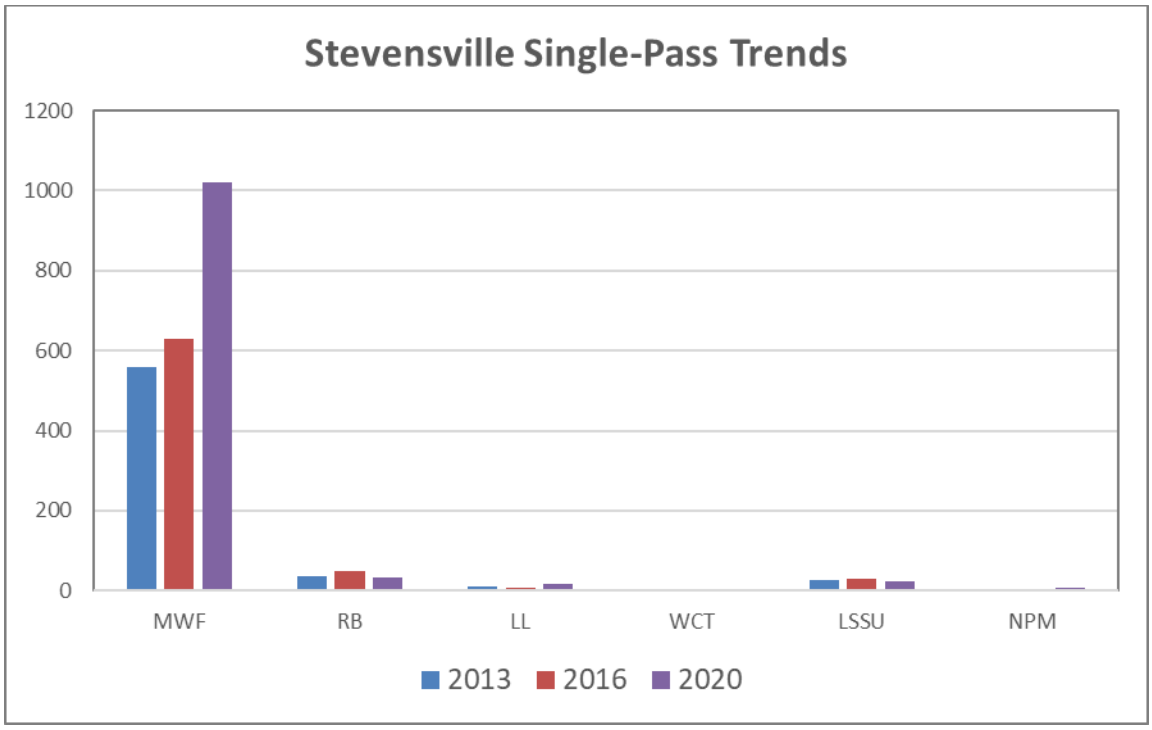

Figure 11. Number of fish handled in the Stevensville single-pass section for the period of record. Species abbreviations are as follows: MWF = Mountain Whitefish, RB = Rainbow Trout, LL = Brown Trout, WCT = Westslope Cutthroat Trout, LSSU = Largescale Sucker, and NPM = Northern Pikeminnow. Rainbow Trout numbers include Rainbow x Westslope Cutthroat Trout hybrids.

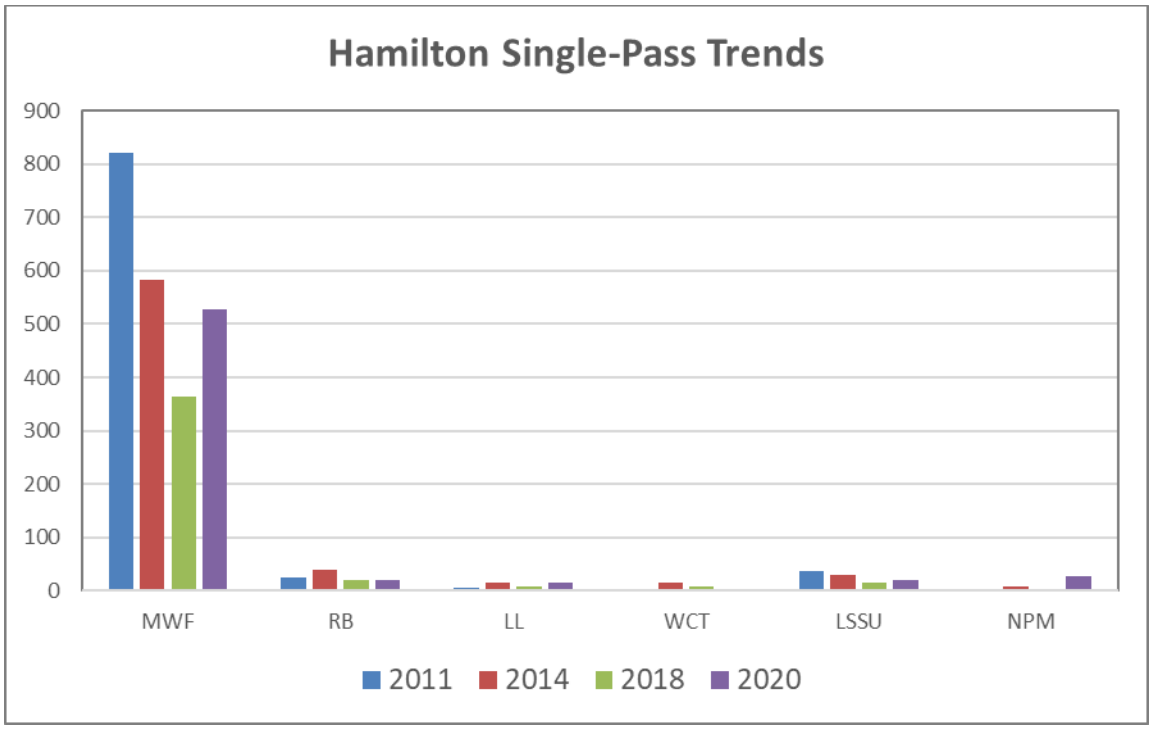

Figure 12. Number of fish handled in the Hamilton single-pass section for the period of record. Species abbreviations are as follows: MWF = Mountain Whitefish, RB = Rainbow Trout, LL = Brown Trout, WCT = Westslope Cutthroat Trout, LSSU = Largescale Sucker, and NPM = Norther Pikeminnow. Rainbow Trout numbers include Rainbow x Westslope Cutthroat Trout hybrids.

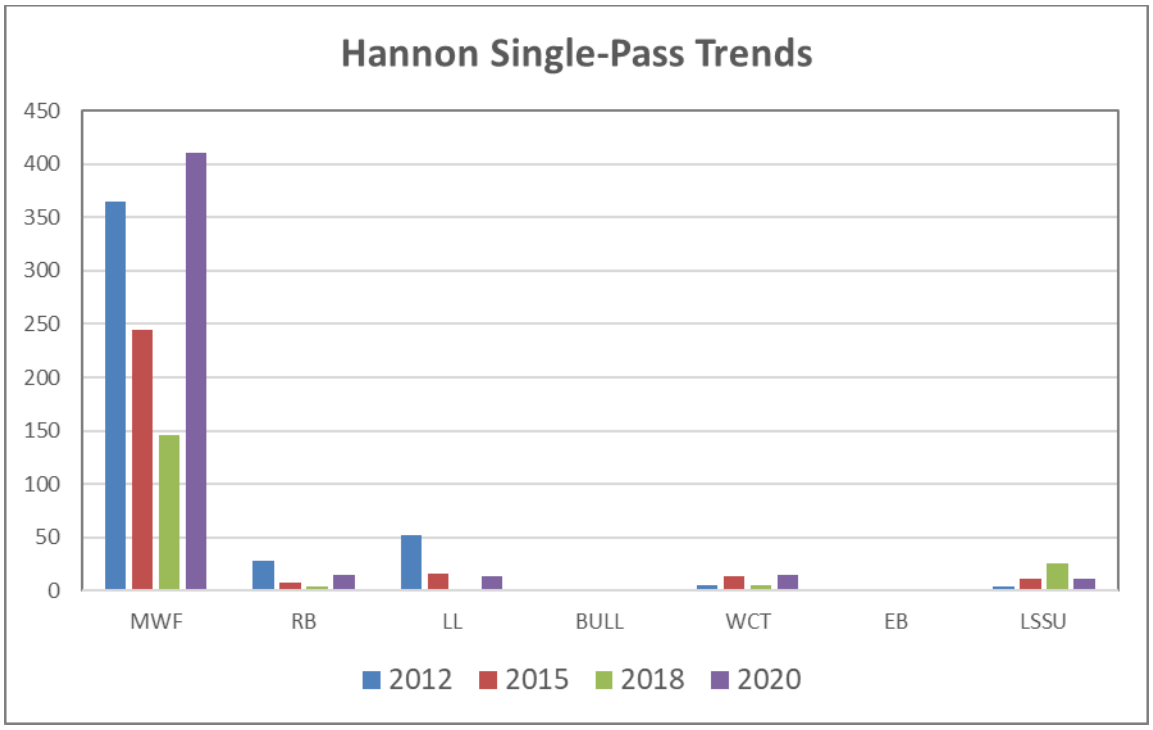

Figure 13. Number of fish handled in the Hannon single-pass section for the period of record. Species abbreviations are as follows: MWF = Mountain Whitefish, RB = Rainbow Trout, LL = Brown Trout, BULL = Bull Trout, WCT = Westslope Cutthroat Trout, EB = Brook Trout, and LSSU = Largescale Sucker. Rainbow Trout numbers include Rainbow x Westslope Cutthroat Trout hybrids.

Tributary Fish Sampling
(Includes Bitterroot National Forest Monitoring)

Threemile Creek Drainage

Threemile Creek

Two fish surveys were completed in upper Threemile Creek during the summer of 2020. The lowest section was near the downstream boundary of the Threemile Wildlife Management Area near Forest Service River Mile (FSRM) 12.3, while the upper section was situated near FSRM 14.5 at the confluence with Placer Creek. A mark-recapture population estimate was completed at FSRM 12.3, while sampling at FSRM 14.5 consisted of only a single electrofishing pass. Table 6 contains a summary of results. At both sites, Westslope Cutthroat Trout dominated the trout community. Brook Trout were also present at both locations, but densities were relatively low. At FSRM 12.3 the population estimate for Westslope Cutthroat Trout over 100 mm in length was 246 per 1000 ft (95% confidence interval: +/- 52), and for Brook Trout it was 34 per 1000 ft (95% confidence interval: +/- 10). At FSRM 14.5, Brook Trout appeared to be less common than at FSRM 12.3. However, sampling conducted in this same general location in 2007

failed to detect any. It appears that Brook Trout are expanding their distribution in upper Threemile Creek. Continued monitoring should be done to track this expansion.

Table 6. Electrofishing data collected at two sections of Three Mile Creek in 2020. Data presented is from the marking run or first electrofishing pass if multiple passes were made. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout and EB = Brook Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 12.3	WCT	76	127	131	64-263	83
	EB	16	27	112	77-217	17
FSRM 14.5	WCT	115	383	124	53-197	97
	EB	3	10	109	95-131	3

Wheelbarrow Creek

Fish sampling was completed at two sites on Wheelbarrow Creek during the summer of 2019. This sampling was related to the identification of a culvert barrier where the main Threemile Wildlife Management Area access road crossed the stream near FSRM 2.2. Single pass surveys were completed immediately above and below the culvert crossing to determine species presence at each site. Westslope Cutthroat Trout were the only fish observed at both locations. Table 7 contains a summary of the electrofishing results. Genetic samples were also collected from fish near FSRM 2.2 in 2019. Results suggest that the Wheelbarrow Creek Westslope Cutthroat Trout population is non-hybridized (FWP 2020). The culvert barrier near FSRM 2.2 is scheduled to be replaced with a bridge in 2021.

Table 7. Electrofishing data collected at two sections of Wheelbarrow Creek in 2019. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 2.2	WCT	55	210	93	57-167	100
FSRM 2.3	WCT	40	153	77	51-155	100

Spring Gulch

Fish sampling was completed at one site on Spring Gulch near FSRM 3.5 during the summer of 2019. The single-pass sample was done to confirm the presence fish at the location where the main Threemile Wildlife Management Area access road crosses the stream. Westslope Cutthroat Trout were the only fish observed at the sample location. Table 8 contains a summary of results.

Table 8. Electrofishing data collected at one section of Spring Gulch in 2019. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 3.5	WCT	13	113	109	51-203	100

Burnt Fork Drainage

North Burnt Fork

Single-pass, presence-absence surveys were completed at two sites in North Burnt Fork during the summer of 2020. The sites were located immediately downstream and upstream of the Bitterroot Irrigation District's (BRID) diversion structure for the Big Ditch located near FSRM 7.4. This structure appears to function as an upstream fish barrier under most conditions. There is a bypass channel located immediately south of the main diversion that was flowing at the time of the survey. However, this channel has a pipe that is several hundred feet long and it is uncertain whether fish can pass upstream through it successfully. Table 9 contains a summary of the 2020 electrofishing results. Brook Trout dominated the fish community at both sample sites, with Westslope Cutthroat Trout also present but in much lower numbers. Downstream of the BRID diversion Brown Trout were also relatively common in the sample section but were not observed at the upstream site. Additional spot electrofishing in disconnected pools in the lowest reach of North Burnt Fork where it intersects the Big Ditch did turn up a large brown trout, so the species is present upstream of the BRID diversion structure. Further investigation is needed to determine the upstream extent of Brown Trout distribution in North Burnt Fork and the Burnt Fork.

Table 9. Electrofishing data collected at two sections of North Burnt Fork in 2020. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, EB = Brook Trout and LL = Brown Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 7.4	WCT	6	9	183	122-270	2
	EB	274	418	111	68-260	85
	LL	41	63	207	87-460	13
FSRM 7.5	WCT	9	31	199	125-330	18
	EB	40	136	165	69-260	82

Burnt Fork

In 2020, a mark-recapture population estimate was completed at the long-term site on the Burnt Fork near FSRM 19.7. In addition, single-pass electrofishing was completed immediately below Burnt Fork Reservoir near FSRM 26.9 in an effort to collect Bull Trout for genetic sampling. Table 10 contains a summary of results. At FSRM 19.7, high flows from Burnt Fork Reservoir irrigation releases reduced capture efficiency and made sampling difficult. Westslope Cutthroat Trout comprised the majority of the fish collected in the reach, although Bull Trout were also somewhat common. Brook Trout and Brook Trout x Bull Trout hybrids were observed, but in low numbers. The population estimate for Westslope Cutthroat Trout over 100 mm in length was 187 per 1000 ft (95% confidence interval: +/- 84). This value was slightly below the long-term average for the site, but within the range of variability (Figure 14). Poor recapture rate did not allow an estimate to be generated for Bull Trout, although the total number captured during 2020 was the lowest on record (Figure 15). Care should be taken not to overinterpret this finding given the sampling challenges at the site. At FSRM 26.9, Rainbow Trout were the most common species present. Rainbow Trout are prevalent in Burnt Fork Reservoir and these fish likely originated from that population. Genetic samples were collected from all Bull Trout captured at FSRM 26.9 and combined with samples collected from Burnt Fork Lake in 2020 (see *Lake Sampling* section of this report). Additionally, samples were also collected from Bull Trout at FSRM 19.7. The purpose of collecting these samples was to test for relatedness of fish from Burnt Fork Lake (and in close proximity to the lake) to those found further downstream (FSRM 19.7). Samples were submitted to the Conservation Genetics Lab in Missoula, but results were not available at the time this report was written.

Table 10. Electrofishing data collected at two sections of Burnt Fork in 2020. Data presented is from the marking run or first electrofishing pass if multiple passes were made. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, RB = Rainbow Trout, BULL = Bull Trout, EB = Brook Trout, and EBxBULL = Brook Trout x Bull Trout hybrid.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 19.7	WCT	58	58	193	67-296	64
	BULL	25	25	188	98-295	27
	EB	2	2	149	117-181	2
	EBxBULL	6	6	208	135-282	7
FSRM 26.9	BULL	3	8	283	197-328	25
	EBxBULL	1	3	245	245-245	8
	RB	8	22	160	85-222	67

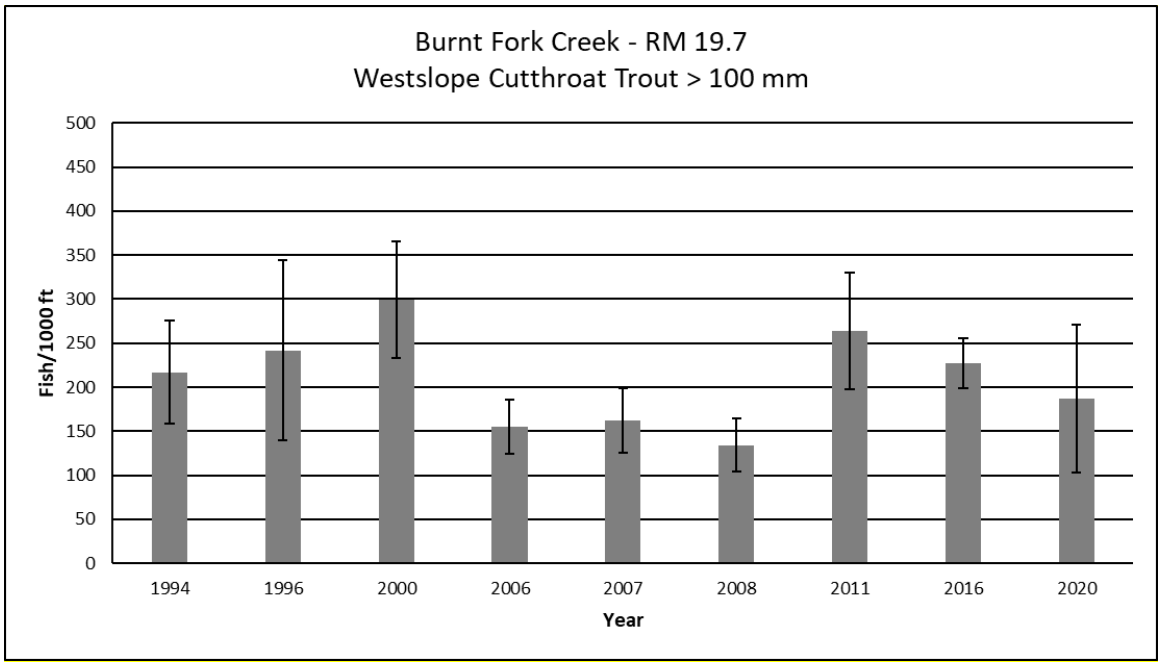

Figure 14. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Burnt Fork at the FSRM 19.7 section for the period of record.

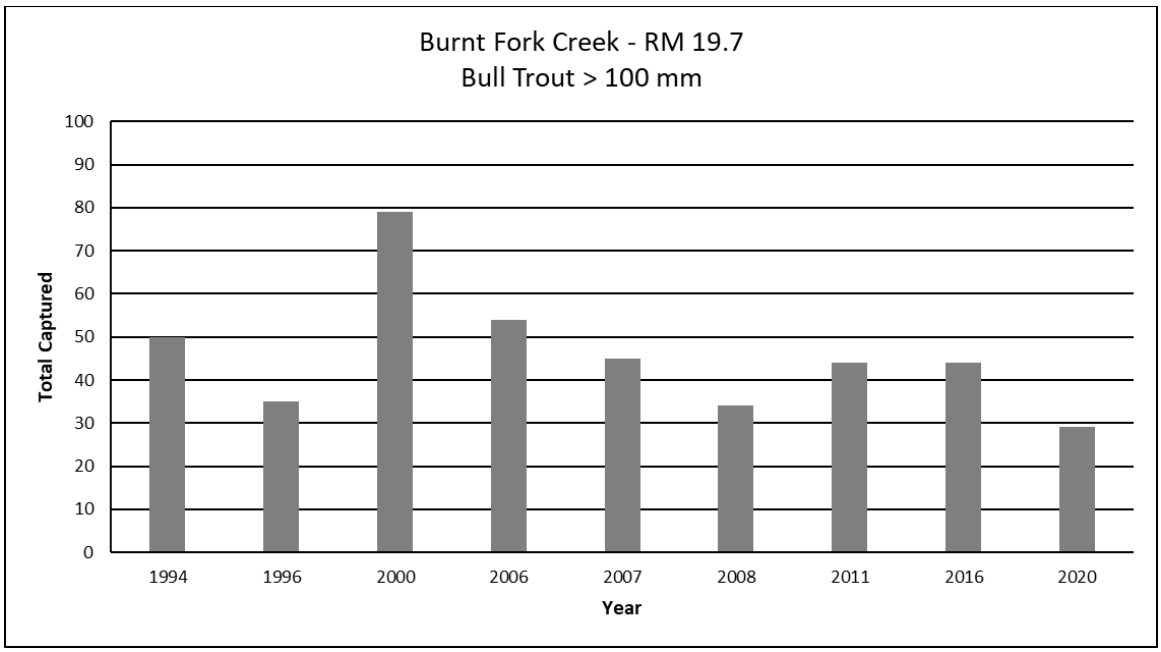

Figure 15. Number of Bull Trout greater than 100 mm (~4") in total length handled in the Burnt Fork FSRM 19.7 section for the period of record.

Willow Creek

Two fish surveys were completed in upper Willow Creek during the summer of 2020. A population estimate was made at the long-term site located near FSRM 12.1, and a single-pass survey was conducted near FSRM 13.3. Table 11 contains a summary of fish collected at each site. Westslope Cutthroat Trout dominated the fish community at both sites, with Bull Trout also present in lower numbers. At FSRM 12.1, The population estimate for Westslope Cutthroat Trout over 100 mm in length was 221 per 1000 ft (95% confidence interval: +/- 43). This value was slightly above the long-term average for the site, but within the range of variability (Figure 16). Poor recapture rate did not allow an estimate to be generated for Bull Trout at FSRM 12.1. However, the total number of Bull Trout handled was also a little above the long-term average (Figure 17). Nonnative Brook Trout were observed at FSRM 12.1, but not at FSRM 13.3. This was expected based on past sampling. In 2020, a partial barrier culvert located between the two sections was replaced with and open bottom arch. Removal of this barrier could make it easier for Brook Trout to expand their distribution in upper Willow Creek. Continued periodic monitoring is recommended.

Table 11. Electrofishing data collected at two sections of Willow Creek in 2020. Data presented is from the marking run or first electrofishing pass if multiple passes were made. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, BULL = Bull Trout, EB = Brook Trout, and EBxBULL = Brook Trout x Bull Trout hybrid.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 12.1	WCT	67	84	161	75-261	83
	BULL	12	15	133	117-187	15
	EB	1	1	215	215-215	1
	EBxBULL	1	1	122	122-122	1
FSRM 13.3	WCT	51	102	159	60-245	86
	BULL	8	16	151	95-176	14

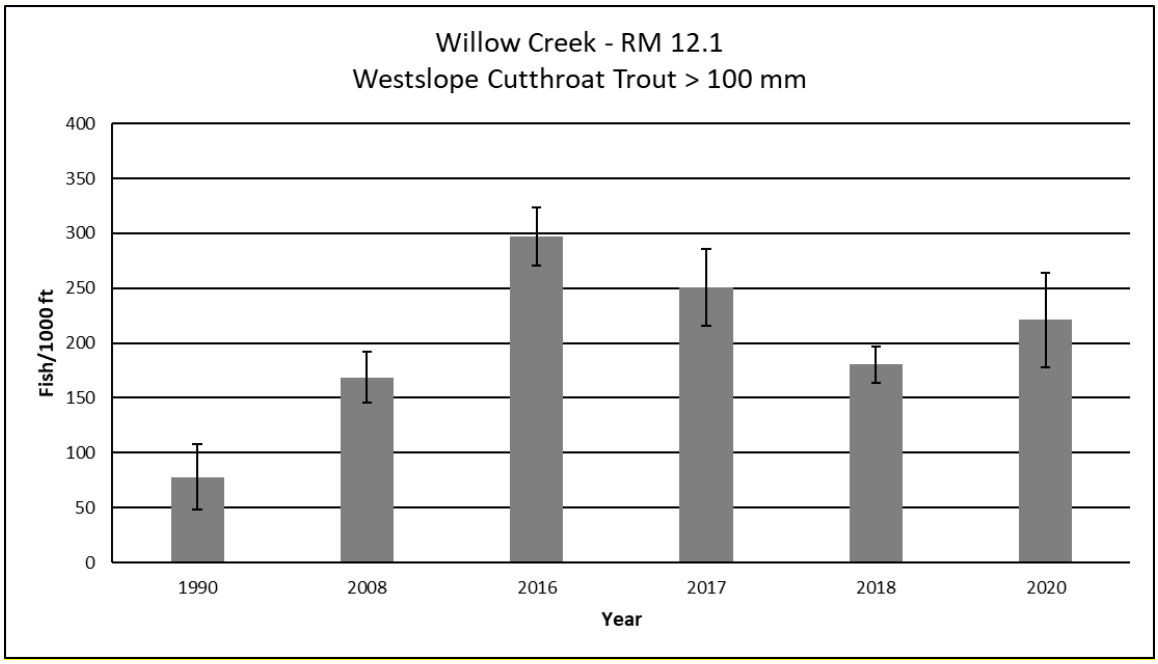

Figure 16. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Willow Creek at the FSRM 12.1 section for the period of record.

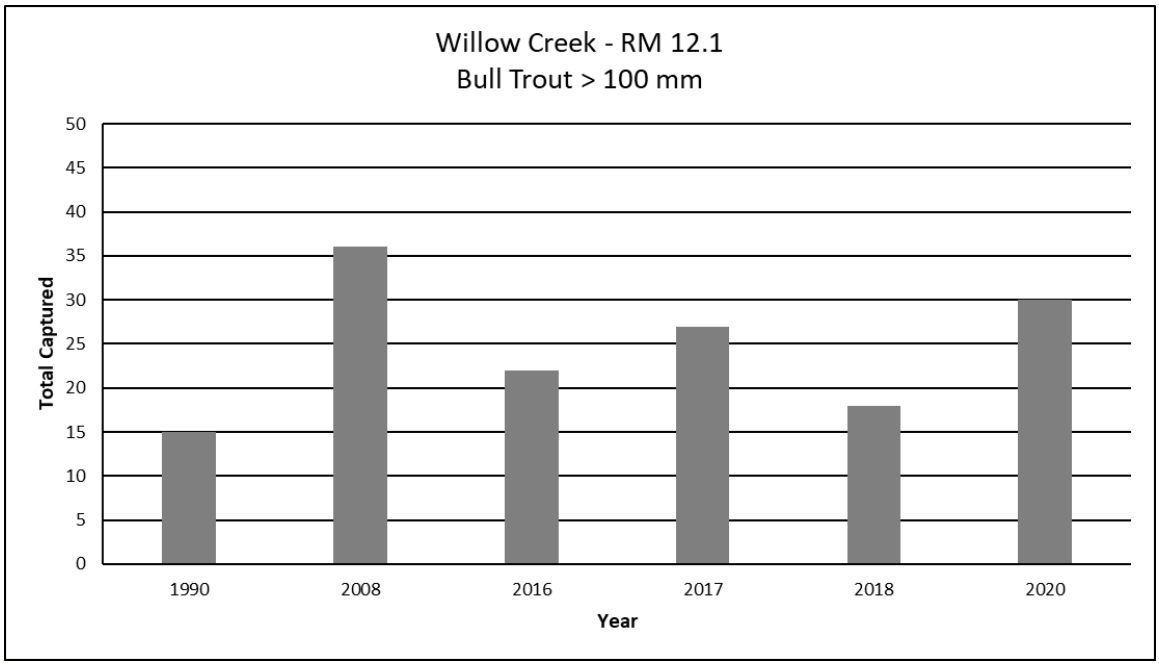

Figure 17. Number of Bull Trout greater than 100 mm (~4") in total length handled in the Willow Creek FSRM 12.1 section for the period of record.

Skalkaho Creek

During the summer of 2020, a single population estimate was conducted on Skalkaho Creek at the long-term site located near FSRM 16.8. This reference site has typically been sampled annually since 1989. Table 12 contains a summary of fish captured during the 2020 marking run. Westslope Cutthroat Trout comprised the bulk of the fish community, with Bull Trout (including one Brook Trout x Bull Trout hybrid) also present but much less common. The population estimate for Westslope Cutthroat Trout over 100 mm in length was 129 per 1000 ft (95% confidence interval: +/- 17). This value was slightly below the long-term average for the site, but within the range of variability (Figure 18). Poor recapture rate did not allow for an accurate estimate to be generated for Bull Trout. The estimate that was generated for fish greater than 100 mm was 69 per 1000 ft (95% confidence interval: +/- 54). This value is a little below the long-term average, but within the range of variability measured at the site (Figure 19).

Table 12. Electrofishing data collected at one section of Skalkaho Creek in 2020. Data presented is from the marking run. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, BULL = Bull Trout, and EBxBULL = Brook Trout x Bull Trout hybrid.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 16.8	WCT	69	69	239	123-366	82
	BULL	14	14	215	123-335	17
	EBxBULL	1	1	238	238-238	1

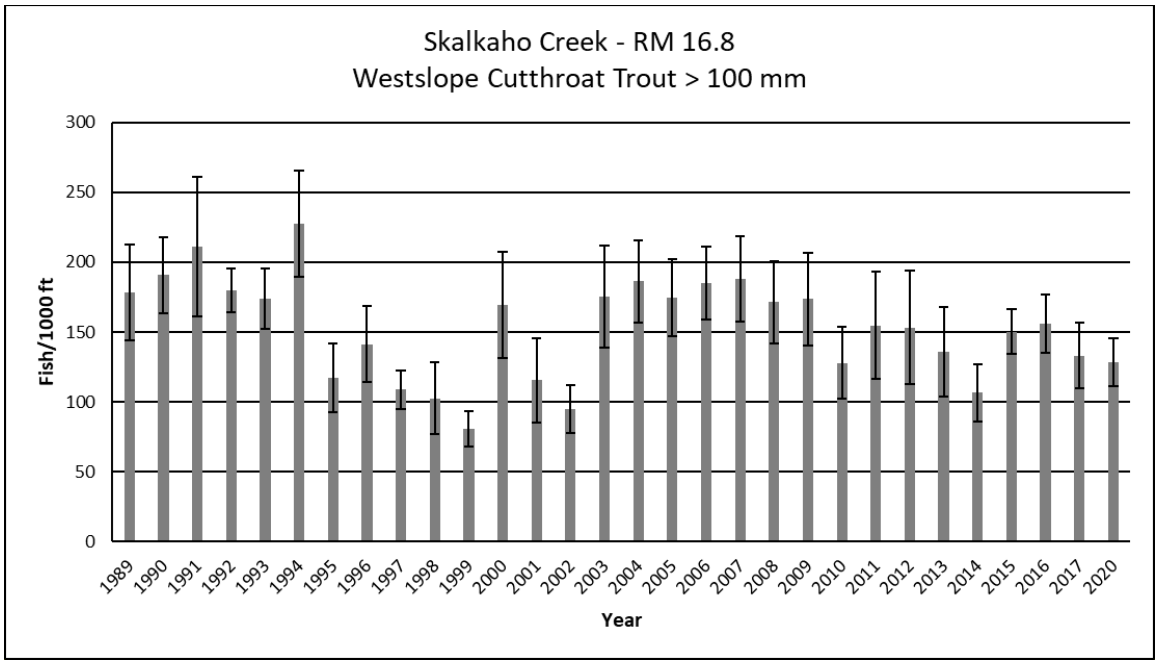

Figure 18. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Skalkaho Creek at the FSRM 16.8 section for the period of record.

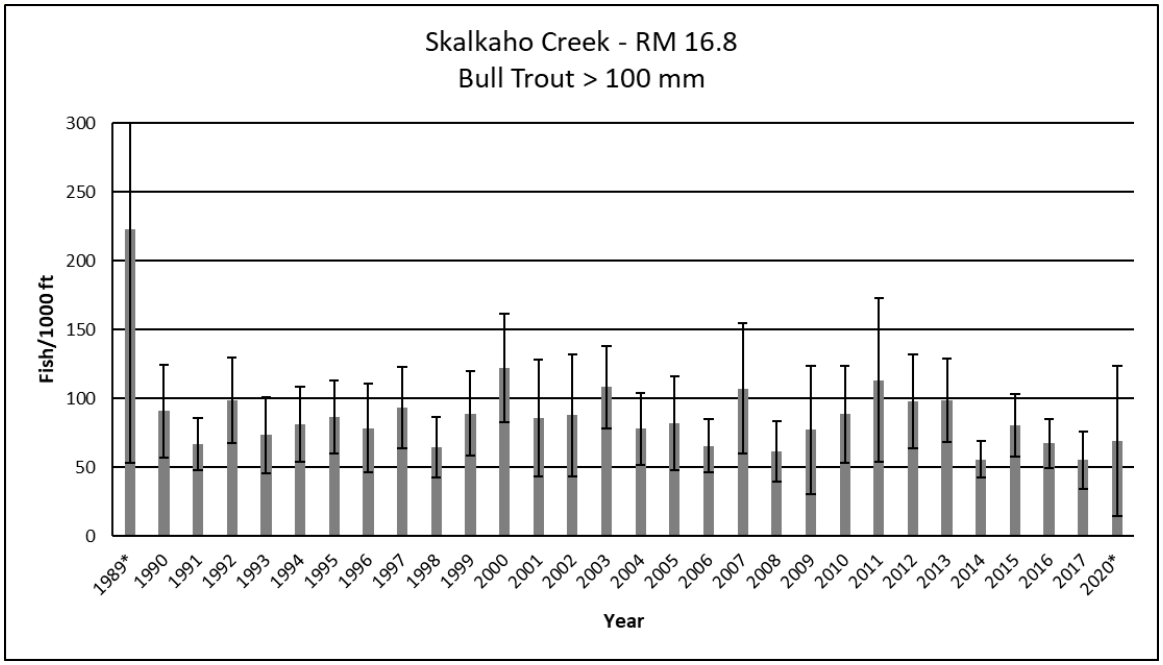

Figure 19. Population estimates for Bull Trout greater than 100 mm (~4") in total length in Skalkaho Creek at the FSRM 16.8 section for the period of record. Asterisk following year denotes estimate likely inaccurate due to poor capture efficiency.

Daly Creek

During the summer of 2020, a single population estimate was conducted on Daly Creek at the established section near FSRM 0.7. Table 13 contains a summary of fish captured during the marking run. Westslope Cutthroat Trout were the dominant species in the section, with Bull Trout also present in fair numbers. The population estimate for Westslope Cutthroat Trout over 100 mm in length was 130 per 1000 ft (95% confidence interval: +/- 15). This value was above the long-term average for the site, but within the range of variability (Figure 20). The population estimate for Bull Trout over 100 mm in length was 93 per 1000 ft (95% confidence interval: +/- 31). This value was slightly below the long-term average, but within the range of variability (Figure 21). In addition to the native trout observed in Daly Creek during the 2020 sampling effort, two nonnative brown trout were also collected at the FSRM 0.7 site. The first year brown trout were documented in lower Daly Creek was 2016. Continued monitoring of this section will be important to better understand Brown Trout range expansion in Daly Creek and the Skalkaho drainage.

Table 13. Electrofishing data collected at one section of Daly Creek in 2020. Data presented is from the marking run. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, BULL = Bull Trout, and LL = Brown Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 0.7	WCT	83	83	209	117-339	71
	BULL	33	33	186	104-289	28
	LL	1	1	280	280-280	1

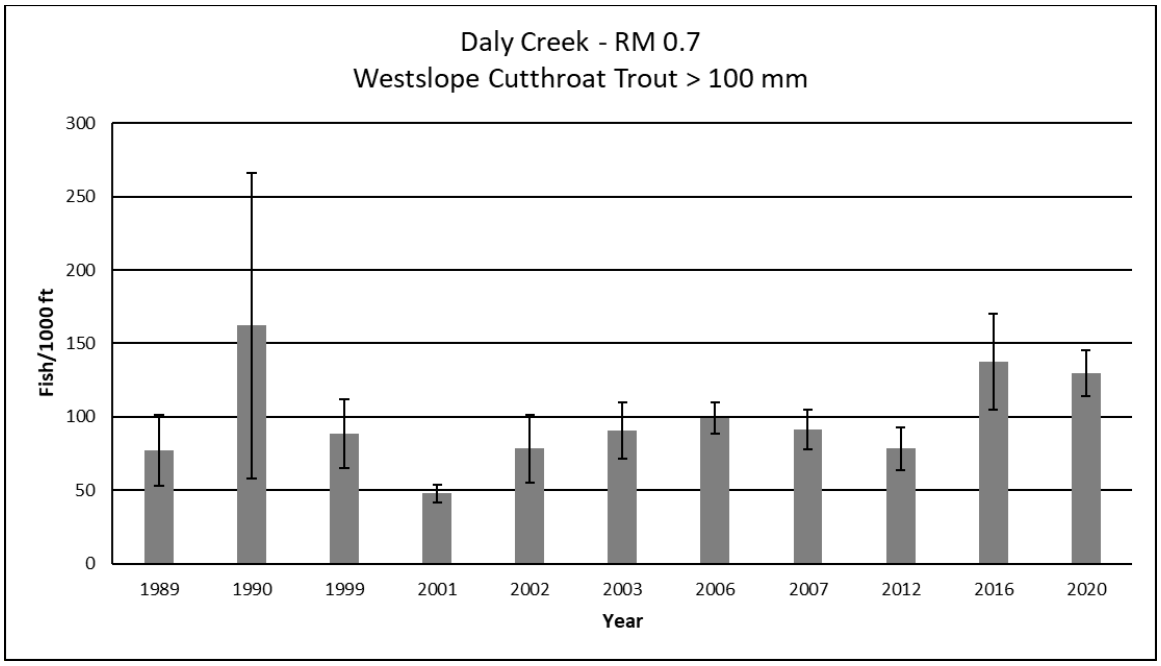

Figure 20. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Daly Creek at the FSRM 0.7 section for the period of record.

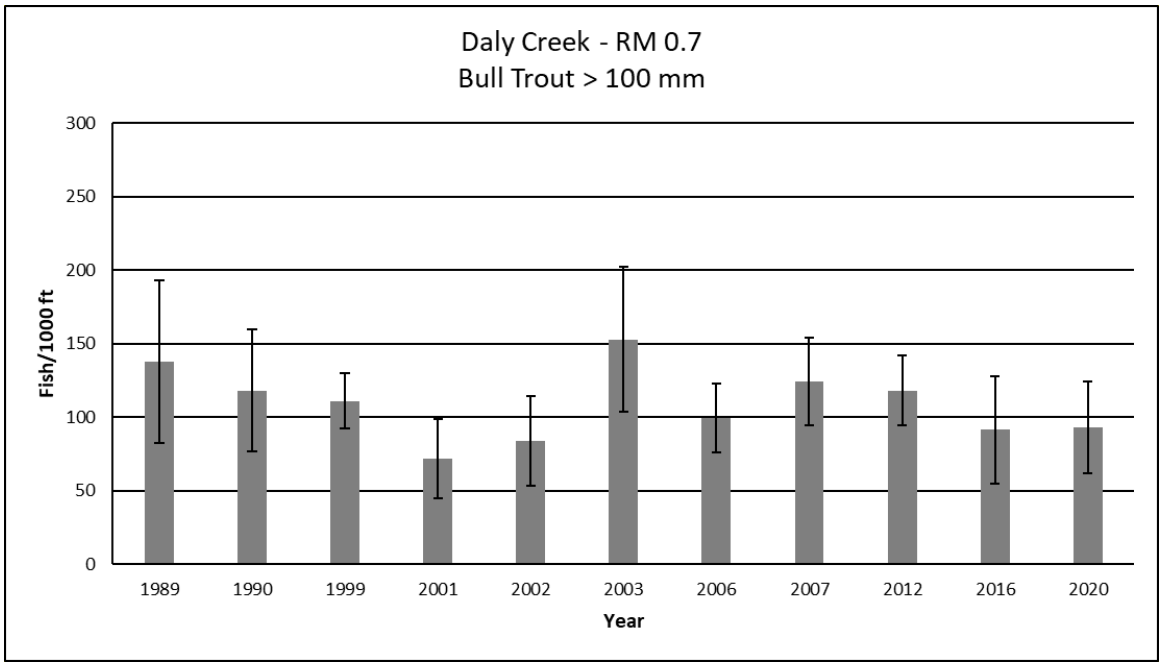

Figure 21. Population estimates for Bull Trout greater than 100 mm (~4") in total length in Daly Creek at the FSRM 0.7 section for the period of record.

Sleeping Child Creek

During the summer of 2019 and 2020, a single population estimate was conducted on Sleeping Child Creek at the long-term site located near FSRM 10.2. This reference site has typically been sampled on an annual basis since 1985. Table 14 contains a summary of fish captured during the marking run for both years. Brown Trout comprised the majority of fish in the reach with Westslope Cutthroat Trout also common, but in fewer numbers. Bull Trout were rare. Brown Trout were first detected in the reach in 1997 but did not become established until approximately 2006. The 2019 population estimate for Brown Trout over 100 mm in length was 139 per 1000 ft (95% confidence interval: +/- 21), and in 2020 it was 95 per 1000 ft (95% confidence interval: +/- 58). While both of these values are above the long-term average from when Brown Trout became established in the section (2006), numbers were down considerably from the record high observed in 2016 (Figure 22). For Westslope Cutthroat Trout, the 2019 estimate for fish over 100 mm in length was 65 per 1000 ft (95% confidence interval: +/- 19), and in 2020 it was 35 per 1000 ft (95% confidence interval: +/- 21). These values are well below the long-term averages for the site with the 2020 estimate being one of the lowest on record (Figure 23). No estimates were made for Bull Trout given the low number present in the sample reach. An evaluation of total number captured through time shows that the 2019 and 2020 values are below the long-term average (Figure 24).

Table 14. Electrofishing data collected at the FSRM 10.2 section of Sleeping Child Creek in 2019 and 2020. Data presented is from the marking run. *Bull Trout listed in 2020 are from the recapture run as none were captured during the marking run. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, BULL = Bull Trout, and LL = Brown Trout.

Year	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
2019	WCT	37	37	147	88-255	31
	BULL	1	1	175	175-175	1
	LL	82	82	207	109-293	68
2020	WCT	14	14	147	92-234	31
	*BULL	2	2	153	142-163	4
	LL	29	29	222	105-275	64

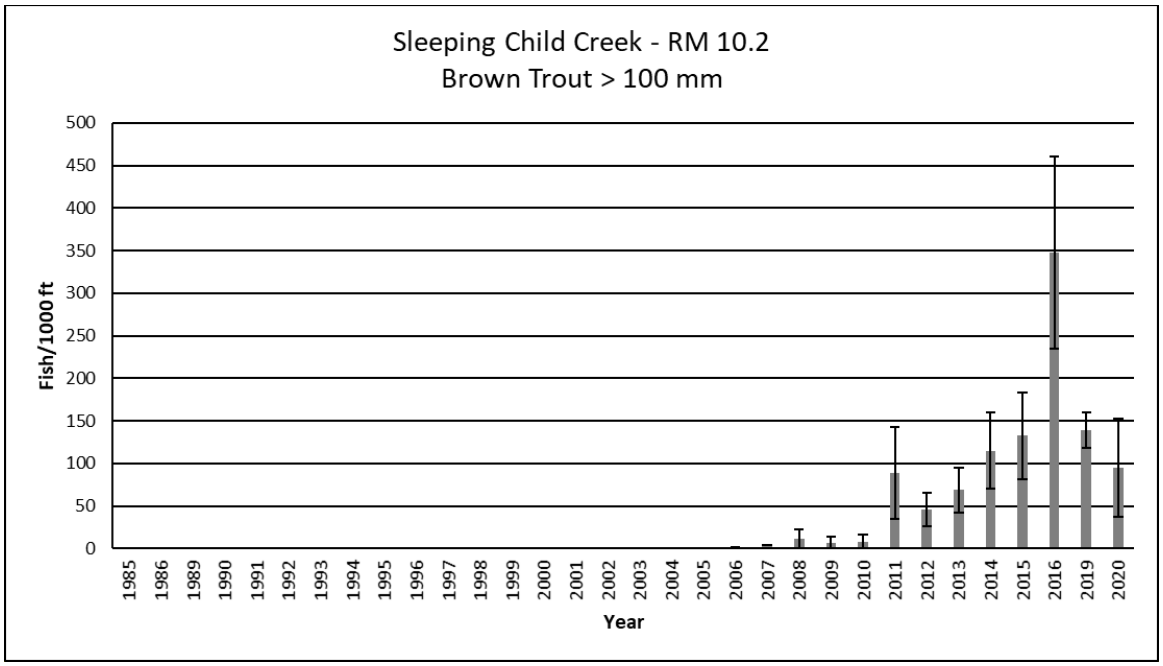

Figure 22. Population estimates for Brown Trout greater than 100 mm (~4") in total length in Sleeping Child Creek at the FSRM 10.2 section for the period of record.

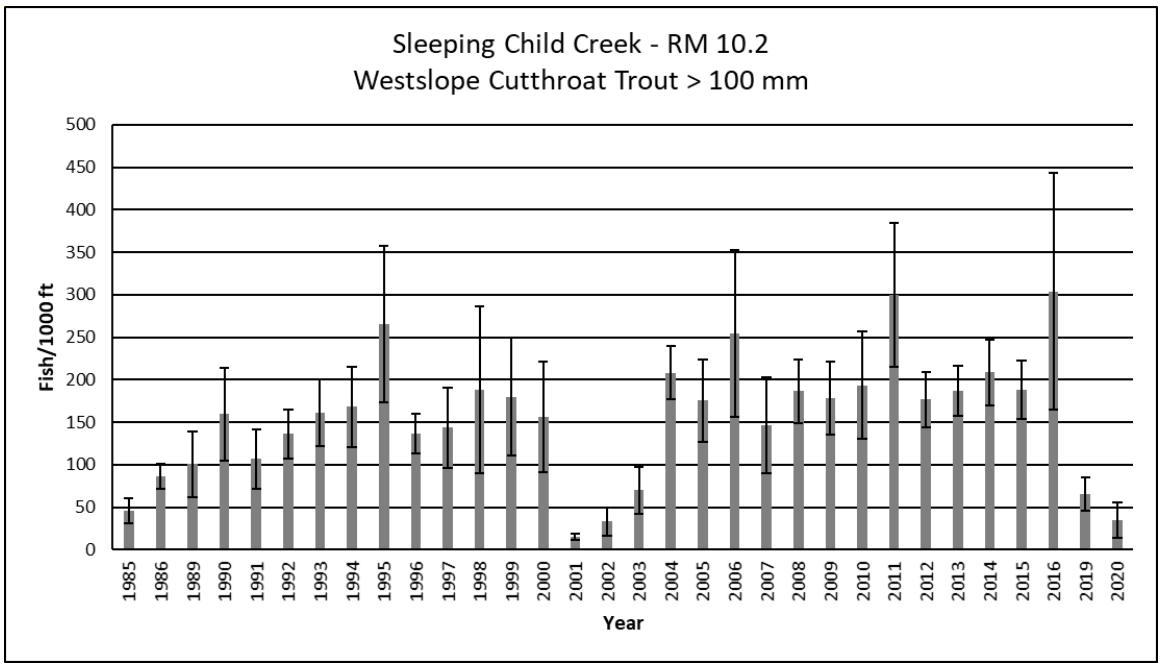

Figure 23. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Sleeping Child Creek at the FSRM 10.2 section for the period of record.

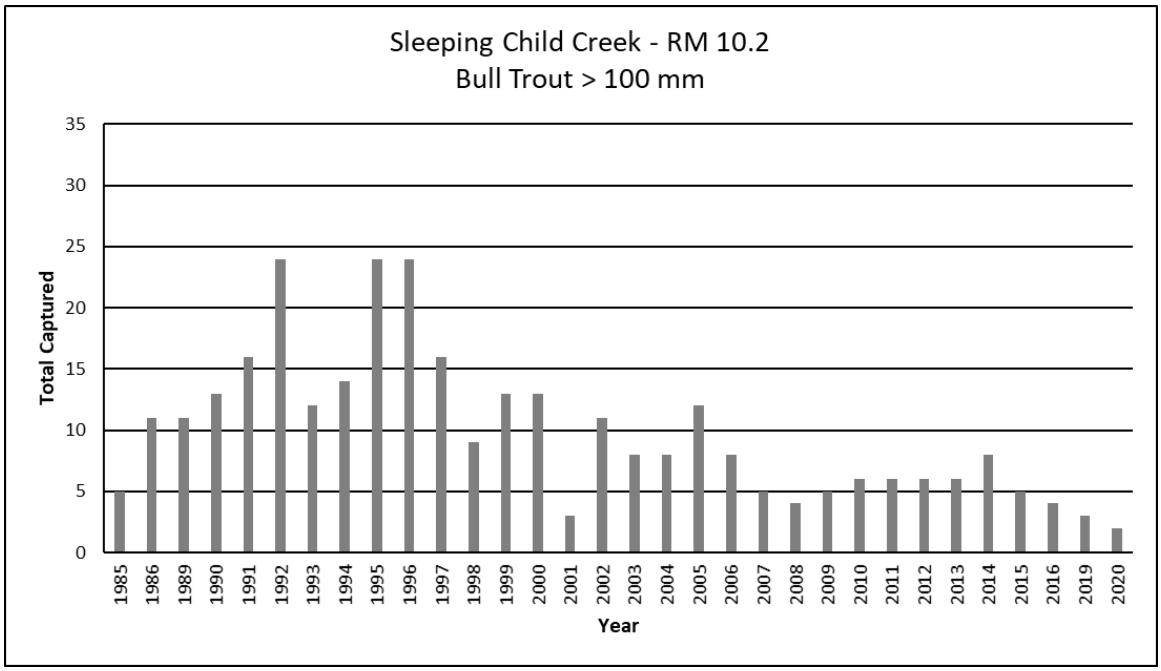

Figure 24. Number of Bull Trout greater than 100 mm (~4") in total length handled in the Sleeping Child Creek FSRM 10.2 section for the period of record.

West Fork Bitterroot River Drainage

Piquett Creek

During the summer of 2019, a single population estimate was conducted on Piquett Creek at the established site located near FSRM 1.3. Table 15 contains a summary of fish captured during the marking run. Westslope Cutthroat Trout comprised the bulk of the fish community, with Brook Trout and Brown Trout also present in relatively low numbers. Bull Trout and Rainbow Trout were also observed in 2019, but both species were very rare. The population estimate for Westslope Cutthroat Trout over 100 mm in length was 270 per 1000 ft (95% confidence interval: +/- 69). This value was above the long-term average and was the highest on record (Figure 25). The population estimate for Brown Trout over 100 mm in length was 22 per 1000 ft (95% confidence interval: +/- 11). 2019 was the first year Brown Trout were detected in the FSRM 1.3 sample reach suggesting the species is expanding its distribution into Piquett Creek. No estimates were run for Brook Trout, Bull Trout, or Rainbow Trout due to low numbers and insufficient recapture numbers. Brook Trout were historically more abundant in lower Piquett Creek, but numbers dropped substantially around 2007 and have not rebounded. Bull Trout and Rainbow Trout have always been relatively rare in Piquett Creek at the FSRM 1.3 section.

Table 15. Electrofishing data collected at one section of Piquett Creek in 2019. Data presented is from the marking run. *Bull Trout and Rainbow Trout included are from the recapture run as none were captured during the marking run. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, BULL = Bull Trout, EB = Brook Trout, RB = Rainbow Trout and LL = Brown Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 1.3	WCT	108	108	128	57-248	86
	*BULL	1	1	249	249-249	1
	EB	8	8	107	46-165	6
	*RB	1	1	154	154-154	1
	LL	8	8	189	137-248	6

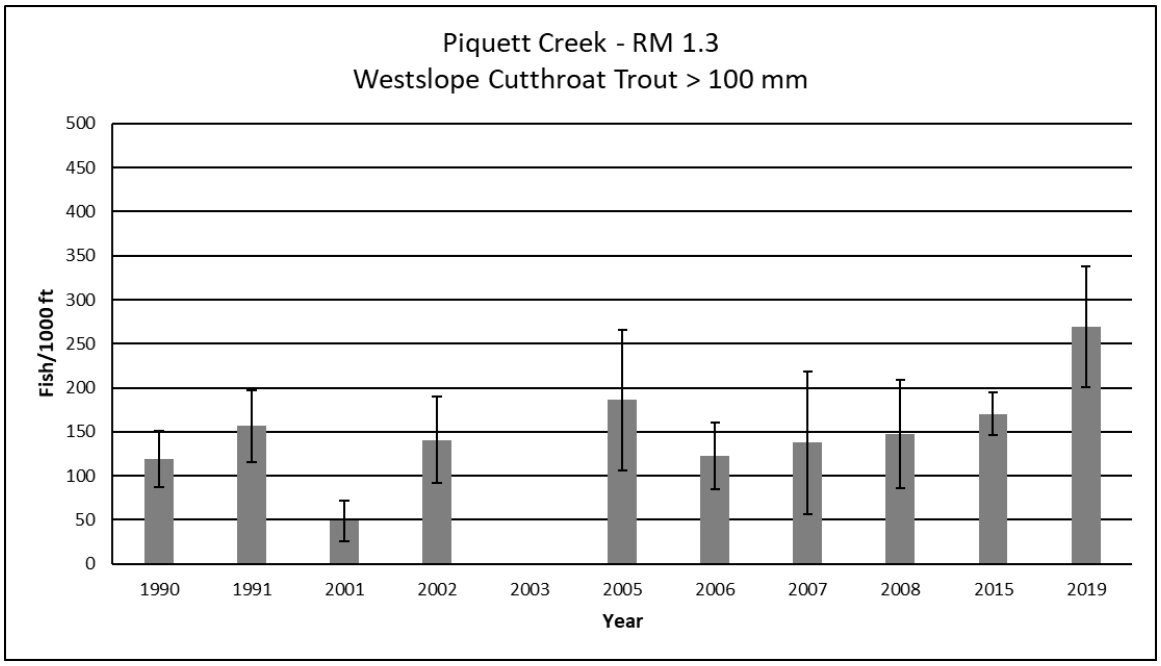

Figure 25. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Piquett Creek at the FSRM 1.3 section for the period of record.

Boulder Creek

During the summer of 2020, a single-pass fish survey was conducted in lower Boulder Creek near FSRM 0.8. This sampling targeted Westslope Cutthroat Trout for genetic testing. Previous genetic samples collected in the mid-1990s suggested the population was genetically pure. These samples were collected to confirm that original finding. A total of 25 individuals were captured throughout a 750 ft section and genetic samples were collected and stored for future analysis. The mean length of fish captured was 144 mm (Range: 83-226 mm). While conducting this sampling, two Bull Trout and a large (>500 mm) Brown Trout were also observed in the section.

Little West Fork Creek

During the summer of 2019, a single population estimate was conducted on Little West Fork Creek at the established section near FSRM 1.3. Table 16 contains a summary of fish captured during the marking run. Westslope Cutthroat Trout comprised the bulk of the fish community at the site. Other species present in lower numbers included Bull Trout, Brook Trout, and Brown Trout. The population estimate for Westslope Cutthroat Trout over 100 mm in length was 411 per 1000 ft (95% confidence interval: +/- 50). This value was above the long-term average and was the highest on record (Figure 26). The population estimate for Brown Trout over 100 mm in length was 8 per 1000 ft (95% confidence interval: +/- 0). Brown Trout were first detected at FSRM 1.3 in 2004 when the section was established. The 2019 sample was the first time enough fish were captured to generate an estimate for the species. No estimates were run for Bull Trout or Brook Trout due to low numbers and insufficient recaptures. However, the total numbers handled in 2019 were similar to previous sample years.

Table 16. Electrofishing data collected at one section of Little West Fork Creek in 2019. Data presented is from the marking run. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, BULL = Bull Trout, EB = Brook Trout, EBxBULL = Brook Trout x Bull Trout hybrid, and LL = Brown Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 1.3	WCT	219	219	147	68-291	86
	BULL	10	10	137	96-196	4
	EB	14	14	156	95-219	5
	EBxBULL	5	5	159	124-176	2
	LL	8	8	178	130-234	3

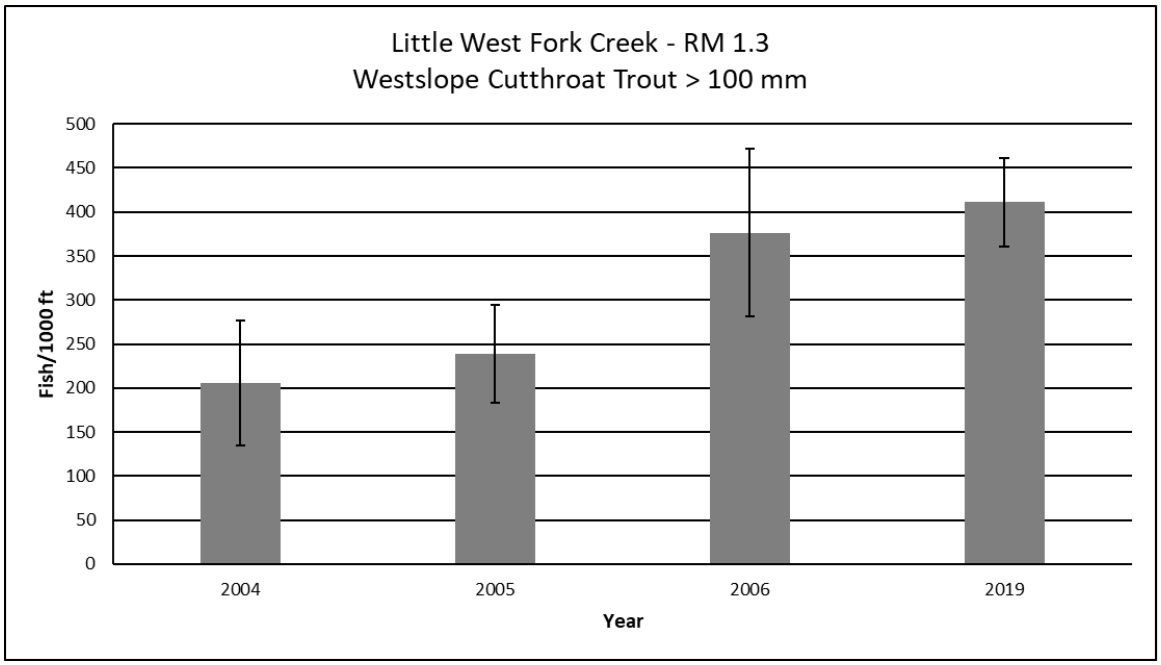

Figure 26. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Little West Fork Creek at the FSRM 1.3 section for the period of record.

Soda Springs Creek

During the summer of 2019, a single population estimate was conducted on Soda Springs Creek at the established section near FSRM 0.3. Table 17 contains a summary of fish captured during the marking run. Westslope Cutthroat Trout comprised most of the fish at the site. Bull Trout and Brook Trout were also observed in the reach, but in much lower numbers. The population estimate for Westslope Cutthroat Trout over 100 mm in length was 221 per 1000 ft (95% confidence interval: +/- 22). This value was above the long-term average and was the highest on record (Figure 27). No estimates were run for Bull Trout or Brook Trout due to low numbers and insufficient recaptures. However, the total numbers handled in 2019 were similar to previous sample years.

Table 17. Electrofishing data collected at one section of Soda Springs Creek in 2019. Data presented is from the marking run. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, BULL = Bull Trout, EB = Brook Trout, and EBxBULL = Brook Trout x Bull Trout hybrid.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 0.3	WCT	120	120	142	67-249	92
	BULL	7	7	151	108-230	5
	EB	2	2	165	155-174	2
	EBxBULL	1	1	150	150-150	1

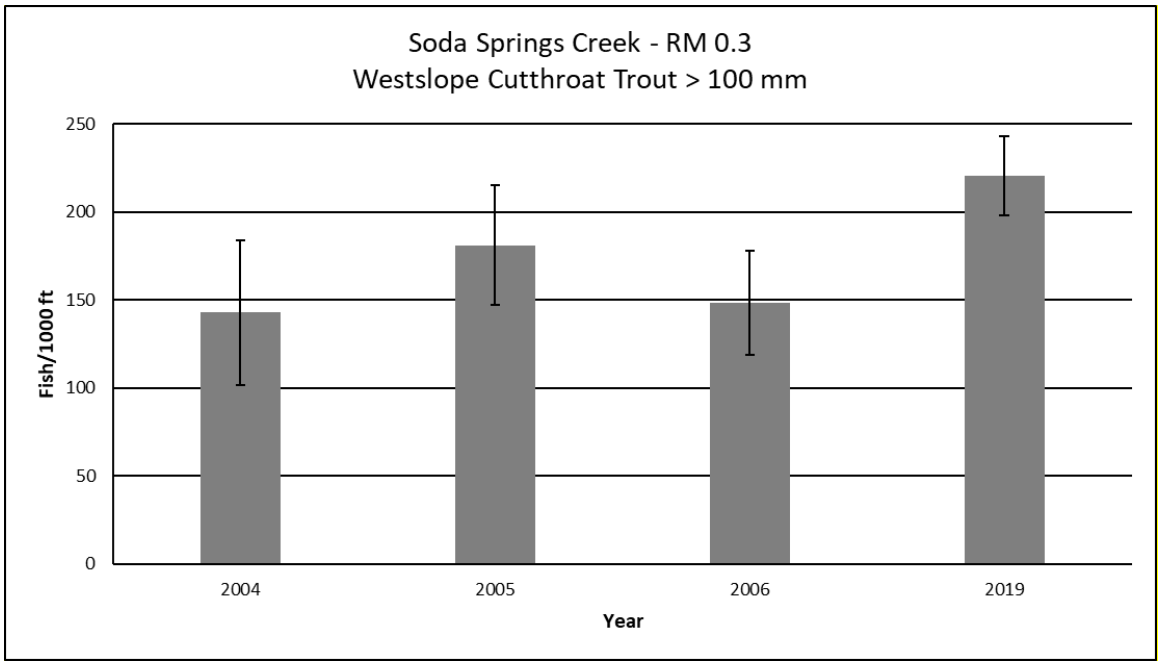

Figure 27. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Soda Springs Creek at the FSRM 0.3 section for the period of record.

Watchtower Creek

During the summer of 2020, a single population estimate was conducted on lower Watchtower Creek at the established section near FSRM 0.1. Table 18 contains a summary of fish captured during the marking run. Westslope Cutthroat Trout made up much of the fish community at the site. Bull Trout and Brook Trout were also observed in the reach, but in much lower numbers. The population estimate for Westslope Cutthroat Trout over 100 mm in length was 208 per 1000 ft (95% confidence interval: +/- 33). This value was slightly above the long-term average for the site, but within the range of variability (Figure 28). No estimates were run for Bull Trout or Brook Trout due to low numbers and insufficient recaptures. Total numbers handled in 2020 for both species were lower than the long-term averages for the site (Figures 29 and 30).

Table 18. Electrofishing data collected at one section of Watchtower Creek in 2020. Data presented is from the marking run. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, BULL = Bull Trout, and EB = Brook Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 0.1	WCT	149	149	121	55-230	96
	BULL	2	2	84	62-105	1
	EB	5	5	109	61-156	3

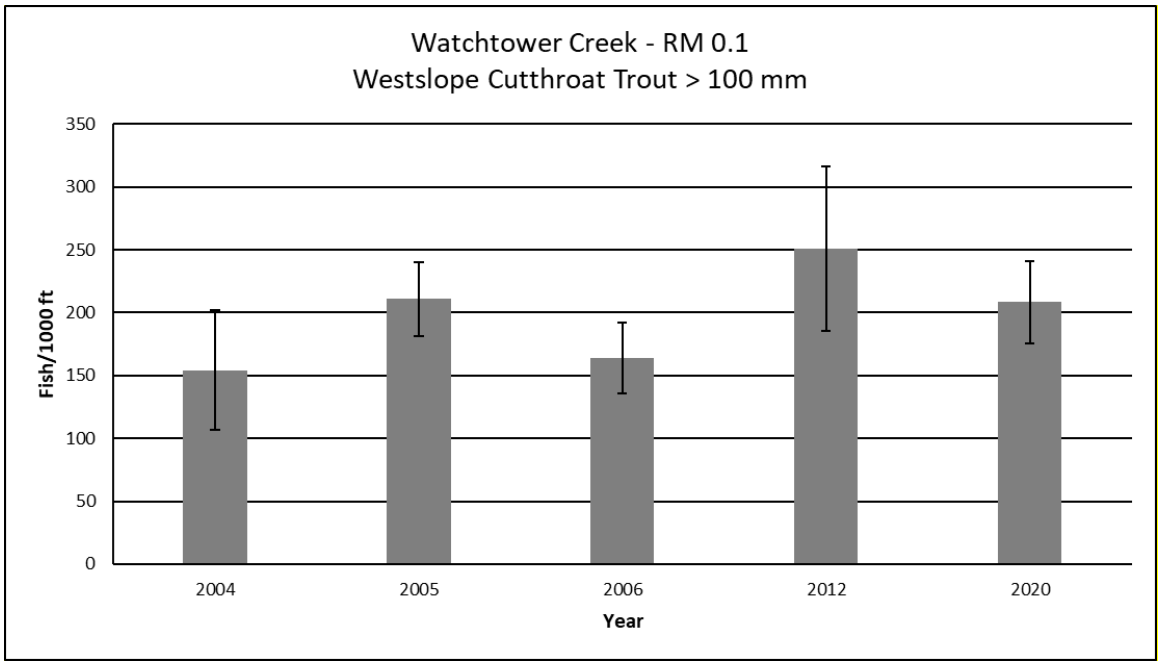

Figure 28. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Watchtower Creek at the FSRM 0.1 section for the period of record.

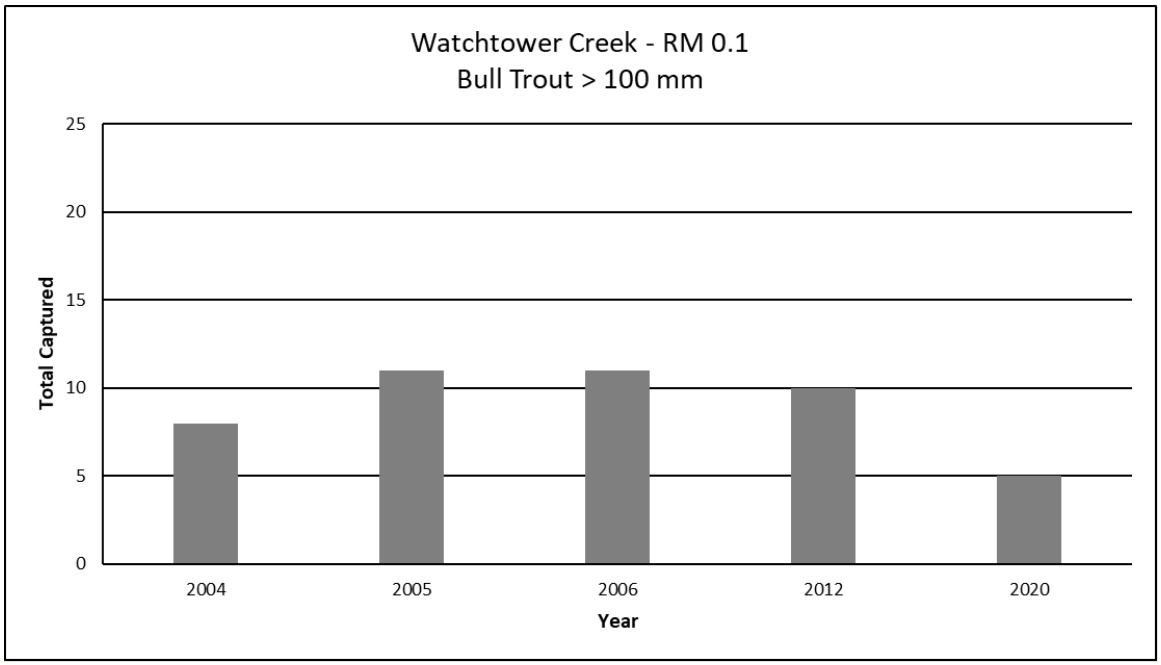

Figure 29. Number of Bull Trout greater than 100 mm (~4") in total length handled in the Watchtower Creek FSRM 0.1 section for the period of record.

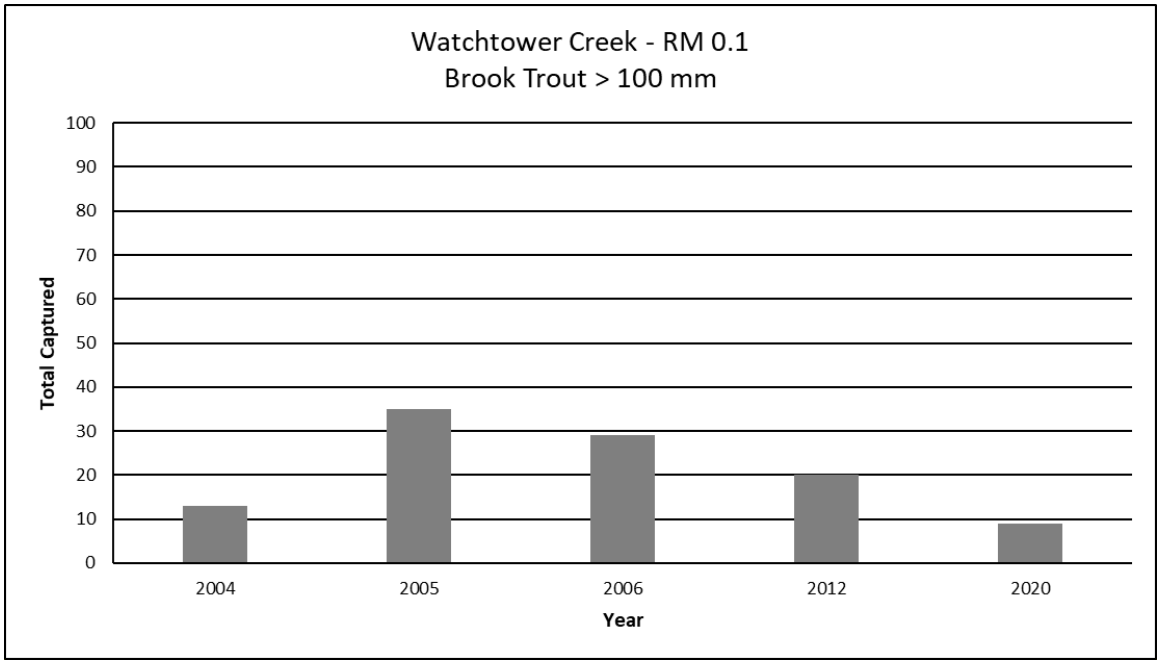

Figure 30. Number of Brook Trout greater than 100 mm (~4") in total length handled in the Watchtower Creek FSRM 0.1 section for the period of record.

Sheephead Creek

During the summer of 2020, a single population estimate was conducted on lower Sheephead Creek at the established section near FSRM 0.2. Table 19 contains a summary of fish captured during the marking run. Westslope Cutthroat Trout comprised most of the fish at the site. Bull Trout, Brook Trout, and Brown Trout were also observed in the reach, but in much lower numbers. The population estimate for Westslope Cutthroat Trout over 100 mm in length was 327 per 1000 ft (95% confidence interval: +/- 178). This value was above the long-term average for the site and is the highest on record (Figure 31). However, relatively poor recapture efficiency likely inflated the estimate. No estimates were run for Bull Trout, Brook Trout, or Brown Trout due to low numbers and insufficient recaptures. The total number of Bull Trout greater than 100 mm in length handled in the section was near average (Figure 32) while the number of Brook Trout captured was the lowest on record (Figures 33). Brown Trout were first observed in lower Sheephead Creek in 2005, and densities appear to have changed little in the last 15 years.

Table 19. Electrofishing data collected at one section of Sheephead Creek in 2020. Data presented is from the marking run. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, BULL = Bull Trout, EB = Brook Trout, and LL = Brown Trout hybrid.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 0.2	WCT	100	100	119	65-210	88
	BULL	9	9	143	90-210	8
	EB	4	4	157	124-210	3
	LL	1	1	114	114-114	1

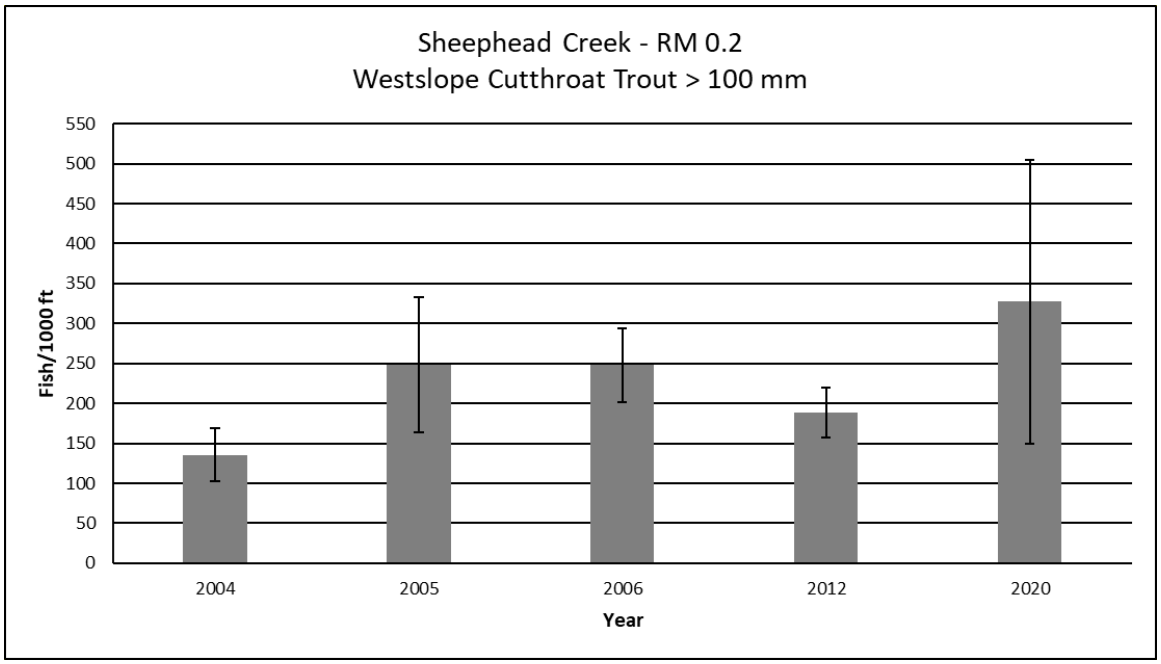

Figure 31. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Sheephead Creek at the FSRM 0.2 section for the period of record.

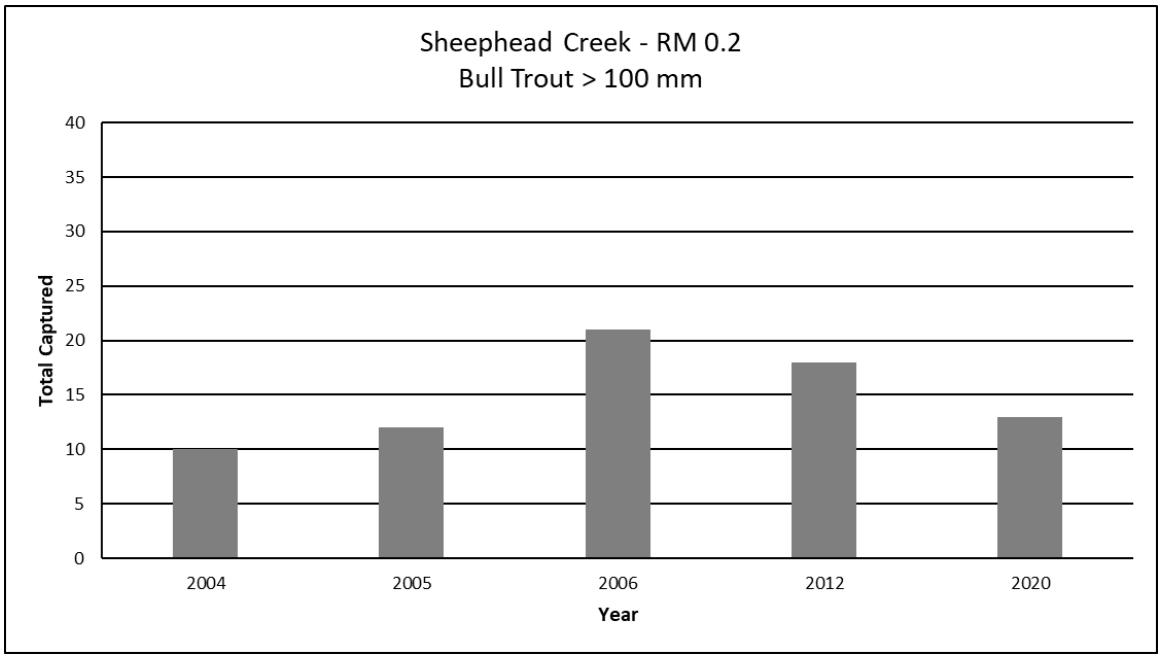

Figure 32. Number of Bull Trout greater than 100 mm (~4") in total length handled in the Sheephead Creek FSRM 0.2 section for the period of record.

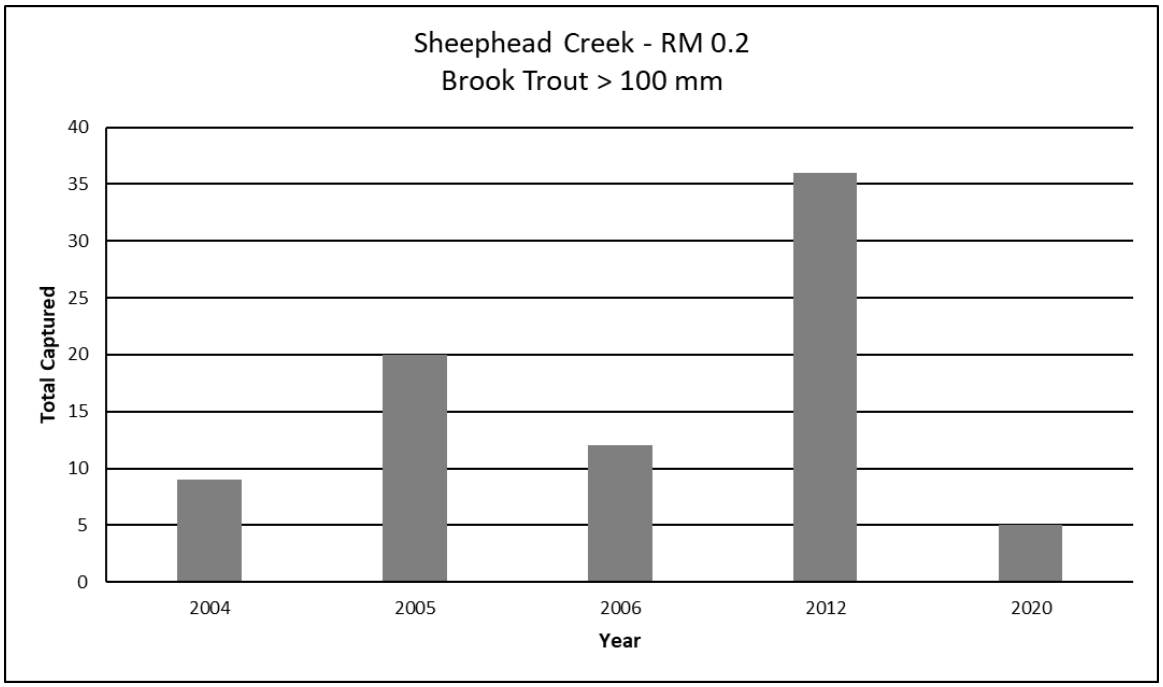

Figure 33. Number of Brook Trout greater than 100 mm (~4") in total length handled in the Sheephead Creek FSRM 0.2 section for the period of record.

Rye Creek

During the summer of 2019 and 2020, two population estimates were completed on Rye Creek at established sections located near FSRM 12.4 and FSRM 6.6, respectively. Table 20 contains a summary of fish captured during the marking runs. Westslope Cutthroat Trout comprised the bulk of the fish community at both sites, with Brook Trout also present in lower numbers. The population estimate for Westslope Cutthroat Trout over 100 mm in length at FSRM 6.6 was 148 per 1000 ft (95% confidence interval: +/- 22). This value was slightly above the long-term average, but within the range of variability for the site (Figure 34). The estimate for Brook Trout at FSRM 6.6 was 112 per 1000 ft (95% confidence interval: +/- 50). This value was much higher than the long-term average for the reach and was more in line with the estimate from 2001, which was completed just after the fires of 2000 burned much of the Rye Creek basin (Figure 35). Brook Trout numbers dropped noticeably at FSRM 6.6 a couple years post-fire. At FSRM 12.4 Westslope Cutthroat Trout continued to be the dominant species present. The population estimate for fish over 100 mm in length was 186 per 1000 ft (95% confidence interval: +/- 138). This value was slightly above the long-term average, but within the range of variability for the site (Figure 36). No estimate was run for Brook Trout at FSRM 12.4 due to insufficient recaptures. Total numbers handled in 2019 appeared to be roughly half of the previous three sample periods (Figures 37). Bull Trout were historically present in Rye Creek at FSRM 12.4, but the species has not been detected since the fires of 2000 burned much of the drainage (Figure 38).

Table 20. Electrofishing data collected at two sections of Rye Creek in 2019 (FSRM 12.4) and 2020 (FSRM 6.6). Data presented is from the marking runs. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout and EB = Brook Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 6.6	WCT	109	109	130	80-231	75
	EB	37	37	117	35-169	25
FSRM 12.4	WCT	35	44	121	65-185	71
	EB	14	18	126	80-160	29

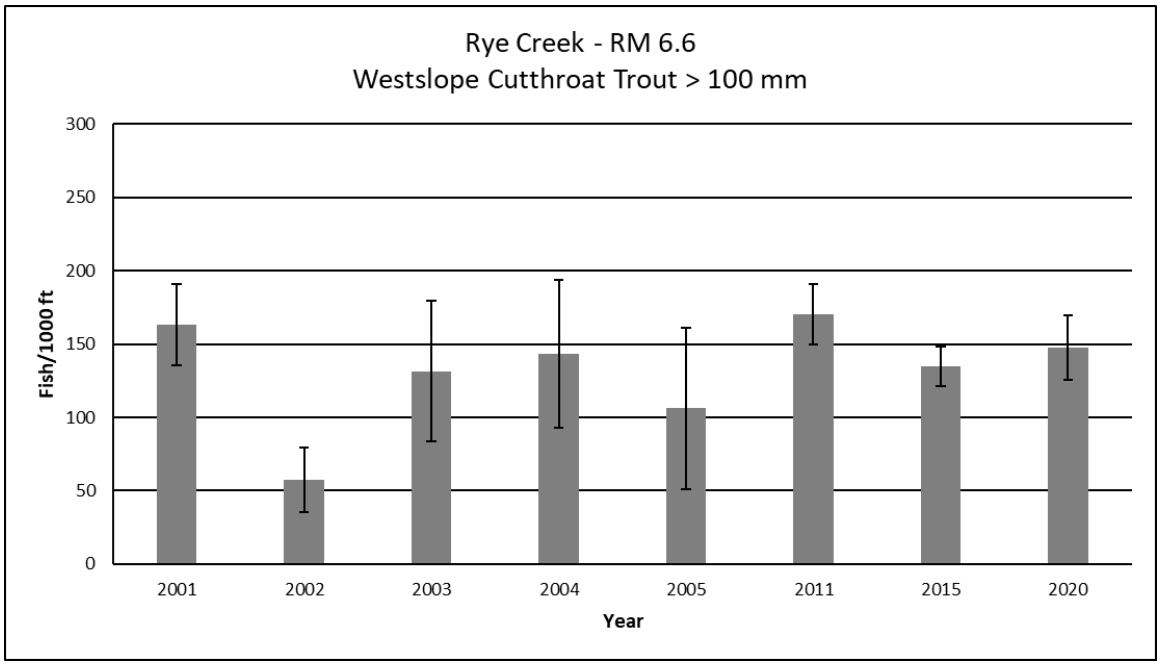

Figure 34. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Rye Creek at the FSRM 6.6 section for the period of record.

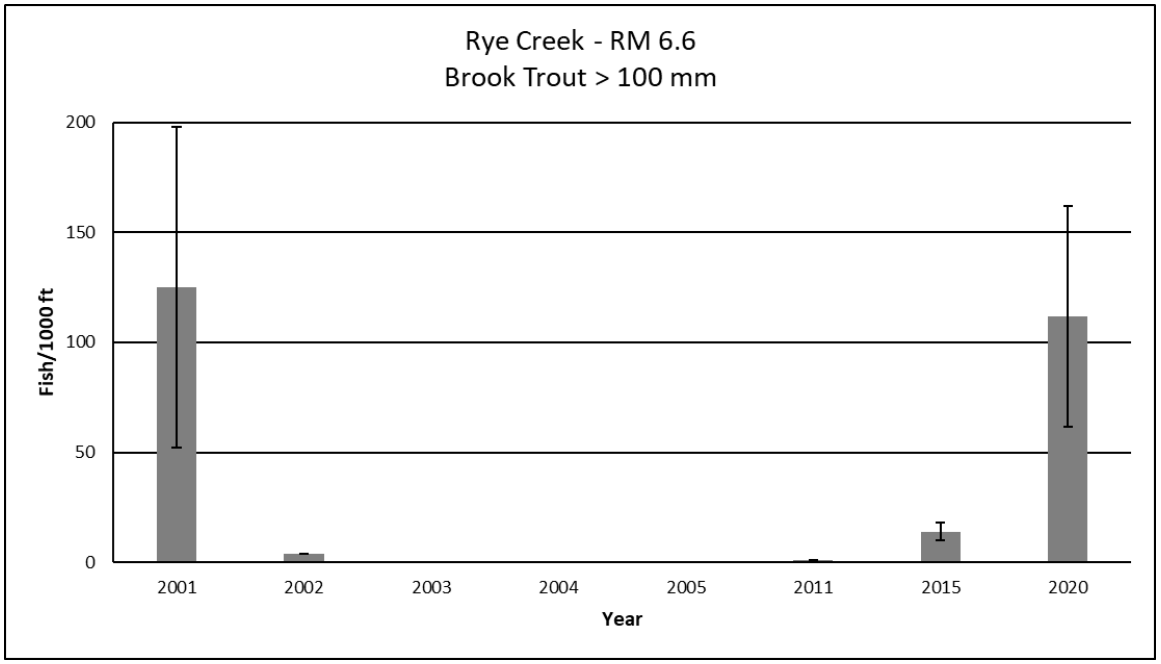

Figure 35. Population estimates for Brook Trout greater than 100 mm (~4") in total length in Rye Creek at the FSRM 6.6 section for the period of record.

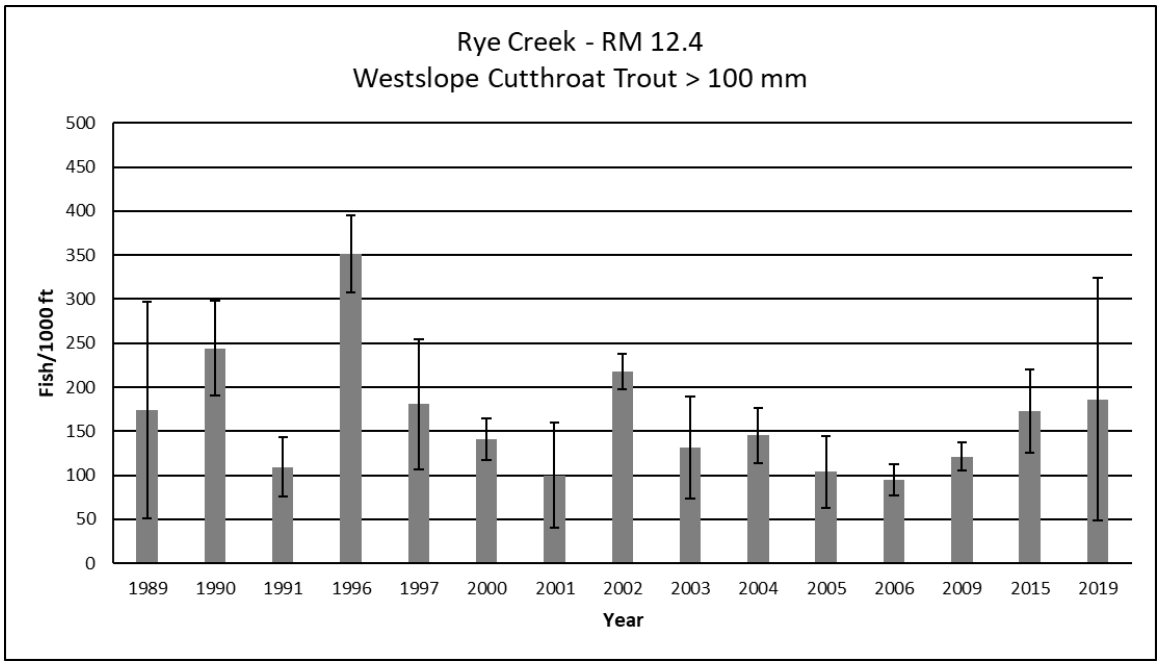

Figure 36. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Rye Creek at the FSRM 12.4 section for the period of record.

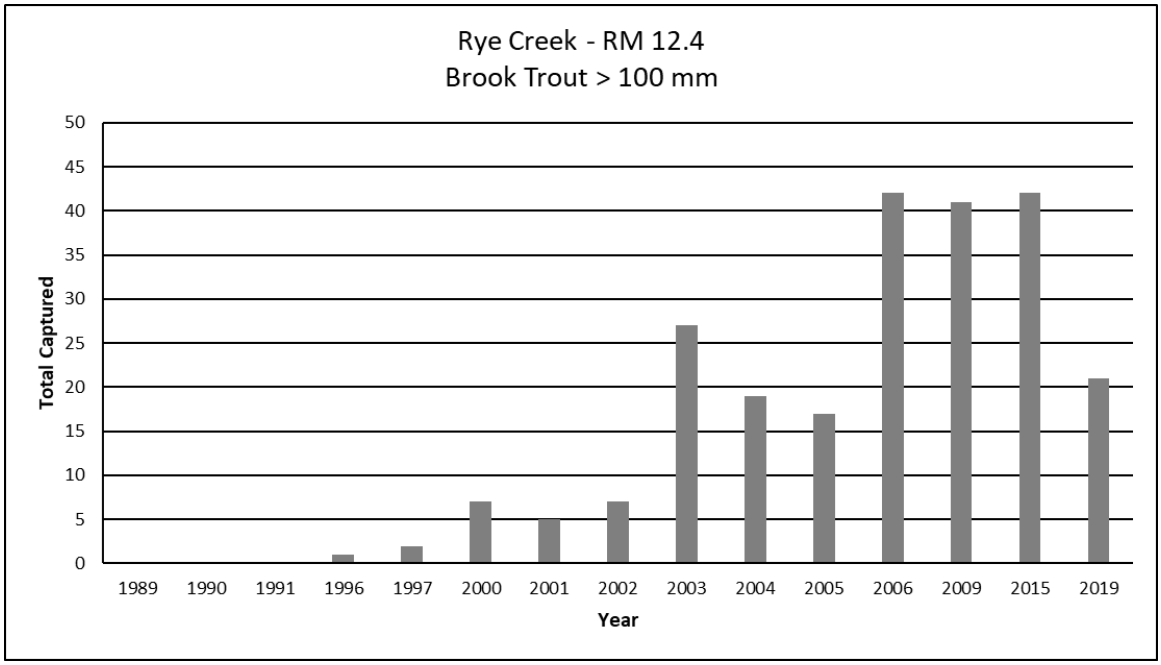

Figure 37. Number of Brook Trout greater than 100 mm (~4") in total length handled in the Rye Creek FSRM 12.4 section for the period of record.

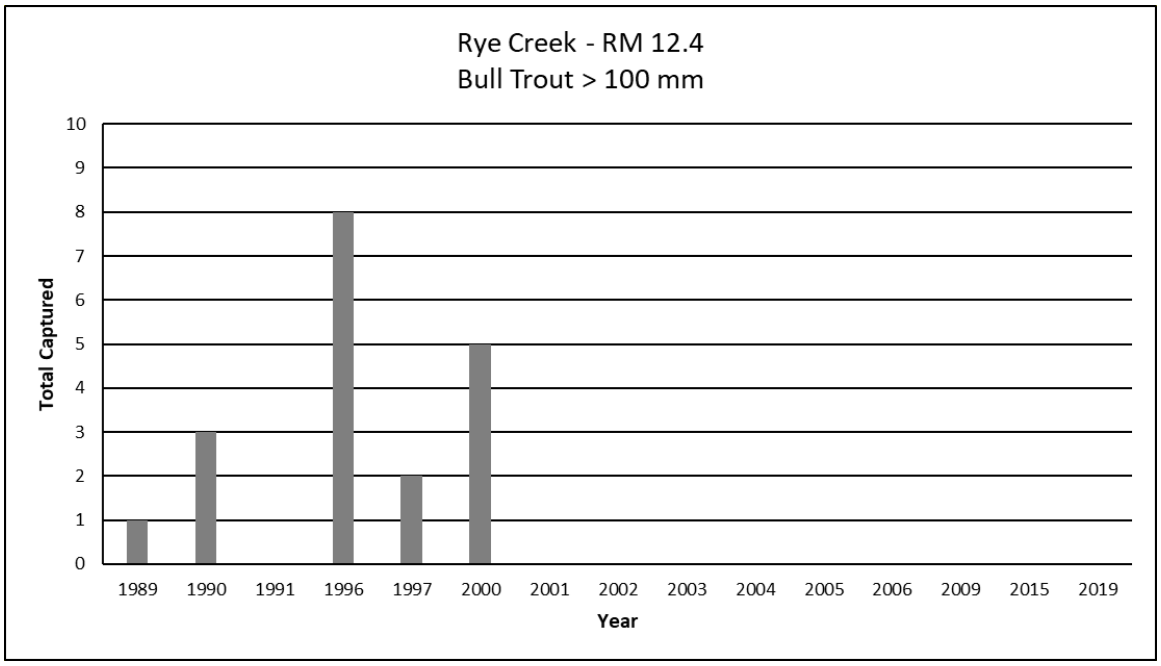

Figure 38. Number of Bull Trout greater than 100 mm (~4") in total length handled in the Rye Creek FSRM 12.4 section for the period of record.

North Fork Rye Creek

During the summer of 2019, a single population estimate was completed on North Fork Rye Creek at the established section located near FSRM 1.9. Table 21 contains a summary of fish captured during the marking run. Westslope Cutthroat Trout comprised the bulk of the fish community at the site, with Brook Trout also present but in far less numbers. Many of the fish present were juveniles less than 100 mm in length. This was especially true for Brook Trout. The population estimate for Westslope Cutthroat Trout over 100 mm in length at FSRM 1.9 was 123 per 1000 ft (95% confidence interval: +/- 35) (Figure 39). This value was close to the long-term average for the site. No estimate was run for Brook Trout because only two fish were captured over 100 mm in length. This finding was similar to previous samples collected after the fires of 2000, which burned much of the drainage and led to a significant reduction in Brook Trout density in North Fork Rye Creek (Figures 40). While Westslope Cutthroat Trout were also impacted by the fire, population numbers rebounded within a few years (Figure 39).

Table 21. Electrofishing data collected at one section of North Rye Creek in 2019. Data presented is from the marking run. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout and EB = Brook Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 1.9	WCT	156	195	94	59-211	88
	EB	22	28	56	50-65	12

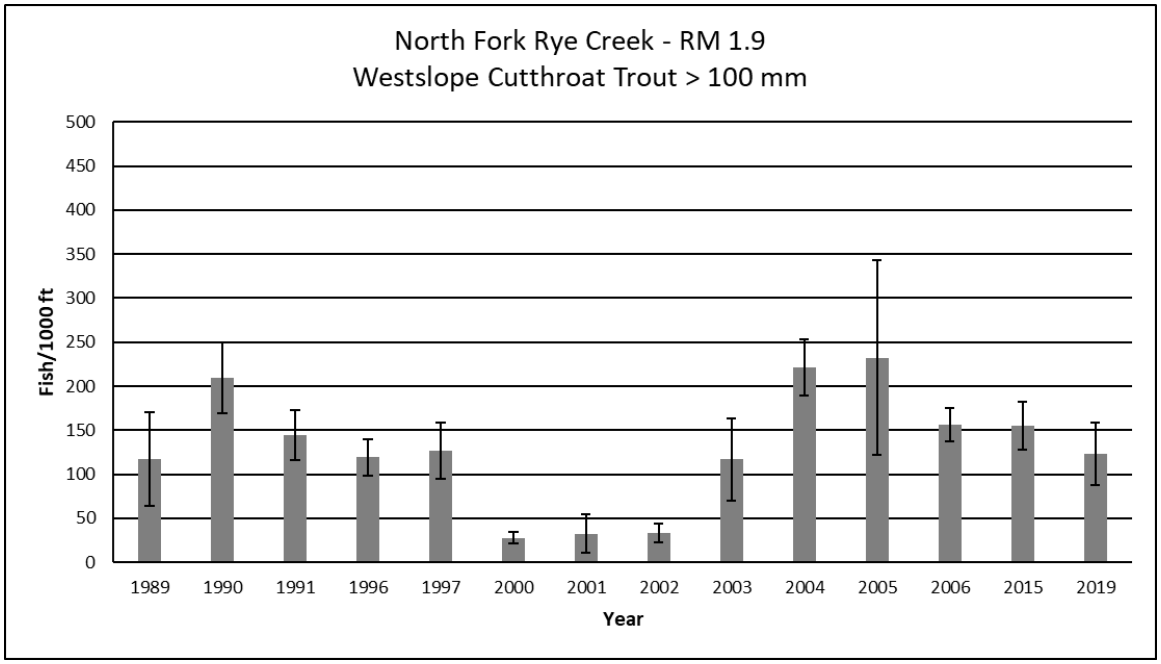

Figure 39. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in North Fork Rye Creek at the FSRM 1.9 section for the period of record.

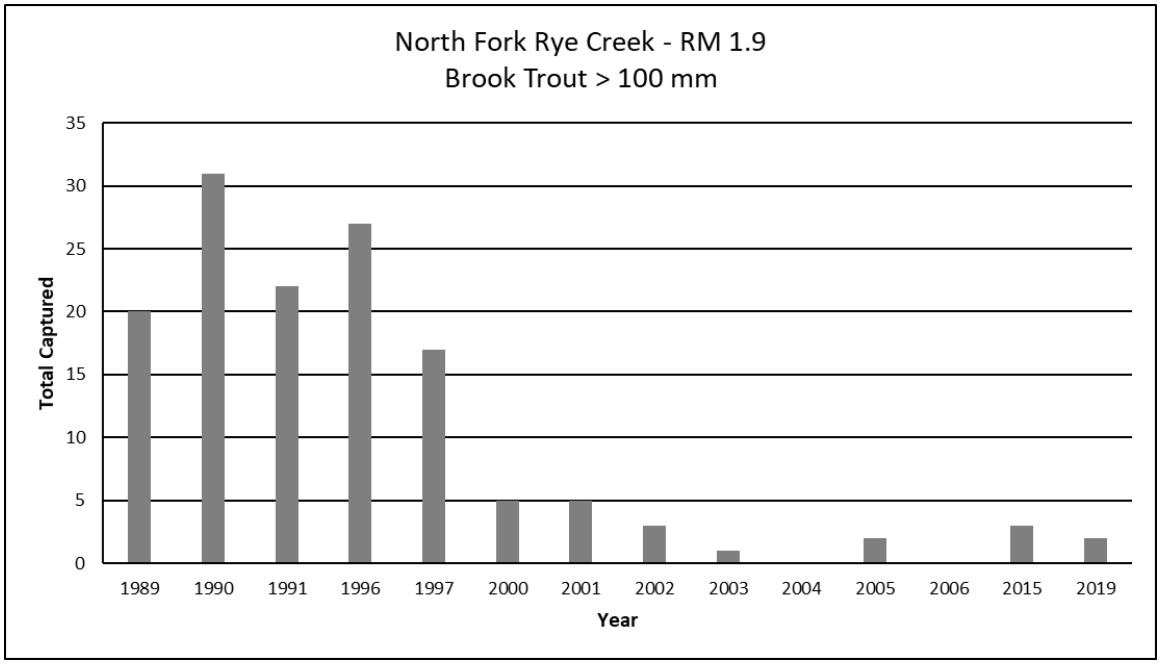

Figure 40. Number of Brook Trout greater than 100 mm (~4") in total length handled in the North Fork Rye Creek FSRM 1.9 section for the period of record.

East Fork Bitterroot River Drainage

Cameron Creek

During the summer of 2020, a single population estimate was completed on Cameron Creek at the established section located near FSRM 6.1. Table 22 contains a summary of fish captured during the marking run. Brook Trout comprised the bulk of the fish community at the site, with Westslope Cutthroat Trout also present in lower numbers. Brown Trout were also observed in the sample section but appeared to be fairly uncommon. The population estimate for Brook Trout over 100 mm in length at FSRM 6.1 was 215 per 1000 ft (95% confidence interval: +/- 87). This value was nearly triple the long-term average for the site and was the highest on record (Figure 41). The estimate for Westslope Cutthroat Trout of the same size was 78 per 1000 ft (95% confidence interval: +/- 30) (Figure 42). This value was nearly double the long-term average for the site. No estimate was made for Brown Trout due to low numbers and the fact none were captured during the marking run. Brown Trout were first observed in this section of Cameron Creek in 2010.

Table 22. Electrofishing data collected at one section of Cameron Creek in 2020. Data presented is from the marking run. * Brown Trout included are from the recapture run as none were captured during the marking run. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, EB = Brook Trout, and LL = Brown Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 6.1	WCT	20	33	137	90-225	19
	EB	81	135	100	44-245	78
	*LL	3	5	222	185-255	3

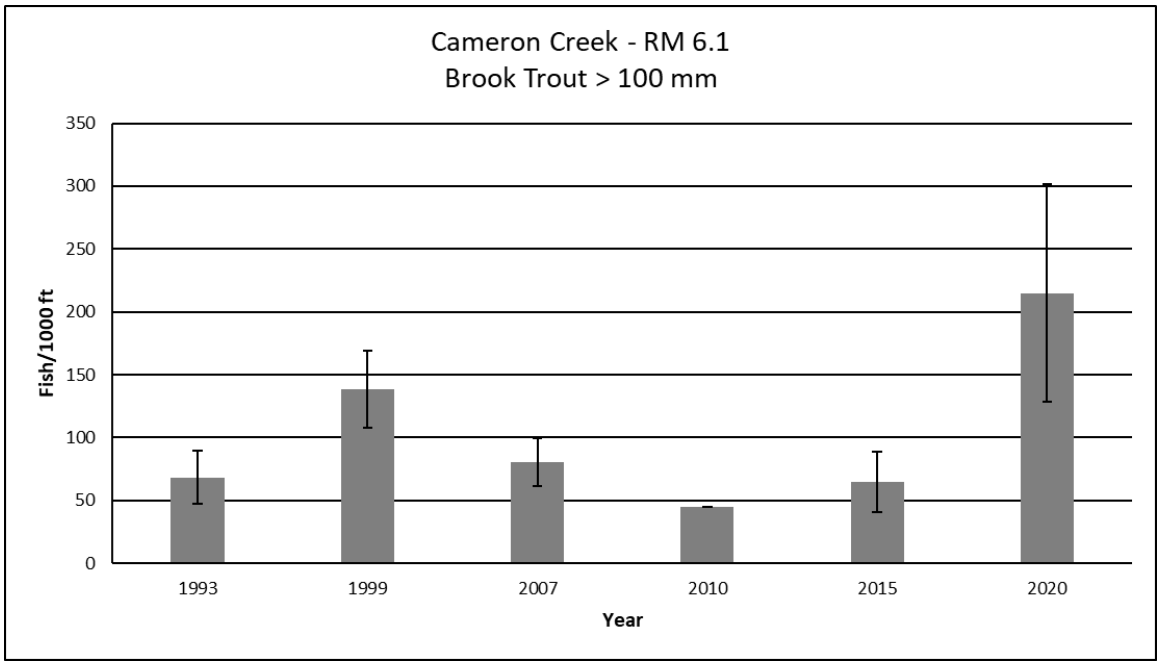

Figure 41. Population estimates for Brook Trout greater than 100 mm (~4") in total length in Cameron Creek at the FSRM 6.1 section for the period of record.

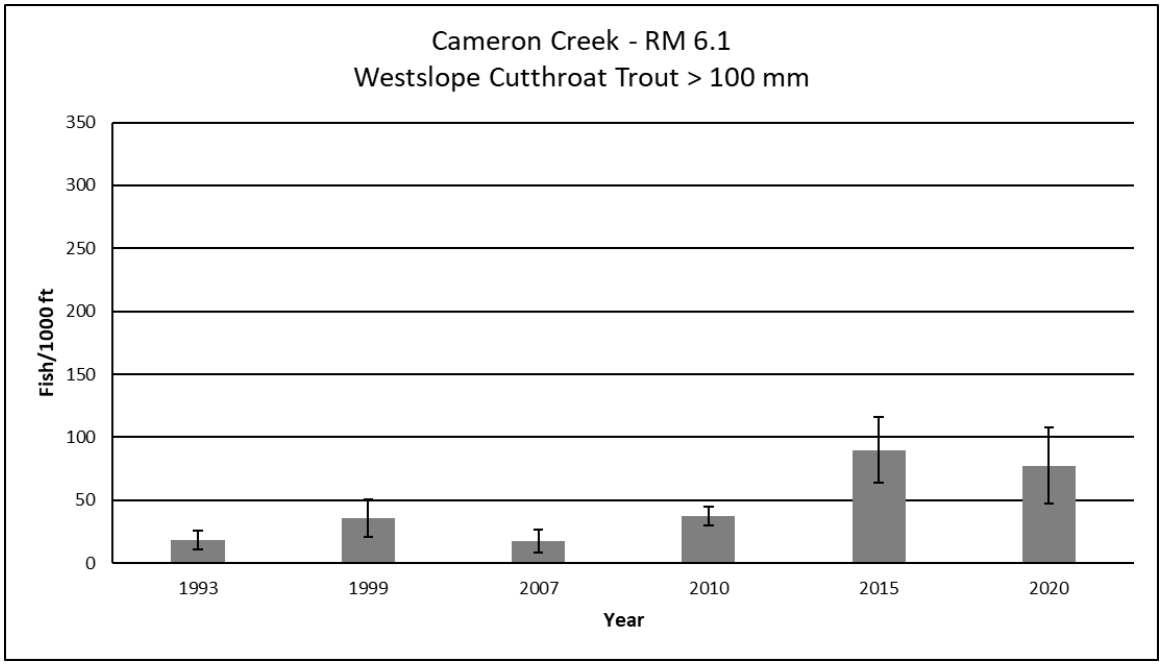

Figure 42. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Cameron Creek at the FSRM 6.1 section for the period of record.

Meadow Creek

Two population estimates were completed in Meadow Creek during the summer of 2019. The surveys were conducted at established sections located near FSRM 0.3 and FSRM 5.6. Table 23 contains a summary of fish collected during the marking runs at each site. Westslope Cutthroat Trout comprised most of the fish in both sections, with Bull Trout present, but in low numbers. One Brook Trout and three Brown Trout were also handled at FSRM 0.3, but these species were not observed at FSRM 5.6. The population estimate for Westslope Cutthroat Trout over 100 mm in length at FSRM 0.3 was 234 per 1000 ft (95% confidence interval: +/- 42). This value was the highest recorded since the section was established in 2010 (Figure 43). Low numbers did not allow an estimate to be generated for Bull Trout. However, the total number of Bull Trout handled was the lowest on record (Figure 44). At FSRM 5.6, the population estimate for Westslope Cutthroat Trout over 100 mm in length was 232 per 1000 ft (95% confidence interval: +/- 31). This value was slightly above the long-term average (Figure 45). No estimate was run for Bull Trout due to low numbers and insufficient recaptures. The total number of Bull Trout handled was the lowest recorded since the section was established in 1989 (Figure 46).

Table 23. Electrofishing data collected at two sections of Meadow Creek in 2019. Data presented is from the marking run. Species abbreviations are as follows: WCT = Westslope Cutthroat Trout, BULL = Bull Trout, EB = Brook Trout, and LL = Brown Trout.

Section	Species	Number of Fish Captured	Fish per 1000 ft (CPUE)	Mean Length (mm)	Length Range (mm)	Species Composition (%)
FSRM 0.3	WCT	128	128	140	56-276	96
	BULL	2	2	125	88-162	1.5
	EB	1	1	206	206-206	1
	LL	2	2	152	148-156	1.5
FSRM 5.6	WCT	183	183	122	57-231	96
	BULL	7	7	178	85-370	4

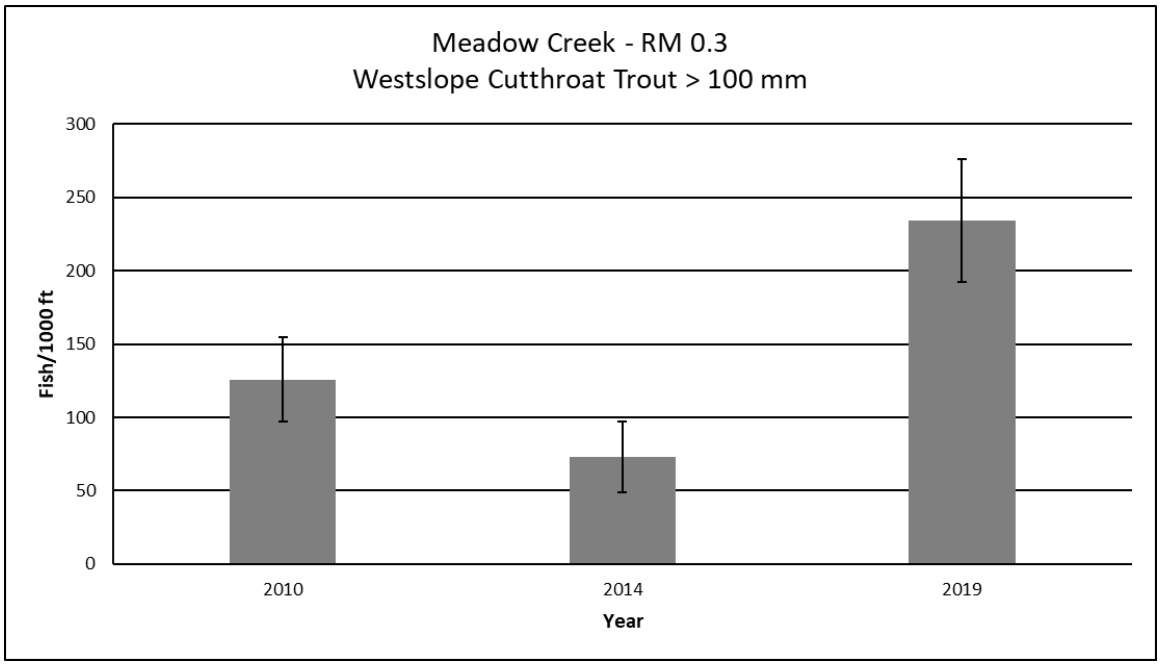

Figure 43. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Meadow Creek at the FSRM 0.3 section for the period of record.

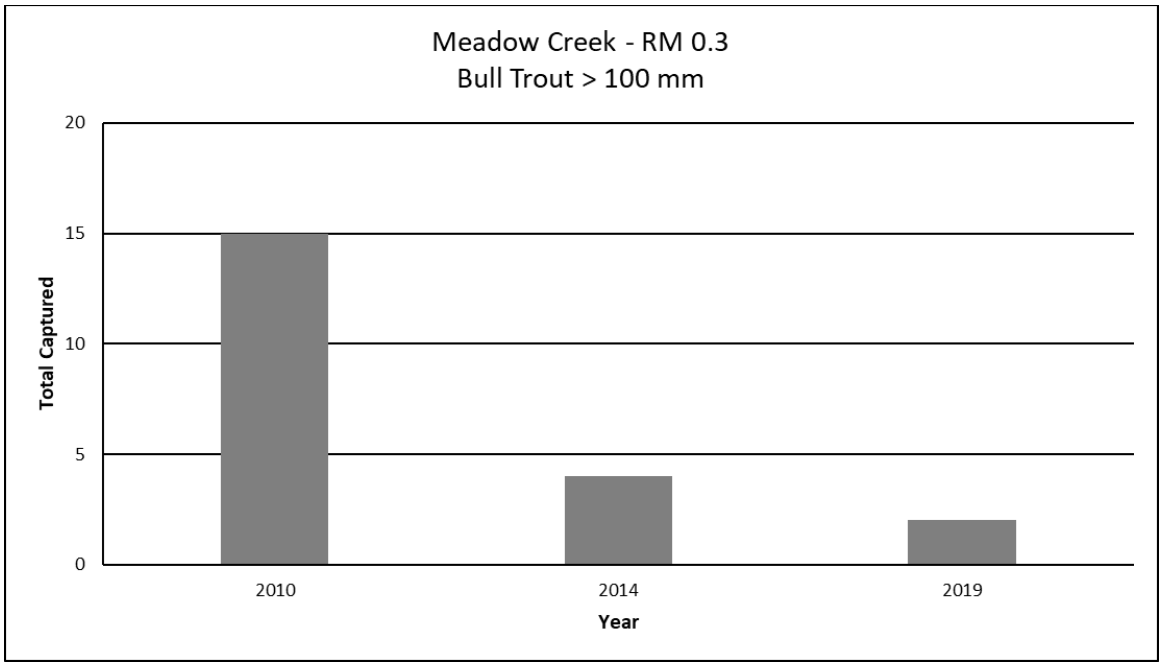

Figure 44. Number of Bull Trout greater than 100 mm (~4") in total length handled in the Meadow Creek FSRM 0.3 section for the period of record.

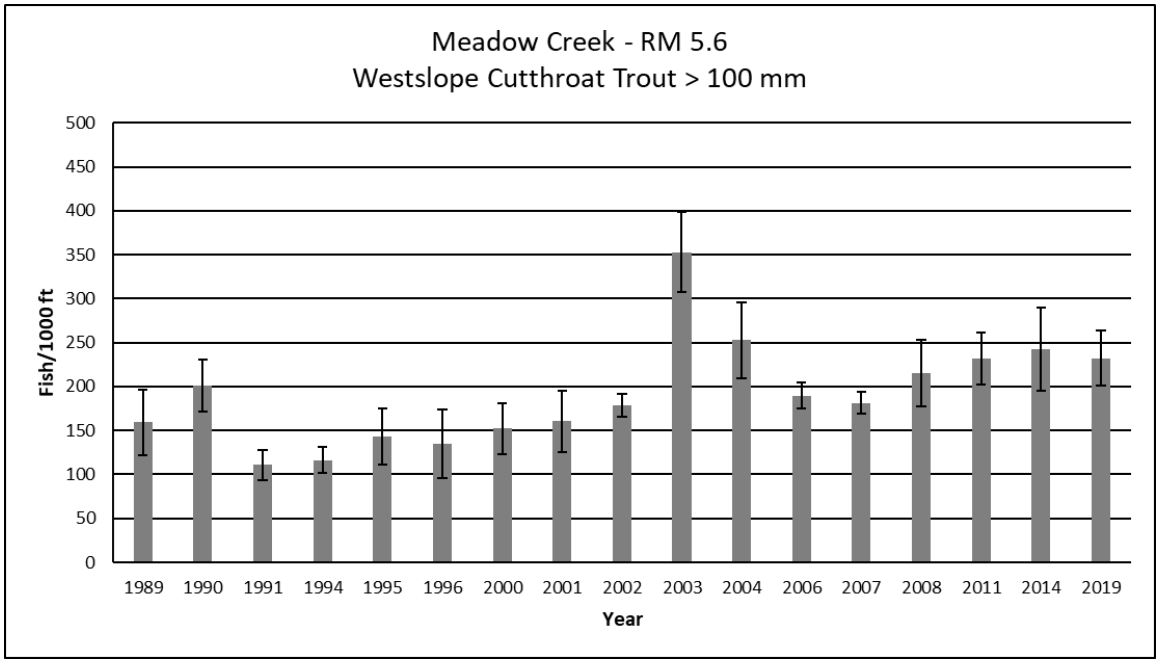

Figure 45. Population estimates for Westslope Cutthroat Trout greater than 100 mm (~4") in total length in Meadow Creek at the FSRM 5.6 section for the period of record.

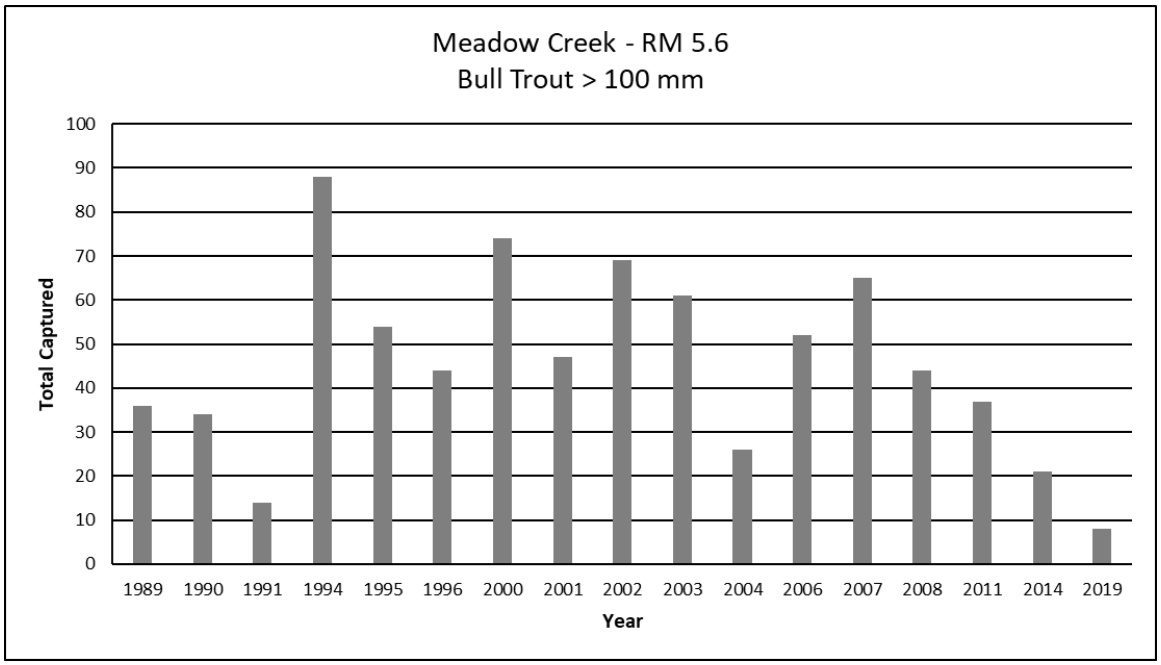

Figure 46. Number of Bull Trout greater than 100 mm (~4") in total length handled in the Meadow Creek FSRM 5.6 section for the period of record.

Lake Fish Sampling

Burnt Fork Drainage

Burnt Fork Lake

Gillnet and angling surveys were conducted in Burnt Fork Lake in late July 2020. Two sinking gillnets were set during a single day and allowed to soak for approximately 4 hours each. While the nets soaked, five anglers fished throughout the lake (3 from shore and 2 from float tubes) to bolster the catch. The total effort yielded six bull trout (Mean Length: 332 mm; Range 285-419 mm) and seven Rainbow Trout (Mean Length: 243 mm; Range 152-304 mm). Most of the fish were captured by the gillnets. Genetic samples were gathered from all Bull Trout and were combined with samples collected immediately below the Reservoir (FSRM 26.9) via electrofishing. Results of the electrofishing survey are summarized above in the *Tributary Sampling* section of this report. All samples were submitted to the Conservation Genetics Lab in Missoula, but results were not available at the time this report was written.

Literature Cited

Bailey, N. J. J. 1951. On estimating the size of mobile populations from recapture data. Biometrika 38:293-306.

Chapman, D. G. 1951. Some properties of the hypergeometric distribution with application to zoological sample census. University of California Publications in Statistics 1:131-160.

Javorsky, L. 1994. The Bitterroot River floodplain: An historical analysis. Montana Department of Fish, Wildlife and Parks.

Montana Fish, Wildlife & Parks (FWP). 2020. Montana statewide angling pressure 2019 summary report.

Spoon, R.L. 1987. Evaluation of management of water releases for Painted Rocks Reservoir, Bitterroot River, Montana. Final Report. Montana Department of Fish, Wildlife and Parks. Bonneville Power Administration, contract report. Project 83-463, contract number DE-A179-83BP13076.