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Native Cutthroat Trout (*Oncorhynchus clarkii* ssp.) Conservation Activities in the Northern Region, 2022

Publication Number 23-04

Utah Division of Wildlife Resources
1594 West North Temple
Salt Lake City, Utah 84414

J. Shirley, Director

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by

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INTRODUCTION

BONNEVILLE CUTTHROAT TROUT (*Oncorhynchus clarkii utah*)

The Bonneville Cutthroat Trout (BCT) conservation activities by the UDWR Ogden Office in 2022 included population monitoring in the Ogden River and Weber River drainages in the Northern Bonneville GMU, and stocking of BCT into both Big Creek and Deadman Creek in Summit County. In addition, a radio telemetry study was implemented in the Chalk Creek drainage to evaluate BCT movement related to spawning, diversions, and stream temperatures. Activities conducted during 2022 will help accomplish the objectives for long-term conservation of BCT in Utah (BCT State of Utah Conservation Team 2008) and range-wide (Oplinger and Birdsey 2019).

COLORADO RIVER CUTTHROAT TROUT (*Oncorhynchus clarkii pleuriticus*)

The Colorado River Cutthroat Trout (CRCT) conservation activities conducted in 2022 included population monitoring in Henrys Fork, the Middle and West forks of Beaver Creek, and East Fork Blacks Fork. The work completed in the Upper Green GMU North Slope subunit will help accomplish the objectives for long-term conservation of CRCT in Utah (Lentsch and Converse 1997).

YELLOWSTONE CUTTHROAT TROUT (*Oncorhynchus clarkii bouvieri*)

Yellowstone Cutthroat Trout (YCT) conservation work in 2022 included monitoring of all YCT populations in the Raft River drainage. As with the other cutthroat trout subspecies, conservation activities involving YCT help accomplish the objectives for long-term conservation of YCT (Range-wide YCT Conservation Team 2009).

METHODS

All stream surveys and monitoring stations were completed at or near base flow conditions. Surveys were completed to determine the extent of the resident cutthroat trout populations in each stream/stream section. When possible, stream survey locations were chosen as closely as possible to previous UDWR or USFS survey locations. Approximately 123 people days were required to complete the native cutthroat trout fieldwork in the Northern Region during 2022.

For surveys on small streams, a 100 m reach, representing habitat conditions throughout the entire stream/section, was identified. For monitoring efforts, the attempt was made to revisit select stations surveyed previously. Stations were measured using a 100 m tape. A natural habitat break (e.g., small waterfall/cascade) was chosen for the upper end of each reach and whenever possible, the lower end. Two to four battery-powered backpack electrofishing units, manufactured by Smith-Root or Halltech, were utilized side-by-side for surveys on larger streams (e.g., streams >2.5-7 m in width). On the remaining surveys, a single battery-powered backpack electrofishing unit was used. Between two and eight personnel were utilized on electrofishing surveys. Electrofishing settings varied depending on stream conductivity. In general, the frequency was set at 60 Hz and the voltage at 250-350V when using a Halltech HT-2000, and 50 Hz, 25% duty cycle, and 250V when using a Smith-Root LR-20B.

All captured fish were transferred to live cages placed in the stream. Fish collected from the first electrofishing pass were kept separate from fish collected on the second electrofishing pass, and so forth. Fish processing and data collection commenced immediately following electrofishing and fish not collected for genetic analyses or health inspections were returned to the stream. All fish captured were measured to the nearest millimeter (mm) total length (TL)

and weighed to the nearest gram (g). Identification of cutthroat trout x rainbow trout hybrids is generally based on examination of phenotypic traits, primarily spotting patterns, fin tips and body coloration.

Population estimates were calculated separately for ≥age-1 salmonids and age-0 salmonids because smaller fish are not immobilized as effectively as larger fish while electrofishing (Reynolds 1989) and consequently, population estimates for age-0 fish are usually not as meaningful. In general, cutthroat trout <50-60 mm TL were considered to be age-0.

Population estimates were based on two-pass electrofishing, unless otherwise noted. A modified Zippin multiple pass depletion electrofishing formula was used to calculate the population estimates and ninety-five percent confidence limits for each site surveyed (Zippin 1958). The formulas used to calculate the estimates were:

$$N = C_1^2 / C_1 - C_2$$

$$SE = [C_1 * C_2 / (C_1 - C_2)^2] * (C_1 + C_2)^{½}$$

$$95\%\ C.I. = 2 * SE$$

where,
N = estimated fish population,
C_1 = the number of fish captured from the first pass, and
C_2 = the number of fish captured on the second pass.

Condition factor (K) was calculated using the formula:

$$K = W * 100{,}000/L^3$$

where,
W = weight in g, and
L = TL in mm.

All cutthroat trout tissue samples retained for genetic analyses were collected according to protocol established by Brigham Young University (BYU). These samples were submitted to the Salt Lake Office during the fall of 2022 and will be analyzed with nuclear DNA and mitochondrial DNA techniques.

Population estimates were not attempted for many of the non-game species because these species are difficult to capture. An estimate of abundance was made for these species as follows: >50 individuals per 100 m - abundant, 10-50 individuals per 100 m station - common, and <10 individuals per 100 m station - sparse. Due to the difficulty of differentiating Mottled Sculpin (*Cottus bairdii*) and Piute Sculpin (*C. beldingii*) in the field, no distinction was attempted for this report and these species are simply referred to as sculpin.

Chalk Creek Telemetry Project
Adult BCT were collected from two reaches of Chalk Creek via backpack electrofishing and held in the stream in a live cage. One at a time, each BCT was moved from the live cage to an aerated bucket of approximately 11 L of stream water containing a 25-30 mg/L solution of the experimental anesthetic AQUI-S®20E. Once anesthesia was achieved (fish had lost equilibrium, no longer swimming upright, and gilling slowly), each fish was measured (TL to nearest mm), weighed (in grams), and transferred to a cradle for surgical implantation of a small radio transmitter. The cradle was constructed to allow the head and gills of the fish to remain submerged in a maintenance solution (approximately 12.5 mg/L) of anesthetic, while exposing the underside of the fish for surgery. Following blotting of the ventral area between the paired

fins with a sterile towel, a sterile scalpel (size #15) was used to make a 15 mm incision slightly anterior of the left pelvic fin. The whip antenna of a transmitter was threaded through a 150 mm needle, which was then guided through the incision to the body wall posterior of the pelvic fin via a grooved director. The needle was then pulled through a small piercing to allow the antenna to exit the body cavity. The transmitter, obtained from Advanced Telemetry Systems, Inc. (ATS, Model No. F1580), was pushed gently through the incision, and the incision closed with two sutures using an absorbable polydioxanone monofilament suture (size 4/0). All surgical tools were sanitized with chlorhexidine diacetate (Nolvasan® Solution, available from Zoetis, Inc.) disinfectant between surgeries. Following surgery, tagged fish were placed in an aerated bucket of fresh water until recovery was demonstrated by upright swimming. All tagged fish were released back into Chalk Creek soon thereafter. Transmitters were re-located near release locations on multiple occasions using an ATS Receiver (Model No. R410) and three-element Yagi antenna (Model No. 13860) or magnetic roof-mounted dipole antenna (Model No. 13861). Transmitter frequency (unique to each fish), date, geographic coordinates, and habitat type were recorded on each re-location occasion.

RESULTS AND DISCUSSION

BONNEVILLE CUTTHROAT TROUT

Surveys

Efforts to increase knowledge of the distribution of BCT through inventory of previously un-surveyed streams in the Bonneville Basin are essentially complete. However, a reach of Mill Creek (Uintas) not previously sampled was surveyed in 2022 (Table 1).

Table 1. Bonneville Cutthroat Trout surveyed in 2022.

Stream/section	Approximate # of stream km occupied (# stream miles)	# of ≥age-1 BCT/km (#/mile)
Mill Creek, Hidden Bear Ranch	2.6 (1.6)	136 (219)

Monitoring

Multiple-pass electrofishing was completed on three streams during 2022 BCT monitoring efforts (Table 2). Each of the monitored populations appeared to have decreased since the previous sampling.

Fish species encountered during stream sampling in 2022 included Bonneville Cutthroat Trout, Brook Trout (BKT; *Salvelinus fontinalis*), Longnose Dace (LND; *Rhinichthys cataractae*), Mountain Sucker (MTS; *Catostomus platyrhynchus*), Mountain Whitefish (MWF; *Prosopium williamsoni*), Redside Shiner (RSS; *Richardsonius balteatus*), sculpin (SC; *Cottus* spp.), Speckled Dace (SPD; *Rhinichthys osculus*).

Table 2. Results of BCT population monitoring in 2022.

Stream/section	Year	# of ≥age-1 BCT/km	# of ≥age-1 BCT/mile
Bear River GMU, Uinta Mountains/Upper Bear River Subunit			
Gold Hill Creek	2022	151 ± 38	243 ± 61
	2020	376 ± 19	606 ± 30
	2019	449 ± 41	722 ± 66
	2018	1025 ± 65	1650 ± 105
	2017	318 ± 37	511 ± 60
	2016	595 ± 106	958 ± 170
	2015	392 ± 66	631 ± 106
	2014	421 ± 19	677 ± 30
	2013	781 ± 23	1256 ± 38
	2012	564 ± 68	908 ± 109
	2011	342 ± 71	551 ± 114
	2010	210 ± 39	338 ± 63

Table 2.—cont.

Stream/section	Year	# of ≥age-1 BCT/km	# of ≥age-1 BCT/mile
Northern Bonneville GMU, Ogden River Subunit			
North Fork Ogden River	2022	125 ± 21	201 ± 34
	2021	322 ± 32	518 ± 52
	2020	650 ± 54	1046 ± 87
	2016	410 ± 3	660 ± 5
	2011	439 ± 34	868 ± 55
	2006	482 ± 10	779 ± 17
	2000	716 ± 87	1153 ± 140
Northern Bonneville GMU, Weber River Subunit			
Echo Creek	2022	45 ± 29	72 ± 47
	2021	141 ± 7	227 ± 11
	2018	229 ± 33	369 ± 54
	2014	58 ± 38	93 ± 61
	2007	85 ± 11	137 ± 18

BEAR LAKE GMU

Bonneville Cutthroat Trout work in the Bear Lake GMU was coordinated and completed by personnel at Bear Lake Field Station. Results from 2022 activities may be found in reports prepared by the field station.

BEAR RIVER GMU
Uinta Mountains/Upper Bear River Subunit

Mill Creek **IVAQ230**

Survey

A reach of Mill Creek, 111 m in length, was electrofished on August 22, 2022. The station is located on Hidden Bear Ranch where instream habitat restoration has been proposed by Trout Unlimited. The BCT population in the reach is relatively small but, surprisingly, occurs in greater abundance than the BKT (Table 3 and Figure 1). This is in contrast to the Mill Creek station at the Wyoming border where BKT have outnumbered BCT in the three most recent monitoring surveys but similar to their co-occurrence at the North Slope Road where BCT continue to outnumber BKT (McKell 2018).

Table 3. Population statistics for species sampled in the Mill Creek station on Hidden Bear Ranch, 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2021	≥age-1 BCT	15	136±6 (219±9)	8 (7)	148	109-231	33	10-98	0.87
	≥age-1 BKT	4	36±0 (58±0)	4 (3)	181	132-236	65	25-123	0.99
	MWF	2	18±0 (29±0)	1 (1)	165	154-175	47	45-48	1.06
	LND	28	common						
	SC	338	abundant						
	SPD	2	sparse						

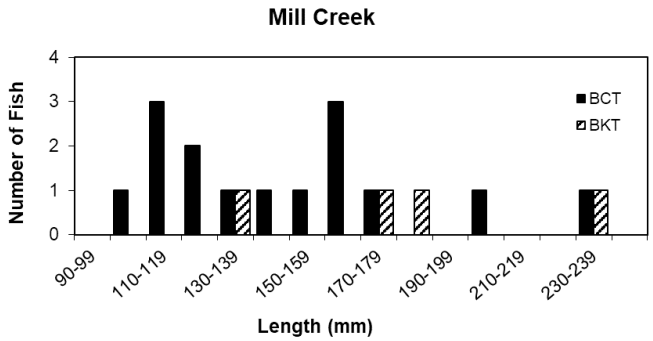

Figure 1. Size distribution of trout species sampled in the Mill Creek station on Hidden Bear Ranch, 2022.

Deadman Creek **IVAQ230B**

Chemical Reclamation

The analysis of eDNA samples collected from Deadman Creek in October 2021 (McKell 2022) by the National Genomics Center for Wildlife and Fish Conservation revealed the presence of BKT eDNA at three of nine sites within the rotenone treatment reach. During June 2022, portions of the treatment reach overlapping the positive eDNA samples were electrofished to search for and remove BKT. Four BKT were found and removed; their mean TL was 108 mm (range 88-126 mm), suggesting they represented a single age-class spawned in 2020 immediately following the rotenone treatment.

As a result of the BKT finding, a project was undertaken to swamp the population with stocked triploid BKT. Therefore, adipose-clipped triploid BKT were stocked in relatively high densities in the BKT-positive portions of the treatment reach; 560 fingerling (mean TL 112 mm) were stocked on August 25; 114 adults (mean TL 432 mm) that were part of a recently completed triploid marking study were stocked on September 19. As electrofishing is conducted in the future, naturally reproduced BKT will be distinguished from stocked BKT by the presence of the adipose fin and will be removed from the population.

Population Restoration

A load of 1,002 sub-catchable BCT (mean TL 193 mm) was stocked on June 7 into the lower portions of the treatment reach, downstream of the BKT, to add to the BCT stocked in 2021 and boost the BCT population in the stream.

Gold Hill Creek **IVAQ270A**

Monitoring

The 2022 monitoring station, 100 m in length, was electrofished on June 16, 2022. This was a NLSC reintroduction site in 2010 and has been sampled annually since then (Table 4 and Figure 2). Based on the data points for this station, the BCT population has experienced fluctuations but maintained moderately high densities, until 2022 when the population exhibited its lowest abundance estimate (Table 4 and Figure 2). Estimated biomass has declined in recent years but is greater than at least two of the monitored years, owing to the larger size of the BCT sampled in 2022 (Table 4). Recruitment has been documented each year, with relatively strong age-1 cohorts present during most years, until 2022, with only sparse representation of the age-1 cohort (Figure 2). NLSC were abundant in the station during 2010, absent in 2011, sparse in 2012-2015, and absent again in 2016-2022 (Table 4).

The factors contributing to the decline in BCT abundance are unknown as there have been no obvious changes to habitat or declines in stream flow. The virtual absence of yearling BCT in 2022 could be explained, at least in part, by the timing of sampling, which was conducted approximately 4-6 weeks earlier than normal, and most of the age-1 cohort might have been too small to be sampled efficiently via electrofishing.

Table 4. Population statistics for species sampled in Gold Hill Creek, 2010-2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 BCT	14	151±38 (243±61)	25 (23)	138	44-255	52	7-171	1.15
2021	≥age-1 BCT	40	single pass		114	50-245	24	1-158	1.10
2020	≥age-1 BCT	73	376±19 (606±30)	34 (31)	118	54-237	24	1-126	0.85
2019	≥age-1 BCT	84	449±41 (722±66)	75 (67)	124	53-250	35	1-137	0.92
2018	≥age-1 BCT	98	1025±65 (1650±105)		90	45-219			
2017	≥age-1 BCT	76	318±37 (511±60)		129	47-236	30	4-124	0.96
2016	≥age-1 BCT	49	595±106 (958±170)	126 (113)	105	50-225	31	1-119	0.88
2015	≥age-1 BCT NLSC	36 1	392±66 (631±106) 10±0 (16±0)	65 (58)	122 95	46-219	36 8	1-125	1.04
2014	≥age-1 BCT NLSC	53 1	421±19 (677±30) 8±0 (13±0)	51 (46)	116 90	49-212	29 8	3-89	0.99
2013	≥age-1 BCT NLSC	153 1	781±23 (1256±38) 5±0 (8±0)	33 (29)	90 72	39-220	12 4	1-100	0.98
2012	≥age-1 BCT NLSC	123 3	564±68 (908±109) 12±0 (20±0)	27 (24)	93 61	46-223 55-66	12 2	1-90 2-3	0.91
2011	≥age-1 BCT	59	342±71 (551±114)	16 (14)	90	42-249	15	1-134	0.92
2010	≥age-1 BCT age-0 BCT NLSC	38 2	210±39 (338±63) 10±0 (16±0) abundant (stocked)	24 (21)	110 27	62-232 27-27	21	1-124	0.86

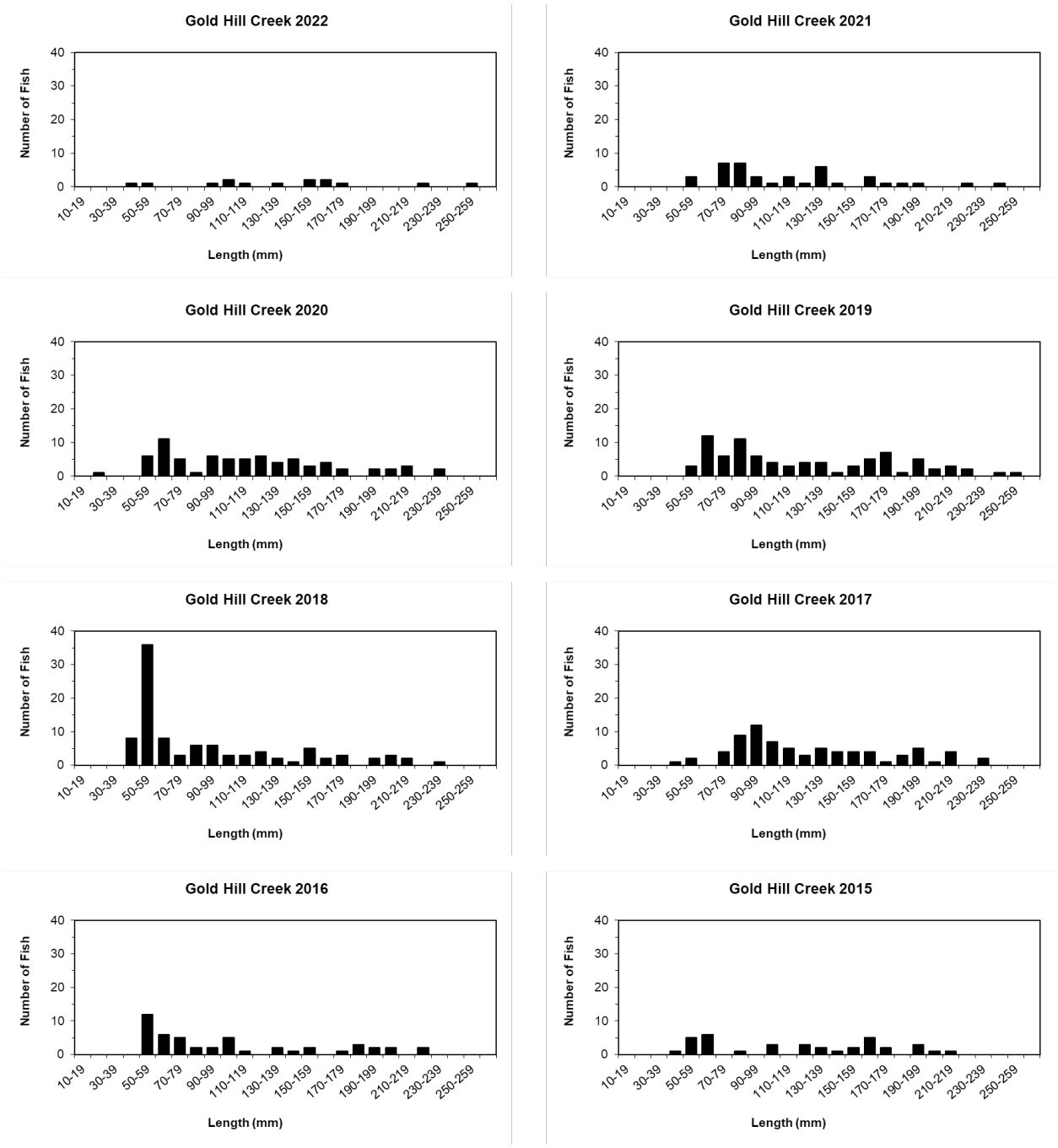

Figure 2. Size distribution of BCT sampled in Gold Hill Creek, 2015-2022.

Rich County Subunit

Big Creek **IVAQ190**

Chemical Reclamation

The analysis of a single eDNA sample collected by BLM personnel in 2021 resulted in a positive detection of BKT, the target of chemical removal efforts during 2018 and 2019. Consequently, a significant amount of electrofishing was conducted during 2022 to find and remove BKT from Big Creek. Seven sections of Big Creek, totaling 10.8 km, were electrofished in search of BKT; four adults (305-354 mm TL) and 120 age-0 (31-152 mm TL) BKT were removed (Table 5, Figure 3). The total distance electrofished was 24.4 km; 2.5 km of Randolph Creek and 1.3 km of Spring Canyon were also electrofished, although neither contained BKT. The four adult BKT were spread among three contiguous sections while the age-0 BKT were distributed in a more localized area spanning portions of two sections (Table 5, Figure 3). It is noteworthy that no BKT were found on October 6, although none of Section F was electrofished that day (Table 5).

Population Restoration

Cutthroat trout produced from the Bear Lake brood source at Mantua Hatchery were stocked into Big Creek to aid in the reestablishment of BCT following the rotenone treatments in 2018 and 2019 to remove nonnative trout from the drainage. Approximately 5,024 sub-catchable BCT (mean TL 193 mm) were stocked on June 7, and 1,992 fingerling BCT (mean TL 82 mm) were stocked on September 26.

Table 5. Sections† of Big Creek electrofished (shaded areas), showing relative locations from which Brook Trout were removed by date during 2022. Colored circles represent adults (pink=female; blue=male) and the numbers of age-0 individuals removed; individual capture locations are plotted on the map in Figure 3.

	Big Creek Electrofishing Section						
Date	A	B	C	D	E	F	G
5/17							
5/18				●	●		
5/20							
5/26							
6/1							
6/2			●				
6/17					36 2		
6/23					1 18		
7/12					2 23 13		
7/25					6		
9/23					● 1 7	6 3	
9/28						2	
10/6							

† Section details:
A: Randolph Cr confluence to private/BLM boundary (Argyles Ranch LLC); 1.36 km
B: Private/BLM boundary to BLM lower livestock exclosure; 0.99 km
C: BLM lower livestock exclosure; 1.23 km
D: Fenced private property (Hat M Properties LLC); 1.17 km
E: Unfenced private property (Randolph Land and Livestock Co); 1.57 km
F: BLM upper livestock exclosure; 1.66 km
G: Unfenced private property (Randolph Land and Livestock Co, Bell); 2.85 km

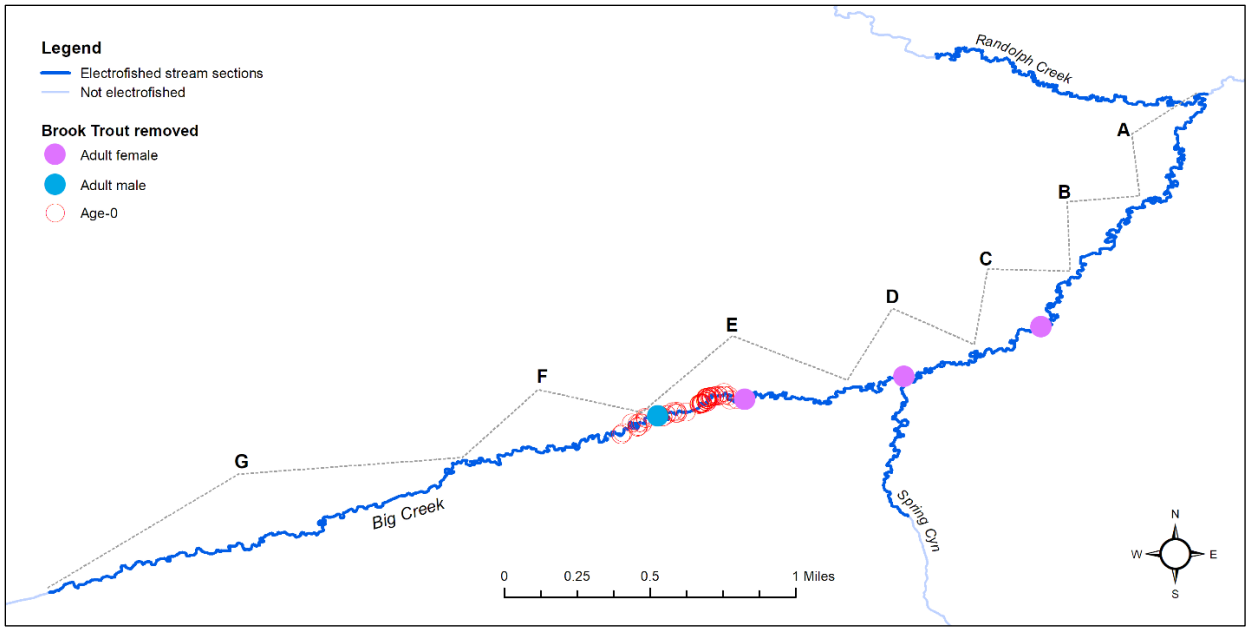

Figure 3. Locations of Brook Trout removed from Big Creek during 2022. Each circle represents an individual fish. Section delineations (A-G) are defined in Table 5.

NORTHERN BONNEVILLE GMU
Ogden River Subunit

North Fork Ogden River IVAP030D

Monitoring

This monitoring station, an "index site" for BCT in the Northern Bonneville GMU, was electrofished on July 13, 2022. The station was 100 m in length. Results of this and the previous surveys are shown in Table 6 and Figure 4. Based on seven data points, the BCT population maintained moderate densities, though exhibiting a decrease by half between 2020 and 2021, and by half again between 2021 and 2022 (Table 6). Two noticeable changes in the population, also noted during 2021 (McKell 2022), were a decrease in estimated biomass and further truncation of the age (size) structure exhibited by fewer larger individuals and decreased recruitment among the age-1 cohort (Figure 4). Sculpin remain abundant in the sampled reach.

Table 6. Population statistics for species sampled in North Fork Ogden River, 2000, 2006, 2011, 2016, 2020, 2021, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 BCT SC	12 124	125±21 (201±34) abundant	15 (13)	147	105-194	36	11-79	1.00
2021	≥age-1 BCT SC	31 168	322±32 (518±52) abundant	26 (23)	124	88-235	23	5-133	0.95
2020	≥age-1 BCT age-0 BCT SC	62 5 140	650±54 (1046±87) present abundant	47 (42)	118 43	73-195 42-44	19 1	4-70	0.97
2016	≥age-1 BCT age-0 BCT SC	41 4 95	410±3 (660±5) present abundant	83 (74)	179 36	80-266 30-39	69	6-219	0.99
2011	≥age-1 BCT age-0 BCT SC	55 13	539±34 (868±55) 128±18 (206±29) common	74 (66)	162 59	88-300 47-67	54 2	6-278 1-3	0.95 0.76
2006	≥age-1 BCT age-0 BCT SC	48	482±10 (776±17) present common	74 (66)	172	75-391	73	4-478	1.03
2000	≥age-1 BCT age-0 BCT SC	45 18	716±87 (1153±140) 358±248 (576±399) abundant	81 (73)	147 43	60-275 36-49	45 1	2-222 1-2	0.99 1.36

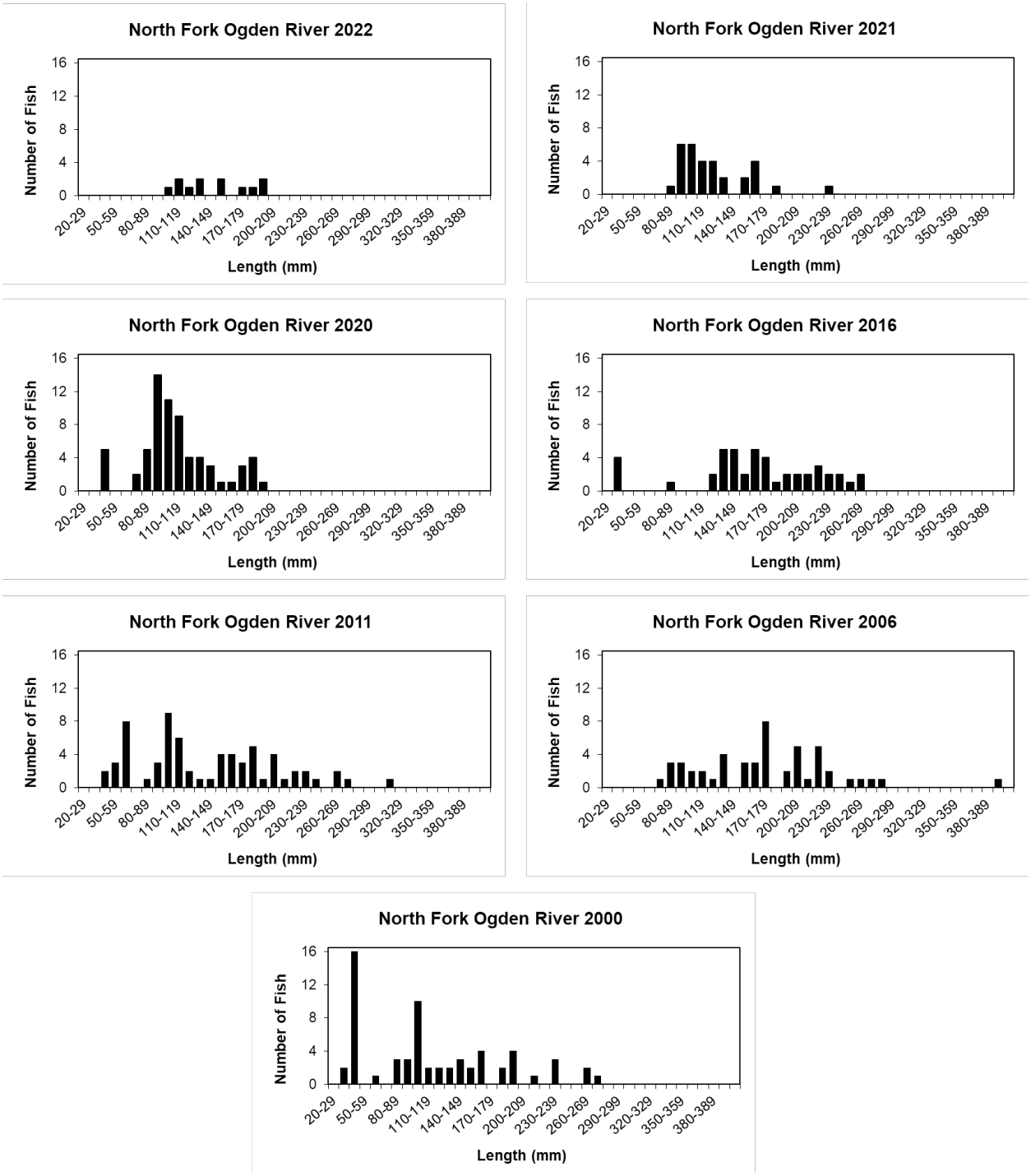

Figure 4. Size distribution of salmonid species sampled in the North Fork Ogden River monitoring station, 2000, 2006, 2011, 2016, 2020, 2021, and 2022.

Weber River Subunit

Echo Creek IVAP210

Monitoring

The monitoring station in Echo Creek, 100 m in length, was electrofished on July 11, 2022. Results of this and previous samplings are shown in Table 7 and Figure 5. Based on the five data points for this station the BCT population experienced a roughly 70% decrease between 2021 and 2022, following a 40% decrease between 2018 and 2021, following a four-fold increase in abundance between 2014 and 2018 (Table 7); population abundance in 2022 was similar to 2014, although estimated biomass in 2022 was three-fold greater than 2014. The length-frequency distribution for 2022 shows a range of sizes similar to 2014, and indicates, at least periodically, inconsistent recruitment in this section (Figure 5). Multiple species of native nongame fish have been present at varying densities in this stream reach during the sampling events.

Table 7. Population statistics for species sampled in the Echo Creek monitoring station, 2007, 2014, 2018, 2021, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 BCT MTS RSS SC SPD	4	45±29 (72±47) common sparse common common	41 (37)	263	231-287	155	110-192	0.84
2021	≥age-1 BCT MTS SC SPD	14	141±7 (227±11) sparse abundant abundant	60 (54)	204	115-332	89	14-281	0.86
2018	≥age-1 BCT MTS RSS SC SPD	22	229±33 (369±54) sparse common abundant abundant	77 (69)	182	109-285	73	13-210	1.08
2014	≥age-1 BCT MTS SC SPD	4	58±38 (93±61) common abundant common	13 (12)	239	222-255	119	98-139	0.87
2007	≥age-1 BCT MTS SC SPD	8	85±11 (137±18) sparse abundant common	36 (32)	178	85-284	84	6-242	0.99

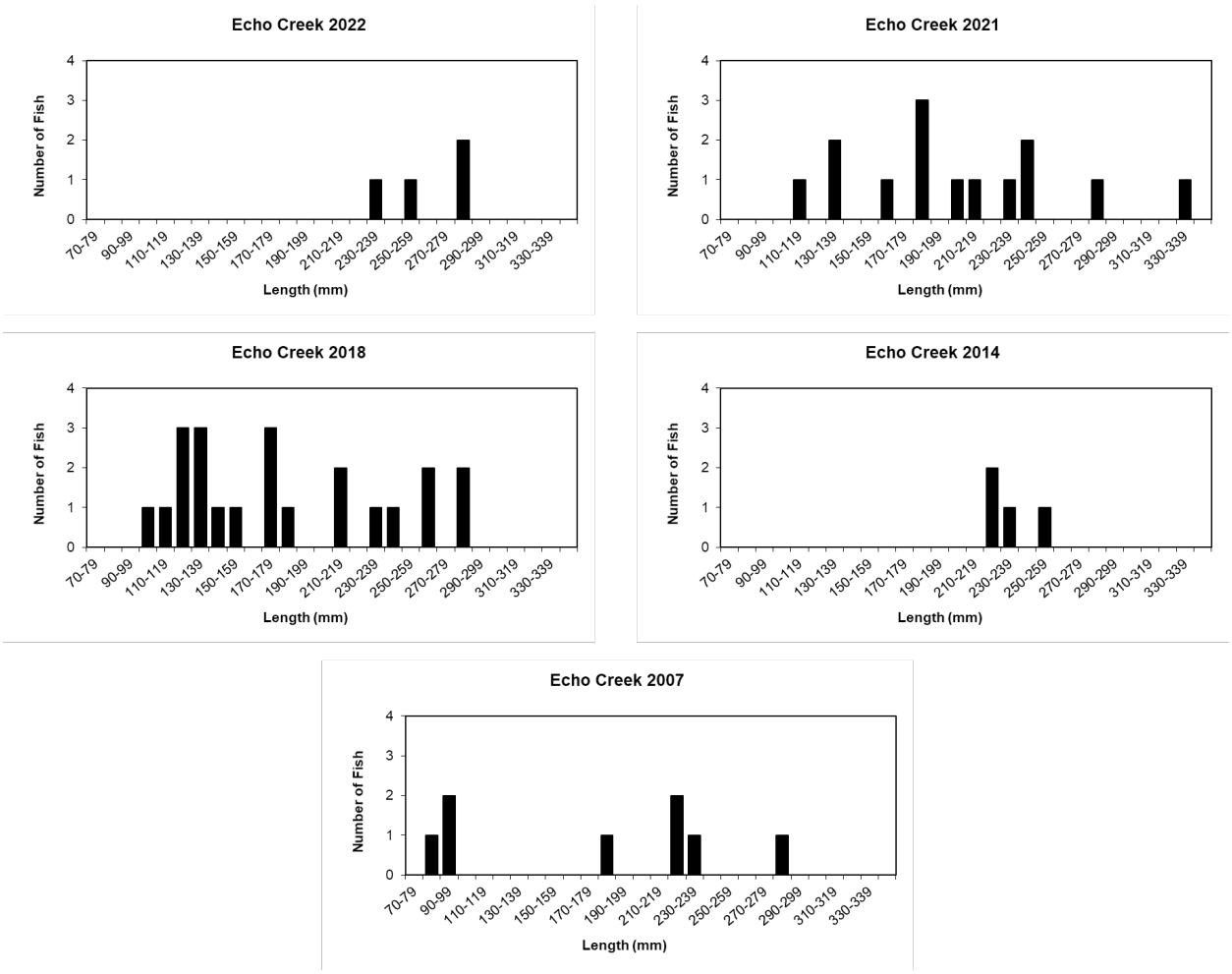

Figure 5. Size distribution of BCT sampled in the Echo Creek monitoring station, 2007, 2014, 2018, 2021, and 2022.

Chalk Creek **IVAP230**

Surveys

A BCT movement study utilizing radio telemetry was implemented in Chalk Creek in 2022 to assess seasonal movements associated with spawning, evaluate behavior related to summertime water temperatures, and identify impediments to movement (e.g. irrigation diversions), as well as the degree to which the water withdrawal network is an entrainment issue for BCT movement. Forty radio telemetry tags were implanted into adult BCT in two separate reaches of Chalk Creek: 14 just downstream of the South Fork confluence on September 20, and 26 downstream of the East Fork confluence on September 21. The BCT tagged near the South Fork ranged 245-408 mm TL, with a mean of 308 mm TL; the BCT tagged near the East Fork ranged 235-354 mm TL, with a mean of 276 mm TL. Tag re-location was conducted on five occasions during the fall of 2022, and only one tag did not move from its release location, suggesting a high degree of post-surgery survival. Incidentally, the greatest movement was 3.5 km between release and December 1, while the least (aside from the tag that did not move) was 15 m, with an overall mean movement of 355 m.

COLORADO RIVER CUTTHROAT TROUT

Monitoring

Multiple-pass electrofishing was completed at 10 sites during 2022 (Table 8). Five of the monitored populations appeared to have increased since the previous surveys, three showed a decrease, and two remained flat.

Fish species encountered during population monitoring in 2022 included Colorado River Cutthroat Trout, Brook Trout, Mountain Sucker, sculpin, and Speckled Dace.

Table 8. Results of CRCT population monitoring in 2022.

Stream/section	Year	# of ≥age-1 CRCT/km	# of ≥age-1 CRCT/mile
Upper Green GMU, North Slope of the Uinta Mountains Subunit			
Henrys Fork, lower	2022	131 ± 7	211 ± 11
	2017	0	0
	2012	813 ± 54	1308 ± 87
	2007	35 ± 0	56 ± 0
Henrys Fork, middle	2022	280 ± 180	451 ± 289
	2017	20 ± 0	32 ± 0
	2012	474 ± 55	762 ± 88
	2007	350 ± 151	563 ± 243
	1996	100 ± 0	161 ± 0
Dahlgreen Creek	2022	203 ± 12	326 ± 20
	2017	70 ± 0	113 ± 0
	2012	307 ± 23	495 ± 37
	2007	507 ± 53	816 ± 85
	2000	445 ± 68	717 ± 110
Joulious Creek	2022	197 ± 24	317 ± 39
	2017	171 ± 6	275 ± 9
	2012	165 ± 104	266 ± 167
	2007	178 ± 28	287 ± 45
	2002	164 ± 338	263 ± 544
West Fork Beaver Creek	2022	0	0
	2017	0	0
	2012	2 captured, no depletion	
	2007	13 ± 0	20 ± 0

Table 8.—cont.

Stream/section	Year	# of ≥age-1 CRCT/km	# of ≥age-1 CRCT/mile
Middle Fork Beaver Creek	2022	0	0
	2017	30 ± 0	48 ± 0
	2012	105 ± 9	170 ± 15
	2007	22 ± 0	35 ± 0
	1997	40 ± 68	64 ± 109
Gilbert Creek, border	2022	20 ± 0	32 ± 0
	2017	27 ± 0	43 ± 0
	2012	88 ± 106	141 ± 170
	2009	16 ± 0	26 ± 0
	2008	28 ± 0	45 ± 0
	2007	30 ± 0	48 ± 0
	2006	0	0
	2005	0	0
	2004	0	0
Gilbert Creek, North Slope Rd	2022	82 ± 11	131 ± 17
	2017	206 ± 23	332 ± 37
	2012	227 ± 12	365 ± 19
	2009	27 ± 0	44 ± 0
	2008	91 ± 0	146 ± 0
	2007	100 ± 0	161 ± 0
	2006	180 ± 59	290 ± 95
	2005	163 ± 15	263 ± 25
	2004	63 ± 15	101 ± 24
East Fork Blacks Fork	2022	270 ± 455	435 ± 733
	2012	141 ± 7	227 ± 11
	2006	143 ± 43	230 ± 70
Little East Fork Blacks Fork	2022	148 ± 576	238 ± 927
	2012	395 ± 141	636 ± 226
	2005	479 ± 99	770 ± 159

UPPER GREEN GMU
North Slope of the Uinta Mountains Subunit

Henrys Fork **IICJ**

Monitoring

Two stations in the Henrys Fork were monitored in 2022, one near the Wyoming border (lower) and the other adjacent to the Henrys Fork Trailhead (middle). Both stations were electrofished on August 17, 2022, and both stations were monitored previously in 2017 and 2012.

Lower Station

The fish community in this 100 m station was comprised of a small to moderate population of CRCT, including representation of the age-0 cohort (Table 9 and Figure 6). As noted in 2017, in 2012, there was a large beaver dam at the upstream end of this station that was not there in 2017 but was partially rebuilt in 2022. Mountain Sucker were common, sculpin were abundant, and Speckled Dace were common in the station (Table 9).

Middle Station

This 100 m station contained a moderate population of CRCT in 2022, exhibiting a greater estimated biomass than any previous sampling (Table 9). The length-frequency distribution for CRCT at this site in 2022 is most similar to 2007 in range of sizes and frequency (Figure 7). Sculpin were abundant and Mountain Sucker continue to be sparse in this reach (Table 9).

Table 9. Population statistics for species sampled in the Henrys Fork monitoring stations, 1996, 2007, 2012, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
Lower Station									
2022	≥age-1 CRCT	13	131±7 (211±11)	16 (14)	210	122-276	95	16-216	0.91
	age-0 CRCT	7	83±58 (134±93)		44	39-50			
	MTS		common						
	SC		abundant						
	SPD		common						
2017	≥age-1 CRCT	0							
	MTS		common						
	SC		abundant						
2012	≥age-1 CRCT	78	813±54 (1308±87)	67 (60)	175	96-282	59	11-203	0.97
	age-0 CRCT	16	202±120 (325±193)	1 (1)	50	35-64	2	1-12	
	MTS		common						
	SC		abundant						
	SPD		sparse						
2007	≥age-1 CRCT	4	35±0 (56±0)	5 (4)	216	112-307	103	12-214	0.82
	age-0 CRCT	1	9±0 (14±0)	4 (3)	31				
	MTS		sparse						
	SC		abundant						

Table 9.—cont.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
Middle Station									
2022	≥age-1 CRCT MTS SC	21	280±180 (451±289) sparse abundant	24 (22)	177	94-315	70	8-280	0.97
2017	≥age-1 CRCT MTS SC	2	20±0 (32±0) sparse abundant	1 (1)	176	145-206	58	28-87	0.96
2012	≥age-1 CRCT age-0 CRCT MTS SC	54 21	474±55 (762±88) 182±30 (293±48) sparse abundant	22 (20)	151 49	87-235 33-63	36 1	5-102 1-2	0.96
2007	≥age-1 CRCT age-0 CRCT SC	29 2	350±151 (563±243) 19±0 (31±0) abundant	19 (17)	148	86-243	36	4-130	0.93
1996	≥age-1 CRCT SC	10	100±0 (161±0) common	6 (5)	162	135-206	46	25-95	1.00

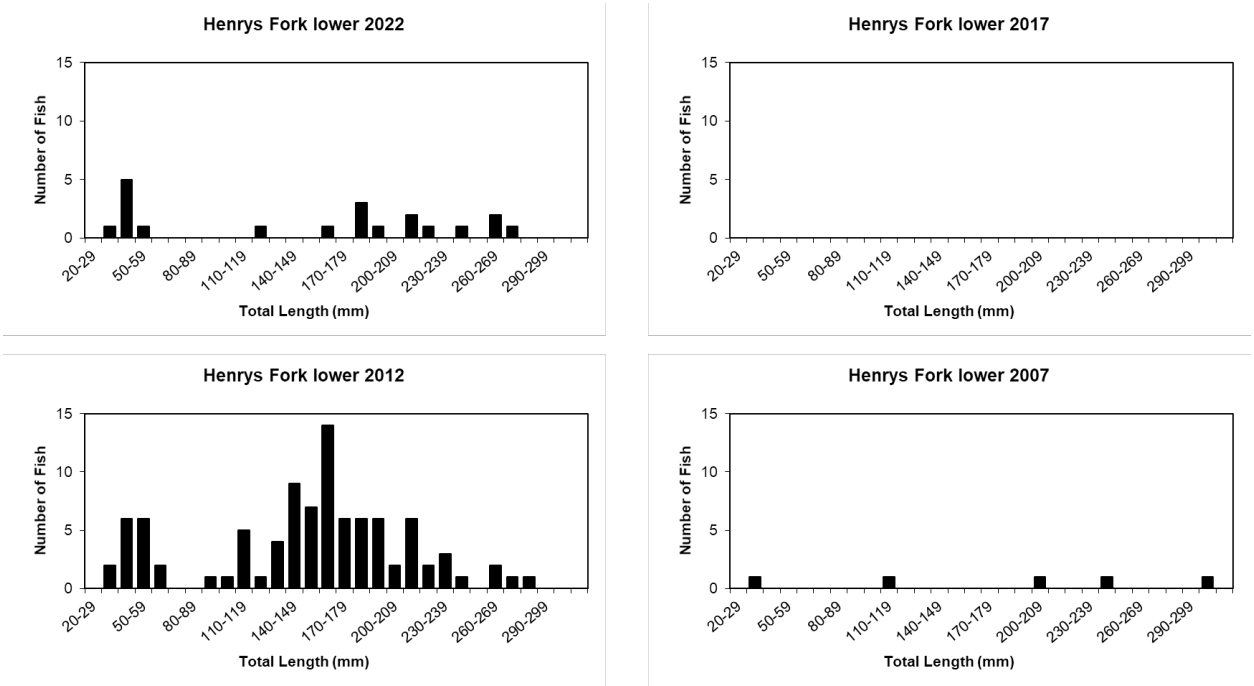

Figure 6. Size distribution of CRCT sampled in the Henrys Fork lower monitoring station, 2007, 2012, 2017, and 2022.

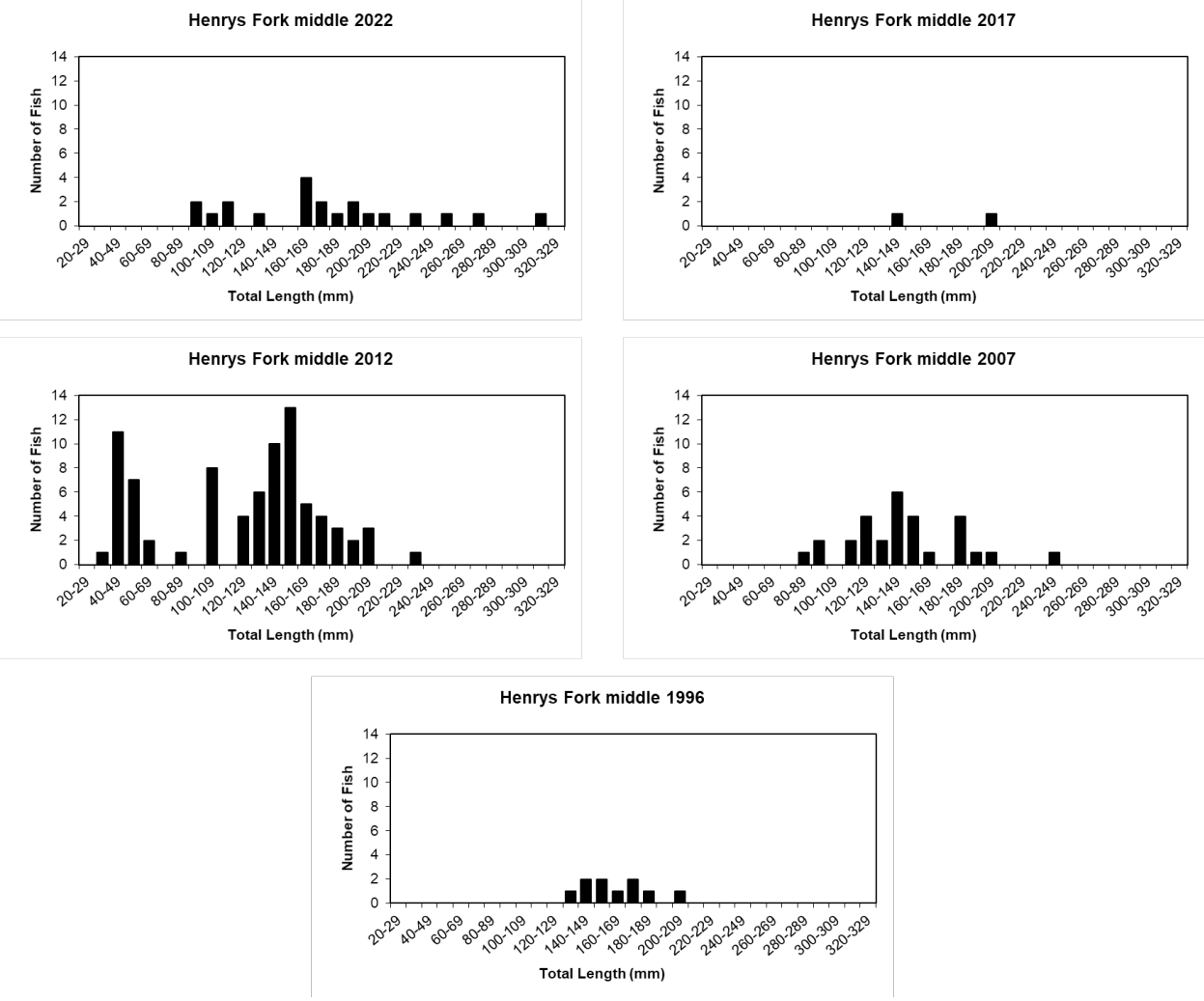

Figure 7. Size distribution of CRCT sampled in the Henrys Fork middle monitoring station, 1996, 2007, 2012, 2017, and 2022.

Dahlgreen Creek **IICJ050**

Monitoring

The 100 m station in Dahlgreen Creek was electrofished on August 17, 2022. The size of the CRCT population in this station increased threefold since 2017 after a 75% decrease from 2012; the biomass estimate remained the same as 2017 after declining by two-thirds from 2012 (Table 10). The length-frequency distribution for 2022 shows a constriction in the range and number of size-classes similar to 2017, except shifting to smaller size-classes (Figure 8). Although absent in 2017, the age-1 cohort was again represented in 2022 as it was in all other prior samples.

Table 10. Population statistics for species sampled in Dahlgreen Creek, 2000, 2007, 2012, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 CRCT	20	203±12 (326±20)	9 (8)	104	81-140	12	5-26	0.93
2017	≥age-1 CRCT	7	70±0 (113±0)	9 (8)	147	113-176	33	14-56	0.98
2012	≥age-1 CRCT	30	307±23 (495±37)	30 (27)	122	76-225	23	4-101	0.89
2007	≥age-1 CRCT	48	507±53 (816±85)	19 (17)	80	52-173	8	1-46	1.00
2000	≥age-1 CRCT age-0 CRCT	41 1	445±68 (717±110)	26 (24)	91 37	60-209	9 1	1-68	0.76

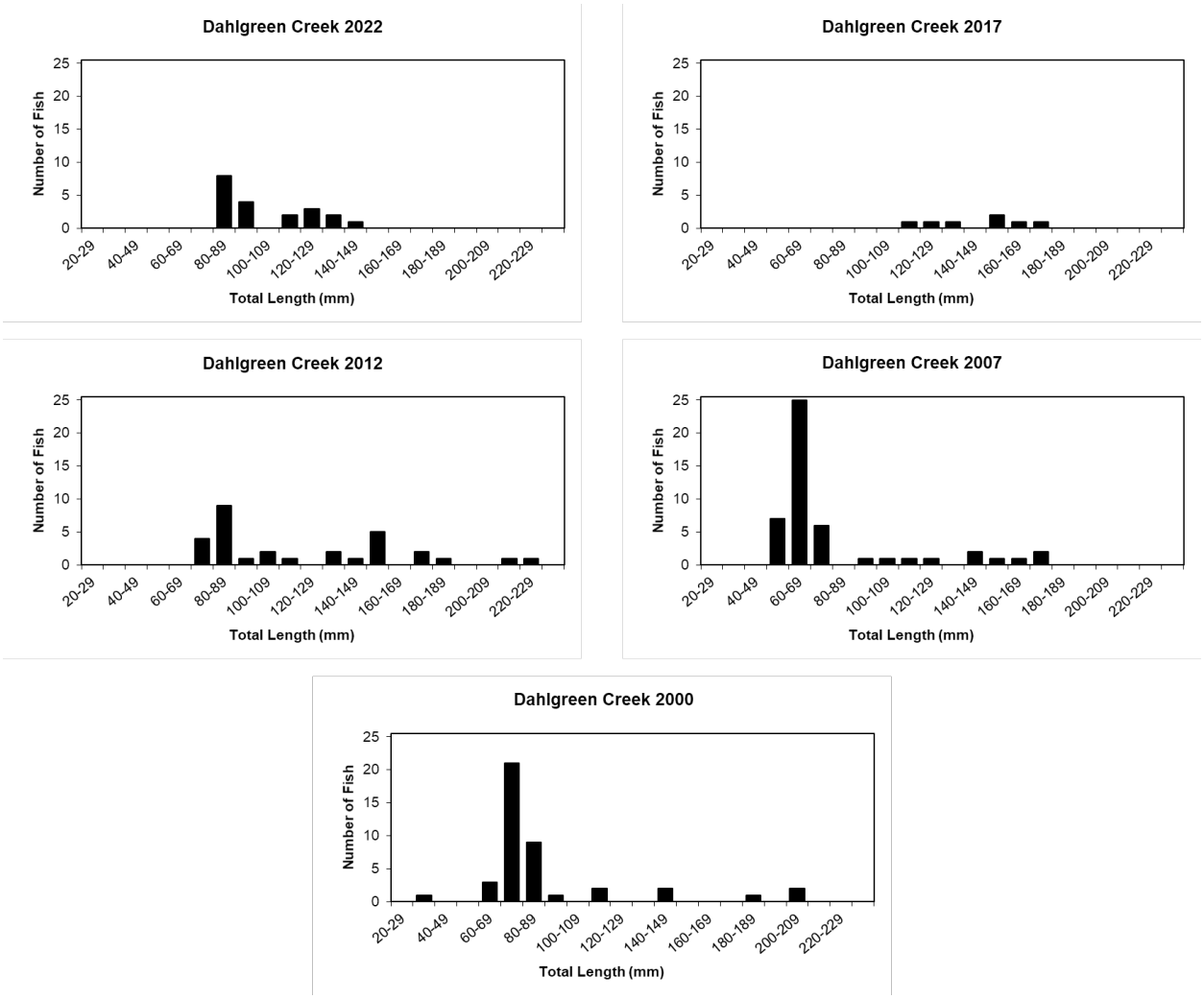

Figure 8. Size distribution of CRCT sampled in the Dahlgreen Creek monitoring station, 2000, 2007, 2012, 2017, and 2022.

Joulious Creek **IICJ060**

Monitoring

The Joulious Creek monitoring station, 100 m in length, was electrofished on August 18, 2022. The CRCT population in this station has maintained moderate and consistent densities during all sampling events (Table 11). Estimated biomass, however, dropped to its lowest since population monitoring began, decreasing to less than half of the 2017 estimate. The length-frequency distribution shows a roughly similar range and number of size-classes between sampling events, but a much more abundant age-1 cohort was represented in 2022 than any previous sampling event (Figure 9).

Table 11. Population statistics for species sampled in Joulious Creek, 2002, 2007, 2012, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 CRCT	19	197±24 (317±39)	7 (7)	93	61-180	11	2-57	0.93
2017	≥age-1 CRCT	17	171±6 (275±9)	17 (15)	139	79-213	35	5-101	0.95
2012	≥age-1 CRCT	13	165±104 (266±167)	22 (19)	140	88-235	40	6-131	0.94
2007	≥age-1 CRCT	17	178±28 (287±45)	11 (10)	117	52-188	17	2-59	0.94
2002	≥age-1 CRCT age-0 CRCT	10 7	164±338 (263±544)	26 (23)	142 43	81-224 38-46	38	6-108	0.97

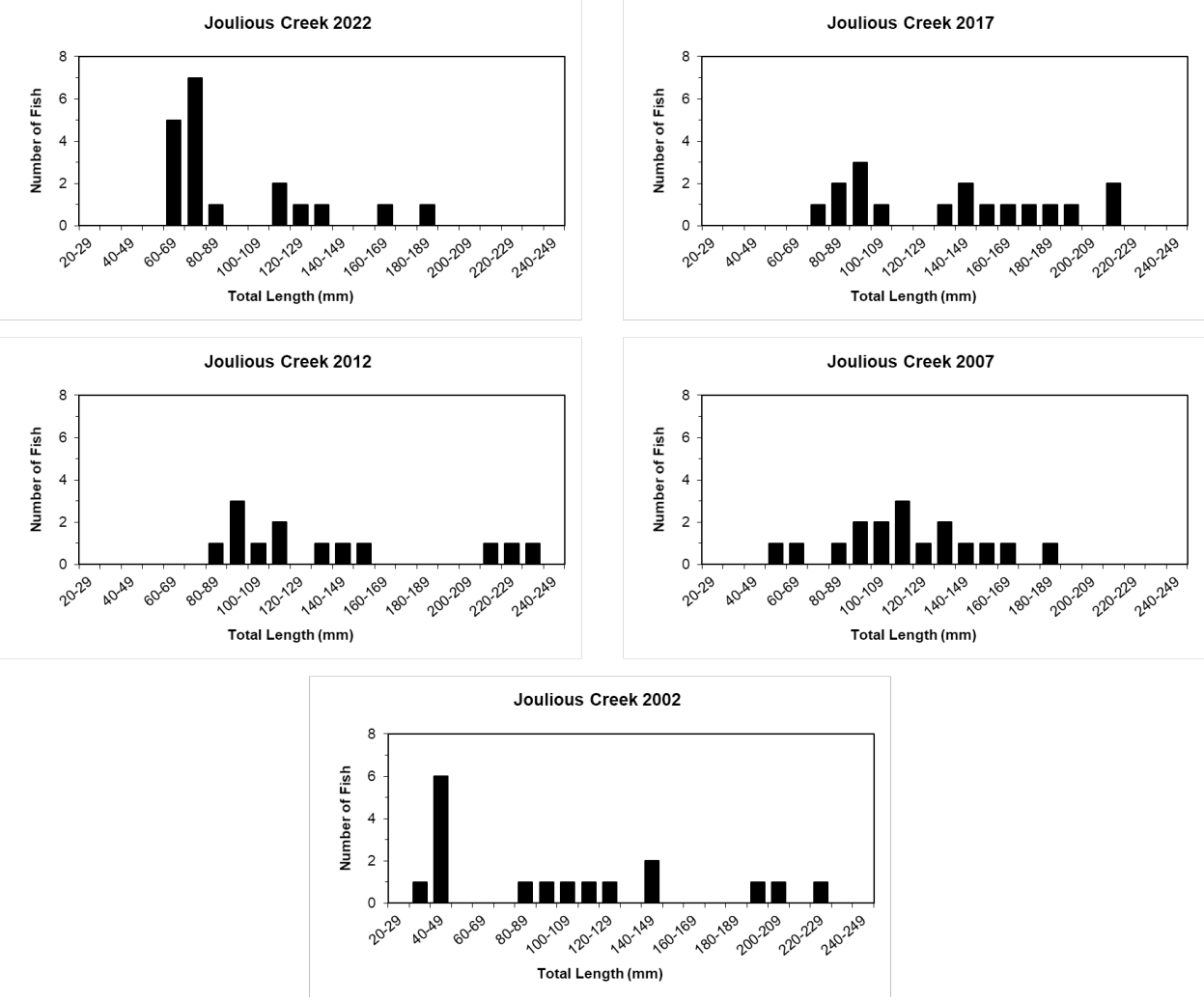

Figure 9. Size distribution of CRCT sampled in the Joulious Creek monitoring station, 2002, 2007, 2012, 2017, and 2022.

West Fork Beaver Creek **IICJ040A**

Monitoring

The 2022 monitoring station, 100 m in length, was electrofished on August 16, 2022. Based on four data points for this station, BKT dominate the stream while CRCT densities are very low (Table 12). Although it was noted following the 2012 monitoring that there had been occasional but limited recruitment of CRCT in this reach (see McKell and Thompson 2013), there was no sign of any CRCT during 2022 or 2017. For BKT, numbers in the station were up from 2017 but down from 2012 (Table 12); the length-frequency distribution for 2022 is similar to 2017 (Figure 10), except greater representation of the age-0 cohort in 2022.

Table 12. Population statistics for species sampled in West Fork Beaver Creek, 2007, 2012, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 BKT	28	294±37 (473±59)	22 (17)	157	112-245	49	12-145	1.01
	age-0 BKT	13	213±314 (343±505)		60	50-69			
	SC		abundant						
2017	≥age-1 BKT	17	no depletion		138	105-224	32	11-118	0.96
	age-0 BKT	1	10±0 (16±0)		49				
	SC		abundant						
2012	≥age-1 CRCT	2	no depletion		158	85-230	63	6-120	0.98
	≥age-1 BKT	82	899±98 (1447±157)	54 (48)	142	60-252	37	1-153	0.89
	age-0 BKT	1			61		2	2	
	SC		abundant						
2007	≥age-1 CRCT	1	13±0 (20±0)	3 (2)	250		156		1.00
	≥age-1 BKT	20	352±277 (567±446)	19 (17)	151	95-229	39	8-112	0.97
	SC		common						

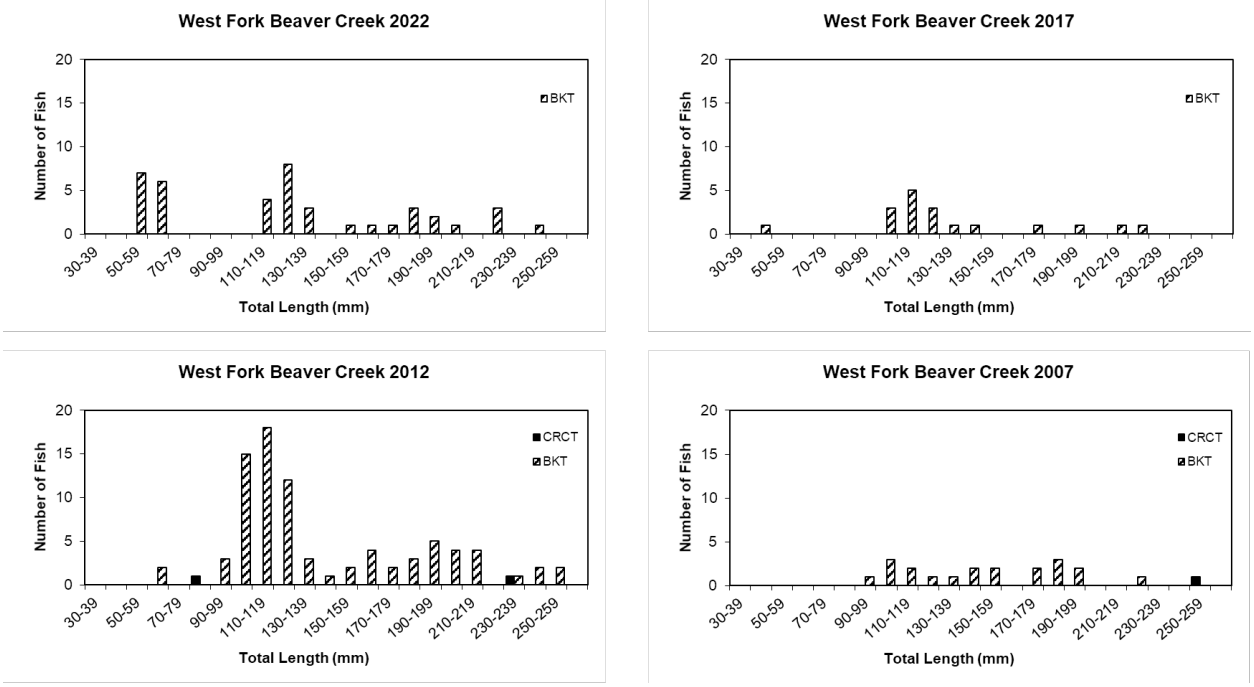

Figure 10. Size distribution of salmonid species sampled in the West Fork Beaver Creek monitoring station, 2007, 2012, 2017, and 2022.

Middle Fork Beaver Creek **IICJ040B**

Monitoring

The 2022 monitoring station, 100 m in length, was electrofished on August 16, 2022. Results of this and the previous samplings are shown in Table 13 and Figure 11. Based on five data points for this station, the CRCT population has struggled for the past 25 years, experiencing a slight bump in number in 2012 but disappearing completely in 2022 (Table 13). Spawning and recruitment of CRCT do not appear to influence the fish community in this reach but likely occur upstream and CRCT subsequently drift downstream into this portion of the creek. Similar to West Fork Beaver Creek, BKT dominate the fish community (Table 13), although 2022 had the lowest BKT abundance and biomass estimates of all sampling events. Sculpin were abundant in the station (Table 13).

Table 13. Population statistics for species sampled in Middle Fork Beaver Creek, 1997, 2007, 2012, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 BKT	17	188±52 (302±83)	14 (13)	171	105-220	58	10-111	1.04
	SC		abundant						
2017	≥age-1 CRCT	3	30±0 (48±0)	1 (1)	135	82-178	27	6-48	0.96
	≥age-1 BKT	24	375±360 (604±579)	25 (23)	165	102-240	54	10-137	1.03
	SC		abundant						
2012	≥age-1 CRCT	10	105±9 (170±15)	3 (3)	129	91-154	19	7-33	0.86
	age-0 CRCT	1			36		1		
	≥age-1 BKT	40	436±44 (702±71)	35 (31)	156	97-242	48	8-165	0.96
	age-0 BKT	13	510±3k+ (821±4k+)	2 (2)	63	54-70	2	1-3	
	SC		present						
2007	≥age-1 CRCT	2	22±0 (35±0)	2 (2)	194	176-212	64	50-77	0.86
	≥age-1 BKT	25	282±31 (454±50)	15 (13)	148	91-215	39	5-103	1.02
	SC		common						
1997	≥age-1 CRCT	3	40±68 (64±109)	4 (4)	209	204-217	84	79-91	0.92
	≥age-1 BKT	29	323±72 (519±116)	17 (15)	161	90-212	44	7-88	0.99
	SC		common						

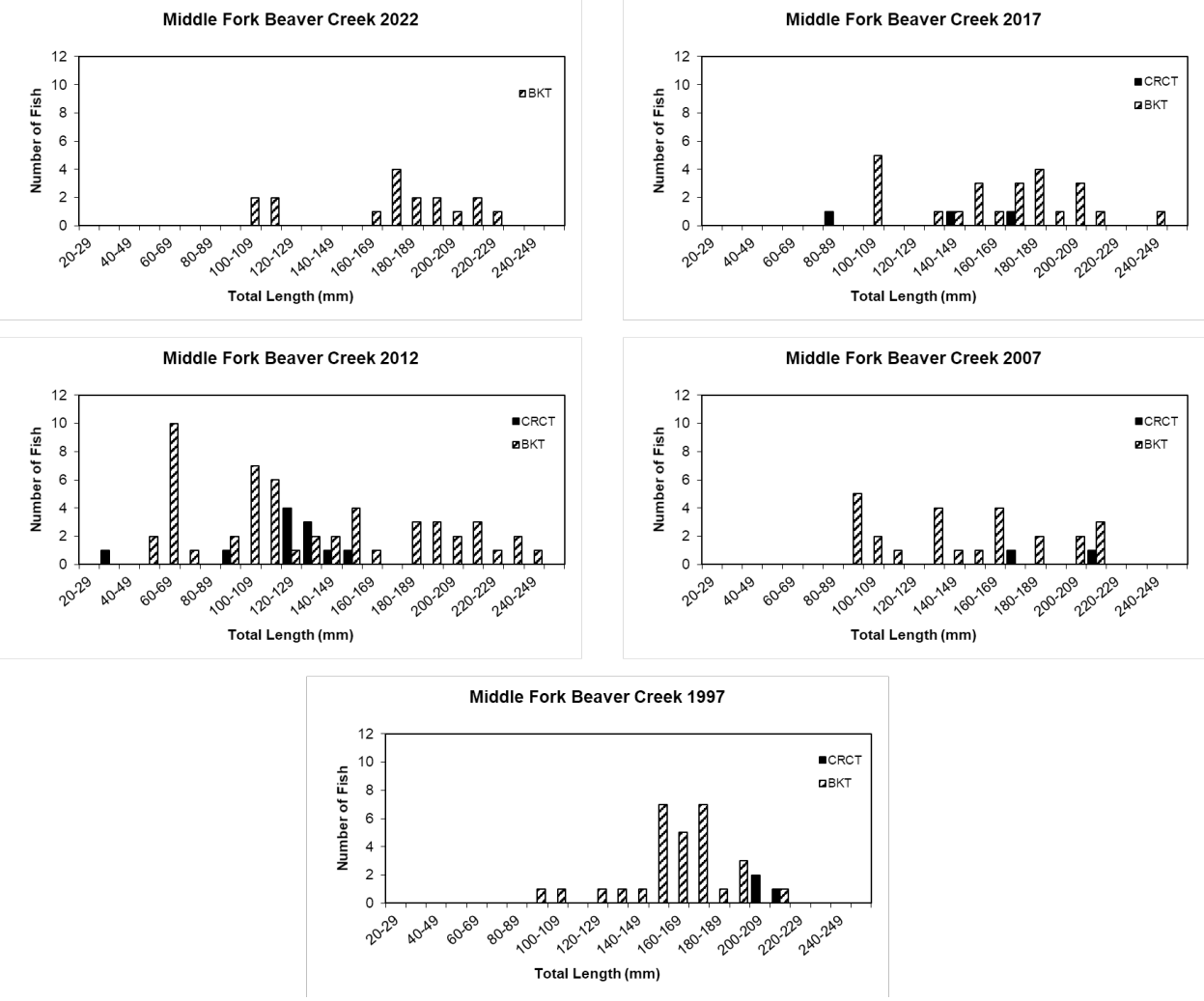

Figure 11. Size distribution of salmonid species sampled in the Middle Fork Beaver Creek monitoring station, 1997, 2007, 2012, 2017, and 2022.

West Fork Smiths Fork **IICK020B**

Population Restoration

Cutthroat trout produced from the North Slope CRCT brood source at Mammoth Creek Hatchery were stocked into West Fork Smiths Fork to aid in the reestablishment of CRCT following the rotenone treatment in 2021 to remove nonnative trout from the drainage. Approximately 100 adult CRCT (mean TL 390 mm) were stocked on August 9, 2022.

Gilbert Creek **IICK020A01**

Monitoring

Two stations in Gilbert Creek, both sampled annually between 2004 and 2009, as well as 2012 and 2017, were monitored in 2022. The stations, both 100 m in length, were electrofished on August 19, 2022.

Border Station

This reach continues to support only very low densities of CRCT (Table 14). Other than a slight bump in numbers in 2012, the population has been comprised of only a few CRCT, mostly small adults (Figure 12), which is reflected in the low estimated biomass of CRCT occupying the reach. Sculpin continue to be abundant in the station (Table 14).

North Slope Road Station

This station contained a small to moderate population of CRCT (relative to the Border Station), only half the size of the population in 2017 (Table 14). The CRCT sampled in 2022 appear to represent possibly three age-classes (Figure 13). Sculpin continue to be abundant in the station (Table 14); Mountain Sucker, although absent in the sample, were found post-survey while spot electrofishing immediately upstream of the station in the culvert pool.

Table 14. Population statistics for species sampled in Gilbert Creek, 2001, 2004-2009, 2012, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
Border Station									
2022	≥age-1 CRCT SC	2	20±0 (32±0) abundant	3 (3)	183	155-210	54	29-79	0.82
2017	≥age-1 CRCT SC	3	27±0 (43±0) abundant	8 (7)	207	185-245	84	62-126	0.93
2012	≥age-1 CRCT SC	6	88±106 (141±170) abundant	10 (9)	142	106-174	27	10-49	0.85
2009	≥age-1 CRCT SC	2	16±0 (26±0) abundant	5 (5)	202	183-221	86	58-113	1.00
2008	≥age-1 CRCT SC	3	28±0 (45±0) abundant	6 (6)	180	173-192	56	47-67	0.95
2007	≥age-1 CRCT SC	3	30±0 (48±0) abundant		159	134-182	21	17-29	0.64
2006	SC		abundant						
2005	SC		abundant						
2004	SC		abundant						
2001	≥age-1 BKT age-0 BKT SC	14 1	139±0 (223±0) present abundant	2 (2)	156 28	64-220	41	10-103	0.98

Table 14.—cont.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
North Slope Road Station									
2022	≥age-1 CRCT SC	8	82±11 (131±17) abundant	12 (11)	137	95-190	30	9-69	1.01
2017	≥age-1 CRCT MTS SC	20	206±23 (332±37) sparse abundant	10 (9)	96	67-133	10	2-21	0.95
2012	≥age-1 CRCT SC	22	227±12 (365±19) abundant	23 (21)	122	86-184	19	6-61	0.87
2009	≥age-1 CRCT SC	3	27±0 (44±0) abundant	8 (7)	167	153-192	51	38-74	1.06
2008	≥age-1 CRCT SC	10	91±0 (146±0) abundant	18 (17)	160	131-192	42	23-66	0.96
2007	≥age-1 CRCT age-0 CRCT MTS SC	10 1	100±0 (161±0) present sparse abundant		131 51	105-171	19 1	6-43	0.77
2006	≥age-1 CRCT SC	16	180±59 (290±95) abundant	1 (1)	124	73-225	21	4-106	0.86
2005	≥age-1 CRCT SC	16	163±15 (263±25) abundant	2 (2)	122	92-217	23	6-98	0.86
2004	≥age-1 CRCT SC	6	63±15 (101±24) abundant	3 (2)	183	137-205	68	32-88	1.10
2001	≥age-1 BKT age-0 BKT MTS SC	81 3	817±20 (1315±33) present sparse abundant	9 (8)	133 30	64-210 26-33	27	4-85	1.12

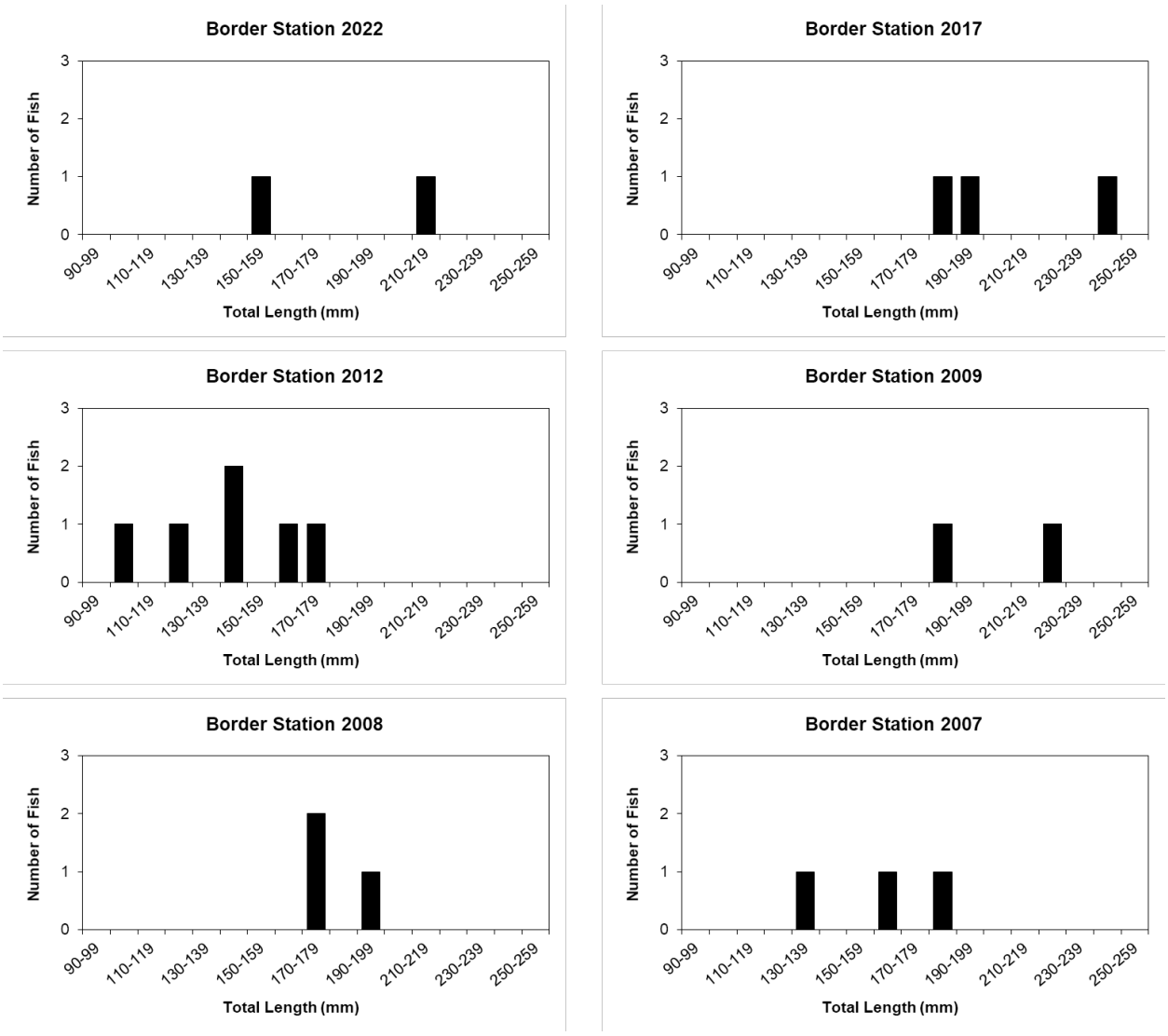

Figure 12. Size distribution of CRCT sampled in the border station on Gilbert Creek, 2007-2009, 2012, 2017, and 2022.

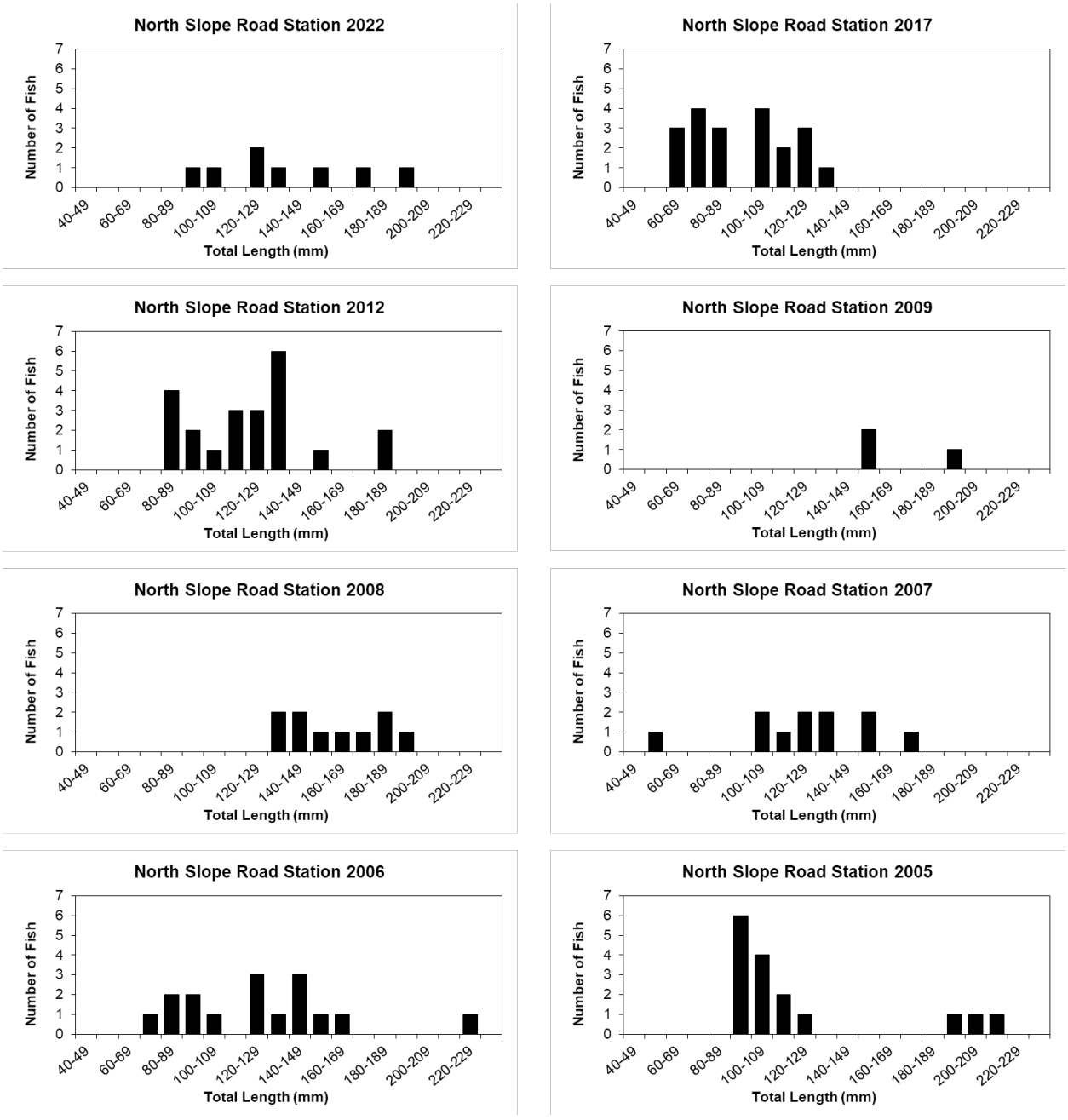

Figure 13. Size distribution of CRCT sampled in the North Slope Road station on Gilbert Creek, 2005-2009, 2012, 2017, and 2022.

East Fork Blacks Fork **IICK040**

Monitoring

The fish community in this 100 m station, which was sampled on August 18, 2022, was comprised of moderate populations of CRCT, Brook Trout, and Mountain Whitefish (Table 15). The CRCT population estimate for 2022 was greater than the previous estimates, but the confidence interval was wider, making the population estimate less certain (Table 15). The length-frequency distribution for 2022 shows a fairly wide range of size-classes of CRCT, similar to 2012 and 2006 (Figure 14). Mountain Whitefish dominated the salmonid biomass in this reach in 2022 (Table 15). The length-frequency distribution for Brook Trout indicates consistently successful spawning and recruitment, especially among the smallest size-class (Figure 14). Sculpin remain abundant in the station.

Table 15. Population statistics for species sampled in the East Fork Blacks Fork, 2006, 2012, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 CRCT	15	270±455 (435±733)	11 (10)	127	60-240	32	2-141	1.00
	≥age-1 BKT	27	308±84 (495±136)	13 (12)	135	92-245	35	8-181	1.07
	≥age-1 MWF	10	180±372 (290±598)	35 (31)	249	196-300	159	66-258	0.97
	SC		abundant						
2012	≥age-1 CRCT	14	141±7 (227±11)	12 (11)	180	113-250	69	12-154	0.97
	≥age-1 BKT	2	20±0 (32±0)	2 (2)	168	110-225	74	12-135	1.04
	≥age-1 MWF	3	30±0 (48±0)	8 (7)	275	251-294	213	162-266	1.01
	MTS		sparse						
	SC		abundant						
2006	≥age-1 CRCT	13	143±43 (230±70)	14 (13)	199	101-270	89	10-207	0.98
	≥age-1 MWF	13	131±7 (211±11)	19 (17)	238	198-311	127	69-259	0.90
	MTS		sparse						
	SC		abundant						

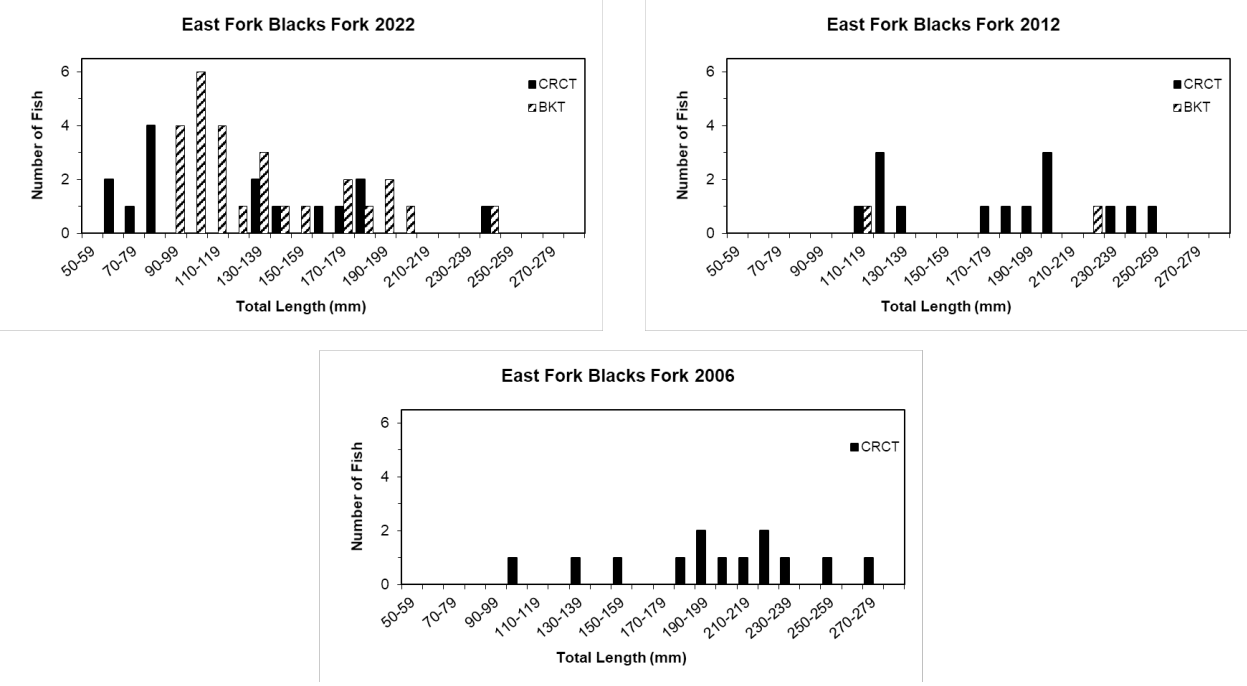

Figure 14. Size distribution of salmonids sampled in the East Fork Blacks Fork monitoring station, 2006, 2012, and 2022.

Little East Fork Blacks Fork **IICK040K**

Monitoring

This station was 108 m station in length and was sampled on August 18, 2022. The fish community was comprised of moderate populations of CRCT and Brook Trout, and a small population of Mountain Whitefish (Table 16). The CRCT population estimate for 2022 was lower than both previous estimates, but the confidence interval was wider, making the actual population estimate less certain (Table 16). The length-frequency distribution for 2022 shows a limited range of size-classes of CRCT, narrower and fewer than 2012 and 2006 (Figure 15). Brook Trout have become the predominant salmonid in this reach, more than doubling in number since the 2012 sampling (Table 16). The length-frequency distribution for Brook Trout indicates consistently successful spawning and recruitment, especially among the younger two age-classes (Figure 15). Sculpin remain abundant in this station.

Table 16. Population statistics for species sampled in the Little East Fork Blacks Fork, 2005, 2012, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 CRCT	7	148±576 (238±927)	4 (4)	124	90-199	23	7-70	1.01
	≥age-1 BKT	22	302±265 (487±426)	15(14)	142	104-227	39	13-156	1.06
	age-0 BKT	12	116±20 (186±32)		53	42-60			
	≥age-1 MWF	4	42±27 (67±44)	10 (9)	278	260-287	194	190-198	0.91
	SC		abundant						
2012	≥age-1 CRCT	42	395±141 (636±226)	21 (19)	134	73-280	33	3-222	0.84
	age-0 CRCT	28	481±936 (774±1506)		36	27-49			
	≥age-1 BKT	16	127±23 (204±37)	10 (9)	156	101-235	50	7-137	0.94
	age-0 BKT	10	135±280 (218±450)		62	53-73	2	2-3	
	SC		abundant						
2005	≥age-1 CRCT	40	479±99 (770±159)	4 (3)	162	66-248	61	5-189	1.15
	≥age-1 BKT	2			115	114-115	17	15-18	1.26
	≥age-1 MWF	12	113±29 (183±47)	2 (2)	232	200-288	122	71-211	0.96
	SC		abundant						

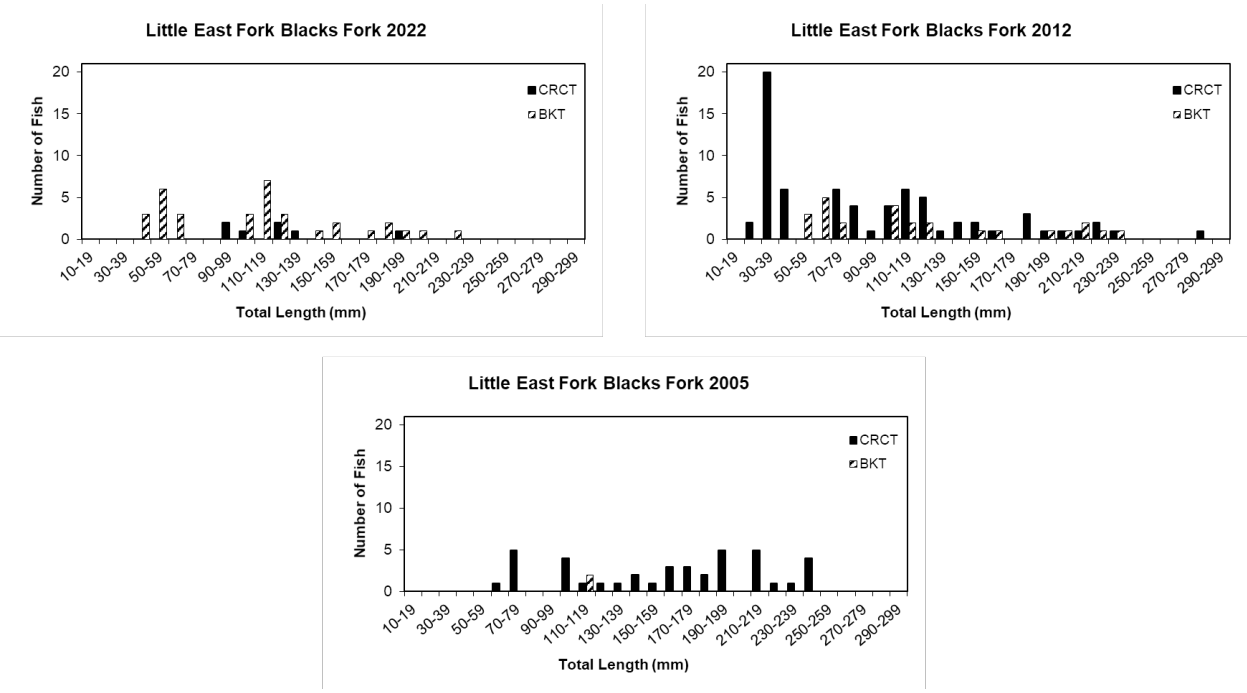

Figure 15. Size distribution of salmonids sampled in the Little East Fork Blacks Fork monitoring station, 2005, 2012, and 2022.

YELLOWSTONE CUTTHROAT TROUT

Monitoring

Population monitoring by multiple-pass electrofishing was completed in 11 stations across the Raft River Range during 2022. Two of the populations exhibited an increase since the previous sampling, five showed a decrease in abundance, and four remained essentially flat (Table 17).

Fish species encountered during population monitoring in 2022 included Yellowstone Cutthroat Trout, Bluehead Sucker (BHS; *Catostomus discobolus*), sculpin, and Speckled Dace.

Table 17. Results of YCT population monitoring in 2022.

Stream/section	Year	# of ≥age-1 YCT/km	# of ≥age-1 YCT/mile
Lower Snake GMU, North Slope of the Raft River Mountains			
Clear Creek	2022	98 ± 0	157 ± 0
	2017	91 ± 12	146 ± 19
	2012	338 ± 8	544 ± 14
	2008	405 ± 17	652 ± 28
	2001	440 ± 68	709 ± 110
Onemile Creek	2022	121 ± 10	194 ± 17
	2017	433 ± 187	697 ± 301
	2006	190 ± 20	306 ± 32
Sawmill Canyon	2022	180 ± 0	290 ± 0
	2017	411 ± 30	661 ± 48
	2006	120 ± 30	193 ± 48
	2001	229 ± 0	370 ± 0
George Creek	2022	673 ± 30	1083 ± 48
	2017	597 ± 51	961 ± 82
	2012	547 ± 60	881 ± 97
	2008	558 ± 11	898 ± 18
Johnson Creek	2022	1060 ± 70	1706 ± 112
	2019	510 ± 36	317 ± 22
	2017	10 ± 0	16 ± 0
	2016	0	0
	2012	38 ± 0	61 ± 0
	2006	0	0
	2001	68 ± 0	109 ± 0
Left Hand Fork Johnson Creek	2022	305 ± 9	490 ± 14
	2017	394 ± 34	634 ± 55
	2015	40 ± 0	64 ± 0
	2014	83 ± 58	134 ± 93

Table 17.—cont.

Stream/section	Year	# of ≥age-1 YCT/km	# of ≥age-1 YCT/mile
Left Hand Fork Johnson Creek (cont.)	2013	524 ± 14	843 ± 23
	2012	442 ± 11	712 ± 18
	2011	336 ± 46	540 ± 74
	2006	230 ± 40	370 ± 64
	2001	642 ± 30	1036 ± 49
Browns Canyon	2022	458 ± 6	737 ± 10
	2017	418 ± 27	672 ± 43
	2015	316 ± 29	508 ± 47
	2014	467 ± 155	751 ± 249
	2013	296 ± 48	477 ± 77
	2012	504 ± 14	811 ± 23
	2011	270 ± 8	435 ± 14
	2001	322 ± 32	518 ± 52
Wildcat Creek	2022	10 ± 0	16 ± 0
	2017	128 ± 0	205 ± 0
	2012	Present, but no population estimate	
	2006	122 ± 0	197 ± 0
	2001	42 ± 0	67 ± 0
Basin Creek, middle	2022	60 ± 0	97 ± 0
	2021	171 ± 14	276 ± 23
	2018	665 ± 621	1070 ± 999
	2017	634 ± 46	1021 ± 75
	2016	116 ± 192	186 ± 310
	2012	127 ± 7	205 ± 11
	2006	232 ± 52	373 ± 84
	2001	303 ± 20	489 ± 33
Basin Creek, upper	2022	40 ± 68	64 ± 109
	2017	57 ± 97	92 ± 156
	2012	434 ± 20	699 ± 32
	2001	166 ± 78	268 ± 126
Mahogany Creek	2022	10 ± 0	16 ± 0
	2017	324 ± 144	521 ± 232
	2012	48 ± 0	77 ± 0
	2006	150 ± 20	241 ± 32
	2001	419 ± 19	675 ± 31

LOWER SNAKE GMU
North Slope Raft River Mountains

Clear Creek IIIAA010

Monitoring

The 2022 monitoring station, 82 m in length, was electrofished on July 20, 2022. Results of this and previous sampling efforts are shown in Table 18 and Figure 16. Based on five data points, the YCT population was essentially static between 2001 and 2012, but decreased by more than two-thirds between 2012 and 2017, and appeared to remain flat between 2017 and 2022 (Table 18). The biomass estimate for 2022 was also comparable to 2017 but both were less than half the estimate for 2012. The length-frequency distribution for 2022 shows a constriction in the range of size-classes and absence of the age-1 cohort in the sample (Figure 16), indicating recruitment failure following the 2021 spawn.

Table 18. Population statistics for species sampled in Clear Creek, 2001, 2008, 2012, 2017, and 2022.

Year	Species	Total Catch	**#/km** ± 95% C.I. (**#/mi** ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 YCT	8	98±0 (157±0)	24 (22)	172	136-224	62	26-146	1.11
2017	≥age-1 YCT	8	91±12 (146±19)	29 (26)	178	117-233	70	16-144	1.09
	age-0 YCT	2	22±0 (36±0)		41	38-43			
2012	≥age-1 YCT	33	338±8 (544±14)	68 (60)	149	70-268	53	3-194	1.11
	age-0 YCT	2	20±0 (33±0)		51	48-53	1		
2008	≥age-1 YCT	40	405±17 (652±28)	38 (34)	108	58-236	22	2-124	0.99
	≥age-1 YCTxRT	1	10±0 (16±0)	14 (13)	327		333		0.95
2001	≥age-1 YCT	42	440±68 (709±110)	98 (87)	124	55-271	37	1-192	0.93
	age-0 YCT	10	174±358 (281±578)		23	21-25			

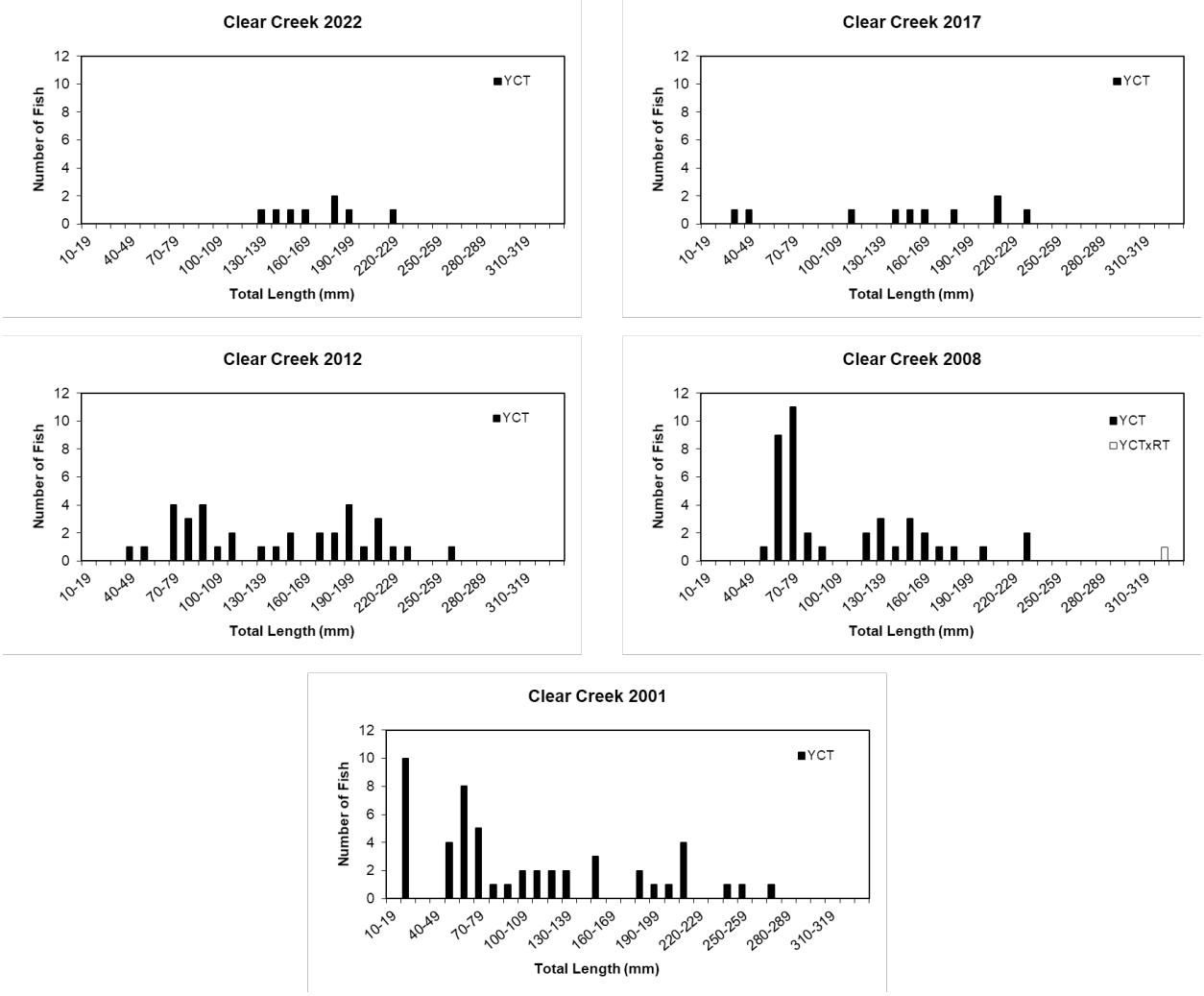

Figure 16. Size distribution of salmonid species sampled in Clear Creek, 2001, 2008, 2012, 2017, and 2022.

Onemile Creek **IIIAA020**

Monitoring

The Onemile Creek monitoring station, 84 m in length, was electrofished on July 21, 2022. Results of this and previous sampling efforts are shown in Table 19 and Figure 17. Based on three data points, the YCT population has experienced some fluctuation: the 2022 population estimate was reduced to almost a quarter of the 2017 estimate, which was double that of 2006 (Table 19). Similarly, the biomass in 2022 was estimated at about one-fifth of the 2017 estimate. Fewer age-classes were represented in 2022, especially underrepresented was the previously strong age-1 cohort (Figure 17), suggesting poor recruitment from the 2021 spawn. Sculpin were again sampled in the station.

Table 19. Population statistics for species sampled in Onemile Creek, 2006, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 YCT SC	10	121±10 (194±17) common	17 (15)	124	91-161	20	8-42	0.95
2017	≥age-1 YCT SC	29	433±187 (697±301) common	88 (78)	128	77-269	33	3-188	0.89
2006	≥age-1 YCT	19	190±20 (306±32)	22 (20)	101	56-218	27	2-111	1.44

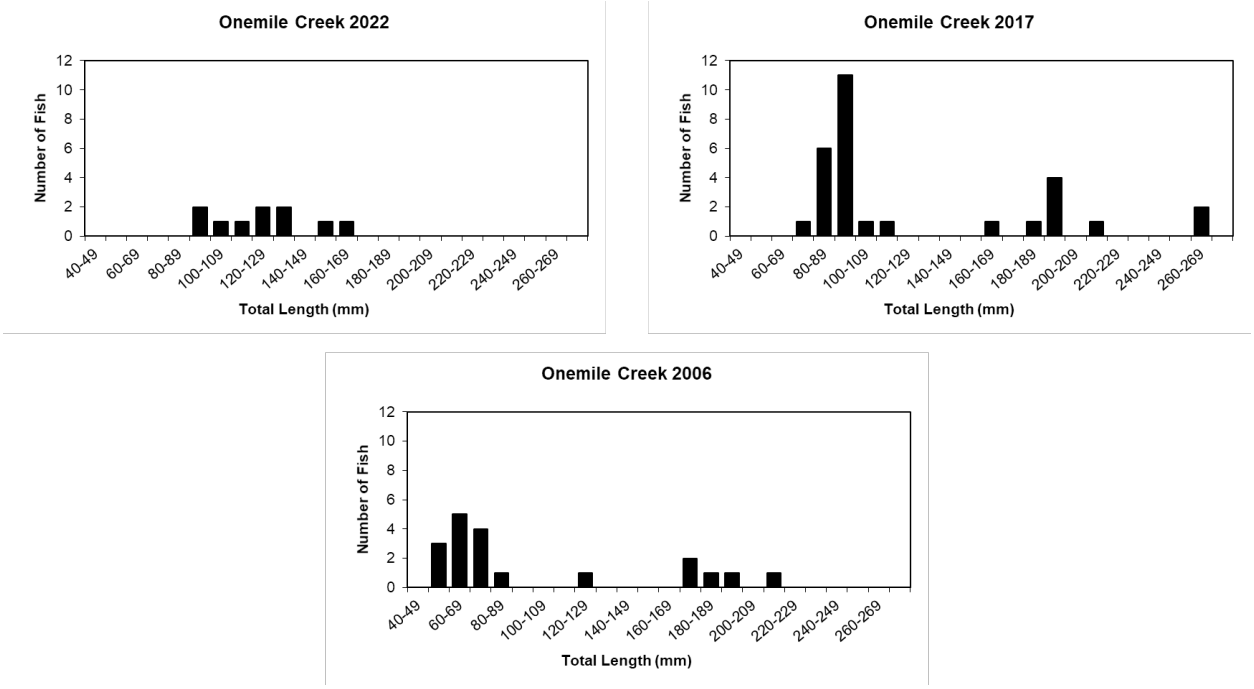

Figure 17. Size distribution of YCT sampled in Onemile Creek, 2006, 2017, and 2022.

Sawmill Canyon **IIIAA02003**

Monitoring

The station in Sawmill Canyon, 100 m in length, was electrofished on July 20, 2022, in an effort to monitor the YCT population. Results of this and the previous sampling efforts are shown in Table 20 and Figure 18. The YCT population in 2022 was about half that of 2017, in terms of both number and biomass (Table 20). The length-frequency distribution for 2022 suggests two age-classes were sampled, including a poorly represented age-1 cohort (Figure 18), suggesting recruitment failure following the 2021 spawn.

Table 20. Population statistics for species sampled in Sawmill Canyon, 2001, 2006, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 YCT	18	180±0 (290±0)	32 (29)	137	97-158	26	8-39	0.97
2017	≥age-1 YCT	36	411±30 (661±48)	60 (54)	135	70-232	29	4-113	0.96
2006	≥age-1 YCT	12	120±30 (193±48)	8 (7)	100	54-150	15	2-42	1.24
2001	≥age-1 YCT age-0 YCT	32 20	229±0 (370±0) no depletion	18 (16)	106 35	72-159 30-50	14	4-45	1.02

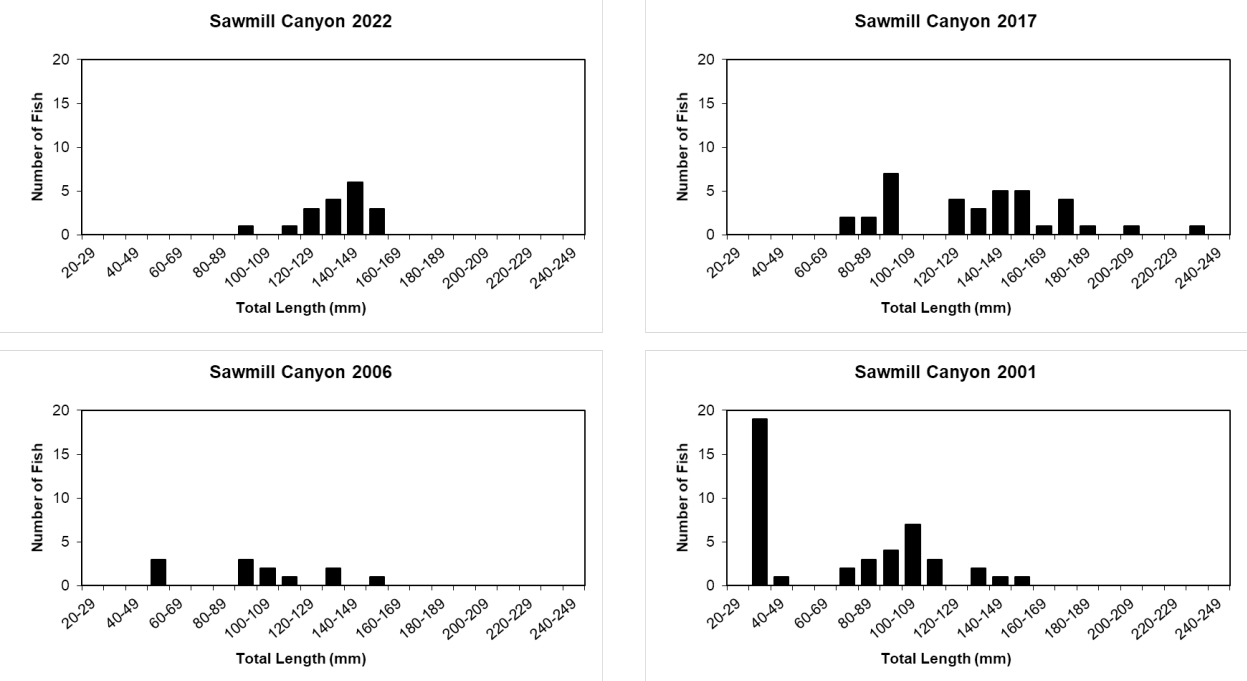

Figure 18. Size distribution of YCT sampled in Sawmill Canyon, 2001, 2006, 2017, and 2022.

George Creek **IIIAA030**

Monitoring

This station, 100 m in length, was electrofished on July 20, 2022, in an effort to monitor the headwater YCT population. Results of this and previous sampling efforts are shown in Table 21 and Figure 19. Based on five data points, the YCT population has essentially maintained high densities between 2001 and 2022 (Table 21). The biomass estimate has been moderate as well but decreased in 2022 to half the 2017 estimate and one-fourth the 2012 estimate (Table 21). The length-frequency distribution for 2022 shows a distribution similar to that of the previous sampling events but with greater representation among the age-1 cohort than the two most recent samplings (Figure 19).

Table 21. Population statistics for YCT sampled in George Creek, 2001, 2008, 2012, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 YCT	66	673±30 (1083±48)	32 (29)	104	61-205	16	2-85	0.96
2017	≥age-1 YCT	57	597±51 (961±82)	56 (50)	119	49-255	30	1-164	0.95
2012	≥age-1 YCT	57	664±67 (1069±108)	118 (105)	130	49-313	39	1-298	1.01
2008	≥age-1 YCT age-0 YCT	50 15	558±11 (898±18) 178±37 (286±60)	56 (50)	116 26	62-306 23-28	28	2-305	0.93
2001	≥age-1 YCT age-0 YCT	55 27	575±39 (927±63) 412±352 (665±568)	41 (36)	125 42	72-256 35-45	24	3-136	0.86

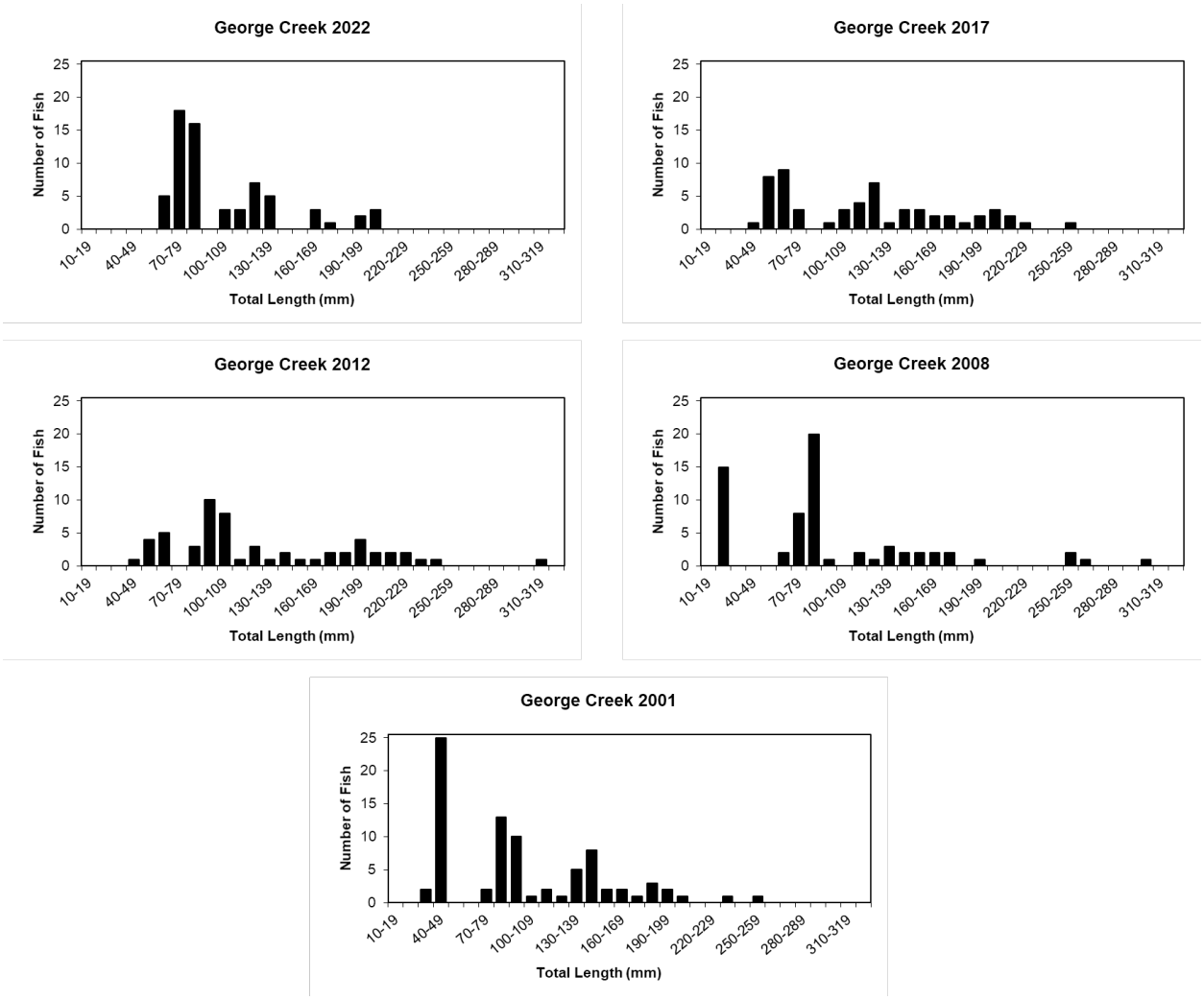

Figure 19. Size distribution of YCT sampled in George Creek, 2001, 2008, 2012, 2017, and 2022.

Johnson Creek **IIIAA030A**

Monitoring

The Johnson Creek monitoring station, 100 m in length, was electrofished on July 18, 2022, in an effort to assess the status of the YCT population. Results of this and previous sampling efforts are shown in Table 22 and Figure 20. In 2012, this monitoring station contained an extraordinarily high density of BKT and very few YCT (Table 22). In 2013 and 2014, Johnson Creek was treated with rotenone to remove BKT from the drainage. While the monitoring station contained no YCT in 2016 and only one in 2017, the population in this reach exhibited a marked increase by 2019 and experienced additional increase by 2022 (Table 22). Multiple age-classes of YCT occupy the station, including a robust age-1 cohort (Figure 20). Sculpin were again abundant in the station.

Table 22. Population statistics for species sampled in Johnson Creek, 2001, 2006, 2012, 2016, 2017, 2019, and 2022.

Year	Species	Total Catch	**#/km** ± 95% C.I. (**#/mi** ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 YCT	101	1060±70 (1706±112)	119 (106)	111	65-240	17	3-144	0.95
	SC		abundant						
2019	≥age-1 YCT	31	317±22 (510±36)	49 (44)	129	78-289	30	5-286	0.94
	SC		abundant						
2017	≥age-1 YCT	1	10±0 (16±0)	10 (9)	282		253		1.13
	SC		sparse						
2016	BHS		sparse						
	SC		sparse						
2012	≥age-1 YCT	4	38±0 (61±0)	34 (31)	254	200-289	161	74-254	0.93
	≥age-1 BKT	137	1322±32 (2127±51)	470 (420)	147	67-318	63	3-307	1.02
	age-0 BKT	63	653±83 (1051±134)	8 (7)	58	37-66	2	1-3	
	SC		abundant						
2006	≥age-1 BKT	26	280±28 (451±46)	128 (114)	195	106-301	96	10-321	1.22
	SC		common						
2001	≥age-1 YCT	7	68±0 (109±0)	13 (12)	145	90-200	40	8-83	1.10
	≥age-1 BKT	74	557±19 (899±31)	111 (99)	145	65-256	40	1-196	1.06
	age-0 BKT	5			43	40-47			

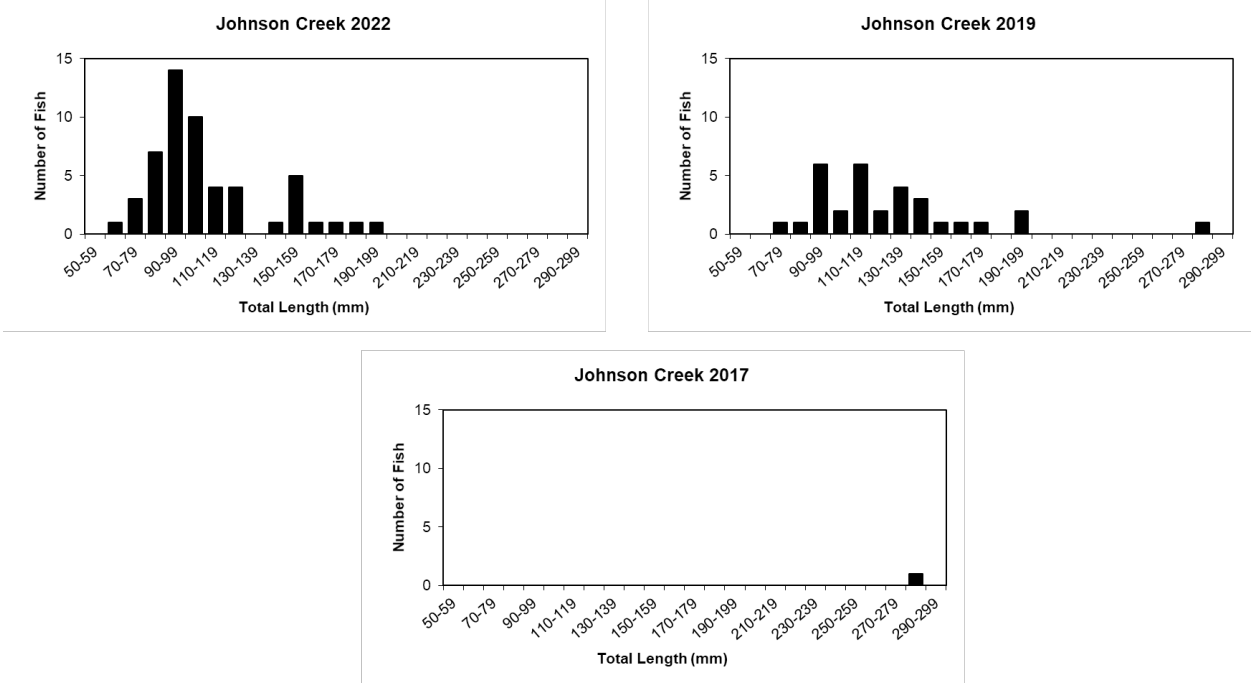

Figure 20. Size distribution of YCT sampled in Johnson Creek, 2017, 2019, and 2022.

Left Hand Fork Johnson Creek **IIIAA030A08**

Monitoring

The station in Left Hand Fork Johnson Creek, 99 m in length, was electrofished on July 18, 2022, in an effort to monitor the YCT population. Results of this and previous samplings are shown in Table 23 and Figure 21. The YCT population in 2022 indicated a slight decrease in abundance from 2017 which displayed a sharp increase from low densities in 2015 and 2014. Estimated biomass for 2022 was roughly one-fourth of the 2017 estimate, which exceeded nearly all previous biomass estimates (Table 23). The length-frequency distribution indicates a single age-class was represented in the 2022 sample, the age-1 cohort (Figure 21), suggesting a potential decrease in the suitability of this reach for supporting a resident YCT population. BKT have not been sampled in the Left Hand Fork since the intensive removal efforts conducted during 2011-2013.

Table 23. Population statistics for species sampled in Left Hand Fork Johnson Creek, 2001, 2006, 2011-2015, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 YCT	30	305±9 (490±14)	19 (17)	93	66-115	8	3-12	0.94
2017	≥age-1 YCT	38	394±34 (634±55)	68 (61)	131	92-248	32	8-168	1.04
2015	≥age-1 YCT	4	40±0 (64±0)	13 (12)	156	128-182	46	27-70	1.20
2014	≥age-1 YCT	7	83±58 (134±93)	17 (15)	137	96-173	31	8-52	1.06
2013	≥age-1 YCT	52	524±14 (843±23)	53 (47)	111	73-256	20	4-140	1.03
	≥age-1 BKT	3	40±68 (64±109)	5 (4)	126	121-134	23	21-26	1.12
2012	≥age-1 YCT	44	442±11 (712±18)	17 (16)	113	66-237	21	4-149	1.05
	≥age-1 BKT	1	10±0 (16±0)	<1 (<1)	134		25		1.04
	age-0 BKT	2	20±0 (32±0)		56	54-57	2		
2011	≥age-1 YCT	31	336±46 (540±74)	39 (34)	115	50-224	25	1-121	1.20
	≥age-1 BKT	19	197±13 (316±21)	55 (49)	166	82-251	62	5-179	1.11
2006	≥age-1 YCT	22	230±40 (370±64)	8 (7)	81	45-130	8	1-29	1.19
2001	≥age-1 YCT	63	644±31 (1036±50)	46 (41)	101	43-177	15	2-58	1.21
	≥age-1 BKT	13	134±19 (216±31)	21 (18)	133	105-192	33	11-92	1.29

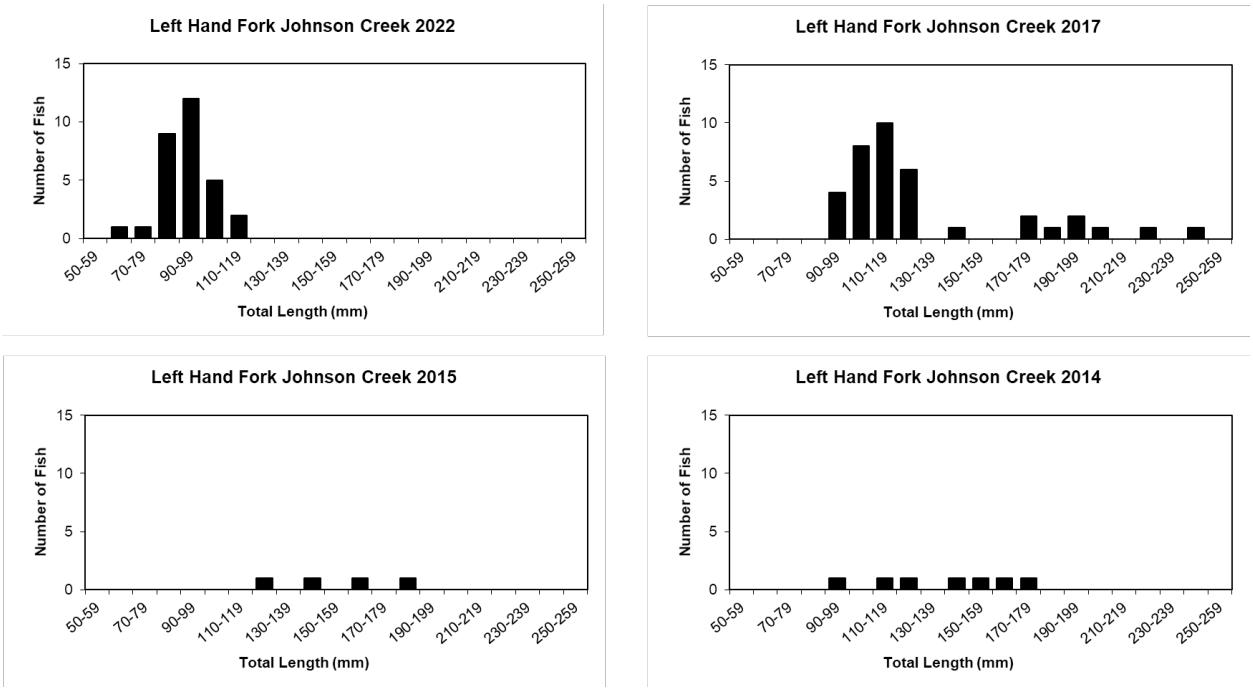

Figure 21. Size distribution of YCT sampled in Left Hand Fork Johnson Creek, 2014, 2015, 2017, and 2022.

Browns Canyon **IIIAA030A08C**

Monitoring

The station in Browns Canyon, 105 m in length, was electrofished on July 18, 2022, in an effort to monitor the YCT population. Results of this and previous sampling efforts are shown in Table 24 and Figure 22. This YCT population exhibits continual cycling but maintains high densities, having a mean of 382/km (613/mi) for all sampling events. The size of the population increased by roughly 10% since 2017, while YCT biomass dropped by half during that time (Table 24). In contrast to 2017, the length-frequency distribution for 2022 was again represented heavily by the age-1 cohort, having a size distribution similar to 2014 and 2015 (Figure 35). Like the Left Hand Fork, BKT have not been sampled in Browns Canyon since the intensive removal efforts conducted during 2011-2013.

Table 24. Population statistics for species sampled in Browns Canyon, 2001, 2011-2015, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 YCT	48	458±6 (737±10)	32 (29)	90	60-185	10	1-61	0.97
2017	≥age-1 YCT	44	418±27 (672±43)	85 (76)	135	51-249	38	1-184	1.03
2015	≥age-1 YCT	32	316±29 (508±47)	28 (25)	99	62-196	15	2-81	1.04
2014	≥age-1 YCT	40	467±155 (751±249)	24 (22)	78	38-194	8	1-78	1.21
2013	≥age-1 YCT	29	296±48 (477±77)	64 (57)	122	54-279	35	2-200	1.02
2012	≥age-1 YCT	50	504±14 (811±23)	9 (8)	80	61-202	9	2-89	1.04
	≥age-1 BKT	1	10±0 (16±0)		113		17		1.18
	age-0 BKT	23	230±5 (371±8)	1 (1)	55	47-60	2	1-2	
2011	≥age-1 YCT	29	270±8 (435±14)	80 (71)	133	65-259	45	2-187	1.04
	age-0 YCT	30	669±1373 (1077±2210)		34	26-38			
	≥age-1 BKT	4	42±27(67±44)	16 (14)	155	75-227	56	3-135	1.02
2001	≥age-1 YCT	31	322±32 (518±52)	20 (17)	84	42-149	9	1-39	1.20
	≥age-1 BKT	9	91±10 (147±15)	18 (16)	129	70-156	28	4-46	1.19

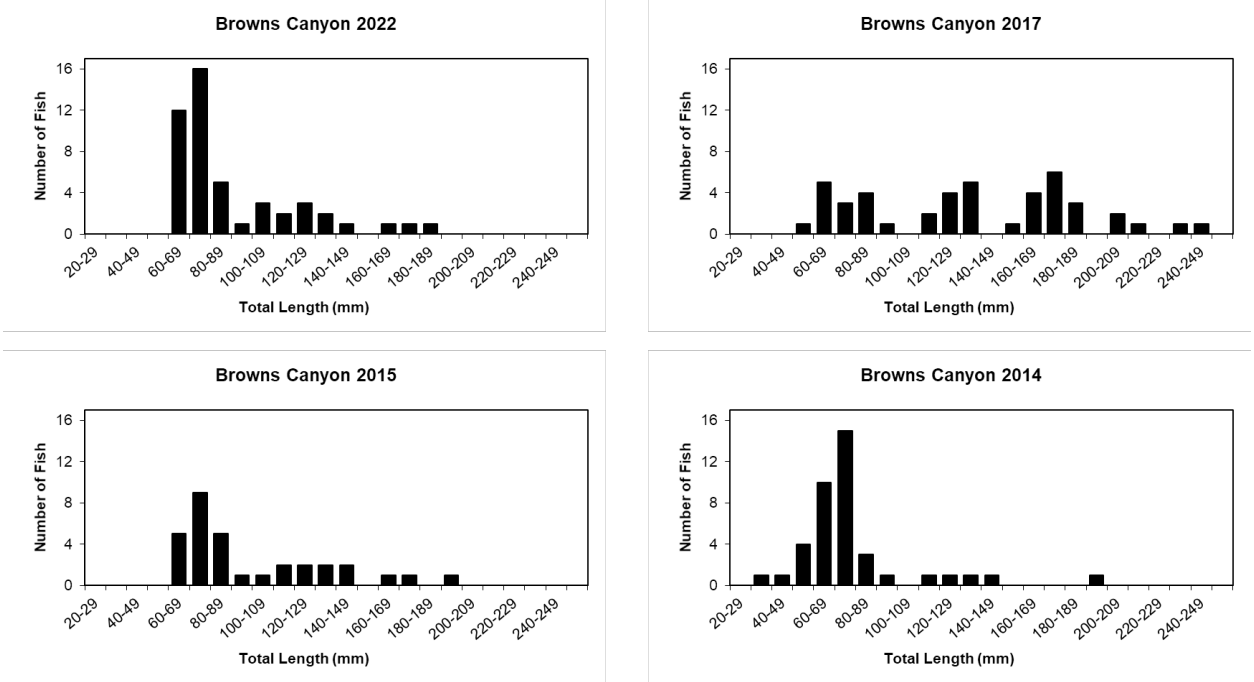

Figure 22. Size distribution of YCT sampled in Browns Canyon, 2001, 2011-2015, 2017, and 2022.

Wildcat Creek **IIIAA040**

Monitoring

This station, 100 m in length, was electrofished on July 19, 2022, in an effort to assess the status of the YCT population. Results of this and previous sampling efforts are shown in Table 25 and Figure 23. The YCT population declined substantially between 2017 and 2022 (Table 25), with only a single small adult and a handful of age-0 YCT sampled (Figure 23). Suitable instream habitat in the station appeared to have changed since 2017 and seems to now be limited to a few small pools and much of the channel is shallow. A headcut and an associated downstream pool that were discovered mid-station in 2012 (see McKell and Thompson 2013) and were present in 2017 and held multiple adult YCT during that time, were gone in 2022; the sediments eroded from the headcut undoubtedly contributed to the loss of pool and run habitats in the vicinity of the headcut.

Table 25. Population statistics for YCT sampled in Wildcat Creek, 2001, 2006, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 YCT age-0 YCT	1 4	10±0 (16±0) 40±0 (64±0)	8 (7)	179 24	 21-26	58		1.01
2017	≥age-1 YCT	12	128±0 (205±0)	157 (140)	213	142-320	112	25-283	0.99
2006	≥age-1 YCT	12	122±0 (197±0)	46 (41)	137	109-235	44	14-170	1.44
2001	≥age-1 YCT	4	42±0 (67±0)	16 (14)	107	60-241	31	2-116	1.07

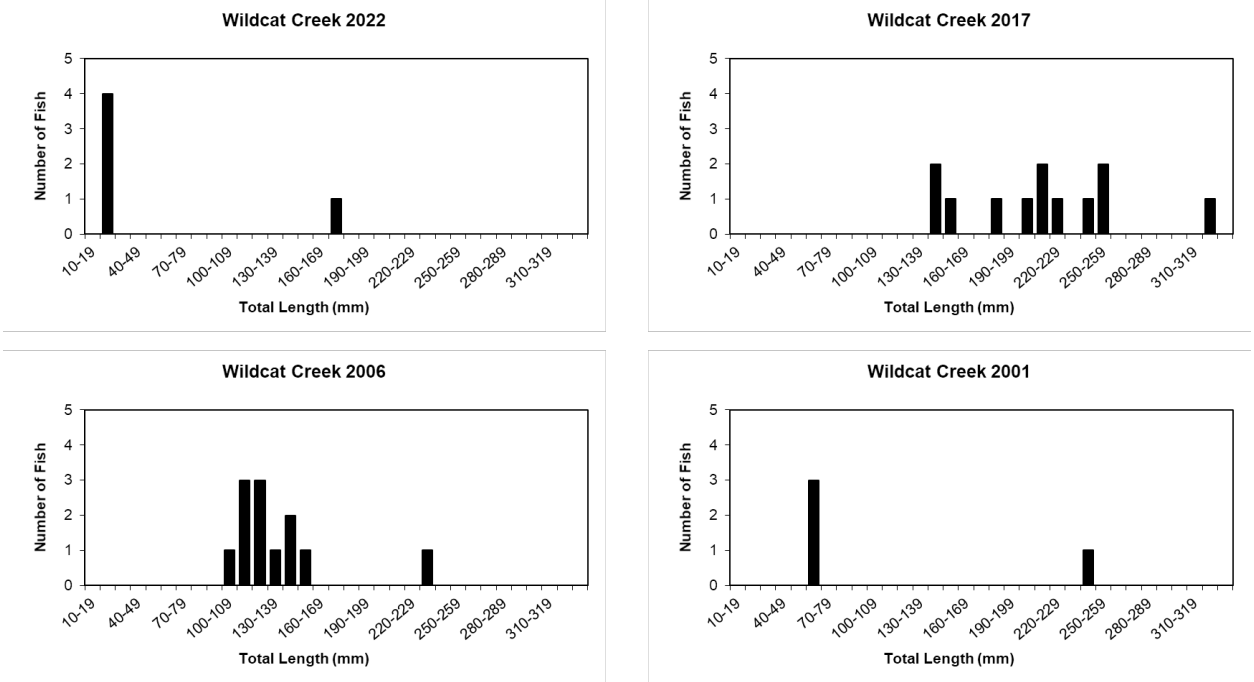

Figure 23. Size distribution of YCT sampled in Wildcat Creek, 2001, 2006, 2017, and 2022.

Basin Creek **IIIAA06011**

Monitoring

Two stations in Basin Creek were sampled in 2022 to monitor YCT populations. Both stations were 100 m in length and were sampled on July 19, 2022. The lower station was located a short distance upstream of the road crossing at the lower end of Cotton Thomas Basin, and the upper station was located upstream of the confluence with Mahogany Creek.

Lower Station

The YCT population in the lower monitoring station declined further from its 70% decline in abundance between 2018 and 2021 (Table 26). The length-frequency distribution for 2022 suggests the population was comprised of a small number of adults and possibly a single age-1 individual (Figure 24). Only three out of the eight times this population has been sampled has there been lesser representation of the age-1 cohort than other age-classes, 2012, 2016, and 2022 (Figure 24). It was also in those same three years that estimates of population abundance were lowest. However, as evidenced between 2016 and 2017, the dip in population abundance seen in 2016 was short-lived and the population rebounded the next year, owing primarily to the abundant age-1 year-class.

Upper Station

Abundance of YCT at this site was low in both 2022 and 2017, with three similarly sized adults sampled on each occasion (Table 26 and Figure 25). Estimated biomass was the same during both years. There was no evidence of recent recruitment as there was with the large age-1 cohort in 2012 (Figure 25). Speckled dace were again common in the station (Table 26).

Table 26. Population statistics for species sampled in Basin Creek, 2001, 2006, 2012, 2016, 2017, 2018, 2021, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
Lower Station									
2022	≥age-1 YCT	6	60±0 (97±0)	19 (17)	189	142-229	64	25-113	0.89
	BHS	5	sparse		125	121-133	18	17-23	
	SPD		abundant						
2021	≥age-1 YCT	17	171±14 (276±23)	21 (18)	134	97-195	28	8-84	0.96
	BHS		common						
	SPD		abundant						
2018	≥age-1 YCT	43	665±621 (1070±999)	131 (117)	142	94-365	39	8-394	0.98
	BHS	5	sparse		149	106-210	41	13-92	
	SPD		abundant						
2017	≥age-1 YCT	61	634±46 (1021±75)	124 (111)	160	112-269	50	14-237	1.10
	BHS	3	sparse		172	151-186	57	41-75	
	SPD		common						
2016	≥age-1 YCT	8	116±192 (186±310)	59 (53)	193	126-252	84	19-151	0.97
	BHS	1	sparse		117				
	SPD		common						
2012	≥age-1 YCT	13	127±7 (205±11)	77 (69)	213	98-289	108	9-229	0.91
	BHS	1	sparse		60		2		
	SPD		common						
2006	≥age-1 YCT	22	232±52 (378±84)	43 (38)	147	98-285	56	10-274	1.23
	SPD		common						
2001	≥age-1 YCT	30	489±33 (303±20)	42 (38)	137	77-244	34	6-156	1.14
	SPD		sparse						
Upper Station									
2022	≥age-1 YCT	3	40±68 (64±109)	21 (19)	170	162-180	49	43-62	1.00
	SPD		common						
2017	≥age-1 YCT	3	57±97 (92±156)	21 (19)	169	163-176	49	46-55	1.03
	SPD		common						
2012	≥age-1 YCT	39	434±20 (699±32)	92 (82)	131	90-223	26	6-132	0.90
	SPD		common						
2001	≥age-1 YCT	14	166±78 (268±126)	63 (56)	152	88-250	46	5-146	0.93
	SPD		sparse						

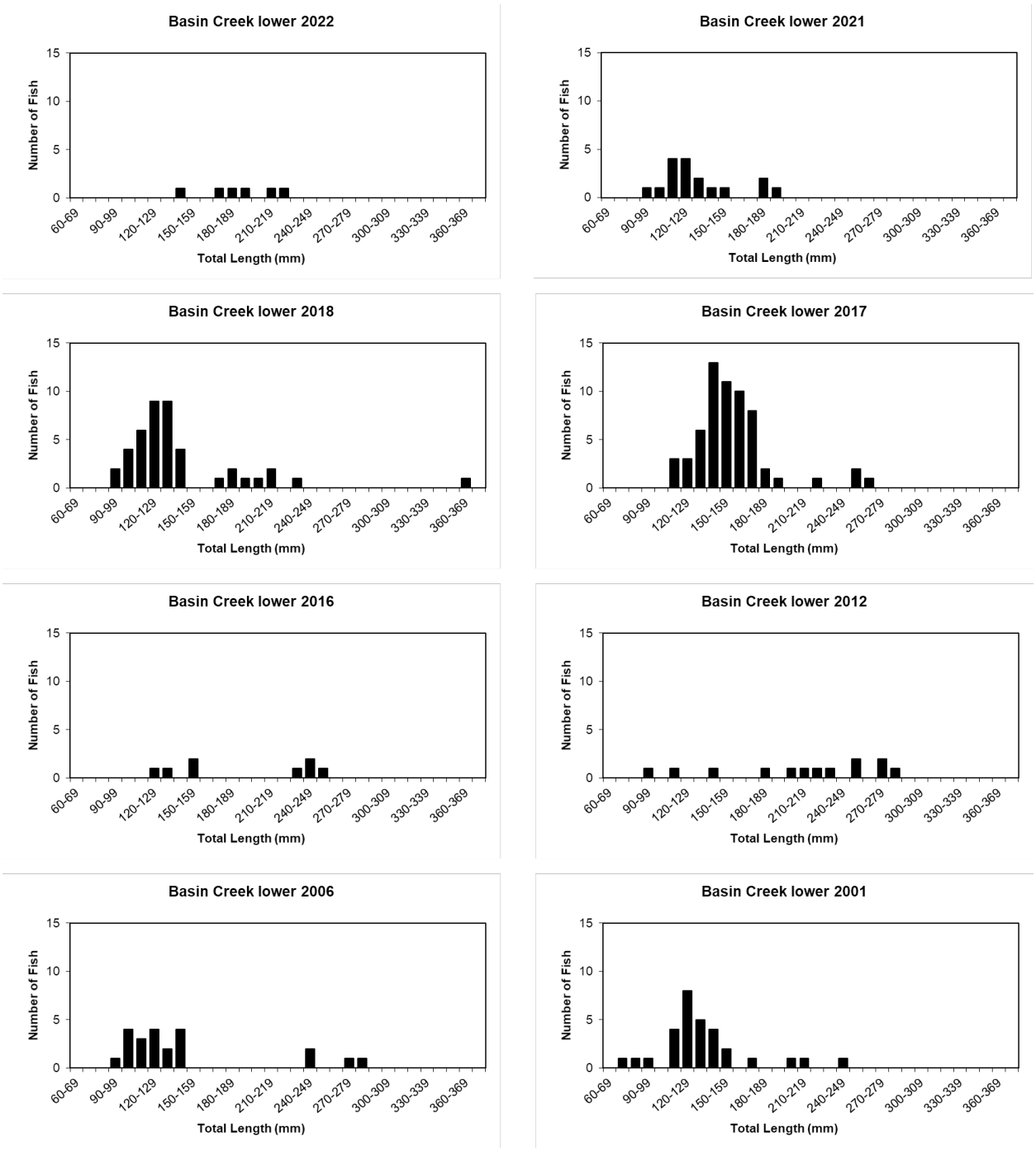

Figure 24. Size distribution of YCT sampled in the lower monitoring station in Basin Creek, 2001, 2006, 2012, 2016-18, 2021, and 2022.

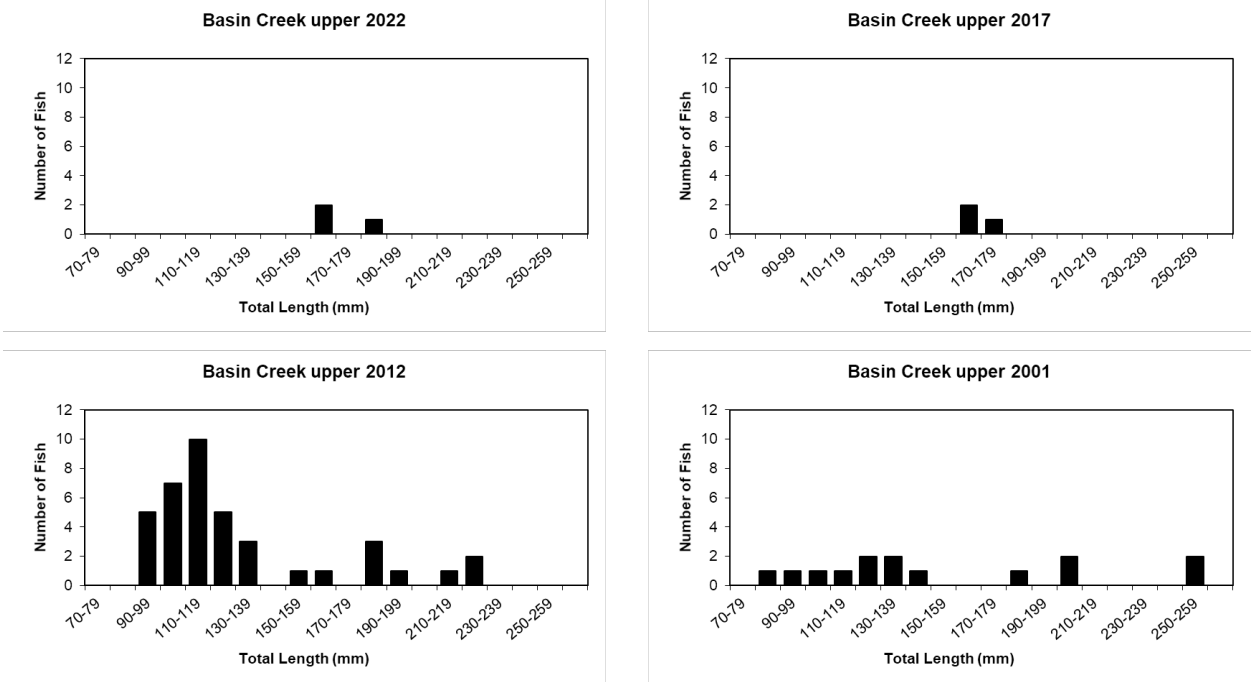

Figure 25. Size distribution of YCT sampled in the upper monitoring station in Basin Creek, 2001, 2012, 2017, and 2022.

Mahogany Creek **IIIAA06011G**

Monitoring

The station in Mahogany Creek, 100 m in length, was electrofished on July 19, 2022, in an effort to monitor the YCT population. Results of this and the previous sampling efforts are shown in Table 27 and Figure 26. The sampled reach contained a single individual YCT in 2022, the population reduced to just a fraction of the 2017 estimate (Table 27). Comparison of the length-frequency graphs suggests a situation in 2022 similar to 2012 (Figure 26), a reduced population with only age-1 YCT represented. Speckled Dace were common in the station (Table 27).

Table 27. Population statistics for species sampled in Mahogany Creek, 2001, 2006, 2012, 2017, and 2022.

Year	Species	Total Catch	#/km ± 95% C.I. (#/mi ± 95% C.I.)	kg/ha (lb/ac)	TL (mm)		WT (g)		Mean K
					Mean	Range	Mean	Range	
2022	≥age-1 YCT SPD	1	10±0 (16±0) common	1 (1)	126		14		0.70
2017	≥age-1 YCT SPD	26	324±144 (521±232) common	173 (154)	187	101-345	95	11-370	1.05
2012	≥age-1 YCT SPD	5	48±0 (77±0) sparse	6 (6)	117	96-131	17	10-22	1.03
2006	≥age-1 YCT	15	150±20 (241±32)	24 (22)	127	91-283	34	5-222	1.07
2001	≥age-1 YCT	44	419±15 (675±24)	111 (99)	138	65-274	39	2-174	0.92

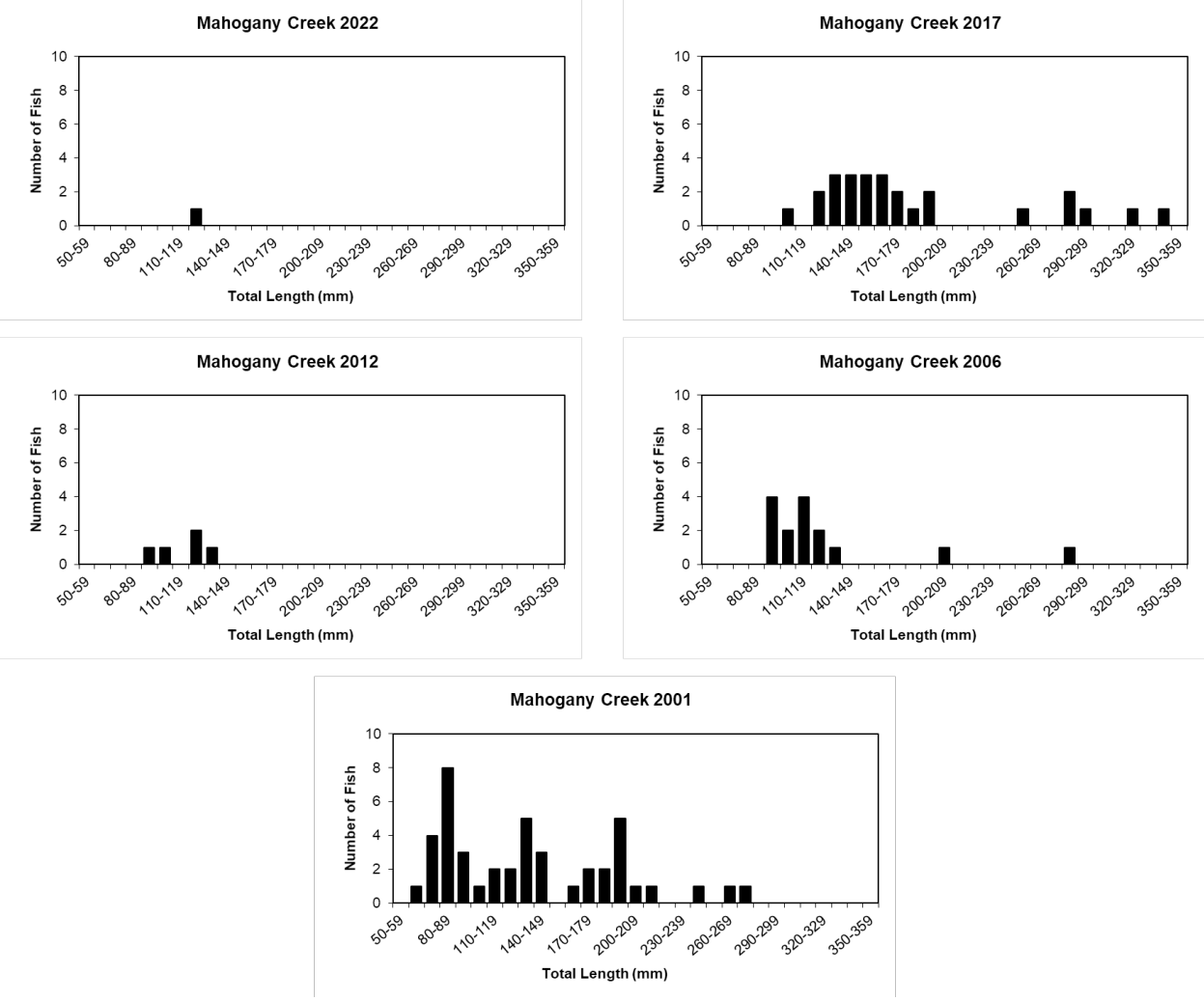

Figure 26. Size distribution of YCT sampled in Mahogany Creek, 2001, 2006, 2012, 2017, and 2022.

RECOMMENDATIONS

BONNEVILLE CUTTHROAT TROUT

Surveys
The majority of surveys to determine BCT distribution in the Northern Region have been completed. Small, un-surveyed streams/stream reaches may be discovered and additional work would be required to determine BCT distribution within them.

Monitoring
The three BCT populations monitored in 2022 showed a decline in numbers compared to previous surveys. Overall, populations appeared to be mostly stable, with consistent recruitment indicated by multiple age-classes in most of the samples.

As noted for some streams surveyed twice during 2008 (see McKell and Thompson 2009), timing of surveys or monitoring may produce varying results—results that may not accurately characterize the long-term status of a population. Unless monitoring is conducted during the same month in the field season as the previous survey, the results may reflect seasonal variation instead of actual trends. Tracking trends is ultimately the purpose of monitoring, which is an important part of efforts to conserve native trout. Monitoring should continue as populations of BCT representative of each GMU/subunit are revisited on an approximate five-year cycle. Specifically for 2023, monitoring is planned for tributaries of the lower Weber River, upper Bear River forks and tributaries, streams in Rich County, as well as the Northern Bonneville GMU index sites.

Efforts toward increasing our understanding of the fluvial BCT population in the lower Weber River and tributaries should continue, including additional electrofishing and PIT-tagging, and antenna deployment in select tributaries where passage has been restored.

Restoration
Opportunities for BCT expansion and enhancement, including barrier construction and chemical treatments, will continue to be explored on an opportunistic basis. Finalization of the EA in August 2012 (USFWS 2012) signaled the commencement of treatment project implementation in 2012 in the Right Hand Fork of Logan River, continued with the second chemical treatment of the Right Hand Fork in September 2013 and stocking of BCT fingerling (produced from Temple Fork gametes) in October 2013 and September 2014, and the small-scale chemical treatment between the barriers in 2015. The chemical treatment of the Otter Creek drainage in Rich County was initiated with the first treatment in September 2015, continued with the second treatment in October 2016, and reintroduction of BCT in October 2016. The first treatment of Big Creek was conducted in September 2018 and the second in September 2019. The chemical treatment of Deadman Creek in the upper Bear River drainage was conducted in 2020. With the Deadman Creek treatment concluded, the Northern Region has decreased efforts to restore BCT and increased focus on population monitoring.

Identifying opportunities to repatriate fishless streams along the Wasatch Front should continue to be a priority. This will add to cutthroat trout reintroduction efforts for Holmes and Willard creeks in 2011 and 2012, Mill and Steed creeks in 2013 and 2014, upper Willard Creek and Stone Creek in 2015, upper Stone Creek in 2016, Ricks, Barnard, and Stone creeks in 2017, North Fork Kays Creek in 2018, and Mill, Stone, Barnard, Ricks, and Holmes creeks in 2019. Opportunities that should be explored further include the headwater portions of Barnard, Ricks, and Parrish creeks in Davis County, and Waterfall and Beus canyons in Weber County.

COLORADO RIVER CUTTHROAT TROUT

Surveys
Colorado River Cutthroat Trout surveys have essentially been completed in the Northern Region. However, small, un-surveyed streams/stream reaches may be discovered and would require additional surveys to determine CRCT distribution within them.

Monitoring
Of the populations monitored in 2022, five showed an increase, three decreased, and two remained flat since the previous sampling in 2017. The monitoring of CRCT populations should follow the timeline established by the UDWR and USFS, and should remain a high priority.

Restoration
Opportunities for CRCT expansion and enhancement in North Slope drainages should continue to be explored. With the chemical treatment of the West Fork Smiths Fork drainage in 2021, effort will be made to re-establish CRCT throughout the drainage beginning in 2022 and continuing in 2023. Opportunities to enhance CRCT habitat should also be explored.

YELLOWSTONE CUTTHROAT TROUT

Monitoring
All YCT populations were monitored in 2022; two of the populations showed an increase in abundance, five exhibited a decrease, and four were essentially flat.

Restoration
Opportunities for YCT restoration and enhancement in Raft River tributaries should continue to be explored, particularly for the population in the headwaters of George Creek. The headwaters of the Raft River are likely to be treated in coming years, primarily South Fork Junction Creek below a fish passage improvement project downstream to and including the Raft River through the Narrows section to a diversion just upstream of the Utah-Idaho state line. Rotenone application would target nonnative Brown Trout, with the ultimate goal of restoring the stream entirely to native aquatic species, including YCT, Bluehead Sucker, Redside Shiner, Speckled Dace, Winged Floater, and others.

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