



State of Utah  
DEPARTMENT OF NATURAL RESOURCES  
Division of Wildlife Resources

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Bonneville cutthroat trout (*Oncorhynchus clarki  
utah*) survey and monitoring activities in the  
Logan River (sections 05-07) Drainage, 1999



Publication Number 00-3  
Utah Division of Wildlife Resources  
1594 W. North Temple  
Salt Lake City, Utah  
John F. Kimball, Director

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by

Paul Thompson  
Aquatics Biologist

Scott Tolentino  
Bear Lake Biologist

Kent Sorenson  
Regional Aquatics Manager

and

Bryce Nielson  
Bear Lake Project Leader

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1594 West North Temple  
Salt Lake City, Utah  
John F. Kimball, Director

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The Utah Division of Wildlife Resources would like to thank the United States Forest Service for providing funding for two Division technicians to complete stream surveys in the Logan River drainage. The USFS provided additional personnel to assist with mainstem and some tributary surveys.

## INTRODUCTION

The metapopulation of Bonneville cutthroat trout (*Oncorhynchus clarki utah*) within the Logan River Drainage is extensive. In fact, this drainage contains one of the strongest and largest natural metapopulations within the Bonneville cutthroat trouts' historic range. The Utah Division of Wildlife Resources (Division) has documented that the cutthroat trout population in the mainstem is strong with surveys completed on sections 05-07 (Third Dam upstream) in 1991 (Wullschleger 1991). Data on tributary streams in the Logan River Drainage, however, has remained incomplete. The surveys completed in 1999 included all tributary streams that contained fish and the mainstem, therefore providing a complete picture on the entire metapopulation of Bonneville cutthroat trout in this system. The 1999 surveys provided needed data that will help towards the objectives of long term conservation of Bonneville cutthroat trout in Utah (Lentsch et al. 1997). This information will be included in the revision of the Bonneville cutthroat trout Conservation Strategy in Utah (Lentsch et al. 1997).

The **Goal** of the 1999 surveys were to document the extent of the Bonneville cutthroat trout metapopulation in the mainstem Logan River sections 05-07, Third Dam upstream to Upper Franklin Basin, and associated tributaries.

More specifically, the **Objectives** for these surveys were:

- 1) to quantify the extent (number of stream kilometers) that Bonneville cutthroat trout occupy during base flow conditions in the Logan River Drainage,
- 2) to quantify the genetic integrity of the Bonneville cutthroat trout in the Logan River Drainage, and
- 3) to evaluate special fishing regulations implemented on the Logan River in 1990.

### 1990 regulations

The special fishing regulations enacted on the Logan River in 1990 were designed to improve the quality of trout fishing with particular emphasis on increasing the average length of the cutthroat trout. The regulations limit anglers fishing between Card Canyon Bridge and Red Banks Campground (and associated tributary streams) to three fish, which may include no more than two fish less than 12 inches (300 millimeters [mm]) total length (TL), and no more than one fish greater than 18 inches (460 mm) TL. Only one of these fish may be a cutthroat trout, rainbow

trout, or cutthroat trout-rainbow trout hybrid, and fishing tackle is restricted to artificial flies and lures only. From Red Banks Campground upstream to the Idaho State line (and associated tributary streams), the same regulations apply, except that bait is permitted and the river is closed to fishing from 1 January through the 2<sup>nd</sup> Saturday in July.

#### 2000 regulations

Presently, the same regulations are in effect with the exception that two salmonids of any size can be included in the creel.

Results related to Objectives 1 and 3 will be discussed within this document. Objective 2 will be addressed during the next several years as the genetic tissue samples of Bonneville cutthroat trout collected in 1999 are processed with nuclear DNA, mitochondrial DNA, and meristic analyses.

The United States Forest Service (USFS) completed additional surveys within the Logan River in 1999. These surveys were completed to: 1) determine habitat conditions on mainstem and tributary streams, and 2) determine the extent that tributary streams are used by spawning Bonneville cutthroat trout. These results will be summarized in a separate document to be produced by the USFS.

Head wedges were collected for whirling disease analyses from the following streams/sections in the Logan River Drainage during 1999:

Logan River section 05 (Spring Hollow Bridge)  
Logan River section 05 (Chokecherry Picnic Area)  
Logan River section 06 (Wood Camp Bridge)  
Logan River section 06 (Lower Twin Bridge)  
Logan River section 07 (Forestry Camp Bridge)  
Logan River section 07 (Red Banks Bridge)  
Logan River section 07 (middle of Franklin Basin)  
Beaver Creek  
Little Bear Creek  
Temple Fork section 02/Spawn Creek

The results from these samples will be summarized in a separate document to be produced by the Fisheries Experiment Station in Logan, Utah.

### **METHODS**

All stream surveys were completed during base flow conditions (August-early September) to determine the extent of the resident Bonneville cutthroat trout populations in each stream/stream

section. When possible, stream survey locations were chosen as closely to previous Division survey locations and some tributaries stations were chosen to maximize information on the cutthroat trout distribution within the target tributary streams. In general, surveys began on tributary streams of the Logan River section 05 and continued upstream through tributaries of section 07. Nineteen days were required to complete the tributary surveys. The mainstem surveys were completed after most of the tributary work was finished. Three days were required to complete the mainstem surveys.

Universal Transverse Mercator (UTM) coordinates were recorded for each stream survey location with a hand-held Global Positioning System (GPS). Physical descriptions of the stations and the average width of the stream also were recorded. All captured fish were transferred to live cages placed in the stream. Fish collected from the first electrofishing pass were kept separate from the fish collected from the second electrofishing pass. Fish processing and data collection commenced immediately and fish not collected for genetic analysis or whirling disease were returned to the water downstream of the station. All fish captured were measured to the nearest millimeter (mm) TL and weighed to the nearest gram (g).

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:

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

where,

N = estimated fish population,

C<sub>1</sub> = the number of fish captured from the first pass, and

C<sub>2</sub> = the number of fish captured on the second pass.

$$SE = [C_1 * C_2 / (C_1 - C_2)^2] * (C_1 + C_2)^{\frac{1}{2}}$$

$$95\% \text{ C.I.} = 2 * SE$$

Population estimates were calculated separately for age-1 and older fish and age-0 fish 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. Age-0 fish were determined from a length frequency histogram with 10 mm increments. In general, all age-0 fish were <55 mm.

Condition factor (Ktl) 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 were collected for genetic analysis according to the cutthroat trout collection procedural manual (Toline and Lentsch 1999). These samples will be submitted to the Salt Lake Office of the Division during the winter of 1999/2000. Samples will be processed with nuclear DNA and mitochondrial DNA techniques. Anticipated completion of these samples is 2002. Meristic analyses will be completed by 2001 at the Division office located in Salt Lake City.

### **Mainstem surveys**

Each sample site was 200 m in length, however, there were exceptions when sites were less than 200 m due to high water conditions which made electrofishing difficult or for other reasons as noted in the results section. Sites were measured using a laser range finder. No upstream or downstream block net was used, however, a natural break in the stream (e.g., small waterfall) was chosen to be the upstream barrier.

Sampling was conducted using a two-pass depletion technique with a combination of electrofishing techniques. For both electrofishing passes, a canoe with a generator and Coffelt C-Phase VVP set to 300-400 V was pulled slowly upstream with four hand held anodes. The cathode was attached to the canoe. Each person with an anode used a dip net to collect stunned fish. Additional netting personnel in the electrified area also collected stunned fish and transferred them from the other personnel a holding container. Immediately downstream of the canoe, up to three personnel with single battery-powered backpack

electrofishing units, manufactured by Smith Root, were deployed to keep fish stunned or to re-stun fish that were missed by the personnel upstream. Electrofishing settings on the backpack units varied depending on the stream conductivity. In general, the pulse was set at J (70 Hz), the frequency was set at 4 (4 ms), and the voltage was set at 400 V. The personnel with backpack electrofishing units also were accompanied by additional netting personnel. Between 9 and 15 personnel were used on these mainstem surveys.

Three single battery-powered backpack electrofishing units were used side by side to complete the Logan River section 07 (Lower Franklin Basin) station and two backpack electrofishing units were used to complete the Logan River section 07 (Upper Franklin Basin) station. Additional netting personnel accompanied the personnel with backpack electrofishing units. Between 5 and 7 personnel were used on these mainstem surveys. As the electrofishing crew approached the upstream boundary, one to two of the personnel with backpack electrofishing units moved around to the station's upstream boundary. They electrified the area to prevent fish from escaping upstream while the remainder of the electrofishing crew moved upstream toward them.

### **Tributary surveys**

A 100 m reach, representing habitat conditions throughout the entire stream, was identified for each tributary stream survey. Stations were measured using a 100 m tape. On tributaries where foot access of less than 1 km was required, a block net was placed at the lower and upper end of the reach. On tributaries where foot access of more than 1 km was required, a natural habitat break (e.g., small waterfall) was chosen for the lower and upper end of the reach. A single battery-powered backpack electrofishing unit, manufactured by Smith Root, was used for all tributary surveys, except in Temple Fork sections 01 and 02 and Beaver Creek where two single battery-powered backpack electrofishing units were utilized because of the increased stream width. Between 3 and 6 personnel were utilized on the tributary surveys. Electrofishing settings varied depending on the stream conductivity. In general, the pulse was set at J (70 Hz), the frequency was set at 4 (4 ms), and the voltage was set at 400 V.

Although quantification of the importance of tributaries for the spawning Bonneville cutthroat trout metapopulation in the Logan River is not available from the data collected, a relative degree of importance was placed on tributary streams based on the number of age-0 Bonneville cutthroat trout observed.

## **RESULTS**

Fish populations in the Logan River sections 05, 06, and 07 (Division classification) of the mainstem were sampled to: 1) reassess the effects of special fishing regulations implemented in 1990, 2) identify species composition changes that have taken place since the last Division sampling in 1991 or 1993, and 3) collect Bonneville cutthroat trout tissue for genetic analyses. In the mainstem, two stations were sampled in both sections 05 and 06 and four stations were sampled in section 07 (Table 1;

Figure 1).

Fish populations in the Logan River sections 05-07 tributaries were sampled to: 1) identify species composition changes that have taken place since the last sampling by the Division, 2) collect Bonneville cutthroat trout tissue for genetic analyses, and 3) identify additional tributaries that may contain Bonneville cutthroat trout. At least one complete two-pass depletion electrofishing survey was completed on the following streams: Right Fork, Wood Camp Creek, Cottonwood Canyon, Temple Fork section 01, Temple Fork section 02, Spawn Creek, Bear Hollow, Twin Creek, Little Bear Creek, Tony Grove Creek, Bunchgrass Creek, White Pine Creek, and Beaver Creek (Table 1; Figure 1).

Twenty-two stream surveys were completed on 14 streams/stream sections in the Logan River Drainage that contained cutthroat trout (Table 1; Figure 1). Based on these 22 stream surveys, Bonneville cutthroat trout occupy approximately 96 stream kilometers (60 stream miles) in the Logan River Drainage upstream from Third Dam (Table 1). Fourteen additional streams/canyons were examined and determined that flows and/or gradient were not conducive to a resident fish population.

Fish species caught during 1999 stream surveys in the Logan River Drainage included: Bonneville cutthroat trout (BCT), brown trout (BNT, *Salmo trutta*), rainbow trout (RBT, *Oncorhynchus mykiss*), brook trout (BKT, *Salvelinus fontinalis*), mountain whitefish (MWF, *Prosopium williamsoni*), albino trout (ALB, *Oncorhynchus mykiss*), and sculpin which were likely mottled sculpin (MSC, *Cottus bairdi*). Mountain sucker (MTS; *Catostomus platyrhincus*) have been caught during past surveys.

Table 1. Streams/stream sections containing cutthroat trout during 1999 surveys in the Logan River (sections 05-07) Drainage. Approximate number of cutthroat trout/stream km and population estimates are provided.

Stream/Section	Approximate # of stream km occupied (# stream miles occupied)	# of >age-1 cutthroat/km (#/mile)	# of age-0 cutthroat/km (#/mile)
Logan River section 05-1 (Spring Hollow)	8.0 (5.0)	5 (8)*	0
Logan River section 05-2 (Chokecherry)		286 (460)	0
Right Fork	5.6 (3.5)	20 (32)	0
Logan River section 06-1 (Wood Camp)	10.5 (6.5)	304 (489)	0
Logan River section 06-2 (Lower Twin Bridge)		86 (138)	0
Wood Camp Creek	0.8 (0.5)	30 (48)	0
Cottonwood Canyon	3.2 (2.0)	144 (232)	0
Temple Fork section 01	1.6 (1.0)	194 (312)	present
Temple Fork section 02	7.2 (4.5)	146 (235)	0
Spawn Creek	4.0 (2.5)	63 (101)	present
Logan River section 07-1 (USU Forestry Camp)	22.5 (14.0)	1361 (2191)	0
Logan River section 07-2 (Red Banks Bridge)		1076 (1735)	7 (12)
Logan River section 07-3 (Lower Franklin Basin)		1359 (2189)	0
Logan River section 07-4 (Upper Franklin Basin)		1298 (2090)	numerous
Bear Hollow	4.0 (2.5)	160 (258)	122 (197)
Twin Creek	3.2 (2.0)	90 (145)	present
Little Bear Creek	3.2 (2.0)	483 (778)	present



Table 1. Continued.

Stream/Section	Approximate # of stream km occupied (# stream miles occupied)	# of ≥age-1 cutthroat/km (#/mile)	# of age-0 cutthroat/km (#/mile)
Tony Grove Creek	2.4 (1.5)	201 (323)	391 (629)
Bunchgrass Creek	3.2 (2.0)	63 (101)	5684 (9153)
White Pine Creek	6.4 (4.0)	507 (816)	10 (16)
Beaver Creek (low)	10.5 (6.5)	909 (1464)	0
Beaver Creek (high)		236 (380)	0
Total	96 (60)		

\* Based on the actual number caught.

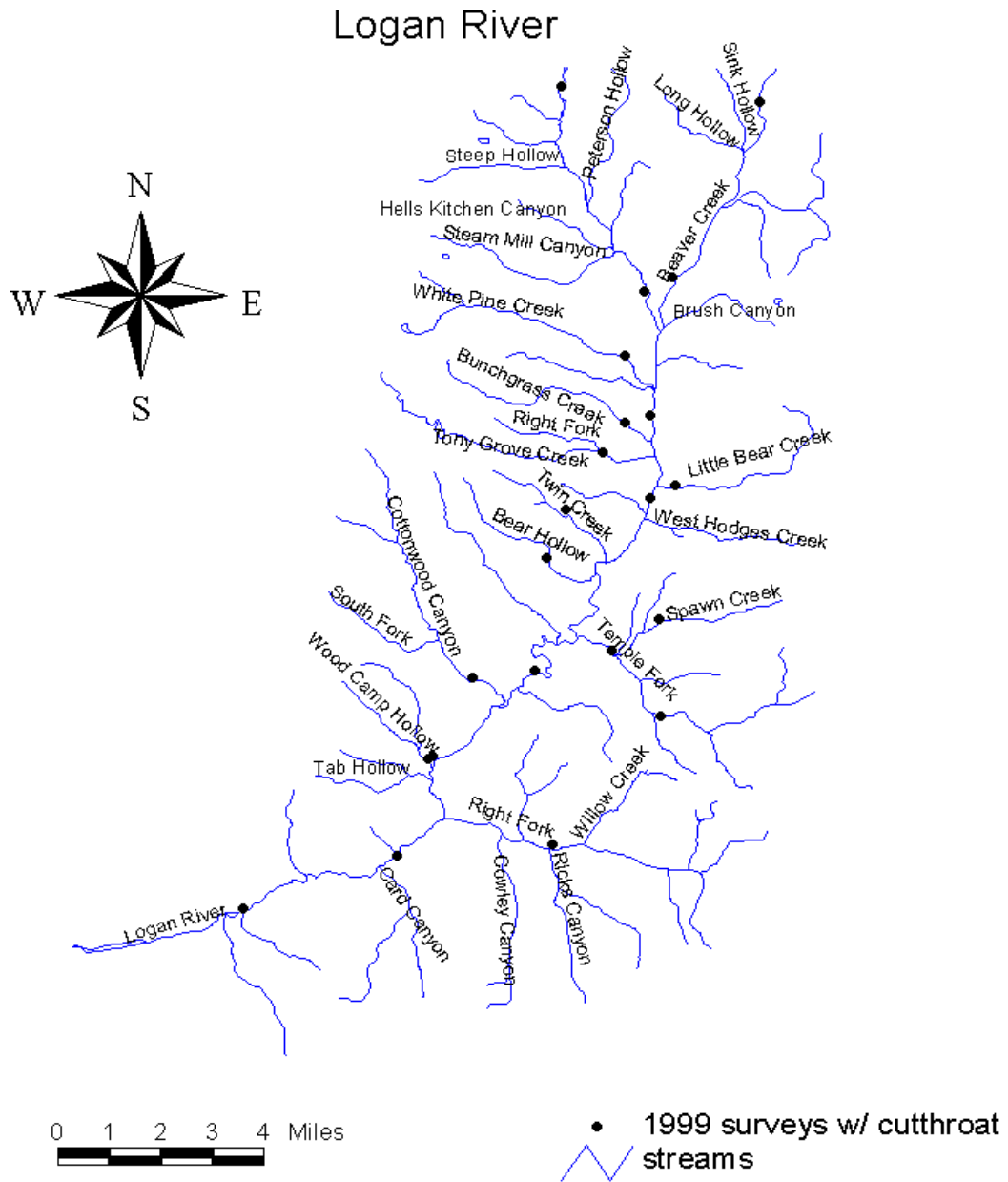


Figure 1. Stream surveys that contained Bonneville cutthroat trout in the Logan River (sections 05-07) Drainage, 1999.

Spring Hollow

The bridge over the Logan River marked the lower boundary of this station. The UTM's were: 0440561E and 4622496N. The length of the electrofished station was 200 m. Within this site, habitat improvements were made in the late 1980s by the USFS by placing boulders in the stream to provide resting and cover areas for trout. A parking area is located just below the site and angler access is good. The base flow survey on the Logan River section 05 (Spring Hollow) was completed on August 24, 1999. The Logan River section 05 is a class I fishery.

Two-pass electrofishing resulted in the capture of 105 age-1 and older brown trout ( $575 \pm 60$ /stream km [ $926 \pm 97$ /stream mile]; 51 kg/ha [45 lb/acre]) (Table 2; Figure 2). Seventeen age-0 brown trout ( $121 \pm 106$ /stream km [ $195 \pm 171$ /stream mile]) also were captured, indicating a self sustaining population. A total of 14 age-1 and older rainbow trout were captured. The estimated number of rainbow trout/stream km was  $245 \pm 1483$  ( $394 \pm 2388$ /stream mile; 21 kg/ha [19 lb/acre]). Seven albino rainbow trout ( $36 \pm 5$ /stream km [ $58 \pm 8$ /stream mile]; 2 kg/ha [2 lb/acre]) also were caught. Albino rainbow trout are stocked by the Division in the 3<sup>rd</sup> Dam impoundment and migrated upstream into this site. The mountain whitefish population was estimated at  $191 \pm 35$ /stream km ( $309 \pm 57$ /stream mile; 60 kg/ha [54 lb/acre]) (Table 2; Figure 2). One Bonneville cutthroat trout was caught, however, it was caught on the second electrofishing pass. This fish was collected as a whole sample for genetic analysis. A population estimate, assuming that all cutthroat trout were caught in the 200 m reach, yields 5 cutthroat trout/stream km (8/stream mile). Fifteen mottled sculpin were caught, however more were caught on the second electrofishing pass than the first pass, consequently, a population estimate was not available.

The fishing regulations at the Spring Hollow site included a trout limit of four fish and bait fishing was permitted. No length or species restrictions are present. Compared to 1991 and 1993, the estimated number of brown trout/stream km was lower (Table 2; Wullschleger 1991). This is probably a function of increased fishing pressure in this section. The 1993 creel (September through May) completed by the Division estimated 81 hours/acre of fishing pressure on the mainstem Logan River sections 05-07. The number of rainbow trout increased slightly and the number of mountain whitefish remained constant at this station. The increase in rainbow trout is most likely the result of fish migrating upstream from the 3<sup>rd</sup> Dam impoundment immediately below this site and is not indicative of a "real" population change.

Table 2. Population statistics for species sampled in section 05-1 (Spring Hollow) of the Logan River, 1991 and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg K
1991	all BNT	1,473 (2,370)				
	all BCT	6 (10)				
	all RBT	25 (40)				
	all MWF	199 (320)				
	all MSC	4,388 (7,060)				
1999	≥age-1 BNT	575 (926)	51 (45)	227 (51-384)	177 (14-602)	0.94
	age-0 BNT	121 (195)	*	59 (51-70)	1 (1-2)	
	≥age-1 BCT	5 (8)	*	301 (301)	276 (276)	1.01
	≥age-1 RBT	245 (394)	21 (19)	254 (197-315)	170 (80-309)	1.01
	≥age-1 ALB	36 (58)	2 (2)	216 (155-276)	125 (34-251)	1.05
	≥age-1 MWF	191 (309)	60 (54)	377 (84-467)	628 (4-1,061)	1.02
	all MSC	common		107 (55-340)	36 (4-35)	

## Length Frequency - Section 5-1 Spring Hollow

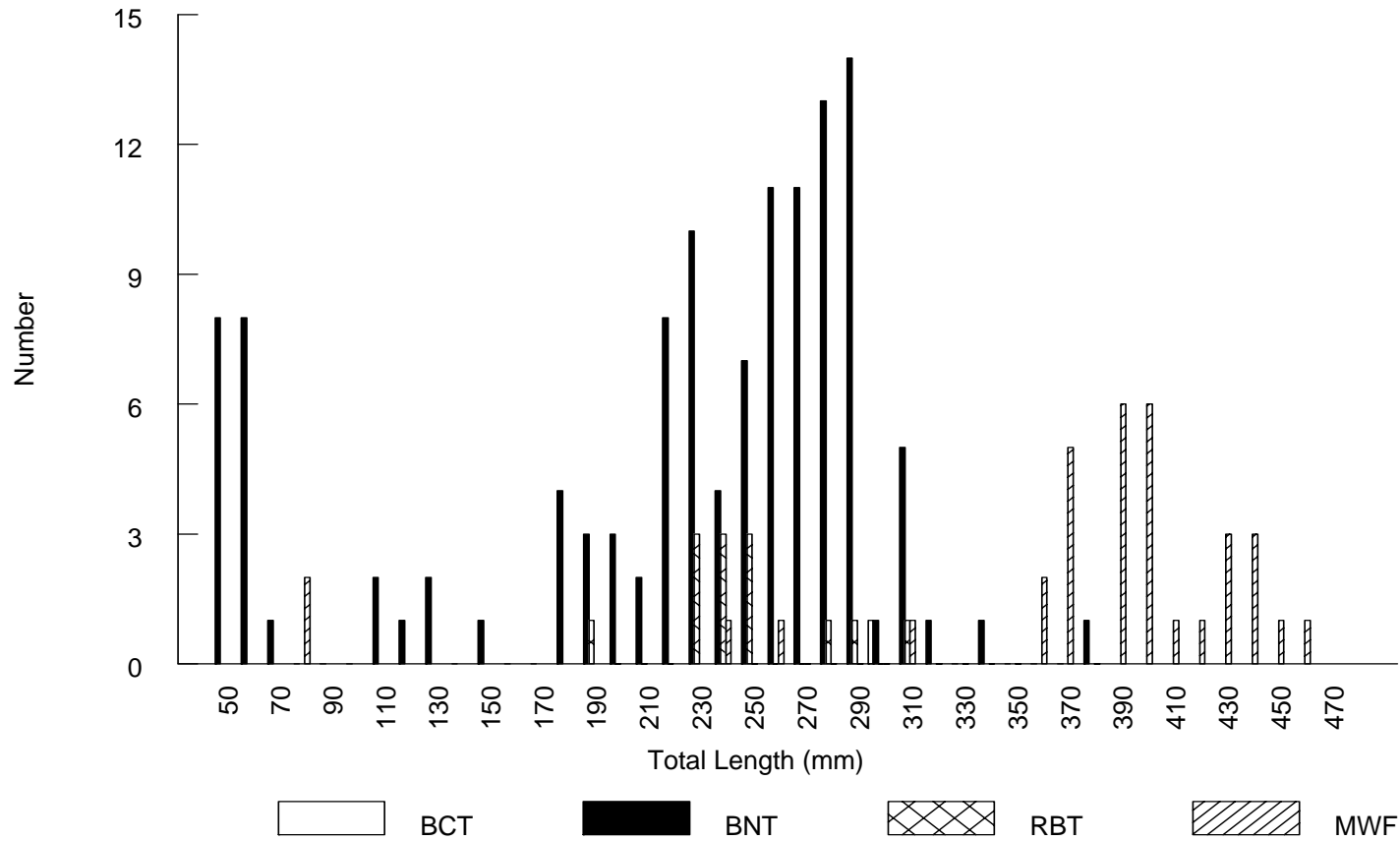


Figure 2. Size distribution of salmonids sampled in the Logan River section 05-1 (Spring Hollow), 1999.

### Chokecherry

The Chokecherry picnic area was the second site in section 05 of the mainstem survey. The site began just downstream of the picnic area and the upstream end was approximately 50 m upstream of the bridge that crossed the river to the summer homes; UTM's were: 0445363E and 4624228N. The length of the electrofished station was 168 m. Due to water depth and velocity, it was not possible to continue electrofishing further upstream. A parking area is located adjacent to the site and angler access is good. The base flow survey on the Logan River section 05 (Chokecherry) was completed on August 24, 1999. The Logan River section 05 is a class I fishery.

Two-pass electrofishing at the Chokecherry site revealed the greatest species diversity as compared to any other 1999 mainstem site surveys in sections 05, 06, or 07. The populations and densities of fish by species were estimated as follows: age-1 and older brown trout -  $278 \pm 71$ /stream km and 51 kg/ha ( $448 \pm 114$ /stream mile; 45 lb/acre); Bonneville cutthroat trout -  $286 \pm 643$ /stream km and 41 kg/ha ( $460 \pm 1035$ /stream mile; 37 lb/acre); rainbow trout -  $583 \pm 2499$ /stream km and 65 kg/ha ( $939 \pm 4024$ /stream mile; 58 lb/acre); albino rainbow trout -  $43 \pm 6$ /stream km and 4 kg/ha ( $69 \pm 10$ /stream mile; 4 lb/acre); mountain whitefish -  $115 \pm 6$ /stream km and 53 kg/ha ( $185 \pm 10$ /stream mile; 47 lb/acre) (Table 3; Figure 3). Fourteen mottled sculpin were caught, however more were caught on the second electrofishing pass than the first pass, consequently, a population estimate was not available. Twenty-seven Bonneville cutthroat trout (23 whole, 2 fin clips, 2 bodies) were collected for genetic analysis.

The fishing regulations from this section upstream to the Red Banks Bridge included the slot limit described in the Introduction and include the use of artificial flies and lures only; no bait fishing is permitted. The overall estimated population of all trout combined was higher in this section (1,190/stream km) compared to the estimates from 1991 (484/stream km) (Table 3; Wullschleger 1991). Estimated mountain whitefish numbers have decreased from 304/stream km in 1991 to 115/stream km in 1999 (Table 3). Rainbow trout numbers increased the greatest, but were probably not indicative of the actual population since they migrate upstream from the 3<sup>rd</sup> Dam impoundment. The positive increase in cutthroat trout numbers is most likely related to the more restrictive regulations in this section and the return of higher water flows allowing for increased natural reproduction.

Table 3. Population statistics for species sampled in section 05-2 (Chokecherry) of the Logan River, 1991 and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	K
1991	all BNT	373 (600)				
	all BCT	87 (140)				
	all RBT	12 (20)				
	all ALB	12 (20)				
	all MWF	304 (490)				
	all MSC	503 (810)				
1999	≥age-1 BNT	278 (448)	71 (45)	292 (141-380)	274 (25-605)	1.03
	≥age-1 BCT	286 (460)	41 (37)	263 (105-365)	216 (13-525)	0.97
	≥age-1 RBT	583 (939)	65 (58)	247 (191-327)	166 (65-338)	1.10
	≥age-1 ALB	43 (69)	4 (4)	240 (221-257)	153 (112-190)	1.09
	≥age-1 MWF	115 (185)	53 (47)	412 (380-455)	693 (333-813)	1.00
	all MSC	common		94 (66-120)	12 (4-23)	

### Length Frequency - Section 5-2 Chokecherry

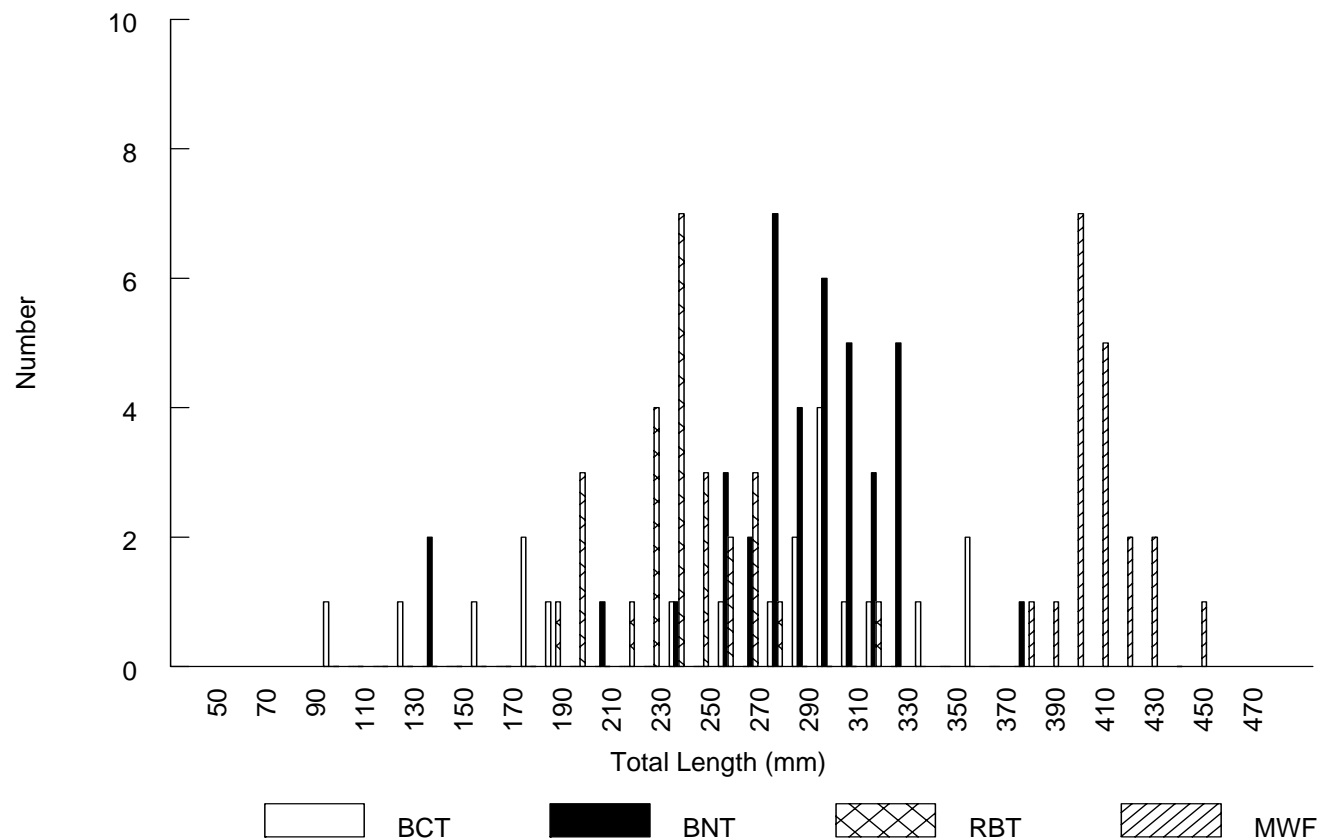


Figure 3. Size distribution of salmonids sampled in the Logan River section 05-2 (Chokecherry), 1999. The slot limit that was in place included fish between 305 mm and 457 mm.



**Card Canyon**

IVAQ040A06 01

Card Canyon is a tributary to the Logan River section 05. Card Canyon is in Cache County (Mount Elmer and Logan Peak USGS Quads). The road parallel to Card Canyon was driven on July 29, 1999 for approximately 1.5 km. The stream was dry for the entire distance. Card Canyon does not appear to maintain sufficient stream flows for a resident fish population and likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Card Canyon had not been sampled before by the Division.

**Right Fork**

IVAQ040A07 01

Right Fork is a tributary of the Logan River that divides section 05 and section 06. Right Fork is in Cache County (Mount Elmer, Temple Peak, and Boulder Mountain USGS Quads). Fish species present in the Right Fork are Bonneville cutthroat trout and brown trout. No barrier exists for the upstream movement of fish from the Logan River.

The base flow stream survey on Right Fork was completed on August 2, 1999. Section 01 (confluence with the Logan River section 05 upstream to the headwaters) was surveyed with two stations. Station #1 was approximately 200 m upstream from Ricks Canyon. UTMs for this station were: 0450160E and 4624558N. Station #2 was downstream from the two headwater forks. UTMs for this station were: 0454473E and 4623920N. Right Fork is a class III fishery.

**Station #1**

Two-pass electrofishing in a 100 m reach resulted in the capture of 96 age-1 or older brown trout ( $1022 \pm 80$ /stream km [ $1646 \pm 129$ /stream mile]; 354 kg/ha [315 lb/acre]) and two age-1 or older Bonneville cutthroat trout ( $20 \pm 0$ /stream km [ $32 \pm 0$ /stream mile]; 11 kg/ha [10 lb/acre]) (Table 4). The two Bonneville cutthroat trout may have been hybridized with rainbow trout. An additional four age-0 brown trout were caught, however, these fish were caught on the second electrofishing pass, consequently, a population estimate was not obtained. At least four age classes of brown trout appear to be represented in the sample with the majority of fish being age 1+ (Figure 4). The two Bonneville cutthroat trout were collected as whole fish samples for genetic analysis. Additional genetic samples were not obtained from the Right Fork for the following reasons: 1) the resident trout population was dominated by brown trout and obtaining a sample of 30 cutthroat trout would have been extremely difficult, and 2) the two cutthroat trout caught appeared to have been hybridized with rainbow trout.

### Station #2

One-pass electrofishing yielded no fish in approximately 500 m of stream. Stream flows and invertebrate populations appeared sufficient to support a resident trout population. A steep canyon with numerous cascades/small waterfalls separated station #1 from station #2. A probable barrier(s) exists in the canyon preventing the upstream movement of fish in the headwaters of the Right Fork. This barrier(s) should be confirmed, and if present, Bonneville cutthroat trout could be introduced into the headwaters of the Right Fork, generating 3-4 more cutthroat trout stream kilometers in the Logan River Drainage.

### Past surveys

Right Fork has been surveyed twice before by the Division. In 1954, brown trout (447/stream km [720/stream mile]) were the most predominant species caught (n=72; Table 4) with one-pass electrofishing a 161 m reach approximately 1.2 km upstream from the confluence with the Logan River. Four rainbow trout (25/stream km [40/stream mile]) also were caught during this survey (Table 4). A second survey was completed in 1968, approximately 160 m upstream from the scout camp. During this survey, 58 brown trout (360/stream km [580/stream mile]) and 3 rainbow trout (19/stream km [30/stream mile]) were caught in a 161 m stream reach (Table 4). It appears that brown trout have been the predominant species in the Right Fork for over 45 years.

### Spawning importance to the Logan

Based on low flow surveys conducted by the Division, the Right Fork does not appear to contribute extensively as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Although limited cutthroat trout spawning may occur in this stream, it appears to be dominated by brown trout.

Table 4. Population statistics for species sampled in the Right Fork, 1954, 1968, and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg K
1954	all BNT <sup>1</sup> all RBT <sup>1</sup>	447 (720) 25 (40)				
1968	all BNT <sup>1</sup> all RBT <sup>1</sup>	360 (580) 19 (30)	127 (113) 0.9 (0.8)	163 (65-240) 227 (176-256)	62 (5-160) 139 (70-180)	1.18 1.15
1999	≥age-1 BNT <sup>2</sup> age-0 BNT present ≥age-1 BCT <sup>2</sup>	1022 (1646) present 20 (32)	354 (315)  11 (10)	164 (95-304) 62 (55-65) 212 (165-259)	66 (12-300) 3 (2-3) 116 (44-187)	1.78  1.03

<sup>1</sup> Based on one-pass electrofishing.

<sup>2</sup> Based on two-pass electrofishing.

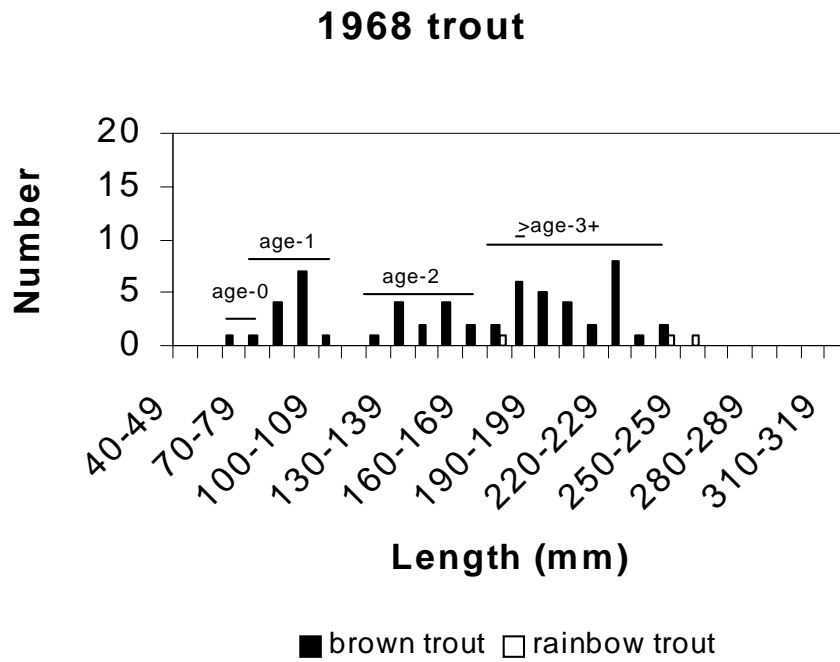
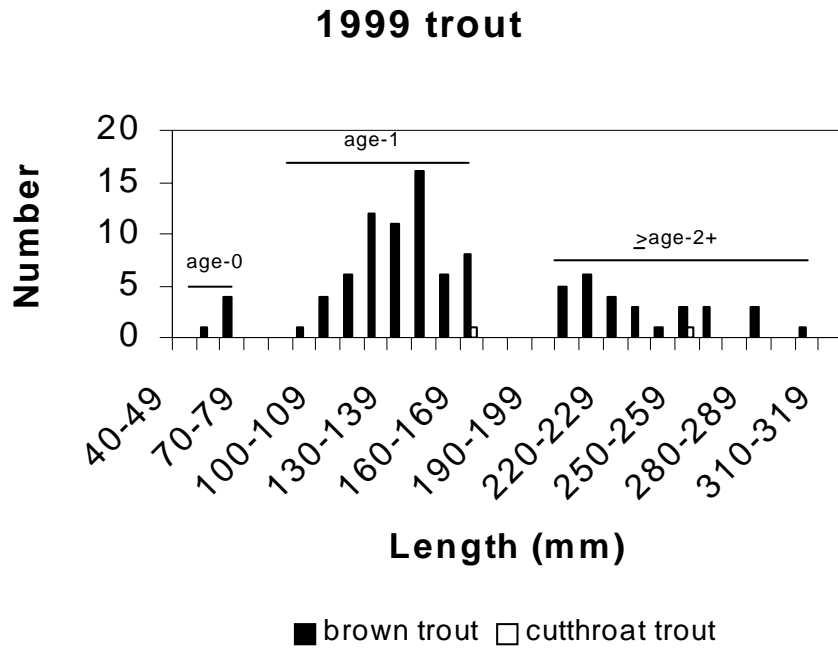


Figure 4. Size distribution of trout and probable age classes of brown trout sampled in Right Fork, 1968 and 1999.

**Cowley Canyon****No water ID**

Cowley Canyon is a tributary to the Right Fork. Cowley Canyon is in Cache County (Temple Peak, Mount Elmer, and Boulder Mountain USGS Quads). The road parallel to Cowley Canyon was driven on July 29, 1999 for approximately 5 km. The stream was dry at the confluence, however, approximately 1.6 km upstream, flowing water was present in the channel. Spot shocking of approximately 150 m resulted in the capture of no fish. Cowley Canyon likely does not maintain sufficient stream flows for a resident fish population and likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Cowley Canyon had not been sampled before by the Division.

**Ricks Canyon****No water ID**

Ricks Canyon is a tributary to the Right Fork. Ricks Canyon is in Cache County (Temple Peak and Boulder Mountain USGS Quads). The trail parallel to Ricks Canyon was walked on July 29, 1999 for approximately 0.8 km. The stream was dry throughout the entire reach. In addition, there was no defined stream channel, indicating that this stream is likely intermittent at best. Ricks Canyon does not maintain sufficient stream flows for a resident fish population and likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Ricks Canyon had not been sampled before by the Division.

**Willow Creek****No water ID**

Willow Creek is a tributary to the Right Fork. Willow Creek is in Cache County (Temple Peak USGS Quad). The trail parallel to Willow Creek was walked on July 29, 1999 for approximately 1.6 km to the fork in the stream. The stream was dry at the confluence, however, some flowing water was present in the channel upstream approximately 400 m. Spot shocking was not attempted because the stream flows were not conducive for a resident fish population. Willow Creek likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Willow Creek had not been sampled before by the Division.

Wood Camp

This site's lower boundary was established approximately 20 m upstream of the bridge over the Logan River at the Wood Camp Campground. The UTM's were: 0446451E and 4627405N. The length of the electrofished station was 200 m. The entire site was adjacent to the Wood Camp Campground and angler access is good. The base flow survey on the Logan River section 06 (Wood Camp) was completed on August 25, 1999. The Logan River section 06 is a class IIB fishery for Bonneville cutthroat trout. The fishing regulations from this section included the slot limit described in the Introduction and include the use of artificial flies and lures only; no bait fishing is permitted.

Two-pass electrofishing resulted in the capture of 16 age-1 and older brown trout (Figure 5) ( $83 \pm 39$ /stream km [ $134 \pm 63$ /stream mile]; 17 kg/ha [15 lb/acre]) (Table 5). Although, one age-0 brown trout was captured indicating some natural reproduction, this site exhibited a marked reduction in the number of brown trout as compared to cutthroat trout from 1991 to 1999. The estimated number of Bonneville cutthroat trout remained almost identical in 1999 ( $304 \pm 1076$ /stream km [ $489 \pm 1732$ /stream mile]; 41 kg/ha [37 lb/acre]) as compared to 1991 (305/stream km; 490/stream mile). It is not apparent as to why there has been a decline in one trout species and no change in another. Only 2 rainbow trout were captured and an estimate was not possible because one fish was caught on each electrofishing pass. Nineteen Bonneville cutthroat trout (10 whole, 9 body) were collected for genetic analysis.

The mountain whitefish population was estimated at  $41 \pm 5$ /stream km ( $66 \pm 8$ /stream mile; 21 kg/ha; 19 lb/acre) (Table 5) in 1999 which is about a 50% decline compared to the 1991 estimates (Table 5; Wullschleger 1991), however, this may be related to water flows in the river. In 1991, the Logan River flows were reduced due to a drought affecting the region. This could have caused the whitefish to migrate from both upstream and downstream locations and to concentrate in the deep holes in this sample section, thus inflating the estimates in 1991. The mottled sculpin population was estimated at  $60 \pm 60$ /stream km ( $96 \pm 96$ /stream mile).

Table 5. Population statistics for species sampled in section 06-1 (Wood Camp) of the Logan River, 1991 and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	K
1991	all BNT	230 (370)				
	all BCT	305 (490)				
	all ALB	10 (6)				
	all MWF	93 (150)				
	all MSC	186 (300)				
1999	≥age-1 BNT	83 (134)	17 (15)	280 (55-392)	307 (21-657)	0.99
	age-0 BNT			55 (55)		
	≥age-1 BCT	304 (489)	41 (37)	269 (104-346)	203 (11-326)	0.99
	≥age-1 RBT			268 (251-285)	215 (173-256)	1.10
	≥age-1 MWF	41 (66)	21 (19)	386 (169-474)	787 (48-1,386)	1.13
	all MSC	60 (96)		88 (53-115)	15 (6-23)	

## Length Frequency - Section 6-1 Wood Camp

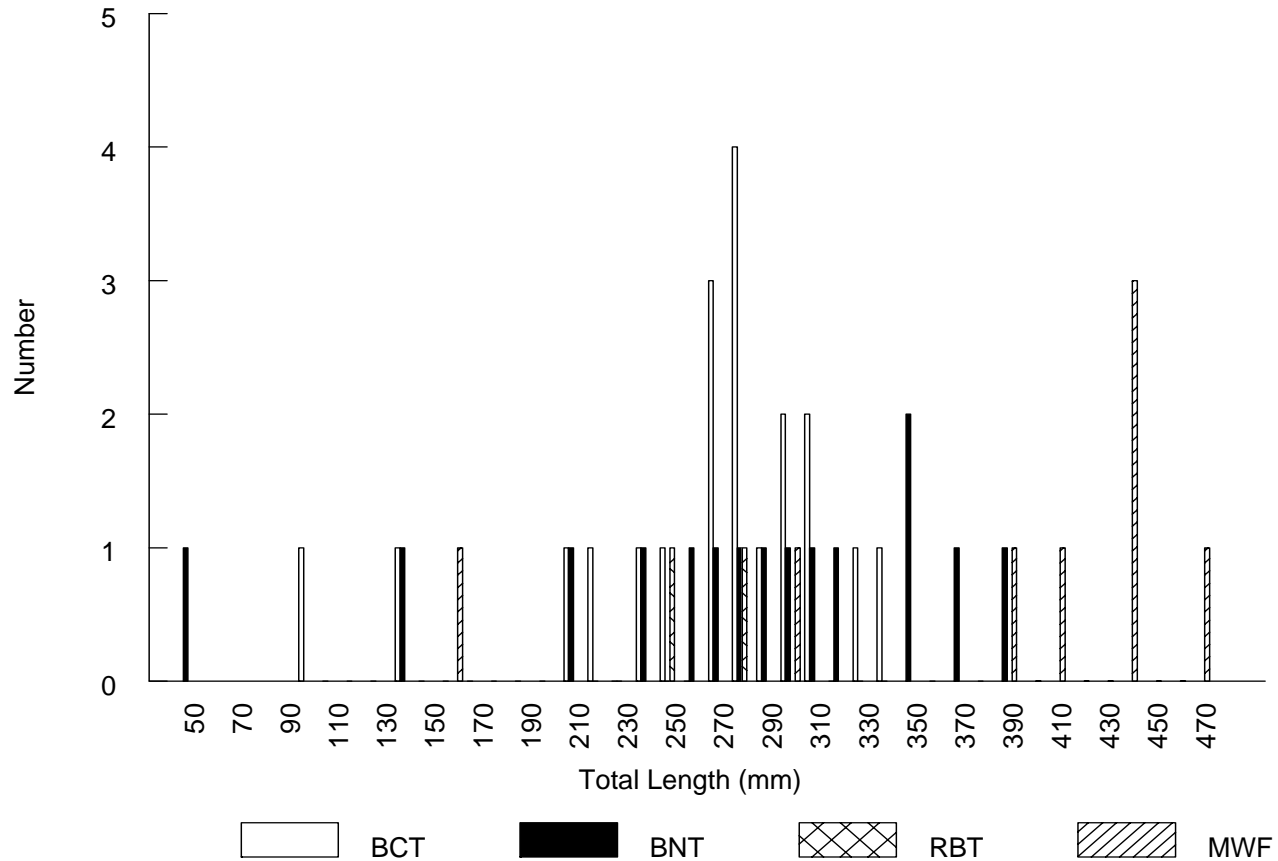


Figure 5. Size distribution of salmonids sampled in the Logan River section 06-1 (Wood Camp), 1999. The slot limit that was in place included fish between 305 mm and 457 mm.



### Lower Twin Bridge

The Lower Twin Bridge was replaced during 1996-1997. During reconstruction the approach to the south end of the bridge was raised and the access road which branched off US Highway 89 was permanently blocked. The site of the sampling began at UTM coordinates 0449636E and 4630163N, which was approximately 100 m below the site sampled in 1991 and corresponded to where the new approach to the Lower Twin Bridge began. The length of the electrofished station was 186 m. Shocking was not possible any further upstream due to high water flows. The base flow survey on the Logan River section 06 (Lower Twin Bridge) was completed on August 25, 1999. The Logan River section 06 is a class IIB fishery for Bonneville cutthroat trout. The fishing regulations from this section included the slot limit described in the Introduction and include the use of artificial flies and lures only; no bait fishing is permitted.

Two-pass electrofishing resulted in the capture of 32 age-1 and older brown trout (Figure 6) ( $155 \pm 92$ /stream km [ $349 \pm 148$ /stream mile]; 49 kg/ha [43 lb/acre]) (Table 6). Fifteen age-1 and older Bonneville cutthroat trout (Figure 6) also were caught ( $86 \pm 16$ /stream km [ $138 \pm 26$ /stream mile]; 14 kg/ha [13 lb/acre]) (Table 6). The only other fish captured in this section were mountain whitefish and mottled sculpin at  $54 \pm 0$ /stream km ( $87 \pm 0$ /stream mile; 40 kg/ha; 36 lb/acre) and  $22 \pm 0$ /stream km ( $35 \pm 0$ /stream mile) (Table 6), respectively. Population estimates at the Lower Twin Bridge site were comparable to 1991 (Table 6; Wullschleger 1991). Brown trout and mountain whitefish numbers were similar and Bonneville cutthroat trout numbers appear to be slightly lower. Fifteen Bonneville cutthroat trout bodies were collected for genetic analysis.

Table 6. Population statistics for species sampled in section 06-2 (Lower Twin Bridge) of the Logan River, 1991 and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	K
1991	all BNT	236 (380)				
	all BCT	199 (320)				
	all RBT	50 (80)				
	all ALB	6 (10)				
	all MWF	68 (110)				
	all MSC	609 (980)				
1999	≥age-1 BNT	155 (349)	49 (43)	287 (56-395)	280 (19-557)	1.14
	≥age-1 BCT	86 (138)	14 (13)	274 (196-327)	207 (62-316)	1.44
	≥age-1 MWF	54 (87)	40 (36)	427 (388-487)	935 (58-1244)	1.20
	all MSC	22 (35)		98 (91-105)	12 (9-13)	

## Length Frequency - Section 6-2 Lower Twin Bridge

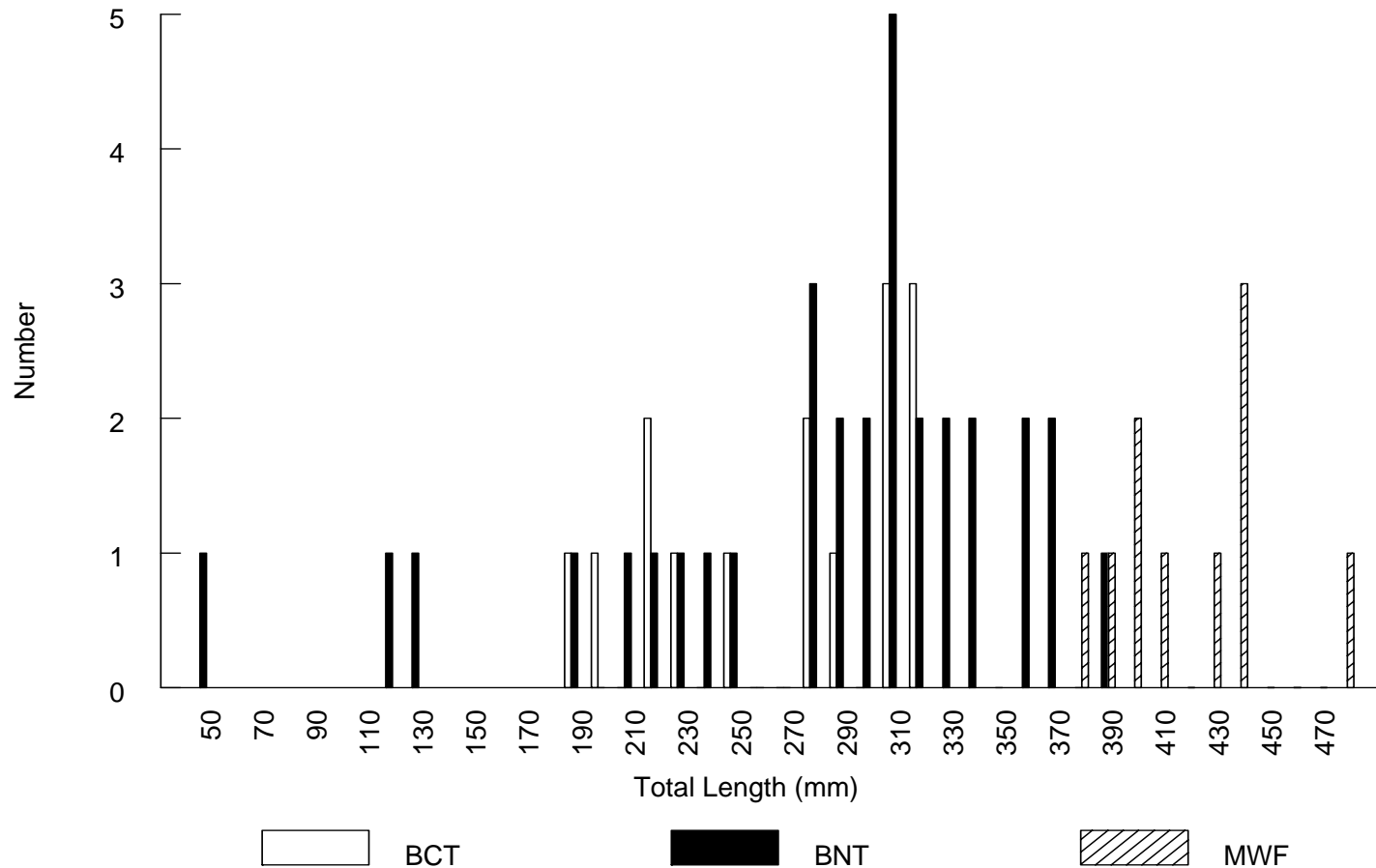


Figure 6. Size distribution of salmonids sampled in the Logan River section 06-2 (Lower Twin Bridge), 1999. The slot limit that was in place included fish between 305 mm and 457 mm.

**Tab Hollow****No water ID**

Tab Hollow is a tributary to the Logan River section 06. Tab Hollow is in Cache County (Mount Elmer USGS Quad). The mouth of Tab Hollow was examined on July 29, 1999. Extremely limited water was present. Tab Hollow does not maintain sufficient stream flows for a resident fish population and likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Tab Hollow had not been sampled before by the Division.

**Wood Camp Creek****IVAQ040A07B 01**

Wood Camp Creek is a tributary of the Logan River section 06. Wood Camp Creek is in Cache County (Mount Elmer USGS Quad) with the headwaters during low flows originating from a spring approximately 0.8 km upstream from the confluence with the Logan River. Fish species present in Wood Camp Creek are Bonneville cutthroat trout. Although brown trout are present in the Logan River in section 06, none were observed during the 1999 surveys. No barrier exists for the upstream movement of fish from the Logan River.

The base flow stream survey on Wood Camp Creek was completed on August 4, 1999. Section 01 (confluence with the Logan River section 06 upstream to the headwaters) was surveyed with two 100 m stations. Station #1 was adjacent to the parking lot/trailhead. UTM's for this station were: 0446314E and 4627332N. Station #2 was just downstream from the spring head, approximately 0.8 km upstream from the confluence with the Logan River section 06. UTM's for this station were: 0445889E and 4627332N. Wood Camp Creek is classified as a IIIB fishery for Bonneville cutthroat trout.

**Station #1**

Two-pass electrofishing resulted in the capture of three age-1 or older Bonneville cutthroat trout ( $30 \pm 0$ /stream km [ $48 \pm 0$ /stream mile]; 27 kg/ha [24 lb/acre]) (Table 7). All three cutthroat trout were adult fish (Figure 7) and they likely had moved upstream from the Logan River. Fin clips were obtained from the three cutthroat trout for genetic analysis. Additional genetic samples were not obtained from Wood Camp Creek for the following reasons: 1) only 0.8 km of stream are available for a resident population, 2) the cutthroat trout present in the stream are likely Logan River residents, 3) 30 cutthroat trout were likely not present in the entire stream, and 4) a genetic sample was obtained from the Logan River section 06 just upstream from the confluence with Wood Camp Creek.

Station #2

One-pass electrofishing yielded no fish, consequently a second pass was not attempted.

Past surveys

Wood Camp Creek had not been sampled before by the Division.

Spawning importance to the Logan River metapopulation

Because of the limited length of Wood Camp Creek and the absence of age-0 Bonneville cutthroat trout, this stream likely contributes very little as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation.

Table 7. Population statistics for species sampled in Wood Camp Creek in 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg K
1999	≥age-1 BCT	30 (48)	27 (24)	224 (146-279)	135 (35-217)	1.05

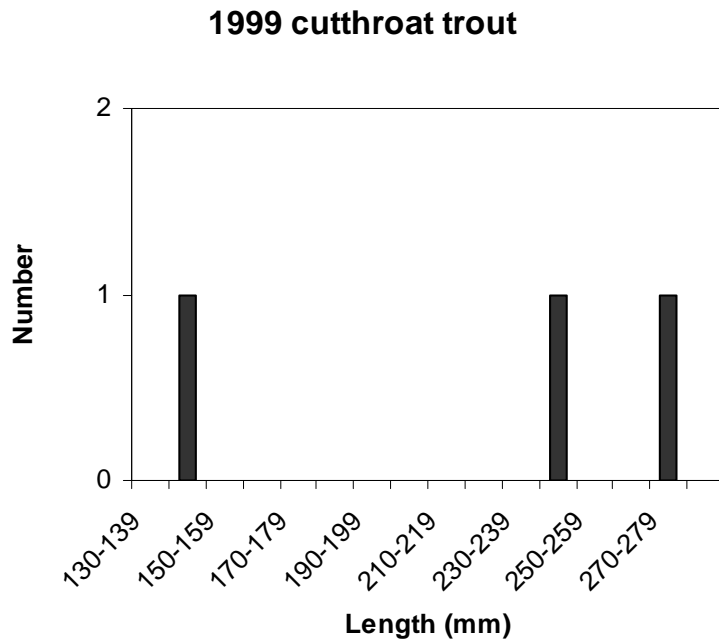


Figure 7. Size distribution of cutthroat trout sampled in Wood Camp Creek, 1999.

## Cottonwood Canyon

IVAQ040A07D 01

Cottonwood Canyon is a tributary of the Logan River section 06. Cottonwood Canyon is in Cache County (Temple Peak and Mount Elmer USGS Quads). The lower reaches of Cottonwood Canyon are dry during low flows, however adequate flows for a resident trout population were present approximately 0.8 km upstream from the confluence with the Logan River. Fish species present in Cottonwood Canyon are Bonneville cutthroat trout. Although brown trout are present in the Logan River in section 06, none were observed during the 1999 surveys. A dry stream bed during low flows prevents the upstream movement of fish from the Logan River, except during runoff conditions.

The base flow stream survey on Cottonwood Canyon was completed on August 11, 1999. Section 01 (confluence with the Logan River section 06 upstream to the headwaters) was surveyed with one 100 m station. This station was approximately 1.6 km upstream from the confluence with the Logan River near an established camp. UTM's for this station were: 0447702E and 4629933N. Cottonwood Canyon is classified as a IIIB fishery for Bonneville cutthroat trout.

Two-pass electrofishing resulted in the capture of 14 age-1 or older Bonneville cutthroat trout ( $144 \pm 20$ /stream km [ $232 \pm 33$ /stream mile]; 82 kg/ha [73 lb/acre]) (Table 8). Although age classes were not readily distinguishable, many age classes of cutthroat trout were present in Cottonwood Canyon (Figure 8), including one age-1 cutthroat trout (64 mm TL) which was observed upstream from the electrofishing station. Cottonwood Canyon appears to have a population of cutthroat trout that is relatively disjunct from the Logan River cutthroat trout population. Although the lower reaches of Cottonwood Canyon reach the Logan River during spring runoff conditions, this stream is isolated during all other times of the year because the lower 0.8 km is dry. An additional 200 m of stream was spot electrofished to obtain a genetic sample of 30 fish (10 whole and 20 fin clips).

### Past surveys

Cottonwood Canyon had not been sampled before by the Division.

### Spawning importance to the Logan River metapopulation

Although no age-0 Bonneville cutthroat trout were caught in the 1999 stream survey, age-1 cutthroat trout were present. Age-0 Bonneville cutthroat trout may not have been observed because this stream was sampled earlier in August when the age-0 cutthroat trout would have been quite small (~25 mm TL) and easily missed with a backpack shocker. Reproduction appears to

be occurring in Cottonwood Canyon and the majority of spawning cutthroat trout are likely resident fish because: 1) many adults were observed during the survey and 2) the dry stream bed in the lower reaches of the stream during all times of the year except runoff conditions would prevent the upstream movement of fish from the Logan River.

Table 8. Population statistics for species sampled in Cottonwood Canyon in 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg K
1999	≥age-1 BCT	144 (232)	82 (73)	187 (126-263)	86 (23-202)	1.16

### 1999 cutthroat trout

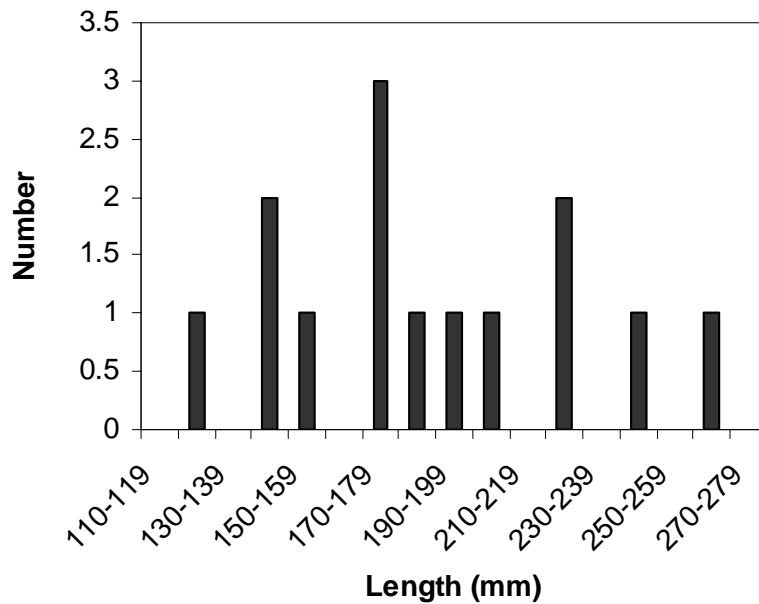


Figure 8. Size distribution of cutthroat trout sampled in Cottonwood Canyon, 1999.

**Chicken Creek****No water ID**

Chicken Creek is a tributary to the Logan River section 06. Chicken Creek is in Cache County (Temple Peak USGS Quad). The mouth of Chicken Creek was walked on August 11, 1999 for approximately 200 m. Stream flows were minimal and not conducive to a resident trout population. Spot shocking was not attempted. Chicken Creek likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Chicken Creek had not been sampled before by the Division.

**Temple Fork****IVAQ040A08**

Temple Fork is a tributary of the Logan River that divides section 06 and section 07. Temple Fork is in Cache County (Temple Peak USGS Quad). Fish species present in Temple Fork are Bonneville cutthroat trout and brown trout. No barrier exists for the upstream movement of fish from the Logan River.

**Section 01**

The base flow stream survey on Temple Fork section 01 was completed on August 10, 1999. Section 01 (confluence with the Logan River upstream to Spawn Creek) was surveyed with one 104 m station located approximately 200 m downstream from the confluence with Spawn Creek in the USFS cattle enclosure. UTM's for this station were: 0451993E and 4630822N. Temple Fork is a class IIIB fishery for Bonneville cutthroat trout.

Two-pass electrofishing resulted in the capture of 16 age-1 or older Bonneville cutthroat trout ( $194 \pm 116$ /stream km [ $312 \pm 187$ /stream mile]; 39 kg/ha [35 lb/acre]), 5 age-0 Bonneville cutthroat trout, 11 age-1 or older brown trout ( $111 \pm 13$ /stream km [ $179 \pm 21$ /stream mile]; 36 kg/ha [32 lb/acre]), and 10 age-0 brown trout ( $173 \pm 356$ /stream km [ $279 \pm 574$ /stream mile]; 1 kg/ha [1 lb/acre]) (Table 9). All age-0 Bonneville cutthroat trout were caught on the second electrofishing pass, consequently, a population estimate was not available. Age classes are not readily distinguishable (Figure 9), however, many age classes are likely present from both Bonneville cutthroat trout and brown trout. No fish were collected for genetic analysis from section 01 because fish were collected from section 02 and Spawn Creek.

Past surveys

Two stream surveys have been completed on Temple Fork section 01 in 1967 and 1983. In 1967 a station was sampled just upstream from the Logan River. Based on one-pass electrofishing, 50 Bonneville cutthroat trout/km (80/mile) and 56 brown trout/km (90/mile) were present (Table 9). In 1983, a two-pass electrofishing survey was completed downstream, through, and upstream from the enclosure. The data was collected in such a



manner that population estimates by species were not available. A population estimate of 256 ± 178/stream km (412 ± 287/stream mile; 29 kg/ha; 26 lb/acre) was obtained for all trout age classes (Table 9). Trout caught included Bonneville cutthroat trout (n=6), rainbow trout (n=6), brook trout (n=1), and brown trout (n=38). Rainbow trout were stocked in Temple Fork between 1969 and 1980 (n was between 1000 and 3600 fingerling and a few catchables) and possibly before. Rainbow trout were caught in the 1983 stream survey and these fish were likely present from the late 1970s to early 1980s plants. Currently, rainbow trout do not appear to be part of the trout population based on the 1999 survey. It is difficult to compare the Bonneville cutthroat trout and brown trout populations through time, however, based on the larger number of Bonneville cutthroat trout caught in the 1999 survey, it appears that their numbers are similar or even higher than what was found in the 1983 survey.

Spawning importance to the Logan River metapopulation

The Temple Fork Drainage is of moderate gradient with little rearing habitat for age-0 trout. Although Temple Fork section 01 may not be important spawning habitat for the Logan River Bonneville cutthroat trout metapopulation, the headwater reaches of Temple Fork (section 02) and Spawn Creek likely are important. Age-0 Bonneville cutthroat trout produced in these two streams/sections then drift downstream to Temple Fork section 01 where more rearing habitat is available.

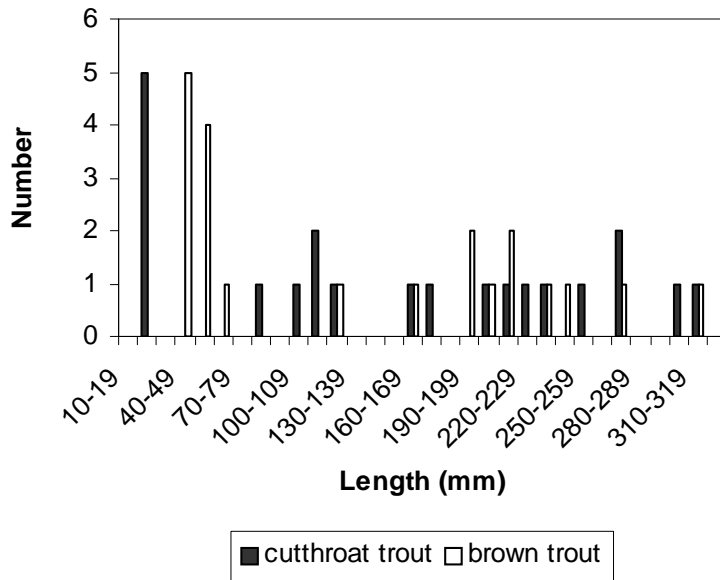
Table 9. Population statistics for species sampled in Temple Fork section 01, 1967, 1983, and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL(mm)	Avg WT(g)	Avg. K
1967	all BCT all BNT	50 <sup>1</sup> (80 <sup>1</sup> ) 56 <sup>1</sup> (90 <sup>1</sup> )				
1983	all trout	256 <sup>2</sup> (412 <sup>2</sup> )	29(26)			
1999	≥age-1 BCT age-0 BCT ≥age-1 BNT age-0 BNT	194 <sup>2</sup> (312 <sup>2</sup> ) present 111 <sup>2</sup> (179 <sup>2</sup> ) 173 <sup>2</sup> (279 <sup>2</sup> )	39(35)  36(32) 1(1)	198 (84-310) 24 (23-26) 217 (127-317) 52 (45-62)	120 (5-296)  128 (24-355) 1 (0.5-3)	1.09  1.07

<sup>1</sup> Based on one-pass electrofishing.

<sup>2</sup> Based on two-pass electrofishing.

### 1999 trout



### 1983 trout

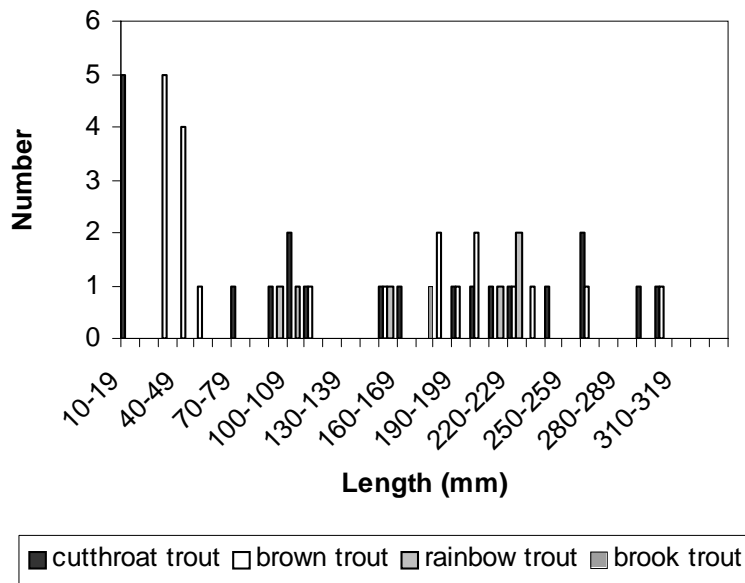


Figure 9. Size distribution of trout sampled in Temple Fork section 01, 1999 and 1983.

## Section 02

The base flow stream survey on Temple Fork section 02 was completed on August 10, 1999. Section 02 (confluence with Spawn Creek upstream to the headwaters) was surveyed with one 98 m station located at the end of the old road before the canyon. UTM's for this station were: 0453510E and 4628713N. Temple Fork is a class IIIB fishery for Bonneville cutthroat trout.

Two-pass electrofishing resulted in the capture of 13 age-1 or older Bonneville cutthroat trout ( $146 \pm 42$ /stream km [ $235 \pm 67$ /stream mile];  $56$  kg/ha [ $50$  lb/acre]) (Table 10). Age classes were not readily distinguishable (Figure 10), however, all cutthroat trout caught were adults. An additional 300 m of stream was spot electrofished to obtain a genetic sample of 30 fish (10 whole and 20 fin clips). All cutthroat trout caught during spot electrofishing were adult fish, as well.

### Past surveys

One stream survey was completed by the Division on Temple Fork section 02 in 1986. This 92 m survey was completed in Temple Fork Flat. A two-pass electrofishing survey yielded 6 Bonneville cutthroat trout ( $66 \pm 0$ /stream km [ $106 \pm 0$ /stream mile];  $15$  kg/ha [ $13$  lb/acre]) and 12 brown trout ( $268 \pm 632$ /stream km [ $431 \pm 1017$ /stream mile];  $64$  kg/ha [ $57$  lb/acre]) (Table 10). Rainbow trout were stocked in Temple Fork between 1969 and 1980 (n was between 1000 and 3600 fingerling and a few catchables) and possibly before. Rainbow trout have not been sampled, however, in section 02. The Bonneville cutthroat trout population appears to be higher in 1999 than what was found in 1986. Brown trout were not present in the 1999 survey, however, brown trout are likely still present in the lower reaches of section 02.

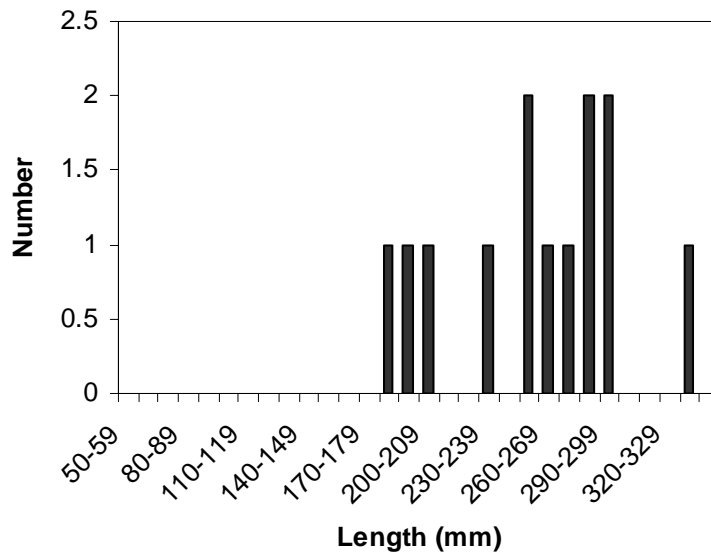
### Spawning importance to the Logan River metapopulation

No age-0 or even probable age-1 cutthroat trout were found during the 1999 survey of Temple Fork section 02. Regardless, the Temple Fork Drainage appears to be an important spawning drainage for the Logan River Bonneville cutthroat trout metapopulation. Based on limited gravels and colder water temperatures than those in Spawn Creek, spawning is likely limited in Temple Fork. Water temperatures in Temple Fork section 01 are approximately  $3^{\circ}\text{C}$  colder than Spawn Creek (Kent Sorenson, personal observation). Spawn Creek likely contains the majority of spawning activity in the Temple Fork Drainage.

Table 10. Population statistics for species sampled in Temple Fork section 02, 1986 and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg. K
1986	all BCT	66 (106)	15 (13)	209 (170-280)	108 (44-210)	1.09
	all BNT	268 (431)	64 (57)	206 (65-320)	119 (3-298)	1.05
1999	≥age-1 BCT	146 (235)	56 (50)	259 (184-334)	193 (67-346)	1.05

### 1999 cutthroat trout



### 1986 trout

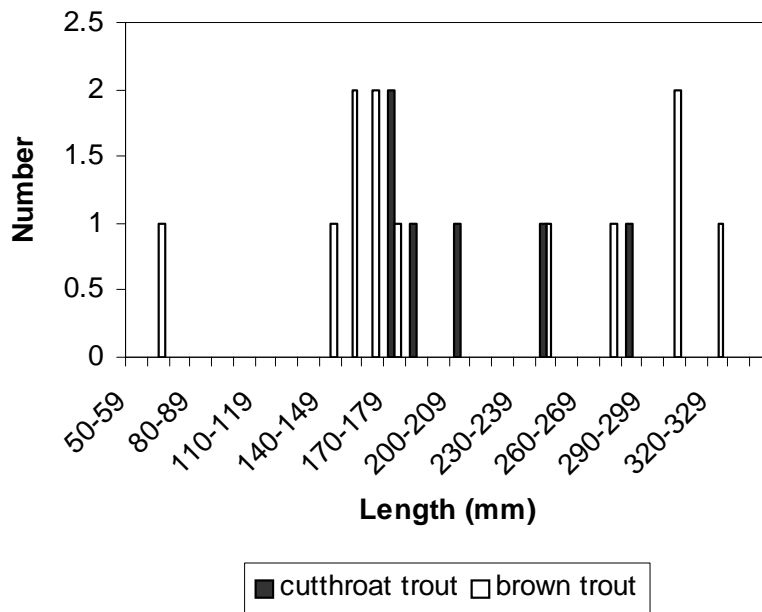


Figure 10. Size distribution of trout sampled in Temple Fork section 02, 1999 and 1986.

## Spawn Creek

IVAQ040A08A 01

Spawn Creek is a tributary to Temple Fork that divides section 01 and section 02 of Temple Fork. Spawn Creek is in Cache County (Temple Peak USGS Quad). Fish species present in Spawn Creek are Bonneville cutthroat trout, brook trout in the headwater reaches, and brown trout in the lower reaches. No barrier exists for the upstream movement of fish from Temple Fork.

The base flow stream surveys on Spawn Creek were completed on August 18, 1999. Section 01 (confluence with Temple Fork upstream to the headwaters) was surveyed with two stations. Station #1 was directly above the first beaver pond which was located approximately 0.8 km upstream from the gate at the end of the road. UTM's for this station were: 0453462E and 4631845N. The upstream end of Station #2 was at the gaging station. Both stations were 100 m in length. UTM's for this station were: 0454053E and 4631858N. Spawn Creek is a class IIIB fishery for Bonneville cutthroat trout.

### Station #1

Two-pass electrofishing resulted in the capture of 6 age-1 or older Bonneville cutthroat trout ( $63 \pm 21$ /stream km [ $101 \pm 34$ /stream mile]; 38 kg/ha [34 lb/acre]), 5 age-1 or older brook trout ( $53 \pm 21$ /stream km [ $86 \pm 34$ /stream mile]; 33 kg/ha [29 lb/acre]), and 2 age-0 brook trout (Table 11). One age-0 brook trout was caught on each electrofishing pass, consequently a population estimate was not obtained. Age classes are not readily distinguishable (Figure 11), however several age classes are likely present for both Bonneville cutthroat trout and brook trout. An additional 24 Bonneville cutthroat trout (one was age-0) were collected for genetic analysis directly in Spawn Creek at the gate on the Spawn Creek road. UTM's for this collection were: 0452882E and 4631580N. While spot shocking for additional tissue samples, one t-bar anchor tagged Bonneville cutthroat trout was encountered. This fish was originally tagged on June 28, 1995 in Spawn Creek. Its' original length and weight were 237 mm and 134 g, respectively. In 1999, its' length and weight were 302 mm and 340 g, respectively. In addition, one brown trout also was caught while spot shocking for additional cutthroat trout. A total of 30 tissue samples (11 whole and 19 fin clips) were collected for genetic analysis.

### Station #2

Two-pass electrofishing resulted in the capture of 10 age-1 or older brook trout ( $180 \pm 370$ /stream km [ $290 \pm 596$ /stream mile]; 110 kg/ha [98 lb/acre]) and 4 age-0 brook trout ( $45 \pm 27$ /stream km [ $72 \pm 43$ /stream mile]; 1 kg/ha [1 lb/acre]) (Table 11). Age classes are not readily distinguishable (Figure 11), however,

several age classes of brook trout are likely present. Because Bonneville cutthroat trout were not caught in this electrofishing station and a genetic sample was collected in the lower reaches of Spawn Creek, no further effort was made to collect cutthroat trout for genetic analysis in station #2.

#### Past surveys

Spawn Creek has been surveyed twice by the Division. In 1967, Bonneville cutthroat trout (161/stream km; 260/stream mile) were the most predominant species caught (n=26; Table 11). Brown trout (n=1; 6/stream km; 10/stream mile) and brook trout (n=2; 12/stream km; 20/stream mile) also were present in this one-pass electrofishing survey of a 161 m reach beginning at the first place that Spawn Creek splits above the confluence with Temple Fork. Another stream survey was completed in 1986 approximately 0.8 km upstream from the gated road. Bonneville cutthroat trout (116 ± 13/stream km [186 ± 21/stream mile]; 37 kg/ha [33 lb/acre]) were caught during this survey (Table 11). Brook trout were stocked (n=1000; 138/lb) in Spawn Creek in 1965 and possibly before 1965. Brook trout appear to have been reproducing in the headwaters reaches of Spawn Creek since the 1960s, however, the population has not expanded from the headwater reaches. Brown trout have been present in low numbers in the lower reaches of Spawn Creek since the 1960s as well. The majority of the brown trout are adult fish that have likely moved upstream from the lower reaches of Temple Fork. A few age-0 brown trout were observed in the lower reaches of Spawn Creek during a spot shocking survey on November 23, 1999, consequently, limited brown trout spawning is occurring in the lower reaches of Spawn Creek. Additional age-0 Bonneville cutthroat trout were observed during this November survey as well. Through time Bonneville cutthroat trout have been the predominant species in Spawn Creek.

#### Spawning importance to the Logan River metapopulation

A few age-0 Bonneville cutthroat trout were found in the lower reaches of Spawn Creek in 1999. Because Spawn Creek is of moderate gradient, many age-0 cutthroat trout likely drift downstream into Temple Fork section 02. In addition, more age-0 Bonneville cutthroat trout likely exist in Spawn Creek than what were observed. Based on the amount of gravels present in Spawn Creek, this stream likely contributes to the majority of the spawning in the Temple Fork Drainage.

Table 11. Population statistics for species sampled in Spawn Creek, 1967, 1986, and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg. K
1967	all BCT all BNT all BKT	161 <sup>1</sup> (260 <sup>1</sup> ) 6 <sup>1</sup> (10 <sup>1</sup> ) 12 <sup>1</sup> (20 <sup>1</sup> )				
1986	all BCT	116 <sup>2</sup> (186 <sup>2</sup> )	37(33)	174 (105-235)	70 (10-182)	0.99
1999 st. #1	≥age-1 BCT ≥age-1 BKT age-0 BKT	63 <sup>2</sup> (101 <sup>2</sup> ) 53 <sup>2</sup> (86 <sup>2</sup> ) present	38(34) 33(29)	211 (144-257) 218 (188-258) 65 (62-68)	124 (28-205) 122 (74-220) 3	1.18 1.14 1.11
1999 st. #2	≥age-1 BKT age-0 BKT	180 <sup>2</sup> (290 <sup>2</sup> ) 45 <sup>2</sup> (72 <sup>2</sup> )	110(98) 1(1)	206 (141-254) 71 (62-81)	122 (41-192) 5 (3-7)	1.31 1.20

<sup>1</sup> Based on one-pass electrofishing.

<sup>2</sup> Based on two-pass electrofishing.



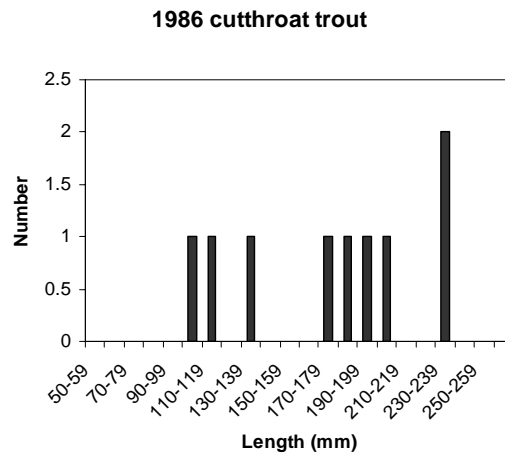
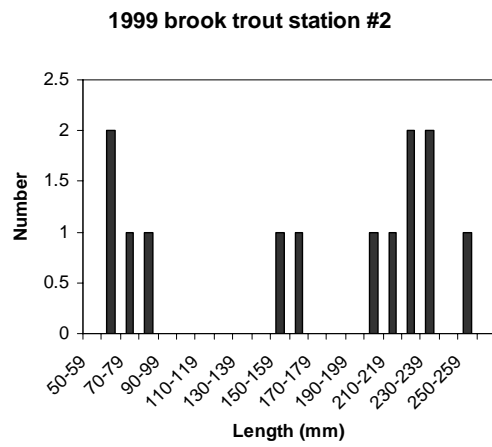
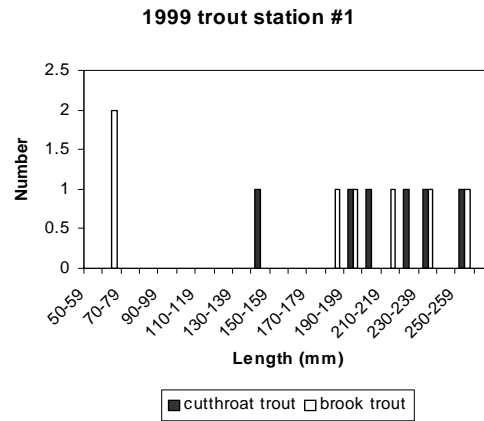


Figure 11. Size distribution of trout sampled in Spawn Creek, 1999 and 1986.

**Logan River section 07**

IVAQ040A 07

Utah State University (USU) Forestry Camp

This site began 200 m below the first artificial drop structure, downstream of the bridge crossing to the USU Forestry Camp. The UTMs were: 0453186E and 4635728N. Several drop structures have been installed in this portion of Section 07 of the Logan River to create pool habitat and holding areas for fish. The drop structures are not a barrier to fish movement in the stream. Angler access to the stream in this area is good and there is ample parking along the river. The base flow survey on the Logan River section 07 (USU Forestry Camp) was completed on August 26, 1999. The Logan River section 07 is a class IIB fishery for Bonneville cutthroat trout. The fishing regulations from this section included the slot limit described in the Introduction and include the use of artificial flies and lures only; no bait fishing is permitted.

Two-pass electrofishing resulted in the capture of 271 age-1 and older Bonneville cutthroat (Figure 12) ( $1,361 \pm 95$ /stream km [ $2,191 \pm 153$ /stream mile];  $100 \text{ kg/ha}$  [ $89 \text{ lb/acre}$ ]). One brown trout was caught ( $5 \pm 0$ /stream km;  $8 \pm 0$ /stream mile). Mountain whitefish and mottled sculpin also were caught. The mountain whitefish population was estimated at  $25 \pm 0$ /stream km ( $40 \pm 0$ /stream mile;  $21 \text{ kg/ha}$ ;  $18 \text{ lb/acre}$ ) and the mottled sculpin population was estimated at  $560 \pm 824$ /stream km ( $896 \pm 1327$ /stream mile) (Table 12). Thirty Bonneville cutthroat trout (10 whole, 20 body) were collected for genetic analysis.

Only a few adult brown trout have been observed in the lower reaches of section 07 of the Logan River. Bonneville cutthroat trout are the dominant trout species in section 07 (Table 1). Section 07-1 contained the highest estimated number of cutthroat trout per stream kilometer of the entire mainstem of the Logan River. All age classes were represented in strong numbers with the exception of age-0 fish, indicating that this section may be important for natural reproduction and/or rearing. Age-0 cutthroat trout are likely present in this section, however, netting them would have been extremely difficult. High numbers of cutthroat trout (Table 12) and well distributed length frequencies also were noted in the 1991 survey (Wullschleger 1991). This section continues to support a small, but stable population of mountain whitefish. The drop structures installed in this area have created substantial plunge pools which serve as holding and rearing habitat for both juvenile and adult fish of all species.

Table 12. Population statistics for species sampled in section 07-1 (USU Forestry Camp) of the Logan River, 1991 and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL(mm)	Avg WT(g)	K
1991	all BNT	12 (20)				
	all BCT	1858 (2,990)				
	all MWF	6 (10)				
	all MSC	783 (1,260)				
1999	≥age-1 BNT	5 (8)		145 (145)	34 (34)	1.12
	≥age-1 BCT	1,361 (2,191)	100 (89)	191 (74-317)	92 (4-340)	1.09
	≥age-1 MWF	25 (40)	21 (18)	425 (375-472)	1032 (595-1301)	1.32
	all MSC	560 (896)		109 (52-130)	19 (4-32)	

Length Frequency - Section 7-1 USU Forestry Camp

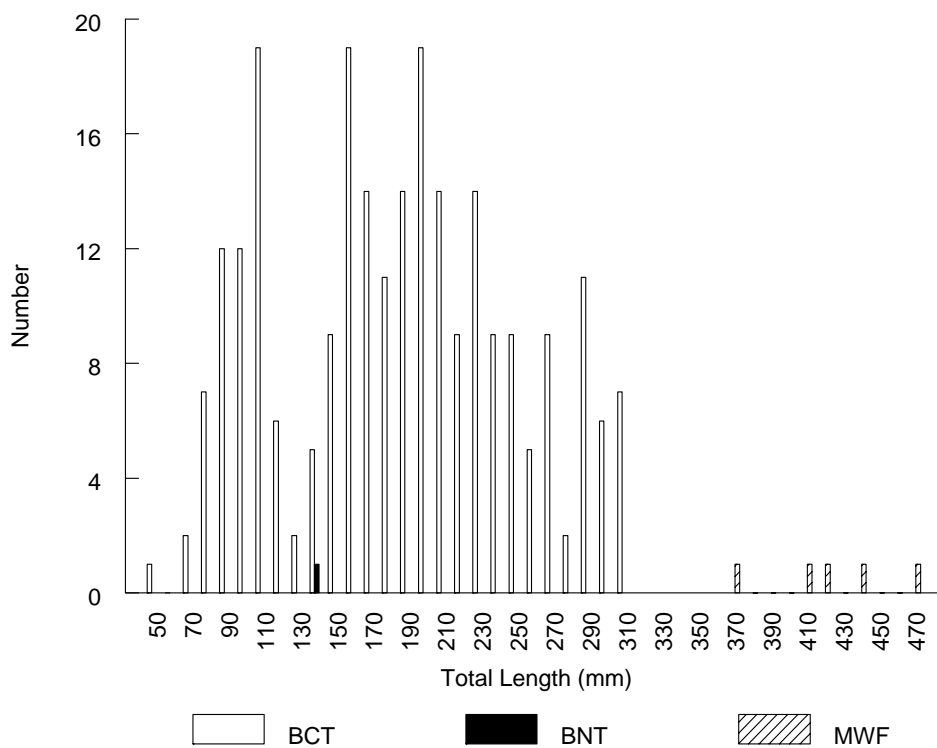


Figure 12. Size distribution of salmonids sampled in the Logan River section 07-1 (USU Forestry Camp), 1999. The slot limit that was in place included fish between 305 mm and 457 mm.

### Red Banks

This site began directly at the upstream side of the Red Banks bridge and continued upstream 139 m. Above this point the stream became braided and electrofishing was not feasible. The UTM's were: 0453182E and 4638384N. Angler access to the stream in this area is good and there is ample parking along the river and within the Red Banks campground. The base flow stream survey on the Logan River section 07 (Red Banks) was completed on August 26, 1999. The Logan River section 07 is a class IIB fishery for Bonneville cutthroat trout. The fishing regulations from this section included the slot limit described in the Introduction and include the use of artificial flies and lures only; no bait fishing is permitted.

Two-pass electrofishing resulted in the capture of 150 age-1 and older Bonneville cutthroat (Figure 13) ( $1,076 \pm 36/\text{stream km}$  [ $1,735 \pm 58/\text{stream mile}$ ];  $238 \text{ kg/ha}$  [ $212 \text{ lb/acre}$ ]). One age-0 Bonneville cutthroat trout was caught ( $7 \pm 0/\text{stream km}$ ;  $12 \pm 0/\text{stream mile}$ ) (Table 13; Figure 13). Two brown trout and two brook trout also were caught. Population estimates were not possible for either species because one was caught on each electrofishing pass. A total of 41 mottled sculpin were caught, however, more fish were caught on the second electrofishing pass, consequently a population estimate was not available. Thirty Bonneville cutthroat trout (10 whole, 20 body) were collected for genetic analysis.

Bonneville cutthroat trout are the dominant trout species in section 07 (Table 1). All age classes were represented in strong numbers with the exception of age-0 fish ( $n=1$ ), indicating that this section may be important for natural reproduction and/or rearing. More age-0 cutthroat trout are likely present in this section, however, netting them would have been extremely difficult. High numbers of cutthroat trout (Table 13) and well distributed length frequencies were also noted in the 1991 survey (Wullschleger 1991). This station continues to support a small population of brown trout which also were present in the 1991 survey (Wullschleger 1991). In 1999, brook trout were observed for the first time during Division surveys in this station. These fish have most likely moved downstream from Beaver Creek. The Logan River section 07 does not contain what would be considered good brook trout habitat in that it is a rather high gradient stream and lacks pool habitat. Therefore, brook trout should not be considered a threat to the cutthroat trout population in this section.

Table 13. Population statistics for species sampled in section 07-2 (Red Banks) of the Logan River, 1991 and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	K
1991	all BNT	12 (20)				
	all BCT	1,125 (1,810)				
	all RBT	6 (10)				
	all MWF	19 (30)				
	all MSC	628 (1,010)				
1999	≥age-1 BNT			126 (110-142)	24 (16-31)	1.14
	≥age-1 BCT	1,076 (1,735)	238 (212)	203 (51-335)	106 (6-365)	1.44
	age-0 BCT	7 (12)		51 (51)	5 (5)	
	≥age-1 BKT			202 (154-249)	108 (44-171)	1.16
	all MSC			109 (51-145)	20 (4-36)	

Length Frequency - Section 7-2 Red Banks

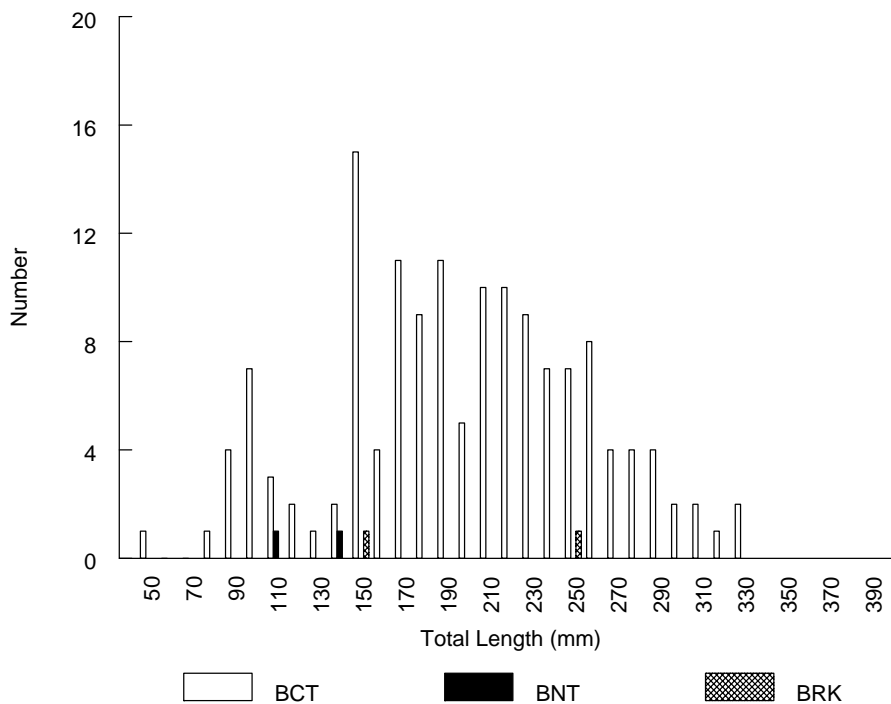


Figure 13. Size distribution of trout sampled in the Logan River section 07-2 (Red Banks), 1999. The slot limit that was in place included fish between 305 mm and 457 mm.

### Lower Franklin Basin

This site began approximately 20 m above the first bridge crossing on Franklin Basin Road and continued upstream 100 m. Due to the lower flow and narrower stream width, it was felt a 100 m site would adequately represent the population structure. The UTMs were: 0453030E and 4642391N. At this site there is a parking lot adjacent to the river which serves as a winter sports recreation area during the winter. It also allows for ample angler parking and good access to the river. At this station the canoe mounted electrofisher was not needed and the electrofishing effort consisted of 3 personnel with backpack electrofishing units and four additional netters. The base flow survey on the Logan River section 07 (Lower Franklin Basin) was completed on August 17, 1999. The Logan River section 07 is a class IIB fishery for Bonneville cutthroat trout. The fishing regulations from this section included the slot limit described in the Introduction and include the use of artificial flies and lures only; no bait fishing is permitted.

Two-pass electrofishing resulted in the capture of 135 age-1 and older Bonneville cutthroat (Figure 14) ( $1359 \pm 90$ /stream km [ $2,189 \pm 145$ /stream mile];  $222$  kg/ha [ $198$  lb/acre]). A total of 9 age-1 and older brook trout was captured which resulted in a population estimate of  $120 \pm 120$ /stream km ( $193 \pm 193$ /stream mile;  $24$  kg/ha;  $22$  lb/acre) (Table 14). The only other species caught was one mottled sculpin on the second electrofishing pass. More mottled sculpin were present, but not collected. Thirty whole Bonneville cutthroat trout were collected for genetic analysis.

Bonneville cutthroat trout are the dominant trout species in section 07 (Table 1). All age classes were represented in strong numbers with the exception of age-0 fish, indicating that this section may be important for natural reproduction and/or rearing. Age-0 cutthroat trout are likely present in this section, however, netting them would have been extremely difficult. High numbers of cutthroat trout (Table 14) and well distributed length frequencies also were noted in the 1991 survey (Wullschleger 1991). In 1999, brook trout were observed for the first time during Division surveys in this station, although it was known that they have been present in low numbers. These fish have most likely moved downstream from Beaver Creek. The Logan River section 07 does not contain what would be considered good brook trout habitat in that it is a rather high gradient stream and lacks pool habitat. Therefore, brook trout should not be considered a threat to the cutthroat trout population in this section.

Table 14. Population statistics for species sampled in section 07-3 (Lower Franklin Basin) of the Logan River, 1991 and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	K
1991	all BCT	634 (1,020)				
1999	≥age-1 BCT	1,359 (2,189)	222 (198)	223 (59-342)	142 (5-420)	1.07
	≥age-1 BKT	120 (193)	24 (22)	237 (130-285)	175 (22-308)	1.15
	all MSC			143 (143)	40 (40)	

### Length Frequency - Section 7-3 Franklin Basin

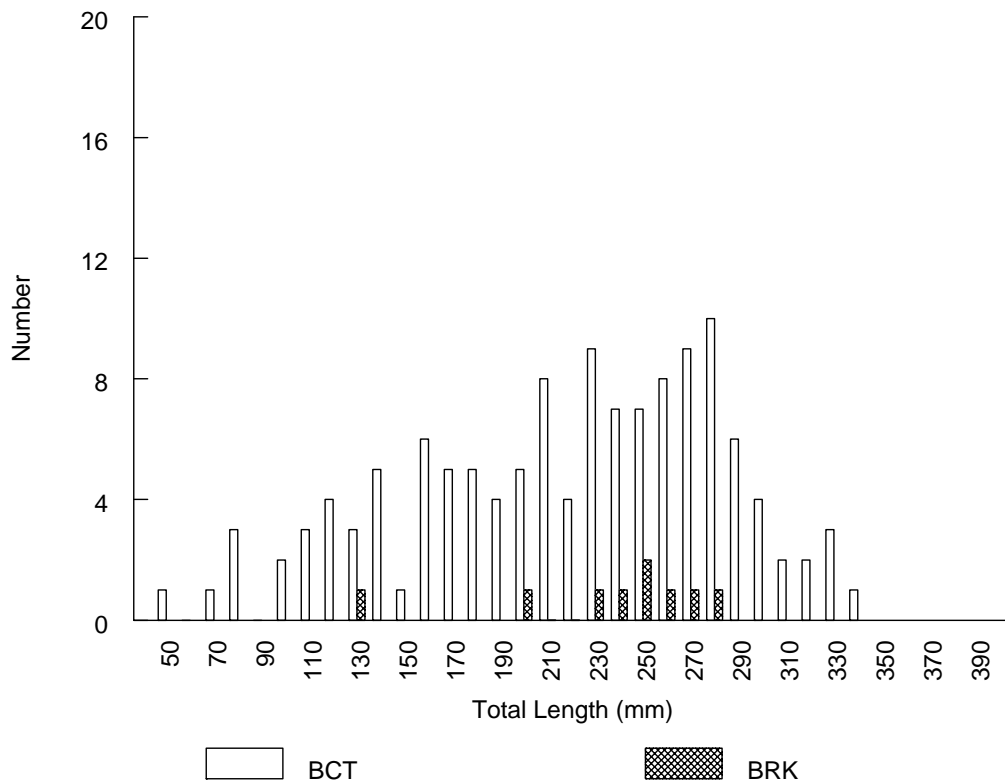


Figure 14. Size distribution of trout sampled in the Logan River section 07-3 (Lower Franklin Basin), 1999. The slot limit that was in place included fish between 305 mm and 457 mm.

### Upper Franklin Basin

This station was located in upper Franklin Basin near the Utah-Idaho state line. The junction of a small dirt road with the Franklin Basin Road marked the downstream boundary. The UTM's were: 0450454E and 4649004N. The length of the electrofished station was 100 m. Electrofishing effort consisted of two personnel, each with a backpack electrofisher and four additional netters. The base flow survey on the Logan River section 07 (Upper Franklin Basin) was completed on August 16, 1999. The Logan River section 07 is a class IIB fishery for Bonneville cutthroat trout. The fishing regulations from this section included the slot limit described in the Introduction and include the use of artificial flies and lures only; no bait fishing is permitted.

Two-pass electrofishing resulted in the capture of 121 age-1 and older Bonneville cutthroat trout (1298 ± 100/stream km [2090 ± 161/stream mile]; 104 kg/ha [93 lb/acre]) (Table 15). Numerous age-0 Bonneville cutthroat trout were observed during electrofishing, but their small size made netting difficult. Two age-0 cutthroat trout were netted. The majority of the catch was age-1 and age-2 Bonneville cutthroat trout (Figure 15). Thirty whole Bonneville cutthroat trout were collected for genetic analysis.

Bonneville cutthroat trout are the dominant trout species in section 07 (Table 1) and the only fish observed in this upper station. All age classes were represented in strong numbers with the exception of age-0 fish, which were seen, but not netted. The headwater portions of the Logan River section 07 are important to the spawning Logan River Bonneville cutthroat trout metapopulation. This portion of the Logan River section 07 had not been sampled before by the Division.

Table 15. Population statistics for species sampled in section 07-4 (Upper Franklin Basin) of the Logan River, 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	K
1999	age-0 BCT ≥age-1 BCT	numerous 1298 (2090)	104 (93)	24 (22-25) 116 (60-285)	2 (2) 28 (4-276)	1.05



### Length Frequency - Section 7-4 Upper Franklin Basin

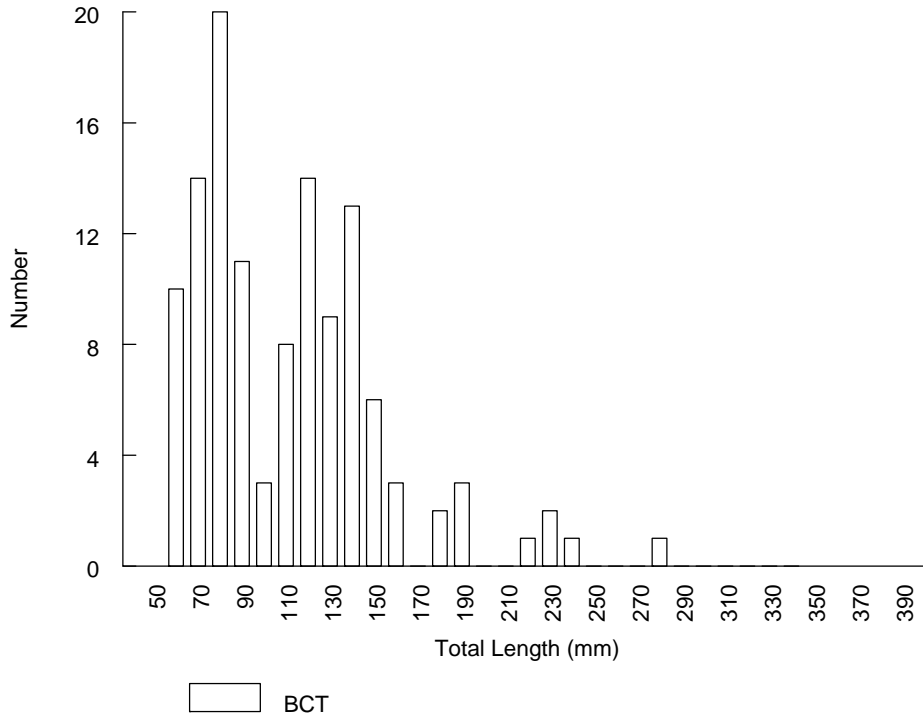


Figure 15. Size distribution of Bonneville cutthroat trout sampled in the Logan River section 07-4 (Upper Franklin Basin), 1999. The slot limit that was in place included fish between 305 mm and 457 mm.

**Bear Hollow**

**IVAQ040A08C 01**

Bear Hollow is a tributary to the Logan River section 07. Bear Hollow is in Cache County (Temple Peak, Mount Elmer, and Naomi Peak USGS Quads). Fish species present in Bear Hollow are Bonneville cutthroat trout. No barrier exists for the upstream movement of fish from the Logan River.

The base flow stream survey on Bear Hollow was completed on August 12, 1999. Section 01 (confluence with the Logan River upstream to the headwaters) was surveyed with one 100 m station which was located approximately 1.6 km upstream from the Logan River above the first intermittent tributary on the left. UTM's for this station were: 0450008E and 4633827N. Bear Hollow is a class IVB fishery for Bonneville cutthroat trout.

Two-pass electrofishing resulted in the capture of 16 age-1+ or older Bonneville cutthroat trout (160 ± 0/stream km [258 ± 0/stream mile]; 38 kg/ha [34 lb/acre]) (Table 16) and 10 age-0 Bonneville cutthroat trout (122 ± 81/stream km [197 ± 131/stream mile]) (Table 16). Age-0 and age-1 year classes were distinguishable in the length frequency histogram (Figure 16). An additional 50 m of stream was spot electrofished to obtain a genetic sample of 30 fish (10 whole and 20 fin clips).

Past surveys

Bear Hollow had not been previously surveyed by the Division.

Spawning importance to the Logan River metapopulation

Bear Hollow appears to contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Approximately 3/4 of the cutthroat trout caught in 1999 were age-0 or age-1 (Figure 16). The lack of adult cutthroat trout >200 mm suggests that adult cutthroat trout run up Bear Hollow to spawn and leave shortly following the spawn. The smaller size classes in Bear Hollow suggest that this stream provides good nursery habitat for smaller cutthroat trout.

Table 16. Population statistics for species sampled in Bear Hollow in 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg K
1999	≥age-1 BCT	160 (258)	38 (34)	134 (87-214)	35 (5-126)	1.17
	age-0 BCT	122 (197)		29 (28-31)		

# 1999 cutthroat trout

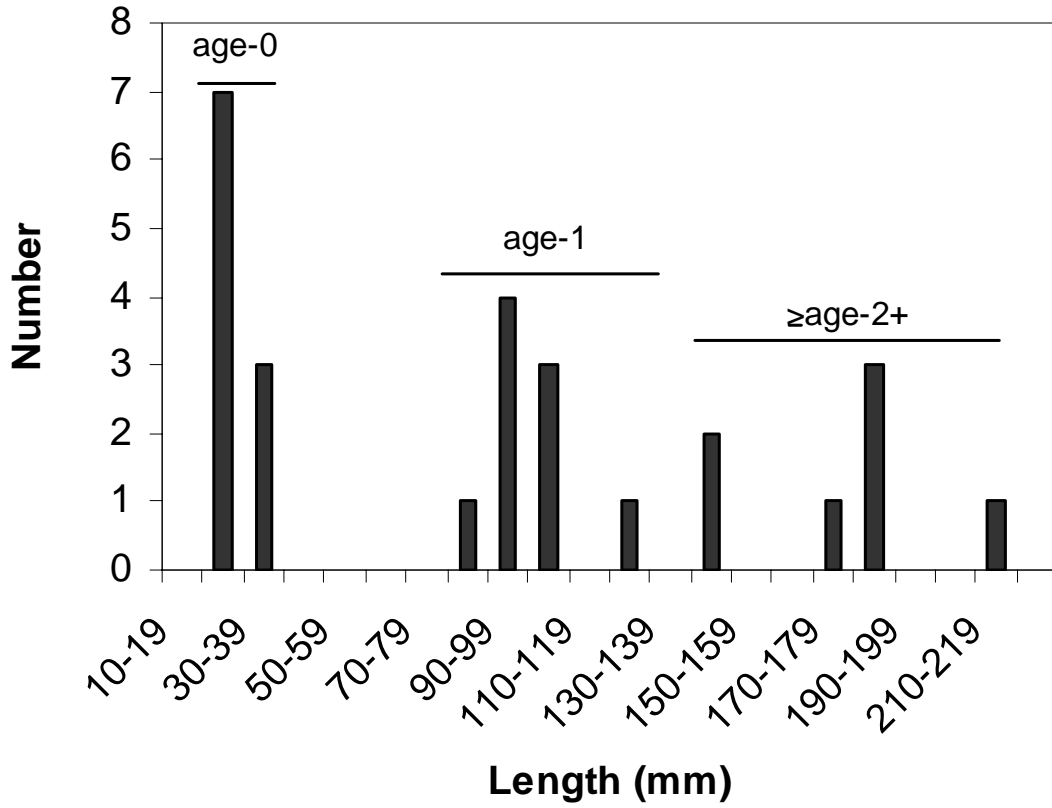


Figure 16. Size distribution and probable age classes of cutthroat trout sampled in Bear Hollow, 1999.

**Twin Creek**

**IVAQ040A09 01**

Twin Creek is a tributary to the Logan River section 07. Twin Creek is in Cache County (Temple Peak and Tony Grove Creek USGS Quads). Fish species present in Twin Creek are Bonneville cutthroat trout. A culvert on US Highway 89 may be a partial barrier to the upstream movement of fish from the Logan River both during high and low flows because of a grate on the upper end (Figure 17).



Figure 17. Upstream end of the US Highway 89 culvert on Twin Creek. Picture taken during low flows.

The base flow stream survey on Twin Creek was completed on August 18, 1999. Section 01 (confluence with the Logan River upstream to the headwaters) was surveyed with one 100 m station which was located approximately 2.4 km upstream from the Logan River at the second road crossing. UTM's for this station were: 0450576E and 4635369N. Bear Hollow is a class IIIB fishery for Bonneville cutthroat trout.

Two-pass electrofishing resulted in the capture of 9 age-1 or older Bonneville cutthroat trout ( $90 \pm 0$ /stream km [ $145 \pm 0$ /stream mile]; 83 kg/ha [74 lb/acre]) (Table 17). Although age classes were not readily distinguishable, several age classes of cutthroat trout were present in Twin Creek (Figure 18). An additional 300 m of stream was spot electrofished at the first road crossing (UTMs 0451288E and 4634653N) to obtain a genetic sample of 30 fish (15 whole and 15 fin clips). Five age-0 Bonneville cutthroat trout (mean TL - 36 mm) were observed while spot electrofishing.

#### Past surveys

One stream survey was completed by the Division on Twin Creek in 1981. This 81 m survey was completed at the first road crossing approximately 0.8 km downstream from the 1999 survey. One-pass electrofishing yielded 12 Bonneville cutthroat trout (149/stream km [240/stream mile]; 10 kg/ha [9 lb/acre]) (Table 17). The Bonneville cutthroat trout population appears to be similar to that found in 1999 with multiple age classes observed during both years.

#### Spawning importance to the Logan River metapopulation

Twin Creek appears to contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Although no age-0 cutthroat trout were observed in the 1999 stream survey, age-0 cutthroat trout were found downstream from this station while spot shocking at the first road crossing. Age-0 cutthroat trout were found in 1981 at the first road crossing as well. The lack of adult cutthroat trout >200 mm suggests that adult cutthroat trout run up Twin Creek to spawn and leave shortly following the spawn. Evidently the culvert on US Highway 89 is not a complete barrier to the upstream movement of fish from the Logan River, at least during higher spring flows. The smaller size classes in Bear Hollow also suggest that this stream provides good nursery habitat for smaller cutthroat trout.

Table 17. Population statistics for species sampled in Twin Creek, 1999 and 1981.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg K
1981	>age-1 BCT	149 <sup>1</sup> (240 <sup>1</sup> )	10 (9)	109 (57-283)	17 (3-125)	0.84
1999	>age-1 BCT	90 <sup>2</sup> (145 <sup>2</sup> )	83 (74)	186 (144-232)	92 (40-165)	1.35

<sup>1</sup> Based on one-pass electrofishing.

<sup>2</sup> Based on two-pass electrofishing.

### cutthroat trout

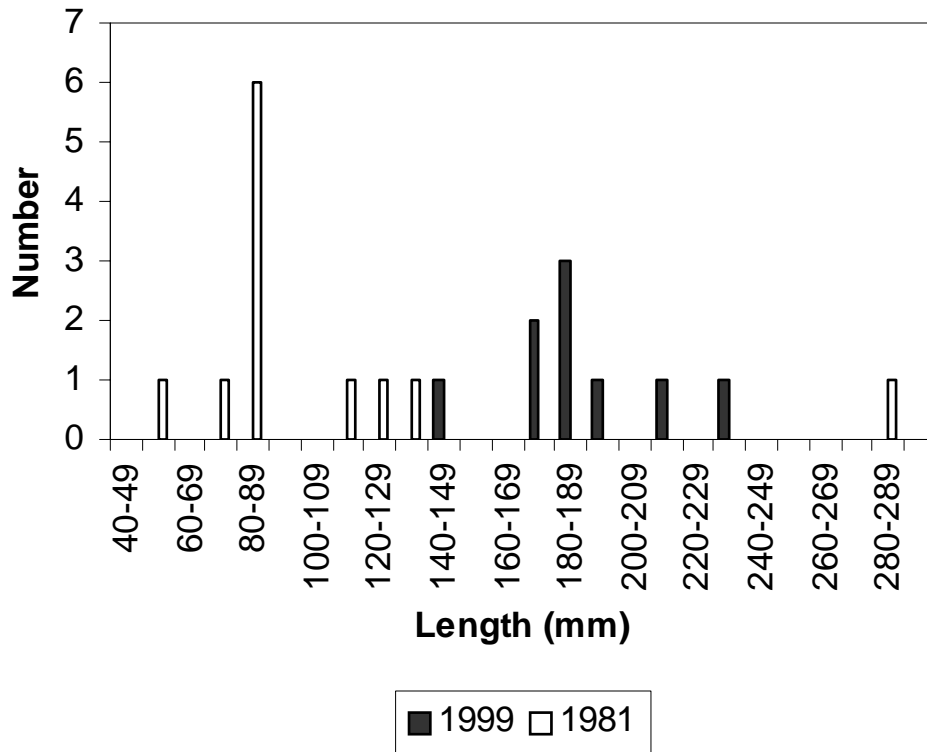


Figure 18. Size distribution of trout sampled in Twin Creek, 1999 and 1981.

**West Hodges Creek**

IVAQ040A10 01

West Hodges Creek is a tributary to the Logan River section 07. West Hodges Creek is in Cache County (Temple Peak USGS Quad). The road parallel to West Hodges Creek was driven on August 9, 1999 for approximately 1.2 km. West Hodges Creek does not maintain sufficient stream flows for a resident fish population and likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. West Hodges Creek had not been sampled before by the Division.

**Theurer Hollow**

IVAQ040A11 01

Theurer Hollow is a tributary to the Logan River section 07. Theurer Hollow is in Cache County (Temple Peak and Tony Grove Creek USGS Quads). Fish species present in Theurer Hollow are Bonneville cutthroat trout. No known barrier exists for the upstream movement of fish from the Logan River. Theurer Hollow was not surveyed in 1999.

Past surveys

One stream survey was completed by the Division on Theurer Hollow in 1981. This 81 m survey was completed upstream and downstream from HWY 89. Dip netting yielded numerous age-0 Bonneville cutthroat trout.

Spawning importance to the Logan River metapopulation

The presence of age-0 Bonneville cutthroat trout in Theurer Hollow suggests that this stream is used by the Logan River Bonneville cutthroat trout metapopulation for spawning. Theurer Hollow should be further evaluated to determine the importance of this stream to the Logan River system.

**Little Bear Creek**

IVAQ040A12 01

Little Bear Creek is a tributary to the Logan River section 07. Little Bear Creek is in Cache County (Tony Grove Creek USGS Quad). Fish species present in Little Bear Creek are Bonneville cutthroat trout and brown trout have been reported in the lower reaches. No barrier exists for the upstream movement of fish from the Logan River.

The base flow stream survey on Little Bear Creek was completed on August 9, 1999. Section 01 (confluence with the Logan River upstream to the headwaters) was surveyed with one 92 m station which was located approximately 0.8 km upstream from the Logan River where the trail nears the stream. UTM's for this station were: 0453979E and 4636161N. Little Bear Creek is a class IIIB fishery for Bonneville cutthroat trout.

Two-pass electrofishing resulted in the capture of 31 age 1 or

older Bonneville cutthroat trout ( $483 \pm 329/\text{stream km}$  [ $778 \pm 530/\text{stream mile}$ ];  $126 \text{ kg/ha}$  [ $112 \text{ lb/acre}$ ]) (Table 18). Although age classes were not readily distinguishable, several age classes of cutthroat trout were present in Little Bear Creek (Figure 19). Age-0 Bonneville cutthroat trout were not caught in the August 9, 1999 survey, however, numerous age-0 cutthroat trout were observed in the lower reaches of Little Bear Creek during a spot shocking survey on November 23, 1999. Thirty Bonneville cutthroat trout (10 whole, 20 fin clips) were collected for genetic analysis during the August survey.

#### Past surveys

One stream survey was completed by the Division on Little Bear Creek in 1976. This 81 m survey was completed adjacent to the Forestry Camp approximately 400 m downstream from the 1999 survey. One-pass electrofishing yielded 6 Bonneville cutthroat trout ( $75/\text{stream km}$  [ $120/\text{stream mile}$ ];  $8 \text{ kg/ha}$  [ $7 \text{ lb/acre}$ ]) (Table 18). The Bonneville cutthroat trout population appears to be considerably higher in 1999 compared to the 1976 survey.

#### Spawning importance to the Logan River metapopulation

Although no age-0 Bonneville cutthroat trout were caught in the August 1999 stream survey, the majority of the catch was age-1 cutthroat trout (Figure 19). Age-0 Bonneville cutthroat trout may not have been observed because this stream was sampled earlier in August when the age-0 cutthroat trout would have been quite small ( $\sim 25 \text{ mm TL}$ ) and easily missed with a backpack shocker. Age-0 Bonneville cutthroat trout were detected in the November spot shocking survey. Little Bear Creek appears to be an important stream that is used by the Logan River Bonneville cutthroat trout metapopulation for spawning.

Table 18. Population statistics for species sampled in Little Bear Creek in 1999 and 1976.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg K
1976	$\geq$ age-1 BCT	75 <sup>1</sup> (120 <sup>1</sup> )	8 (7)			
1999	$\geq$ age-1 BCT	483 <sup>2</sup> (778 <sup>2</sup> )	126 (112)	124 (65-303)	2 (2-269)	1.04

<sup>1</sup> Based on one-pass electrofishing.

<sup>2</sup> Based on two-pass electrofishing.



# 1999 cutthroat trout

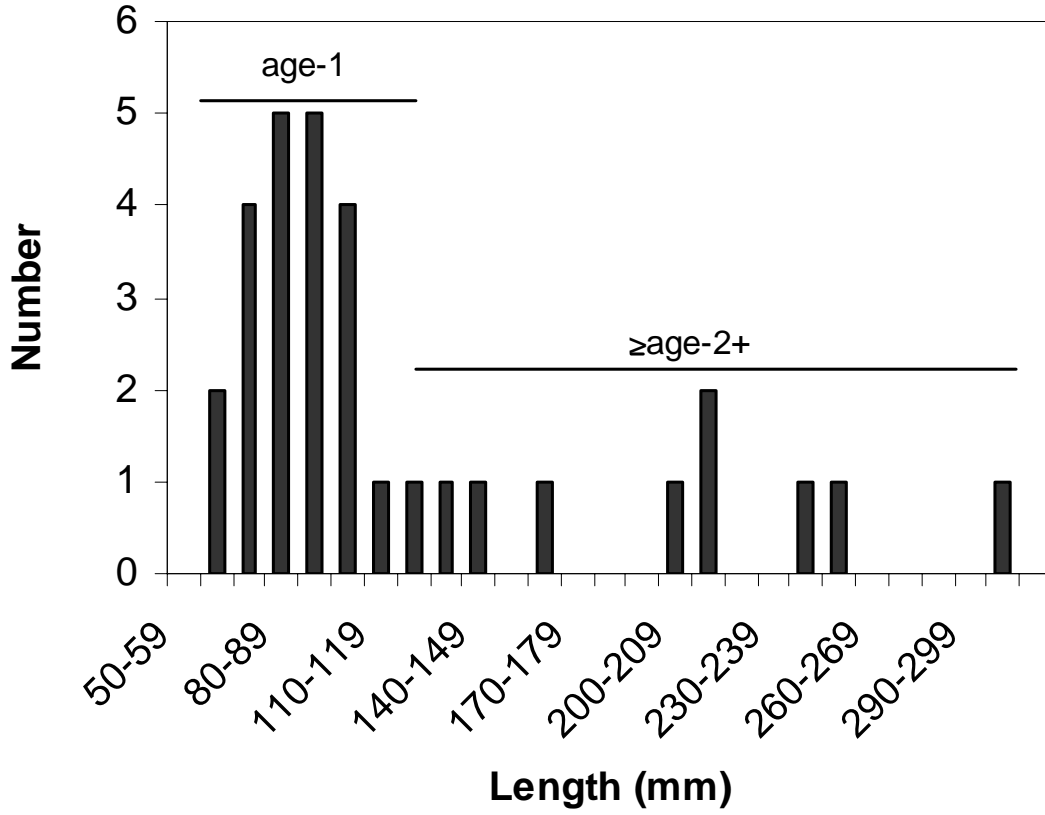


Figure 19. Size distribution of trout sampled in Little Bear Creek, 1999.

## **Tony Grove Creek**

**IVAQ040A13 01**

Tony Grove Creek is a tributary to the Logan River section 07. Tony Grove Creek is in Cache County (Tony Grove Creek and Naomi Peak USGS Quads). Fish species present in Tony Grove Creek are Bonneville cutthroat trout and between 7,000-8,000 rainbow trout are stocked into Tony Grove Lake per year. No barrier exists for the upstream movement of fish from the Logan River. Tony Grove Creek is dry below Tony Grove Lake, except during runoff conditions. Because Tony Grove Lake winterkills annually, escapement of fish into the Logan River Drainage is not a problem.

The base flow stream survey on Tony Grove Creek was completed on August 17, 1999. Section 01 (confluence with the Logan River upstream to the headwaters) was surveyed with one 105 m station, which was located approximately 2 km upstream from the Logan River where the trail crosses the stream directly below the Right Fork of Tony Grove Creek. UTM's for this station were: 0451746E and 4637220N. Tony Grove Creek is a class IVB fishery for Bonneville cutthroat trout.

Two-pass electrofishing resulted in the capture of 21 age-1 or older Bonneville cutthroat trout ( $201 \pm 0$ /stream km [ $323 \pm 0$ /stream mile]; 28 kg/ha [25 lb/acre]) and 41 age-0 Bonneville cutthroat trout ( $391 \pm 0$ /stream km;  $629 \pm 0$ /stream mile) (Table 19). At least three age classes of Bonneville cutthroat trout appear to be represented in the sample with the majority of fish being age-0 (Figure 20). Thirty Bonneville cutthroat trout (25 whole, 5 fin clips) were collected for genetic analysis.

### Past surveys

One stream survey was completed by the Division on Tony Grove Creek in 1981. This 81 m survey was completed in the Lewis M Turner campground approximately 1.2 km downstream from the 1999 survey. One-pass electrofishing yielded 9  $\geq$ age-1 Bonneville cutthroat trout (112/stream km [180/stream mile]; 10 kg/ha [9 lb/acre]) and mountain sucker (Table 19). The Bonneville cutthroat trout population appears to be similar if not higher in 1999 compared to the 1981 survey.

### Spawning importance to the Logan River metapopulation

Tony Grove Creek contributes as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Greater than 80% of the cutthroat trout caught in 1999 were age-0 or age-1, with approximately 70% being age-0 (Figure 20). The lack of any adult cutthroat trout  $>200$  mm suggests that adult cutthroat trout run up Tony Grove Creek to spawn and leave shortly following the spawn. The smaller size classes in Tony Grove Creek suggest that this stream provides good nursery habitat for smaller cutthroat trout.

Table 19. Population statistics for species sampled in Tony Grove Creek in 1999 and 1981.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg K
1981	≥age-1 BCT	112 <sup>1</sup> (180 <sup>1</sup> )	10 (9)	103 (50-182)	15 (3-50)	1.18
	MTS	sparse				
1999	≥age-1 BCT	201 <sup>2</sup> (323 <sup>2</sup> )	28 (25)	103 (62-177)	21 (2-82)	1.29
	age-0 BCT	391 <sup>2</sup> (629 <sup>2</sup> )		25 (22-29)		

<sup>1</sup> Based on one-pass electrofishing.

<sup>2</sup> Based on two-pass electrofishing.

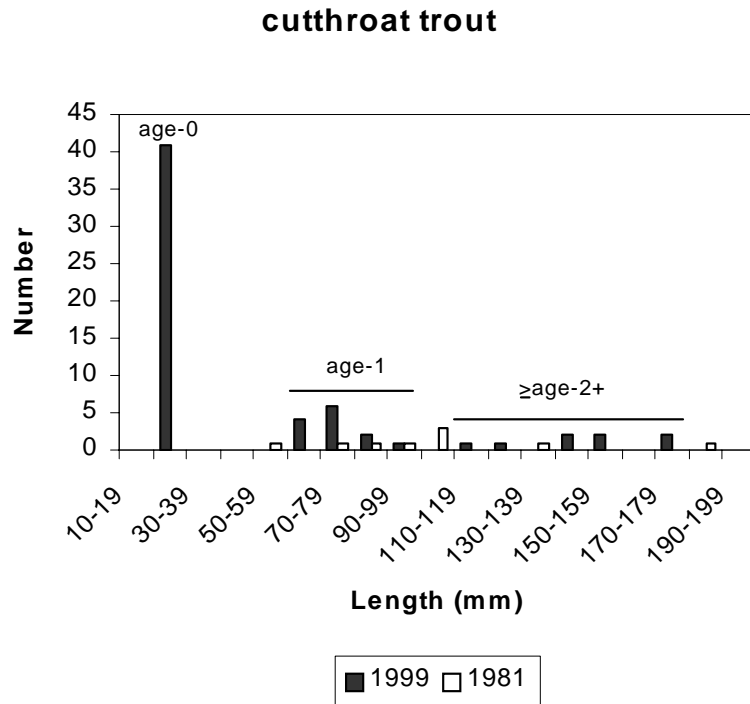


Figure 20. Size distribution of cutthroat trout sampled in Tony Grove Creek, 1981 and 1999. Probable age classes of cutthroat trout sampled in 1999 are provided.

**Bunchgrass Creek**

**IVAQ040A14 01**

Bunchgrass Creek is a tributary to the Logan River section 07. Bunchgrass Creek is in Cache County (Tony Grove Creek and Naomi Peak USGS Quads). Fish species present in Bunchgrass Creek are Bonneville cutthroat trout. A culvert on US Highway 89 may be a partial barrier to the upstream movement of fish from the Logan River at least during low flows (Figure 21).



Figure 21. Downstream end of the US Highway 89 culvert on Bunchgrass Creek. Picture taken during low flows.

The base flow stream survey on Bunchgrass Creek was completed on August 23, 1999. Section 01 (confluence with the Logan River upstream to the headwaters) was surveyed with one 100 m station which was located approximately 0.8 km upstream from the Logan River. UTM's for this station were: 0452431E and 4638183N. Bunchgrass Creek is a class IVB fishery for Bonneville cutthroat trout.

Two-pass electrofishing resulted in the capture of 6 age-1 or older Bonneville cutthroat trout ( $63 \pm 21$ /stream km [ $101 \pm 34$ /stream mile]; 7 kg/ha [6 lb/acre]) and 417 age-0 Bonneville cutthroat trout ( $5684 \pm 2278$ /stream km;  $9153 \pm 1416$ /stream mile) (Table 20). Only two year classes of Bonneville cutthroat trout appear to be present with the majority of fish caught being age-0 (Figure 22). Thirty-nine whole Bonneville cutthroat trout were collected for genetic analysis.

#### Past surveys

One stream survey was completed by the Division on Bunchgrass Creek in 1976. This 81 m survey was completed near the confluence with the Logan River section 07. One-pass electrofishing yielded 71 Bonneville cutthroat trout (882/stream km; 1420/stream mile) of all ages (Table 20). The excellent year class of Bonneville cutthroat trout produced in 1999 accounts for the higher cutthroat trout population than what was seen in 1976.

#### Spawning importance to the Logan River metapopulation

Bunchgrass Creek is a primary contributor as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. All cutthroat trout caught during the 1999 stream survey were age-0 or age-1 with over 98% being age-0 (Figure 22). The lack of any adult cutthroat trout suggests that adult cutthroat trout run up Bunchgrass Creek to spawn and leave shortly following the spawn. The smaller size classes in Bunchgrass Creek suggest that this stream provides good nursery habitat for smaller cutthroat trout. The culvert on US Highway 89 did not function as a barrier, at least during the 1999 cutthroat trout spawn. In fact, this culvert may be beneficial by preventing the upstream movement of brown trout during most times of the year, while providing cutthroat trout access to Bunchgrass Creek during the spawn.

Table 20. Population statistics for species sampled in Bunchgrass Creek in 1999 and 1976.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg K
1976	all BCT	882 <sup>1</sup> (1420 <sup>1</sup> )				
1999	≥age-1 BCT	63 <sup>2</sup> (101 <sup>2</sup> )	7 (6)	104 (79-123)	10 (5-19)	0.88
	age-0 BCT	5684 <sup>2</sup> (9153 <sup>2</sup> )		42 (29-53)		

<sup>1</sup> Based on one-pass electrofishing.

<sup>2</sup> Based on two-pass electrofishing.

### 1999 cutthroat trout

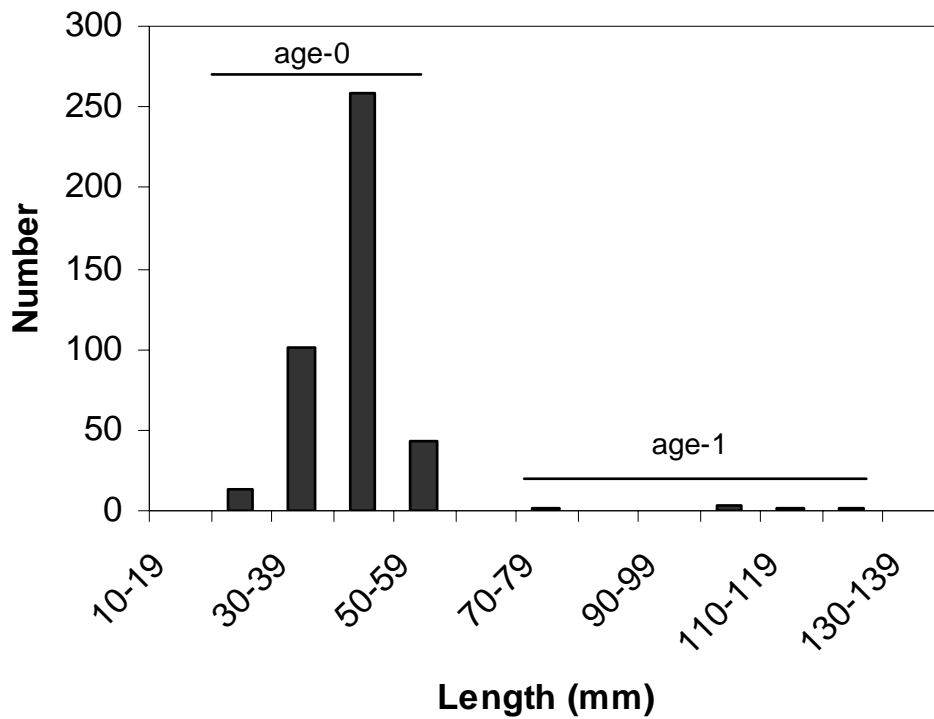


Figure 22. Size distribution and probable age classes of cutthroat trout sampled in Bunchgrass Creek, 1999.

## White Pine Creek

IVAQ040A15 01

White Pine Creek is a tributary to the Logan River section 07. White Pine Creek is in Cache County (Tony Grove Creek and Naomi Peak USGS Quads). Fish species present in White Pine Creek are Bonneville cutthroat trout and brook trout. No barrier exists for the upstream movement of fish from the Logan River.

The base flow stream survey on White Pine Creek was completed on August 30, 1999. Section 01 (confluence with the Logan River upstream to the headwaters) was surveyed with one 100 m station, which was located approximately 2 km upstream from the Logan River downstream from the first trail crossing. The stream was dry upstream from the trail crossing, however cutthroat trout are likely present further upstream near White Pine Lake. UTM's for the survey station were: 0452427E and 4640315N. White Pine Creek is a class IIIB fishery for Bonneville cutthroat trout.

Two-pass electrofishing resulted in the capture of 47 age-1 or older Bonneville cutthroat trout ( $507 \pm 70$ /stream mile [ $816 \pm 112$ /stream mile]; 53 kg/ha [47 lb/acre]), 1 age-0 Bonneville cutthroat trout, and 1 age-1 or older brook trout ( $10 \pm 0$ /stream km [ $16 \pm 0$ /stream mile]; 1 kg/ha [1 lb/acre]) (Table 21). The age-0 Bonneville cutthroat trout was caught on the second electrofishing pass, consequently a population estimate was not available. Several year classes of Bonneville cutthroat trout appear to be present in White Pine Creek (Figure 23). Thirty whole Bonneville cutthroat trout were collected for genetic analysis.

### Past surveys

Two stream surveys were completed by the Division on White Pine Creek in 1954. The lower station was completed approximately 0.8 km upstream from the confluence with the Logan River section 07. This 81 m one-pass electrofishing survey yielded 19  $\geq$ age-1+ Bonneville cutthroat trout (236/stream km; 380/stream mile) and one mottled sculpin (12/stream km; 20/stream mile) (Table 21). The higher station was completed approximately 0.8 km downstream from White Pine Lake. This 81 m one-pass electrofishing survey yielded one  $\geq$ age-1 brook trout (12/stream km; 20/stream mile) (Table 21). The Bonneville cutthroat trout population appears to be similar if not higher in 1999 compared to the 1954 survey.

### Spawning importance to the Logan River metapopulation

Although only one age-0 Bonneville cutthroat trout was caught in the August 1999 stream survey, the majority of the catch was age-1 cutthroat trout (Figure 23). Age-0 Bonneville cutthroat trout are likely present in greater numbers further downstream in White Pine Creek than where the survey was completed. Because of the

large numbers of age-1 cutthroat trout present, White Pine Creek appears to be used by the Logan River Bonneville cutthroat trout metapopulation for spawning.

Table 21. Population statistics for species sampled in White Pine Creek in 1999 and 1954.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg. length (mm)	Avg. weight (g)	Avg K
1954 low	≥age-1 BCT	236 <sup>1</sup> (380 <sup>1</sup> )				
	all MSC	12 <sup>1</sup> (20 <sup>1</sup> )				
1954 high	≥age-1 BKT	12 <sup>1</sup> (20 <sup>1</sup> )				
1999	≥age-1 BCT	507 <sup>2</sup> (816 <sup>2</sup> )	53 (47)	101 (59-175)	16 (2-61)	1.00
	age-0 BCT	10 <sup>3</sup> (16 <sup>3</sup> )		23		
	≥age-1 BKT	10 <sup>2</sup> (16 <sup>2</sup> )	1 (1)	103	10	0.92

<sup>1</sup> Based on one-pass electrofishing.

<sup>2</sup> Based on two-pass electrofishing.

<sup>3</sup> Based on actual number caught.



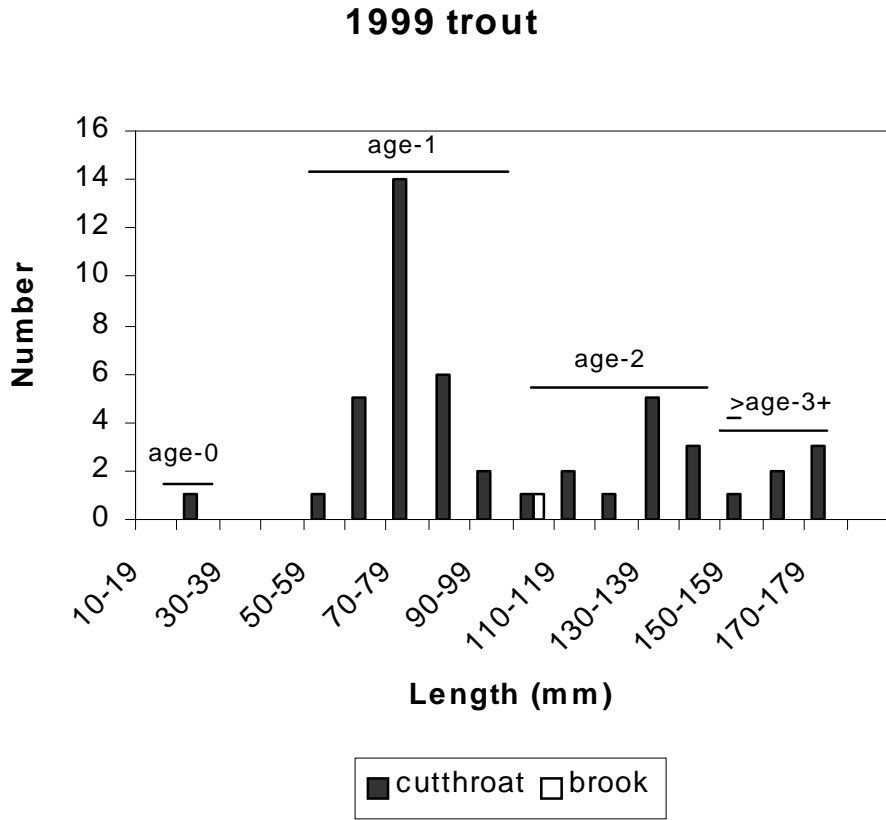


Figure 23. Size distribution of cutthroat trout and brook trout sampled in White Pine Creek, 1999. Probable age classes of cutthroat trout are provided.

## Beaver Creek

IVAQ040A16 01

Beaver Creek is a tributary to the Logan River section 07. The Utah portion of Beaver Creek is in Cache County (Tony Grove Creek USGS Quad). Fish species present in Beaver Creek are Bonneville cutthroat trout, brook trout, and mottled sculpin. No barrier exists for the upstream movement of fish from the Logan River.

The base flow stream surveys on Beaver Creek were completed on August 5, 1999 (station #2) and August 26, 1999 (station #1). Section 01 (confluence with the Logan River upstream to the headwaters) was surveyed with two stations. Station #1 was a 94 m station that began approximately 20 m upstream of the bridge crossing that is approximately 0.5 km upstream of the Franklin Basin Road turn off. The UTM coordinates for this station were: 0453899E and 4642869N. Angler access to this section of Beaver Creek is good. There are numerous pull outs along US Highway 89. Station #2 was a 102 m station which began approximately 1 km up the USFS road that joins into the Beaver Mountain Road. Beaver Creek station #2 was located on the west side of the road at UTM coordinates: 0456586E and 4648520N. Angler access to this section of Beaver Creek is fair. There are numerous unimproved campsites along the USFS road that continues north into Idaho. Beaver Creek is closed to fishing from January 1<sup>st</sup> to the 2<sup>nd</sup> Saturday in July. Beaver Creek also was subject to the slot limit described in the Introduction. Artificial flies or lures and bait is permitted in this tributary to the Logan River. Beaver Creek is a class IIIB fishery for Bonneville cutthroat trout.

### Station #1

Two-pass electrofishing resulted in the capture of 76 age-1 and older Bonneville cutthroat trout ( $909 \pm 137$ /stream km [ $1464 \pm 221$ /stream mile];  $216$  kg/ha [ $192$  lb/acre]) (Table 22). A total of 4 brook trout was captured, however, two fish were caught on each electrofishing pass, consequently a population estimate was not available. Seventy mottled sculpin also were caught ( $1023 \pm 394$ /stream km;  $1647 \pm 635$ /stream mile) (Table 22). Age classes of Bonneville cutthroat trout are not readily distinguishable (Figure 24), however, several age classes are likely present. Thirty whole Bonneville cutthroat trout were collected for genetic analysis.

### Station #2

Two-pass electrofishing resulted in the capture of 23 age-1 and older Bonneville cutthroat trout ( $236 \pm 30$ /stream km [ $380 \pm 48$ /stream mile];  $76$  kg/ha [ $67$  lb/acre]) (Table 22). Age classes of Bonneville cutthroat trout are not readily distinguishable (Figure 24), however, several age classes are likely present. An

additional 50 m of stream was spot electrofished in order to obtain 30 Bonneville cutthroat trout (10 whole, 20 fin clips) for genetic analysis.

#### Past surveys

Beaver Creek has been surveyed twice by the Division. In 1954, a one-pass electrofishing survey of a 161 m station, located above the second bridge crossing on US Highway 89, produced 25 Bonneville cutthroat trout (155/stream km; 250/stream mile), 2 brown trout (12/stream km; 20/stream mile), 1 rainbow trout (6/stream km; 10/stream mile), and 7 mottled sculpin (43/stream km; 70/stream mile). Another stream survey was completed in 1968 at the first bridge crossing on the Beaver Mountain Road downstream 161 m. This one-pass electrofishing survey produced 9 Bonneville cutthroat trout (56/stream km; 90/stream mile) and 3 mottled sculpin (19/stream km; 30/stream mile). Approximately 40-50 planted rainbow trout also were observed during this survey. Rainbow trout catchables (mean number stocked - 1,000-1,500) were stocked virtually every year between 1959 and 1978 in Beaver Creek. Rainbow trout were not sampled, however, during the 1968 or 1999 surveys. The rainbow trout stocked in the 1960s and 1970s do not appear to still be present in Beaver Creek. Genetic testing of Bonneville cutthroat trout from Beaver Creek will determine if the cutthroat trout in this stream have rainbow trout influence. All cutthroat trout caught during the 1999 surveys, phenotypically resemble Bonneville cutthroat trout.

#### Spawning importance to the Logan River metapopulation

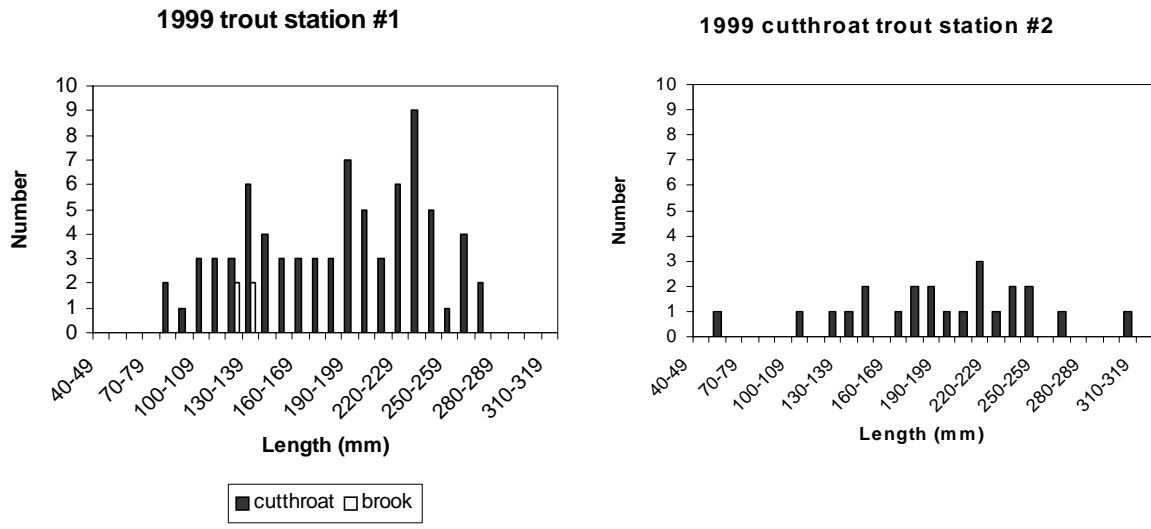
Bonneville cutthroat trout spawn in Beaver Creek (see Figure 24). Beaver Creek undoubtedly has resident cutthroat trout that maintain the population in this stream. In addition, mainstem Logan River cutthroat trout likely use the lower reaches of Beaver Creek to spawn, which would contribute cutthroat trout to the Logan River. Because Beaver Creek is the largest tributary to the Logan River section 07, this streams' spawning contribution to the Logan River Bonneville cutthroat trout metapopulation is likely substantial.

Table 22. Population statistics for species sampled in Beaver Creek, 1954, 1968, and 1999.

Year	Species	#/km (#/mile)	kg/ha (lb/acre)	Avg TL (mm)	Avg WT (g)	Avg. K
1967	all BCT all BNT all RBT MSC	155 <sup>1</sup> (250 <sup>1</sup> ) 12 <sup>1</sup> (20 <sup>1</sup> ) 6 <sup>1</sup> (10 <sup>1</sup> ) 43 <sup>1</sup> (70 <sup>1</sup> )				
1968	≥age-1 BCT MSC	56 <sup>1</sup> (90 <sup>1</sup> ) 19 <sup>1</sup> (30 <sup>1</sup> )	8 (7)	151 (103-240)	45 (12-129)	1.12
1999 st. #1	≥age-1 BCT ≥age-1 BKT MSC	909 <sup>2</sup> (1464 <sup>2</sup> ) 1023 <sup>2</sup> (1647 <sup>2</sup> )	216 (192)	187 (80-275) 129 (123-134) 90 (51-124)	83 (4-208) 23 (18-29) 12 (4-29)	1.07 1.08
1999 st. #2	≥age-1 BCT	236 <sup>2</sup> (380 <sup>2</sup> )	76 (67)	190 (59-309)	100 (2-318)	1.18

<sup>1</sup> Based on one-pass electrofishing.

<sup>2</sup> Based on two-pass electrofishing.



**1968 cutthroat trout**

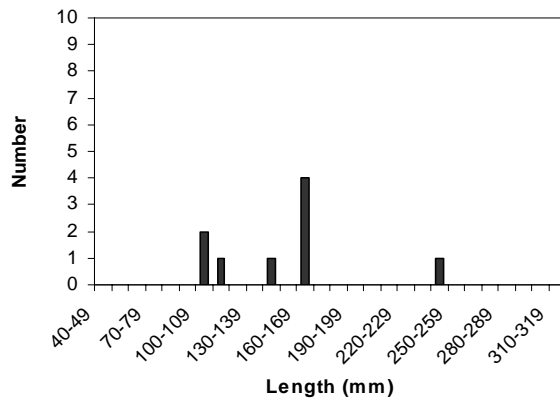


Figure 24. Size distribution of trout sampled in Beaver Creek, 1999 and 1968.

**Brush Canyon****No water ID**

Brush Canyon is a tributary to Beaver Creek. Brush Canyon is in Cache County (Tony Grove Creek USGS Quad). The mouth of Brush Canyon was examined on August 5, 1999. Extremely limited water was present. Brush Canyon does not maintain sufficient stream flows for a resident fish population and likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Brush Canyon had not been sampled before by the Division.

**Long Hollow****No water ID**

Long Hollow is a tributary to Beaver Creek. Long Hollow is in Cache County (Tony Grove USGS Quad). The mouth of Long Hollow was examined on August 5, 1999. Extremely limited water was present. Long Hollow does not maintain sufficient stream flows for a resident fish population and likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Long Hollow had not been sampled before by the Division.

**Sink Hollow****No water ID**

Sink Hollow is a tributary to Beaver Creek. Sink Hollow is in Cache County and Franklin County, Idaho (Tony Grove Creek and Egan Basin USGS Quads). The mouth of Sink Hollow was examined on August 5, 1999. Extremely limited water was present. Sink Hollow does not maintain sufficient stream flows for a resident fish population and likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Sink Hollow had not been sampled before by the Division.

**Steam Mill Canyon****IVAQ040A 18**

Steam Mill Canyon is a tributary to the Logan River section 07. Steam Mill Canyon is in Cache County (Tony Grove Creek and Naomi Peak USGS Quads). The lower 400-800 m of stream was spot electrofished on August 18, 1999. Although flows were conducive to a resident trout population, no fish were encountered. Steep gradient, continuous step pools, and probable high flushing flows during spring runoff may keep cutthroat trout from utilizing this stream. Steam Mill Canyon has been sampled once before by the Division. In 1976, a 81 m station upstream from the road crossing in Franklin Basin produced no fish. Steam Mill Canyon was experimentally stocked in 1967 with 2,080 (832/pound) cutthroat trout (likely Yellowstone cutthroat trout). This stocking did not appear to establish a fishery in the stream.

**Hells Kitchen Canyon****No water ID**

Hells Kitchen Canyon is a tributary to the Logan River section 07. Hells Kitchen Canyon is in Cache County (Tony Grove Creek USGS Quad). The mouth of Hells Kitchen Canyon was examined on August 5, 1999. Extremely limited water was present. Hells Kitchen Canyon does not maintain sufficient stream flows for a resident fish population and likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Hells Kitchen Canyon had not been sampled before by the Division.

**Steep Hollow****No water ID**

Steep Hollow is a tributary to the Logan River section 07. Steep Hollow is in Cache County (Tony Grove Creek and Naomi Peak USGS Quads). The lower 400 m of stream was spot electrofished on August 18, 1999. Although flows were conducive to a resident trout population, no fish were encountered. The gradient of Steep Hollow likely keeps cutthroat trout from utilizing this stream. Steep Hollow has not been sampled before by the Division.

**Peterson Hollow****No water ID**

Peterson Hollow is a tributary to the Logan River section 07. Peterson Hollow is in Cache County and Franklin County, Idaho (Tony Grove Creek and Egan Basin USGS Quads). The mouth of Peterson Hollow was examined on August 5, 1999. Extremely limited water was present. Peterson Hollow does not maintain sufficient stream flows for a resident fish population and likely does not contribute as a spawning tributary to the Logan River Bonneville cutthroat trout metapopulation. Peterson Hollow had not been sampled before by the Division.

## DISCUSSION

### **Bonneville cutthroat trout metapopulation status**

Twenty-two stream surveys were completed on 14 streams/stream sections in the Logan River Drainage that contained cutthroat trout (Table 1; Figure 1). Based on these 22 stream surveys, Bonneville cutthroat trout occupy approximately 97 stream kilometers (60 stream miles) in the Logan River drainage (Table 1). The Bonneville cutthroat trout metapopulation in the Logan River Drainage represents the largest metapopulation remaining in Utah with the possible exception of the Chalk Creek Drainage metapopulation. This metapopulation may even be the largest remaining within the Bonneville cutthroat trouts' historic range. With the surveys completed in 1999, three additional streams (Twin Creek, Wood Camp Creek, and Cottonwood Creek) can be added to the Utah Bonneville cutthroat trout Conservation Strategy (Lentsch et al. 1997) and pending genetic analyses, the potential exists to add an additional 77 stream km (48 stream miles) towards conservation populations of Bonneville cutthroat trout to the Strategy.

### Non-native trout

Non-native trout (brown trout, rainbow trout, brook trout, and albino trout) have been in the Logan River Drainage for at least 100 years. Data summarized in this report indicate that the non-native trout in the Logan River Drainage have not expanded their populations during the past several decades. For example, brown trout have been present in comparable numbers in the Logan River sections 05 and 06, Right Fork, and Temple Fork (lower reaches) for 30-40 years. Low densities of brown trout exist in the lower reaches of the Logan River section 07 (up to Red Banks Bridge), however, these densities have remained depressed through time and likely indicate that a threat of a serious brown trout invasion into section 07 is not likely. In addition, brown trout do not thrive in pocket water habitats like those present in section 07.

Brook trout have been present in the headwaters of Spawn Creek for at least 35 years, however, this population has shown no indication of expanding beyond the headwater reaches of this stream. Brook trout also are the dominant trout species present in the headwaters of Beaver Creek in Idaho. In Idaho, brook trout dominate low velocity beaver ponded reaches, while Bonneville cutthroat trout dominate adjacent higher gradient reaches (Hilderbrand 1998). While brook trout have been present in the Utah portion of Beaver Creek, their densities have remained low through time. Beaver Creek is a larger system in Utah which may be keeping the brook trout population from expanding in low velocity habitats in the Utah portions of Beaver



Creek.

Rainbow trout likely have been stocked into Third Dam (Logan River section 05) since it was impounded in the early 1900s. Catch return rates for hatchery trout are higher in lentic waters than lotic waters (Wiley et al. 1993) most likely because hatchery trout have been selected for lentic habitats through years of intensive culture. Consequently, most trout stocked into lentic waters such as Third Dam will not venture into lotic waters such as the Logan River section 05. Stream surveys on the Logan River through time have substantiated this. Through time rainbow trout have been present in the Logan River section 05, but virtually non-existent in section 06. Rainbow trout were stocked for over a decade through the 1970s in Temple Fork as well, however, they are no longer present in this stream. The rainbow trout present in the Logan River section 05 do not appear to pose a threat in regards to hybridization with cutthroat trout. All cutthroat trout caught in 1999 surveys, with the possible exception of two fish in the Right Fork, phenotypically resembled Bonneville cutthroat trout. Nuclear, molecular, and meristic analyses of tissue samples collected in 1999 will definitively describe the genetic makeup of the Bonneville cutthroat trout in the Logan River Drainage. At present time, these cutthroat trout should be considered to represent the historic genetic makeup of the Bonneville cutthroat trout that evolved in the Logan River system.

#### Whirling disease

Whirling disease samples were collected from portions of the Logan River in late August and late November 1999 (see Introduction for collection locations). The results will be summarized in a report to be produced by the Fisheries Experiment Station in Logan, Utah. Preliminary results from the Logan River sections 05 and 06, however, indicate that whirling disease is present in the Logan River. The recent discovery of whirling disease in the Logan River makes it too early to determine what effects the disease will have to the system. The reproductive mechanism that is in place for cutthroat trout in the Logan River is such that much of the spawning takes place in tributary streams. The whirling disease parasite is not transmitted through egg deposition, consequently, when adult cutthroat trout lay eggs and leave tributary streams, emerging cutthroat trout may not be exposed to the parasite at the most susceptible life stage (e.g., juvenile).

### **Evaluation of special fishing regulations**

After reviewing the 1999 data, it was determined there has been no appreciable change to the structure of the fish population of the Logan River sections 05-07 as influenced by the fishing regulation change instituted in 1990. The regulations that were in effect were as follows:

- 1) From the Card Canyon Bridge upstream to the highway bridge at Red Banks Campground, including all tributary streams in between: trout limit 3, two under 12 inches and 1 over 18 inches; no more than one of which could be a cutthroat trout or trout with cutthroat trout markings. Artificial flies and lures only.
- 2) From the highway bridge at Red Banks Campground upstream to the Idaho state line, including all tributaries: trout limit 3, two under 12 inches and 1 over 18 inches; no more than one of which could be a cutthroat trout or trout with cutthroat trout markings. Closed January 1 to the second Saturday in July.

Since most of the trout caught are released in all sections of the Logan River with the exception of the impoundments, and many anglers find it difficult to identify trout to species, it was decided to simplify the regulations by removing the slot length requirement and not requiring anglers to identify the trout species. The regulations that when into effect as of January 1, 2000 are as follows:

- 1) From the Card Canyon Bridge upstream to the highway bridge at Red Banks Campground, including all tributary streams in between: trout and whitefish limit 2 in aggregate. Artificial flies and lures only.
- 2) From the highway bridge at Red Banks Campground upstream to the Idaho state line, including all tributaries: trout and whitefish limit 2 in aggregate. Closed January 1 to the second Saturday in July.

The new regulations still maintain a section of stream for artificial flies and lures only anglers, but also allow for bait to be used in some areas. Additionally, the closed season on the upper reaches of the Logan River and tributaries will protect the cutthroat trout during their spawning season.

## RECOMMENDATIONS

- 1) Update the Conservation Strategy for Bonneville cutthroat trout in Utah based on information gained in the 1999 stream surveys.
- 2) Complete genetic analyses on tissue samples collected in 1999 surveys to determine if rainbow trout influence is in the Logan River Bonneville cutthroat trout metapopulation.
- 3) Continue monitoring the Bonneville cutthroat trout populations in the Logan River Drainage to determine what impacts whirling disease will have on the system.
- 4) Continue public education on whirling disease.
- 5) Explore the possibility of introducing Bonneville cutthroat trout in the headwaters of the Right Fork.

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