

**REDBAND TROUT (*Oncorhynchus mykiss gairdneri*) POPULATION AND  
HABITAT SURVEYS IN SOUTHERN OWYHEE COUNTY, IDAHO**

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## ABSTRACT

Seventeen stream segments were sampled by electrofishing for redband trout (*Oncorhynchus mykiss gairdneri*) in stream drainages in southern Owyhee County, Idaho. Stream surveys were conducted on the South Fork Owyhee, Little Owyhee, Owyhee, West Fork Bruneau, and Jarbidge Rivers and Marys, Blue, Little Blue, Shoofly, and Sheep Creeks. Seven of the seventeen stream segments sampled contained redband trout. Redband trout densities for all size classes of trout ranged from 0.08 to 1.82 trout/100m<sup>2</sup>.

Habitat data were also collected on the sampled stream segments. Data collected included stream depth, stream width, percent of stream gradient, and percent composition of substrate. Measurements of bank stability, percent of stream shading, and available trout habitat were also collected.

Basic water quality parameters of water temperature, pH, conductivity, hardness and alkalinity were all within acceptable ranges for trout survival. Recording thermographs were placed in Jordan Creek from June until November, 1995. Maximum water temperature recorded was 24.6°C on July 16, 1995.

It is recommended that redband trout surveys be continued to better define the distribution of the desert populations of redband trout.

## INTRODUCTION

This report presents redband trout (*Oncorhynchus mykiss gairdneri*) population and stream habitat data collected on the Owyhee and Bruneau Resource Areas of the Bureau of Land Management (BLM) lands in Owyhee County, Idaho. Data was collected by Idaho Department of Fish and Game (IDFG) Southwest Region fisheries management staff in a cooperative project with the Boise District BLM. This report documents the third field season of stream and habitat surveys conducted by Southwest Region IDFG. Previous survey data were reported in Allen et al. 1993 and Allen et al. 1995.

Redband trout historically occupied perennial drainages in Owyhee County, Idaho (Behnke 1992). Sampling of these redband trout populations by BLM staff from 1976-1991 documented fragmented populations composed of small numbers of redband trout. Drought conditions experienced from 1987-1994 likely negatively impacted these redband trout populations. Unfortunately, accurate distribution maps documenting the presence or absence of redband trout in Owyhee County streams were not available to document changes in redband distributions. The main objectives of this third year of investigation remain constant:

- (1) To determine redband trout density estimates for previously sampled stream segments.
- (2) To establish trout density estimates for unsurveyed stream segments.
- (3) To measure stream substrate, bank stability, instream fish cover, solar input, composition of greenline plant communities, and water quality.

## STUDY AREA

Stream surveys were conducted on South Fork Owyhee River, Little Owyhee River, and the Owyhee River in the Owyhee Resource Area. Surveys were also conducted on the Bruneau River, Jarbidge River, Marys Creek, Little Blue, Blue, Shoofly, and Sheep Creeks in the Bruneau Resource Area. Locations and descriptions of the survey sites are presented in Table 1, Figures 1-3, and Appendix A.

## METHODS

### Fish Populations

The 1995 sample sites were selected to document the presence of redband trout within drainages in previously unsampled areas of Owyhee County, Idaho. The streams were selected in the southern part of the county because little was documented about the resident fish populations. The topography of these stream drainages somewhat limited access especially by vehicle and sometimes even by foot.

Sample segments were a minimum of 61 m in length, with the preferred length being increased to 100 m in 1995. The upstream and downstream sample segment boundaries were located at stream constrictions to minimize fish migration during electrofishing.

A Smith-Root Model 15-B backpack electrofishing unit was utilized by two people electrofishing from the lower to the upper sample segment boundaries. In some sample areas two backpack electrofishing units and four personnel were utilized to provide a larger effective sampling field. All fish species encountered were netted and placed in small net pens placed in the stream. We made two or three electrofishing passes, removing and segregating the fish from each pass. If no redband trout were encountered on the first pass and collection conditions were considered good, no further electrofishing passes were completed. All trout collected were measured to the nearest mm; weighted to the nearest gram; and a scale sample was collected from all trout captured; and then the trout were released. All other fish species were identified to species and counted and released.

Collected trout scales were mounted on acetate sheets and pressed with a Carver Heat Press to create a readable impression in the acetate. The acetate impressions were then used in a microfiche reader where the focus, annuli, and margin were identified and marked on a slip of paper. The annuli marks were entered on a digitizing pad and the DisBCal 89 V1.0 Program in the Fishery Analysis Tools software of the Missouri Department of Conservation. This program produced average back-calculated lengths for each age class of trout.

Redband trout population estimates and confidence intervals were calculated by utilizing the MicroFish 3.0 program developed by Van Deventer and Platts (1987). Population estimates were calculated for all trout captured and for all trout greater than 100 mm in length, giving two estimates for sites where trout were collected. Trout densities were calculated by dividing the population estimate by sampled area and reported as trout/100m<sup>2</sup>.

## Whirling Disease Sample Collection

Additional trout were collected near Black Rock Crossing to test for the presence of whirling disease. Redbands captured larger than 350 mm were released. Trout were stored on ice in whole body condition and delivered to the IDFG Fish Health Laboratory for analysis for *Myxobolus cerebralis*.

## Stream Habitat

Each stream segment was divided into ten equal length sections starting from the bottom. At each cross section, depth measurements were taken at 1/4, 1/2, and 3/4 widths across the channel. Average depth was calculated by dividing each three cross sectional depth measurements by four and then calculating a mean of the ten cross sections. Previous reports used an average of the thirty measurements as a mean depth. Substrate composition was determined with standard IDFG methods, categorizing the substrate into size classes (Petrosky and Holubetz 1988).

Instream fish cover was a subjective visual assessment of several parameters and was recorded for each cross-section as the percentage of the stream width defined as cover. For this study cover was defined as areas where redband trout were likely to be found: (1) pools >0.45 m (>1.5 feet) in depth, (2) overhanging bank vegetation, (3) instream vegetation, (4) near large instream rocks, (5) velocity breaks i.e., broken water surface (6) pocket water behind or beside large rocks, and (7) near large woody debris.

Stream gradient was measured using an ocular hand level and a stadia rod. Gradient is the vertical drop between the upstream and downstream boundaries divided by the stream segment length and reported as a percentage.

Streambank stability measurements were a visual assessment to determine the vulnerability of the bank slopes to erosion (Platts et al. 1983). Four classes were used to rate the stability of the streambanks. Covered and Stable: over 50 percent of banks in healthy vegetation and/or anchoring rocks. The banks did not show signs of erosion. Covered and Unstable: more than 50 percent of streambank covered by vegetation but signs of erosion were present. Uncovered and Stable: less than 50 percent of stream bank covered by vegetation or anchoring rock. Does not show signs of erosion, i.e., banks were bare but not vertical or slumped. Uncovered and Unstable: less than 50 percent covered with vegetation. Banks show some erosion, i.e., slumped or vertical bare banks.

Thermal input to the stream waters was measured using a Solar Pathfinder™ following Platts, et al. (1987). Percent stream shading was reported as the average percent of shading on the stream surface during June through September at ten cross sections.

The "greenline" is the first continuous cover of perennial vegetation above the stable low water level (USDA 1992). We determined the composition of plant communities along the greenline

on both banks for each stream transect. Streambank distances were summed for each community type and the percentage of the total greenline made up by each community type was calculated for each stream segment.

### Water Quality

Several water quality parameters were measured at each stream segment. Conductivity and pH measurements were taken with hand held conductivity and pH meters. Alkalinity and hardness measurements were taken with Hach Company field titration kits. Water temperature was recorded with a pocket thermometer at each site.

Recording thermographs (HOBOS) were placed in Jordan Creek at five locations from near the headwaters to the confluence of Flint Creek. Locations of the thermographs are provided in Appendix Table B1. Thermographs were placed in the stream on June 7, 1995 and retrieved on November 4, 1995.

## **RESULTS AND DISCUSSION**

### **Redband Trout Populations**

#### Trout Densities

Of seventeen stream segments sampled, seven contained redband trout. None of these segments had been previously sampled by BLM or IDFG. Redband trout population estimates (95%CI) and densities of trout per 100m<sup>2</sup> are presented in Table 2. Densities of all size classes of trout ranged from 0.08 to 1.82 trout/100m<sup>2</sup> and 0.08 to 1.70 trout/100m<sup>2</sup> for trout greater than 100 mm.

#### Little Owyhee River

The Little Owyhee River was dry except for a few scattered pools, when observed on September 11, 1995. No redband or other fish were observed in the remaining pools. A resident of the Star Valley Ranch near the Nevada border stated that the river typically dries up by late summer.

#### South Fork Owyhee River

No redband trout were captured in the three sample sections completed in the South Fork Owyhee River. Electrofishing conditions were considered good at all three sites.

#### Owyhee River

Redband trout density was 0.32 trout/100m<sup>2</sup> in a segment of the Owyhee River just above Crutchers Crossing. Three sample sites from 1994 sampling from upstream on the Owyhee River found no redband trout. Redband trout densities in the Owyhee River are probably rather low.

### West Fork Bruneau River

Five sites were sampled in the West Fork Bruneau River in 1995 and all contained redband trout in low densities. Densities ranged from 0.08 to 0.84 trout/100m<sup>2</sup> for all size classes. The absence of age 0 and age 1 fish in all five sample sites was disturbing. Juvenile redbands had been collected relatively consistently when sampling other areas; if juveniles were present we were confident we would have collected them in these reaches of the Bruneau River. Absence of age 0 and age 1 redbands was likely indicator of year class failures.

### Jarbidge River

One sample site was conducted slightly upstream from the river mouth. Sampled densities of all size classes of redbands was 1.82 trout/100m<sup>2</sup>.

### Sheep Creek

No redband trout were sampled at this site. This site was probably dry in the fall of 1994. Redband trout were sampled at SHEEP027.5 and SHEEP029.0 upstream of this site near Rough Mountain in the 1994 inventory (Allen et al. 1995).

### Marys Creek

No redband trout were sampled. This stream section was dry in the fall of 1994. BLM data records no redband trout sampled in 1990 at the next road crossing south.

### Blue, Little Blue, and Shoofly Creeks

No redband trout were found in one sample site on each of these three streams. Only electrofishing was conducted to sample fish populations; no habitat sampling was done. Shoofly Creek was dry in May on the road crossing above Bybee Reservoir. Blue Creek was sampled above Blue Reservoir and Little Blue Creek was sampled above Little Blue Reservoir.

## **Redband Trout Length Frequency and Age and Growth**

As in previous sampling of redband populations, missing year classes of trout were observed in samples or no trout were captured at all. Figure 4 depicts the length frequency of captured redbands in the Owyhee River upstream of the mouth of the South Fork Owyhee River. The West Fork Bruneau River length frequencies and average growth at annulus is presented in Figures 5-8. The sample site in the lower Jarbidge River (Figure 9) does seem to contain all redband year classes. One age 1 redband

was collected in the sample taken for whirling disease near Black Rock Crossing on the West Fork Bruneau River (Figure 10). One age 1 redband was an extremely low catch for over a km of electrofishing effort.

### **Whirling Disease Sampling**

The length frequency of additional redband trout collected to test for whirling disease near Black Rock Crossing on the Bruneau River is presented in Figure 10. Laboratory pathology on the 24 collected redband specimens detected no observable *Myxobolus cerebralis* spores. This indicated that the drainage may not contain whirling disease, but it cannot be confirmed from this one sample that the disease is not present in the Bruneau River drainage.

### **Nongame Fish Species Collected**

Several nongame species were collected at sample sites. Species observed were: Speckled Dace (*Rhinichthys osculus*); Longnose Dace (*Rhinichthys cataractae*); Redside Shiner (*Richardsonius balteatus*); Chiselmouth (*Acrocheilus alutaceus*); Northern Squawfish (*Ptychocheilus oregonensis*); Smallmouth Bass (*Micropterus dolomieu*); Bridgelip Sucker (*Catostomus columbianus*); Mountain Whitefish (*Prosopium williamsoni*); Mountain sucker (*Catostomus platyrhynchus*); Largescale sucker (*Catostomus macrocheilus*); and Sculpin spp. (*Cottus*). Species occurrence and location is presented in Table 3.



## Habitat

Habitat variables were collected consistent with the 1993 and 1994 surveys (Allen et al. 1993). The data were collected to provide baseline riparian habitat conditions. Habitat variables of stream sample length, mean stream width, mean depth, substrate composition, and gradient are presented in Table 4. Assessment of instream fish cover and percent habitat type is provided by sample site in Table 5. Percent of streambank stability is presented in Table 6. Percent of stream shading derived from the Solar Pathfinder™ is summarized in Table 7. The percentage of vegetative community types, "greenline" for each stream segment are presented in Appendix A.

## Water Quality

Water quality variables measured during 1995 are presented in Table 8. The parameters measured were all acceptable to trout survival at the time of sample.

Recording thermographs documented summer water temperatures at three sites in Jordan Creek from above the town of Silver City to near the confluence of Flint Creek (Appendix B). A fourth temperature recorder was vandalized and data was not recovered, a fifth thermograph was slightly exposed to air temperatures by the end of the season and its data was considered compromised and thus not used. The water temperature peaks in the summer months generally increase as the elevation decreases. Trout populations also generally decrease as the elevation decreases in Jordan Creek (Allen et al. 1993). Redband trout were easily observable in the upper two thermograph sites when the thermographs were retrieved, but no trout were observed at the lower site when the recorders were retrieved. Maximum water temperatures were 21.6°C at the upper two sites on 8/6/1995, and 24.6°C on 7/16/1995 at the bridge on Triangle road.

## **CONCLUSION**

Seven of seventeen stream segments sampled contained redband trout during 1995. No record of previous sampling on these drainages was found. Data collected contribute to the presence/absence database of Owyhee County streams for redband trout. Water quality was not limiting to trout at the time when stream sections were sampled.

A method to assess the potential of Owyhee County streams to support redband trout populations is needed. Maximum population levels of redband trout during historic times are unknown. Some population data exist from BLM surveys in the 1970's and early 1980's, but it is unlikely that these data represent maximum population levels for redband trout in desert streams.

We suggest using a series of riparian exclosures in scattered drainages and elevations within the county to assess the potential of these desert streams to produce redband trout. Obviously this would be a relatively long-term process, but this method would allow the riparian habitat and stream channels to become fully functioning and trout populations to reproduce and grow to full potential. Many of these exclosures already exist and others would have to be constructed.

Redband trout from other drainages may need to be reintroduced into some of the exclosures to determine the potential of the stream segments to produce trout once they are fully functioning.

## **RECOMMENDATIONS**

1. Complete the survey of major Owyhee County stream drainages. Increase intensity of sampling to positively identify the presence/absence and develop population estimates of redband trout populations on a drainage basis countywide.
2. Monitor seasonal stream temperatures with recording thermographs placed into stream segments to be sampled.
3. Establish a series of 5-20 ha stream and riparian exclosures throughout the county and monitor the changes to the riparian area, stream channel, and fish populations over time.

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Table 1. Location of stream sites sampled in 1995.

SITE	LOCATION	LATITUDE/LONGITUDE	SITE DESCRIPTION
LOWYH000.2	T14SR5WNWSE	N/A	ABOVE ROAD ABOVE MOUTH
LOWYH013.0	T16SR5WS9SWSW	N/A	BELOW STAR VALLEY RANCH
SFOUY0003.0	T14SR5WS2NWNE	N 42° 14.77' W 116° 54.25'	JUNIPER BASIN
SFOUY019.0	T15SR4WS9SWSW	N 42° 07.89' W 116° 49.25'	PACKTRAIL
SFOUY029.0	T16SR4WS12SWNE	N 42° 02.68' W 116° 45.49'	ABOVE COYOTE HOLE
OWYHE184.0	T13SR5WS25SENE	N 42° 15.72' W 116° 51.90'	ABOVE CRUTCHER CROSSING
WFBRU059.2	T12SR7ES33NWSW	N 42° 20.50' W 115° 38.72'	BELOW INDIAN HOT TUB
WFBRU060.8	T13SR7ES5NENE	N 42° 19.61' W 115° 39.20'	ABOVE JARBIDGE R
WFBRU078.4	T15SR7ES6SESE	N 42° 08.68' W115° 40.30'	TRIGUERO ROAD ACCESS
WFBRU085.0	T15SR7ES30SESE	N 42° 04.36' W 116° 39.06'	BELOW BLACK ROCK CROSSING
WFBRUN87.0	T16SR7ES8NESE	N 42° 03.36' W 115° 39.06'	ABOVE BLACK ROCK CROSSING
JARBI000.2	T13SR7ES4NWNW	N 42° 19.71' W 115° 39.07'	JUST ABOVE MOUTH
SHEEP035.2	T14SR6ES21NESE	N 42° 11.91' W 115° 45.08'	ABOVE GRASMERE ROAD
MARYS004.2	T13SR5ES12NWSW	N 42° 18.74' W 115° 49.55'	BELOW GRASMERE ROAD
BLUE031.0	T12SR2ES34NENE	N/A	ABOVE BLUE CR RESERVOIR
LBLUE004.6	T13SR3ES15NWSE	N/A	ABOVE LITTLE BLUE RES.
SHOOF019.0	T13SR2ES6NWSW	N/A	ROAD CROSSING ABOVE BYBEE

Table 2. Redband trout population estimates and densities of stream sites sampled in 1995, in Owyhee County, Idaho.

<b>SITE</b>	<b>DATE COLLECTED</b>	<b>POPULATION ESTIMATE (95%CI)</b>	<b>DENSITY TROUT /100M<sup>2</sup></b>	<b>DENSITY SIZE&gt;100mm /100M<sup>2</sup></b>
LOWYH000.2	9/11/95	0 (DRY)		
LOWYH013.0	9/11/95	0 (DRY)		
SFOUY003.0	9/13/95	0		
SFOUY019.0	9/12/95	0		
SFOUY029.0	9/12/95	0		
OWYHE184.0	9/14/95	4 ( $\pm 3.1$ )	0.32	0.24
WFBRU059.2	10/14/95	1	0.08	0.08
WFBRU060.8	10/3/95	9 ( $\pm 2.9$ )	0.83	0.83
WFBRU078.4	10/6/95	4 ( $\pm 1.9$ )	0.50	0.50
WFBRU085.0	10/5/95	6	0.80	0.80
WFBRU087.0	10/5/95	8 ( $\pm 2.01$ )	0.84	0.84
JARBI000.2	10/3/95	16 ( $\pm 2.6$ )	1.82	1.70
SHEEP035.2	10/2/95	0		
MARYS004.2	10/2/95	0		
BLUE031.0	5/24/95	0		
LBLUE004.6	5/24/95	0		
SHOOF019.0	5/23/95	0 (DRY)		

Table 3. Presence (X) of fish species at sample sites in 1995 in Owyhee County, Idaho.

SITE	RBT	MWF	SMB	RSS	SPD	BLS	LND	MTS	CSM	SQF	SCP	LSS
SFOWY 003.0			X							X	X	X
SFOWY 019.0			X			X	X			X		
SFOWY 029.0			X				X				X	
OWYHE 184.0	X		X				X			X	X	X
WFBRU 059.2	X	X		X	X	X	X	X	X	X		
WFBRU 060.8	X	X		X	X	X			X	X	X	
WFBRU 078.4	X	X		X	X	X	X	X	X	X		X
WFBRU 085.0	X	X		X	X	X	X	X	X	X		
WFBRU 087.0	X	X		X	X	X		X	X	X		
JARBI 000.2	X	X		X	X	X	X	X	X	X	X	
SHEEP 035.2				X	X	X				X		
MARYS 004.2				X	X	X				X		

RBT = REDBAND RAINBOW TROUT, MWF = MOUNTAIN WHITEFISH, SMB = SMALLMOUTH BASS, RSS = REDSIDE SHINER, SPD = SPECKLED DACE, BLS = BRIDGELIP SUCKER, LND = LONGNOSE DACE, MTS = MOUNTAIN SUCKER, CSM = CHISELMOUTH, SQF = NORTHERN SQUAWFISH, SCP = SCULPIN SCP, LSS = LARGESCALE SUCKER.

Table 4. Stream sample length, average width, average depth, percent gradient, and percent composition of substrate in sampled stream sections in 1995 in Owyhee County, Idaho.

<b>SITE</b>	<b>LENGTH (m)</b>	<b>AVE. WIDTH (m)</b>	<b>AVE. DEPTH (m)</b>	<b>% GRADIENT</b>	<b>% SAND</b>	<b>% GRAVEL</b>	<b>% RUBBLE</b>	<b>% BOULDER</b>
SFOWY 003.0	100	8.2	0.33	0.82	14.2	36.0	43.5	6.3
SFOWY 019.0	100	15.7	0.25	0.66	10.3	13.7	46.7	29.3
SFOWY 029.0	93	13.0	0.39	0.54	29.7	3.0	30.3	37.0
OWYHE 184.0	100	12.4	0.27	0.32	24.0	10.7	58.3	7.0
WFBRU 059.2	84	14.4	0.41	0.36	12.2	19.5	57.0	11.3
WFBRU 060.8	100	7.7	0.33	0.43	42.9	46.8	10.3	0
WFBRU 078.4	100	7.9	0.28	1.62	21.7	18.3	51.3	8.7
WFBRU 085.0	86	8.7	0.33	0.44	21.3	37.3	35.0	6.4
WFBRU 087.0	100	9.6	0.31	0.29	32.3	22.3	28.0	17.3
JARBI 000.2	100	8.8	0.27	0.52	18.7	32.0	47.7	1.6
SHEEP 035.2	100	5.7	0.28	0.75	23.3	32.0	34.7	10.0
MARYS 004.2	61.5	4.4	0.13	0.76	15.8	14.3	57.8	12.0



Table 5. Percent habitat type and percent trout cover at stream sample sites in 1995 in Owyhee County, Idaho.

<b>SITE</b>	<b>% POOL</b>	<b>% RIFFLE</b>	<b>% RUN</b>	<b>% POCKET WATER</b>	<b>% TROUT COVER</b>
SFOW Y003.0	0	16.7	83.3	0	78.5
SFOW Y019.0	3.3	33.3	63.3	0	88.0
SFOW Y029.0	0	20.0	80.0	0	76.5
OWYHE 184.0	0	30.0	70.0	0	50.5
WFB RU05 9.2	3.8	15.4	80.8	0	68.0
WFB RU06 0.8	13.3	13.3	73.4	0	46.0
WFB RU07 8.4	10.0	13.3	73.3	3.3	35.0
WFB RU08 5.0	6.7	26.7	66.6	0	74.0
WFB RU08 7.0	6.7	16.7	76.6	0	53.0
JARBI000.2	10.0	30.0	60.0	0	36.5
SHEE P035 .2	40.0	10.0	50.0	0	60.5
MAR YS00 4.2	0	40.0	60.0	0	46.5

Table 6. Streambank stability rating in percent on stream samples in 1995 in Owyhee County, Idaho.

<b>SITE</b>	<b>COVERED/ STABLE</b>	<b>COVERED/ UNSTABLE</b>	<b>UNCOVERED/ STABLE</b>	<b>UNCOVERED/ UNSTABLE</b>
SFOW Y003.0	41.0	51.0	4.0	4.0
SFOW Y019.0	96.5	0	3.5	0
SFOW Y029.0	77.0	10.0	11.5	1.5
OWYHE 184.0	42.0	4.0	54.0	0
WFB RU059.2	36.3	5.0	53.7	5.0
WFB RU060.8	18.0	4.0	51.5	26.5
WFB RU078.4	66.5	19.0	14.0	0.5
WFB RU085.0	49.4	17.5	9.4	23.7
WFB RU087.0	59.5	9.5	12.5	18.5
JARBI000.2	12.5	13.5	45.5	28.5
SHEEP035.2	29.0	26.5	4.0	40.5
MARYS004.2	62.3	6.3	17.6	13.8

Table 7. Percent of stream shading on stream samples in 1995 in Owyhee County, Idaho.

SITE	PERCENT SHADE
SFOWY003.0	11.8
SFOWY019.0	11.2
SFOWY029.0	8.7
OWYHE184.0	15.6
WFBRU059.2	4.3
WFBRU060.8	19.1
WFBRU078.4	24.6
WFBRU085.0	16.1
WFBRU087.0	21.6
JARBI000.2	19.8
SHEEP035.2	12.1
MARYS004.2	8.1

Table 8. Water quality sampling results from stream sampling in 1995 in Owyhee County, Idaho.

SITE	DATE	WATER TEMP °C	pH	CONDUCTIVITY <i>Us/cm</i>	HARDNESS mg/l as CaCO <sub>3</sub>	ALKALINITY mg/l as CaCO <sub>3</sub>
SFLOWY 003.0	9/13/95	19.4	8.9	220	120	140
SFLOWY 019.0	9/12/95	21.1	8.7	210	120	160
SFLOWY 029.0	9/12/95	16.1	8.4	230	100	115
OWYHE 184.0	9/14/95	17.2	8.2	190	60	110
WFBRU 059.2	10/4/95	11.7	9.5	200	60	80
WFBRU 060.8	10/3/95	11.1	8.6	220	80	120
WFBRU 078.4	10/6/95	13.3	9.4	240	100	120
WFBRU 085.0	10/5/95	7.7	9.3	190	120	180
WFBRU 087.0	10/5/95	7.7	9.6	230	100	140
JARBI000.2	10/3/95	10.0	N/A	80	40	80
SHEEP 035.2	10/2/95	11.7	9.5	120	80	140
MARYS 004.2	10/2/95	9.4	8.3	120	80	200

Figure 1. Location of sample sites for redband trout on the West Fork Bruneau River, Jarbidge River, Sheep and Marys Creeks, Owyhee County, Idaho.

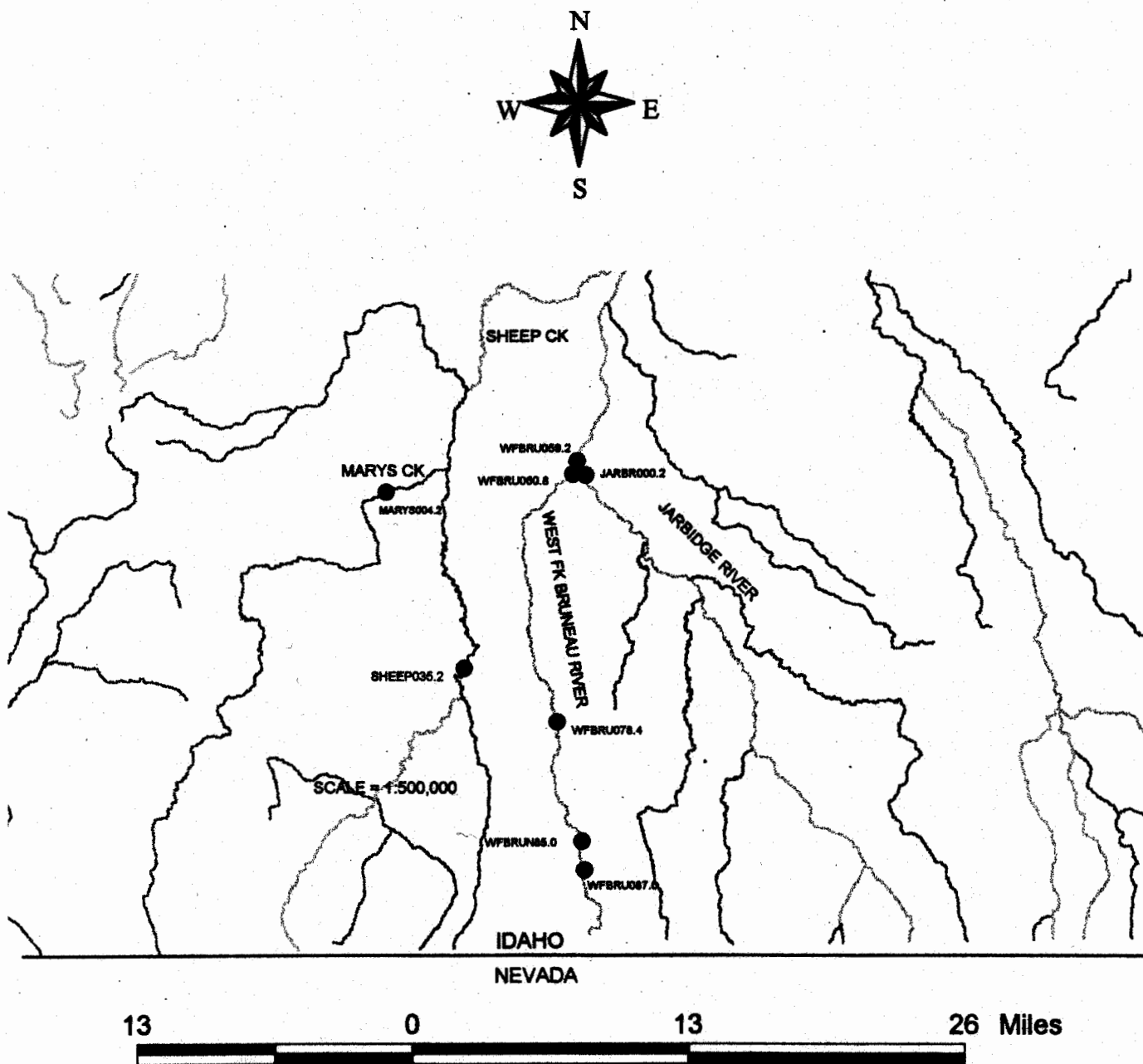


Figure 2. Location of sample sites for redband trout on the South Fork Owyhee River and Owyhee River, Owyhee County, Idaho.

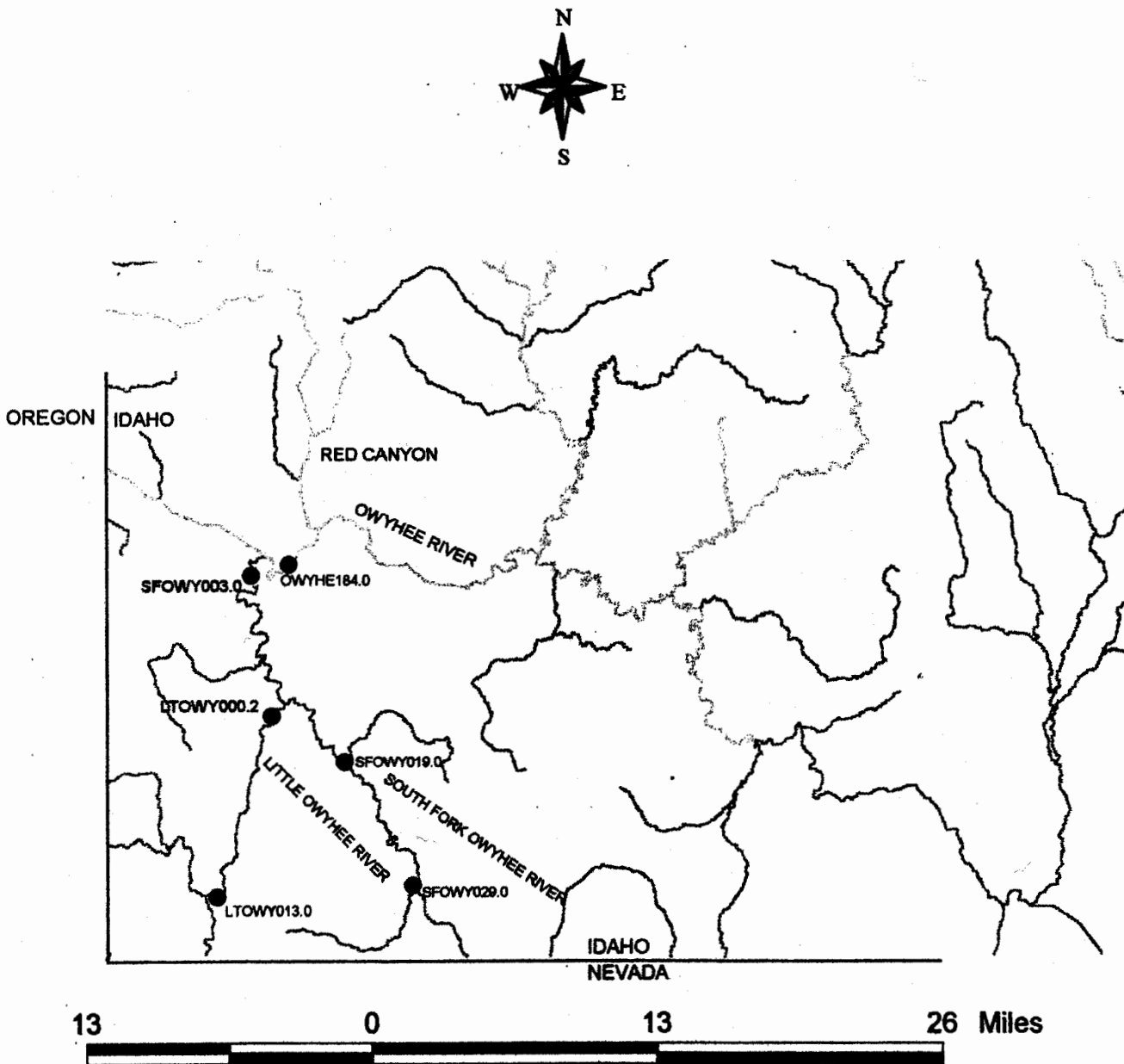


Figure 3. Location of sample sites for redband trout on Blue, Little Blue, and Shoofly Creeks, Owyhee County, Idaho.

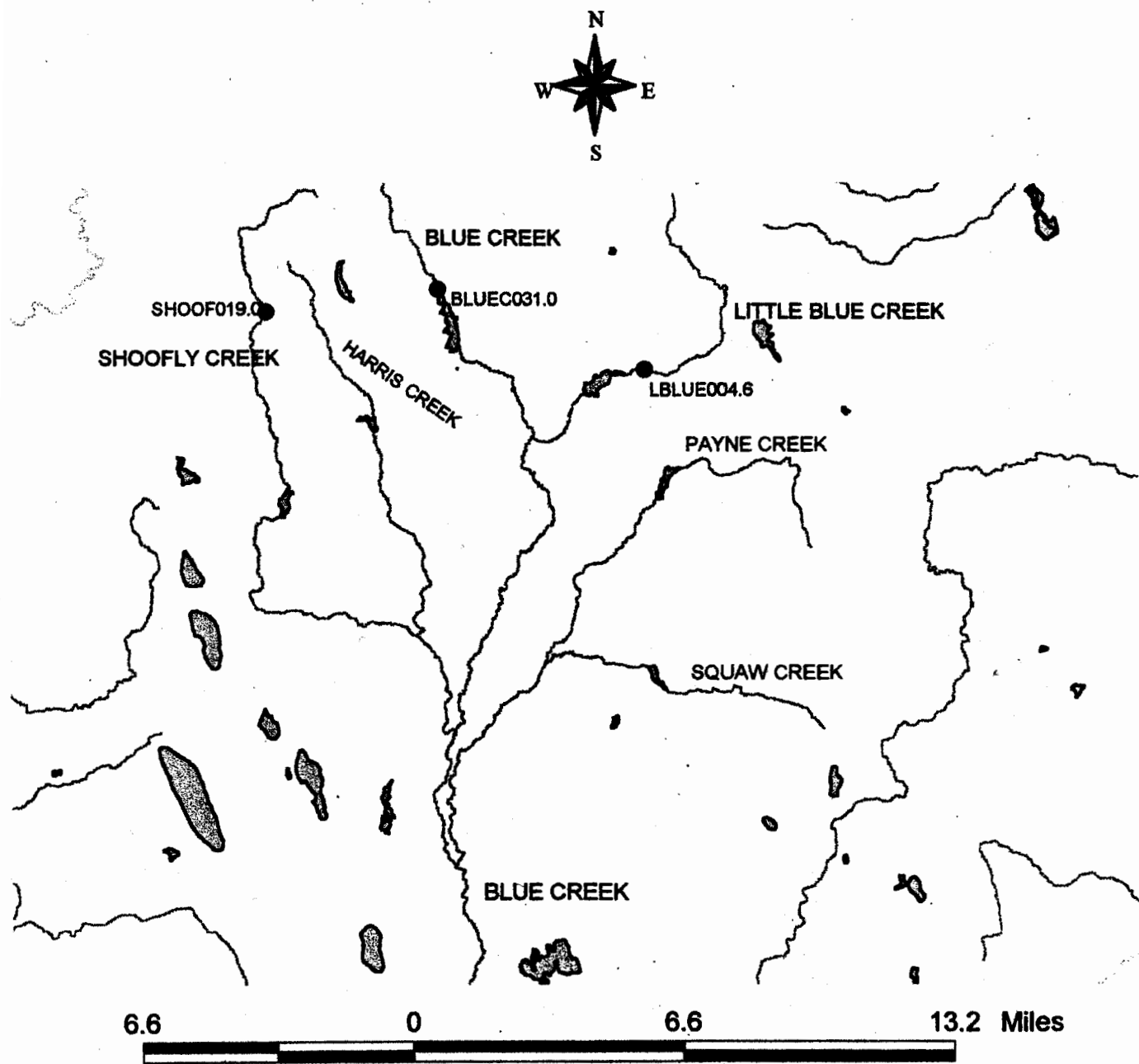
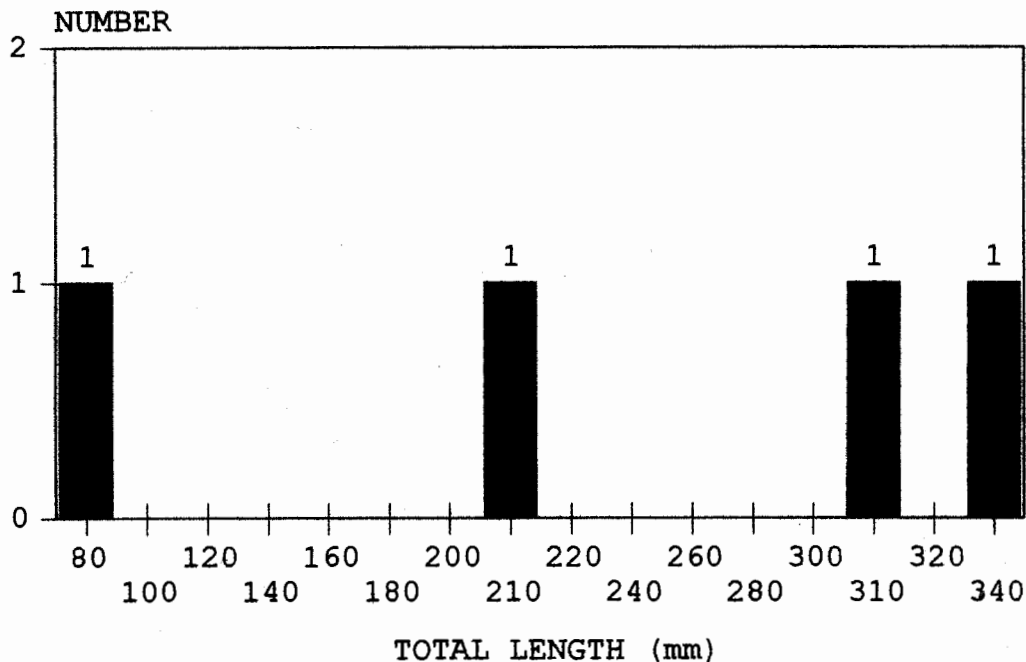


Figure 4. Length frequency of redband trout captured by electrofishing in sample site OWYHEE184.0 in the Owyhee River, Owyhee County, Idaho.

## REDBAND TROUT LENGTH FREQUENCY

OWYHEE RIVER ABOVE CRUTCHER'S CROSSING



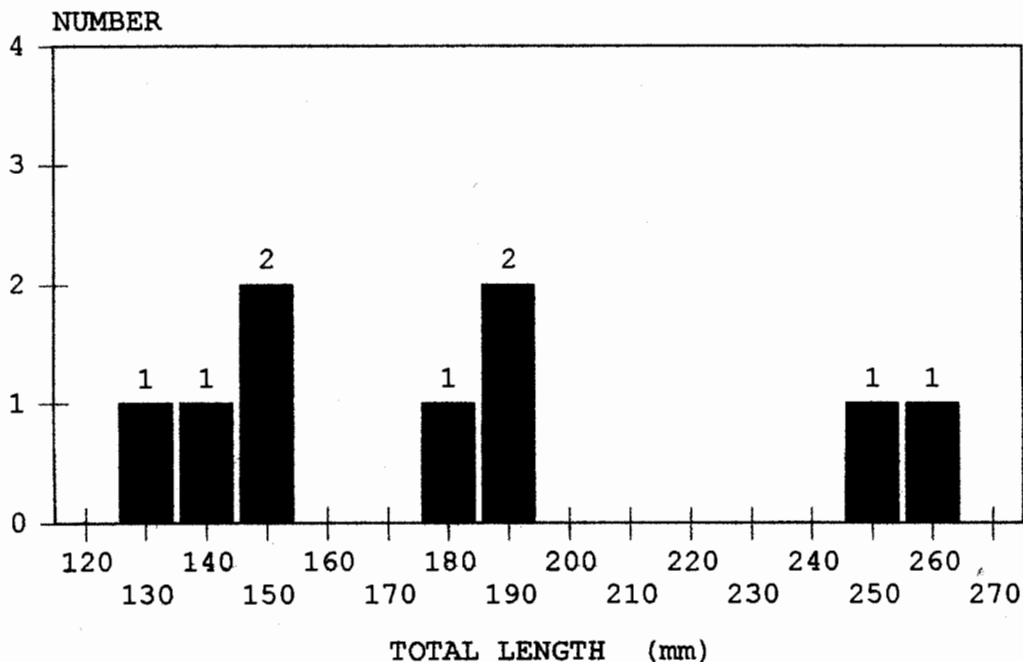
STATION: OWYHEE184.0 9/14/95



Figure 5. Length frequency of redband trout captured by electrofishing in sample site WFBRU060.8 in the West Fork Bruneau River, Owyhee County, Idaho.

## REDBAND TROUT LENGTH FREQUENCY

BRUNEAU RIVER ABOVE JARBIDGE RIVER MOUTH

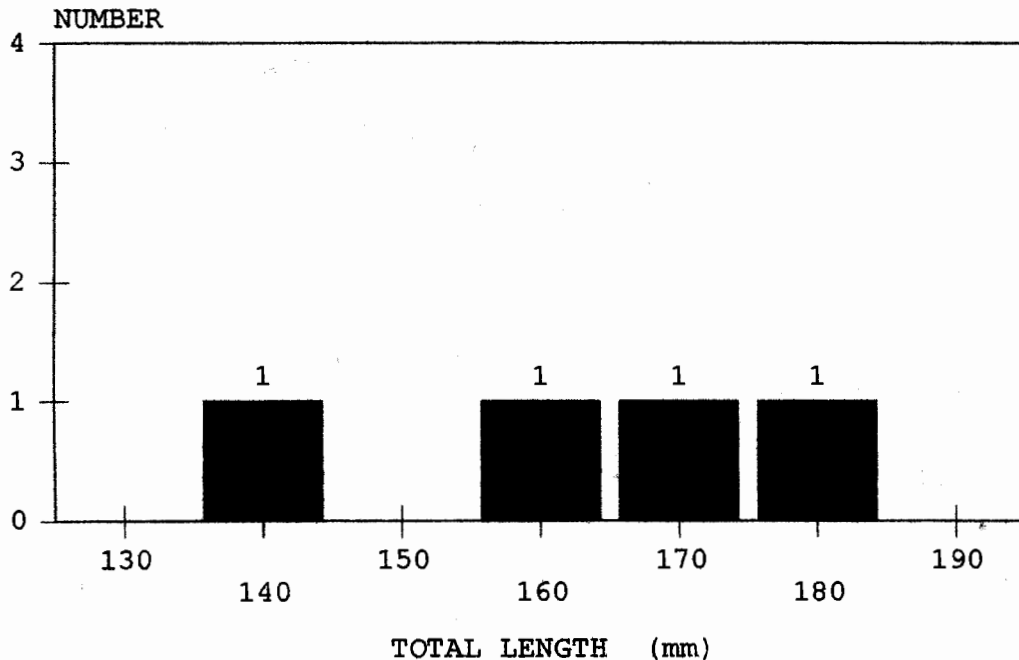


STATION: WFBRUN60.8 10/3/95

Figure 6. Length frequency of redband trout captured by electrofishing in sample site WFBRU078.4 in the West Fork Bruneau River, Owyhee County, Idaho.

## REDBAND TROUT LENGTH FREQUENCY

BRUNEAU RIVER TRIGUERO LAKE ROAD

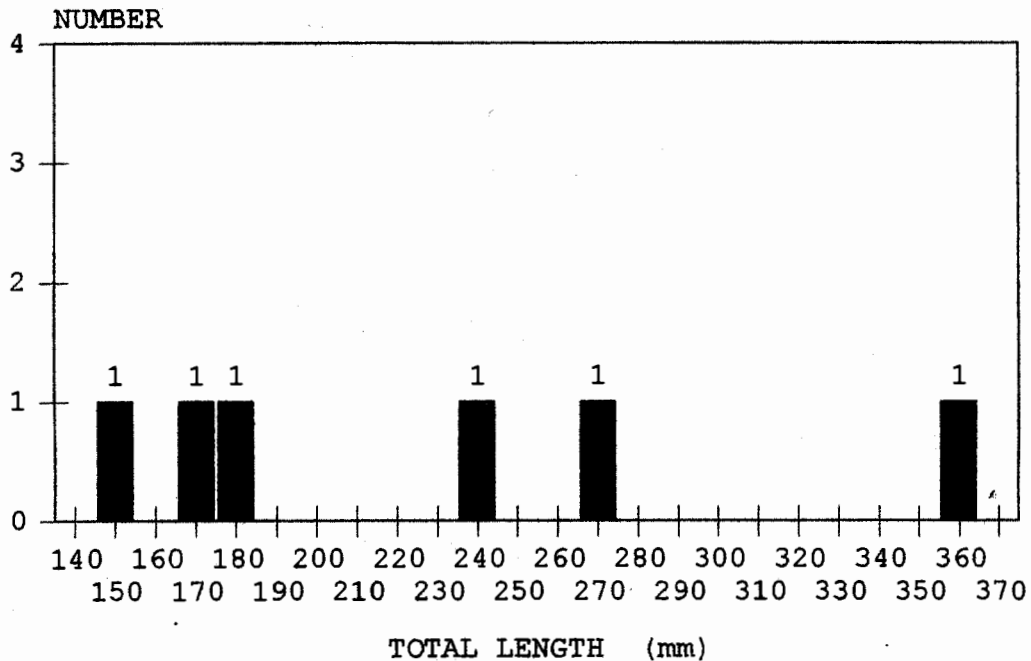


STATION: WFBRUN78.4 10/6/95

Figure 7. Length frequency and average age at annulus of redband trout captured by electrofishing in sample site WFBRU085.0 in the West Fork Bruneau River, Owyhee County, Idaho.

## REDBAND TROUT LENGTH FREQUENCY

BRUNEAU RIVER BELOW BLACK ROCK CROSSING



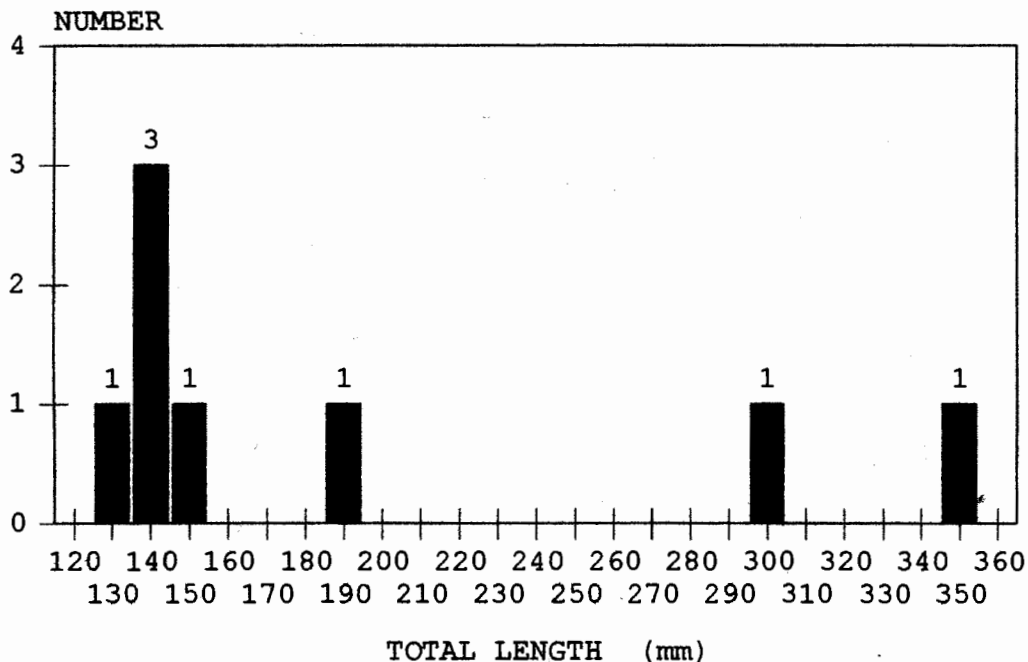
STATION: WFBRUN85.0 10/5/95

AGE	I+	II+	III+	IV+	V+
Average length (mm)	98.9	128.3	157.1	249.9	323.0
number=5	5	5	5	2	1

Figure 8. Length frequency and average age at annulus of redband trout captured by electrofishing in sample site WFBRU087.0 in the West Fork Bruneau River, Owyhee County, Idaho.

## REDBAND TROUT LENGTH FREQUENCY

BRUNEAU RIVER ABOVE BLACK ROCK CROSSING



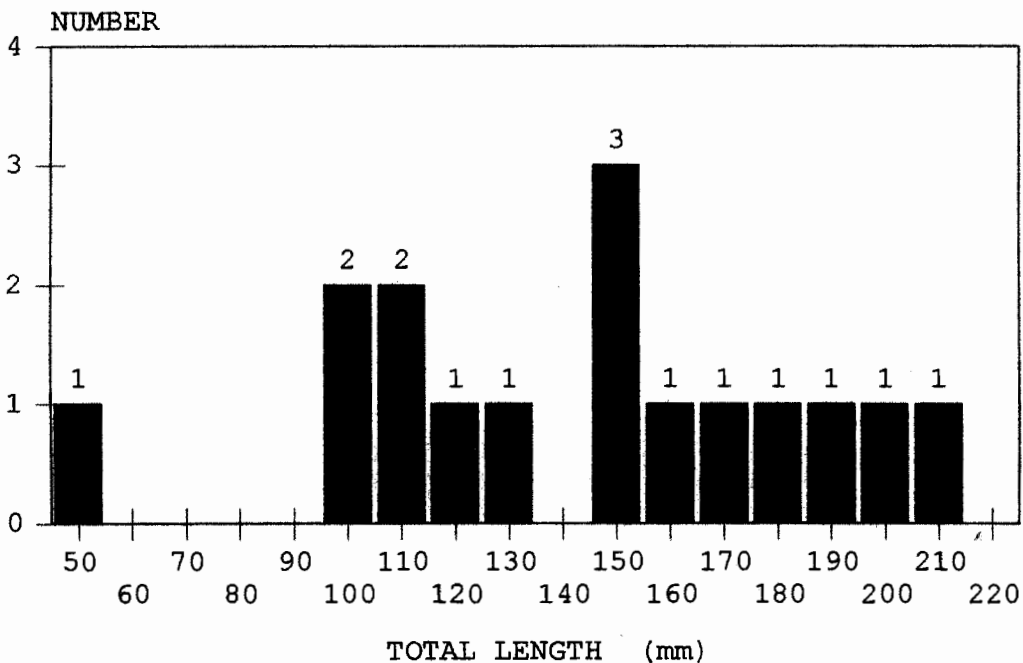
STATION: WFBRUN87.0 10/5/95

AGE	I+	II+	III+	IV+	V+
Average length (mm)	87.1	119.4	144.3	205.3	285.2
number=8	8	8	7	2	2

Figure 9. Length frequency and average age at annulus of redband trout captured by electrofishing in sample site JARBI000.2 in the Jarbidge River, Owyhee County, Idaho.

## REDBAND TROUT LENGTH FREQUENCY

### JARBIDGE RIVER NEAR MOUTH



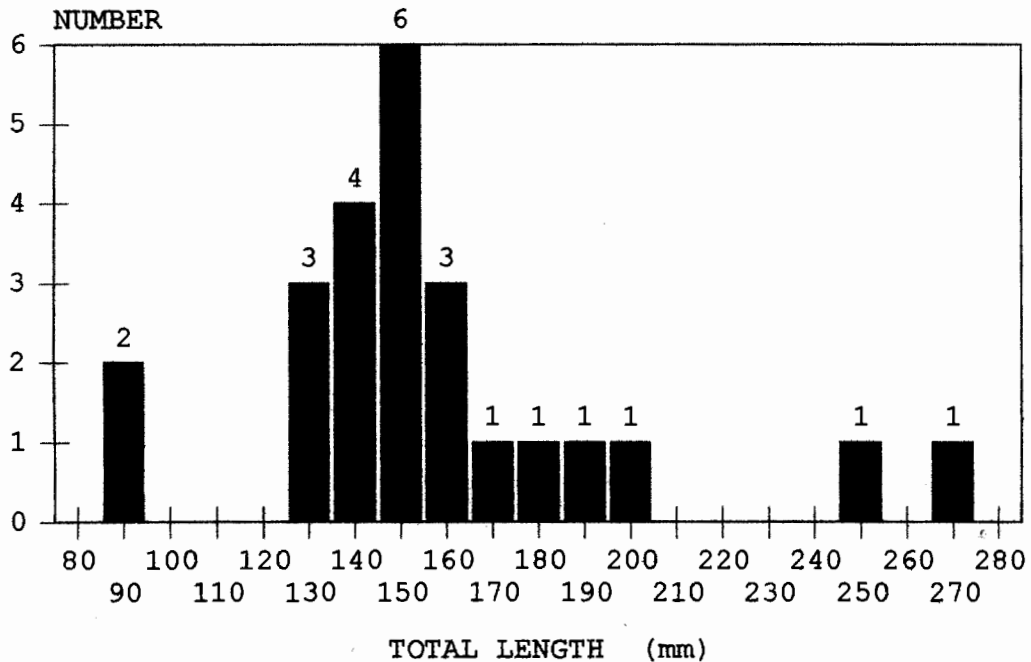
STATION: JARBIDGE00.2 10/3/95

AGE	I+	II+	III+	IV+	V+
Average length (mm)	80.9	103.4	134.6	163.1	193.1
number=15	15	15	9	4	1

Figure 10. Length frequency and average age at annulus of redband trout captured by electrofishing in West Fork Bruneau River near Black Rock Crossing for whirling disease testing.

## REDBAND TROUT LENGTH FREQUENCY

BRUNEAU RIVER WHIRLING DISEASE SAMPLING



COLLECTED NEAR BLACK ROCK CROSSING 10/5/95

AGE	I+	II+	III+	IV+	V+
Average length (mm)	86.8	115.7	142.1	190.2	228.5
number=24	24	22	18	6	2

## **Appendix A.**

**Stream sampling synopsis of sample sections of South Fork Owyhee River, Owyhee River, West Fork Bruneau River, Jarbidge River, Sheep and Marys Creeks in Owyhee County, Idaho.**

## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: SFOWY003.0

DATE:9/13/95

LOCATION: T14S R5W S2 NW NE

LAT/LONG: N 42 14.77' W 116 54.25'

SITE DESCRIPTION: Cross SF Owyhee at 45 Ranch drive to Juniper Basin. Walk about 2 miles skirting ridge to canyon. Tough scramble down, section was south side split channel.

TROUT POPULATION ESTIMATE: 0

DENSITY/100M<sup>2</sup>: DENSITY TROUT >100mm/100M<sup>2</sup>:

WATER QUALITY MEASUREMENTS:

TEMP:19.4

pH:8.9

CONDUCTIVITY uS/cm:220

HARDNESS mg/l:120

ALKALINITY mg/l:140

HABITAT VARIABLES:

SAMPLE LENGTH (m):100

AVERAGE WIDTH (m):8.2

AVERAGE DEPTH (m):0.33

PERCENT GRADIENT: 0.82

SUBSTRATE COMPOSITION:

% SAND:14.2

% GRAVEL:36.0

% RUBBLE:43.5

% BOULDER:6.3

PERCENT STREAM SHADE: 11.8

PERCENT STREAM FISH HABITAT: 78.5

GREENLINE--PERCENT VEGETATIVE COMMUNITY TYPES:

2.0% *Scirpus americanus*/*Salix exigua*

73.5% *Scirpus americanus*

12.5% *Scirpus americanus*/Forb

5.0% *Scirpus americanus*/*Eleocharis*

2.0% Grass

5.0% Forb



## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: SFOWY019.0

DATE:9/12/95

LOCATION: T15S R4W S9 SW SW

LAT/LONG: N 42 07.89' W 116 49.25'

SITE DESCRIPTION: Site lies at the mouth of drainage from the Upper and Lower John G. Reservoirs. Quad map shows a packtrail down the canyon, all we found was a cairn, last 200 feet are extremely steep. Sample section starts at the riffle above the pool at large rock face at mouth of side drainage.

TROUT POPULATION ESTIMATE: 0

DENSITY/100M<sup>2</sup>: DENSITY TROUT >100mm/100M<sup>2</sup>:

WATER QUALITY MEASUREMENTS:

TEMP:21.1

pH:8.7

CONDUCTIVITY uS/cm:210

HARDNESS mg/l:120

ALKALINITY mg/l:160

HABITAT VARIABLES:

SAMPLE LENGTH (m):100

AVERAGE WIDTH (m):15.7

AVERAGE DEPTH (m):0.25

PERCENT GRADIENT: 0.66

SUBSTRATE COMPOSITION:

% SAND:10.3

% GRAVEL:13.7

% RUBBLE:46.7

% BOULDER:29.3

PERCENT STREAM SHADE: 11.2

PERCENT STREAM FISH HABITAT: 88.0

GREENLINE--PERCENT VEGETATIVE COMMUNITY TYPES:

0.5% *Salix exigua*

84.5% *Scirpus americanus*

6.0% *Scirpus americanus*/Forb

2.0% *Scirpus americanus*/Grass

0.5% *Salix exigua*/*Scirpus americanus*

6.5% *Eleocharis*

## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: SFOWY029.0

DATE:9/12/95

LOCATION: T16S R4W S12 SW NE

LAT/LONG: N 42 02.68' W 116 45.49'

SITE DESCRIPTION: Site lies off of 4x4 road not shown on Halogeton Flats. In section 11 several old travel trailers mark the site where you walk down a big bowl to the river. Top end of sample section lies below large pool with bend.

TROUT POPULATION ESTIMATE: 0

DENSITY/100M<sup>2</sup>: DENSITY TROUT >100mm/100M<sup>2</sup>:

WATER QUALITY MEASUREMENTS:

TEMP:16.1

pH:8.4

CONDUCTIVITY uS/cm:230

HARDNESS mg/l:100

ALKALINITY mg/l:115

HABITAT VARIABLES:

SAMPLE LENGTH (m):93

AVERAGE WIDTH (m):13.0

AVERAGE DEPTH (m):0.39

PERCENT GRADIENT: 0.54

SUBSTRATE COMPOSITION:

% SAND:29.7

% GRAVEL:3.0

% RUBBLE:30.3

% BOULDER:37.0

PERCENT STREAM SHADE: 8.7

PERCENT STREAM FISH HABITAT: 76.5

GREENLINE--PERCENT VEGETATIVE COMMUNITY TYPES:

0.5% *Salix exigua*

78.0% *Scirpus americanus*

8.5% *Scirpus americanus*/Forb

5.0% *Glycyrrhiza lepidota*/*Scirpus americanus*

2.0% *Scirpus acutus*

2.0% *Bromus tectorum*/*Artemisia ludoviciana*

4.0% *Salix exigua*/*Scirpus americanus*

## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: OWYHE184.0

DATE:9/14/95

LOCATION: T13S R5W S25 SE NE

LAT/LONG: N 42 15.72' W 116 51.90'

SITE DESCRIPTION: Site lies just above the road down to Crutchers Crossing. The top of the sample section is the first riffle that lies within where the canyon walls again neck down on the stream. The top riffle has good bank cover and undercut on the south side.

TROUT POPULATION ESTIMATE: 4 (+3.1)

DENSITY/100M<sup>2</sup>: 0.32      DENSITY TROUT >100mm/100M<sup>2</sup>: 0.24

### WATER QUALITY MEASUREMENTS:

TEMP:17.2

pH:8.2

CONDUCTIVITY uS/cm:190

HARDNESS mg/l:60

ALKALINITY mg/l:110

### HABITAT VARIABLES:

SAMPLE LENGTH (m):100

AVERAGE WIDTH (m):12.4

AVERAGE DEPTH (m):0.27

PERCENT GRADIENT: 0.32

### SUBSTRATE COMPOSITION:

% SAND:24.0

% GRAVEL:10.7

% RUBBLE:58.3

% BOULDER:7.0

PERCENT STREAM SHADE: 15.6

PERCENT STREAM FISH HABITAT: 50.5

### GREENLINE PERCENT VEGETATIVE COMMUNITY TYPES:

39.0% *Salix exigua*

4.0% *Salix exigua/Scirpus americanus*

4.5% *Eleocharis*

7.5% *Equisetum*    4.0% Forb

10.0% *Scirpus acutus/Leersia oryzoides* /Forb

31.0% *Scirpus pallidus/Equisetum/ Eleocharis/Leersia oryzoides*

## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: WFBRU059.2

DATE:10/4/95

LOCATION: T12S R7E S33 NW SW

LAT/LONG: N 42 20.50' W 115 38.72'

SITE DESCRIPTION: Site lies downstream of Indian Hot Springs bridge crossing approx. 400 m. Take mining road that runs on west side of river across flats by river and park where 4x4 road starts to climb the side hill. Sample site starts downstream at top of long riffle and ends at gravel bar beside where you parked.

TROUT POPULATION ESTIMATE: 1

DENSITY/100M<sup>2</sup>: 0.08      DENSITY TROUT >100mm/100M<sup>2</sup>: 0.08

WATER QUALITY MEASUREMENTS:

TEMP:11.7

pH:9.5

CONDUCTIVITY uS/cm:200

HARDNESS mg/l:60

ALKALINITY mg/l:80

HABITAT VARIABLES:

SAMPLE LENGTH (m):84

AVERAGE WIDTH (m):14.4

AVERAGE DEPTH (m):0.41

PERCENT GRADIENT: 0.36

SUBSTRATE COMPOSITION:

% SAND:12.2

% GRAVEL:19.5

% RUBBLE:57.0

% BOULDER:11.3

PERCENT STREAM SHADE: 4.3

PERCENT STREAM FISH HABITAT: 68.0

GREENLINE PERCENT VEGETATIVE COMMUNITY TYPES:

15.6% *Salix exigua*

58.1% *Salix exigua/Equisetum/Leersia oryzoides*

13.1% *Eleocharis/Leersia oryzoides*

4.4% *Equisetum*

8.8% *Leersia oryzoides /Equisetum*

## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: WFBRU060.8

DATE:10/3/95

LOCATION: T13S R7E S5 NE NE

LAT/LONG: N 42 19.61' W 115 39.20'

SITE DESCRIPTION: Site lies upstream of Jarbidge River mouth and below where 4x4 road goes down to river above the Indian Hot Springs area. Top of section is at large gravel bar about 200 m below old pack bridge.

TROUT POPULATION ESTIMATE: 9 ( $\pm$  2.9)

DENSITY/100M<sup>2</sup>: 0.83      DENSITY TROUT >100mm/100M<sup>2</sup>: 0.83

### WATER QUALITY MEASUREMENTS:

TEMP:11.1

pH:8.6

CONDUCTIVITY uS/cm:220

HARDNESS mg/l:80

ALKALINITY mg/l:120

### HABITAT VARIABLES:

SAMPLE LENGTH (m):100

AVERAGE WIDTH (m):7.7

AVERAGE DEPTH (m):0.33

PERCENT GRADIENT: 0.43

### SUBSTRATE COMPOSITION:

% SAND:42.9

% GRAVEL:46.8

% RUBBLE:10.3

% BOULDER:0.0

PERCENT STREAM SHADE: 19.1

PERCENT STREAM FISH HABITAT: 46.0

### GREENLINE--PERCENT VEGETATIVE COMMUNITY TYPES:

22.5% *Salix exigua*

8.0% *Cornus sericea/Clematis ligusticifolia/Rosa woodsii*

4.5% *Eleocharis/Leersia oryzoides*

14.5% *Equisetum*

7.0% *Cornus sericea*

4.0% *Apocynum cannabinum/Equisetum/Conium maculatum*

11.5% *Leersia oryzoides*    25.0% Rock Cliff    3.0% *Eleocharis*

## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: WFBRU078.4

DATE:10/6/95

LOCATION: T15S R7E S6 SE SE

LAT/LONG: N 42 08.68' W 115 40.30'

SITE DESCRIPTION: Site lies upstream at bottom where the road drops down canyon near what s called Triguero Lake. A side road takes off just past the two stone foundations and deadends near the river. The lower end of site lies about 40 m from big hole in the bend.

TROUT POPULATION ESTIMATE: 4 ( $\pm$  1.9)

DENSITY/100M<sup>2</sup>: 0.50      DENSITY TROUT >100mm/100M<sup>2</sup>: 0.50

### WATER QUALITY MEASUREMENTS:

TEMP:13.3

pH:9.4

CONDUCTIVITY uS/cm:240

HARDNESS mg/l:100

ALKALINITY mg/l:120

### HABITAT VARIABLES:

SAMPLE LENGTH (m):100

AVERAGE WIDTH (m):7.9

AVERAGE DEPTH (m):0.28

PERCENT GRADIENT: 1.62

### SUBSTRATE COMPOSITION:

% SAND:21.7

% GRAVEL:18.3

% RUBBLE:51.3

% BOULDER:8.7

PERCENT STREAM SHADE: 50.8

PERCENT STREAM FISH HABITAT: 35.0

### GREENLINE PERCENT VEGETATIVE COMMUNITY TYPES:

3.5% *Salix exigua*

6.0% *Salix exigua/Equisetum*

12.0% *Juniperus occidentalis/Poa/Equisetum*

2.0% *Rhus radicans/Apocynum cannabinum*

10.5% *Apocynum cannabinum/Eleocharis/Leersia oryzoides /Equisetum*

11.0% *Eleocharis*

34.0% *Equisetum/Leersia oryzoides/Eleocharis/Conium maculatum*

3.0% *Solidago/Poa/Equisetum*

10.5% *Conium maculatum*

1.5% *Leersia* 6.0% Rock Cliff/*Agropyron spicatum/Bromus tectorum*

## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: WFBRU085.0

DATE:10/5/95

LOCATION: T15S R7E S30 SE SE

LAT/LONG: N 42 04.36' W 115 39.06'

SITE DESCRIPTION: The site is located in canyon below private ground at black rock crossing. Cross river and drive past old buildings all the way to end of old hay field, walk about half mile downstream.

TROUT POPULATION ESTIMATE: 6

DENSITY/100M<sup>2</sup>: 0.80      DENSITY TROUT >100mm/100M<sup>2</sup>: 0.80

WATER QUALITY MEASUREMENTS:

TEMP:7.7

pH:9.3

CONDUCTIVITY uS/cm:190

HARDNESS mg/l:120

ALKALINITY mg/l:180

HABITAT VARIABLES:

SAMPLE LENGTH (m):86

AVERAGE WIDTH (m):8.7

AVERAGE DEPTH (m):0.33

PERCENT GRADIENT: 0.44

SUBSTRATE COMPOSITION:

% SAND:21.3

% GRAVEL:37.3

% RUBBLE:35.0

% BOULDER:6.4

PERCENT STREAM SHADE: 16.1

PERCENT STREAM FISH HABITAT: 74.0

GREENLINE--PERCENT VEGETATIVE COMMUNITY TYPES:

4.4% *Salix exigua*

7.5% *Salix exigua*/Forb/Grass

16.3% *Salix exigua*/*Equisetum*/*Eleocharis*

6.2% *Salix exigua*/*Rosa woodsii*

6.2% *Salix exigua*/*Rosa woodsii*/*Cornus sericea*

2.5% *Salix lutea*    10.0% *Cornus sericea*

1.9% Forb/Grass    36.3% *Equisetum*/*Eleocharis*

3.7% *Eleocharis*    5.7% *Phalaris arundinacea*

## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: WFBRU087.0

DATE:10/5/95

LOCATION: T16S R7E S8 NE SE

LAT/LONG: N 42 03.36' W 115 39.06'

SITE DESCRIPTION: The site is located in canyon above private ground at black rock crossing. Cross river and hike upstream not quite half mile above crossing. Site lies against where the east bank first becomes very steep and ends at gravel bar just above very large boulder with large wood debris jam on top.

TROUT POPULATION ESTIMATE: 8 (+2.01)

DENSITY/100M<sup>2</sup>: 0.84      DENSITY TROUT >100mm/100M<sup>2</sup>: 0.84

### WATER QUALITY MEASUREMENTS:

TEMP:7.7

pH:9.6

CONDUCTIVITY uS/cm:230

HARDNESS mg/l:100

ALKALINITY mg/l:140

### HABITAT VARIABLES:

SAMPLE LENGTH (m):100

AVERAGE WIDTH (m):9.6

AVERAGE DEPTH (m):0.31

PERCENT GRADIENT: 0.29

### SUBSTRATE COMPOSITION:

% SAND:32.3

% GRAVEL:22.3

% RUBBLE:28.0

% BOULDER:17.3

PERCENT STREAM SHADE: 21.6

PERCENT STREAM FISH HABITAT: 53.0

### GREENLINE PERCENT VEGETATIVE COMMUNITY TYPES:

4.0% *Salix exigua* 4.0% *Salix exigua/Apocynum cannabinum*

8.0% *Salix exigua/Eleocharis/Equisetum*

12.0% *Cornus sericea*

4.5% *Juniperus occidentalis* 0.5% *Artemisia tridentata*

5.0% *Rosa woodsii* 30.0% *Equisetum* 19.0% *Eleocharis*

8.0% *Conium maculatum/Solidago occidentalis/Eleocharis*

5.0% *Phalaris arundinacea*



## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: JARBI000.2

DATE:10/3/95

LOCATION: T13S R7E S4 NW NW

LAT/LONG: N 42 19.71' W 115 39.07'

SITE DESCRIPTION: The sample site is approximately 300m upstream from mouth, starts at second riffle up.

TROUT POPULATION ESTIMATE: 16 ( $\pm 2.6$ )

DENSITY/100M<sup>2</sup> : 01.82      DENSITY TROUT >100mm/100M<sup>2</sup> : 1.70

### WATER QUALITY MEASUREMENTS:

TEMP:10.0

pH:n/a

CONDUCTIVITY uS/cm:80

HARDNESS mg/l:40

ALKALINITY mg/l:80

### HABITAT VARIABLES:

SAMPLE LENGTH (m):100

AVERAGE WIDTH (m):8.8

AVERAGE DEPTH (m):0.27

PERCENT GRADIENT: 0.52

### SUBSTRATE COMPOSITION:

% SAND:18.7

% GRAVEL:32.0

% RUBBLE:47.7

% BOULDER:1.6

PERCENT STREAM SHADE: 19.8

PERCENT STREAM FISH HABITAT: 36.5

### GREENLINE PERCENT VEGETATIVE COMMUNITY TYPES:

61.5% *Salix exigua*

5.5% *Salix exigua/Equisetum/Eleocharis*

2.5% *Salix exigua/Clematis ligusticifolia/Rosa Woodsii*

2.5% *Salix exigua/Salix lutea*

20.5% *Salix lutea*

0.5% *Rosa woodsii*

3.0% *Rosa woodsii/Ribes aureum*

4.0% *Equisetum/Carex*

## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: SHEEP35.2

DATE:10/2/95

LOCATION: T14S R6E S21 NE SE

LAT/LONG: N 42 11.91' W 115 45.08'

SITE DESCRIPTION: From Sheep Creek crossing of Grasmere Road go upstream past private ground to fenceline. Lower end of sample section starts at fenceline.

TROUT POPULATION ESTIMATE: 0

DENSITY/100M<sup>2</sup>: 0      DENSITY TROUT >100mm/100M<sup>2</sup>:

WATER QUALITY MEASUREMENTS:

TEMP:11.7

pH:9.5

CONDUCTIVITY uS/cm:120

HARDNESS mg/l:80

ALKALINITY mg/l:140

HABITAT VARIABLES:

SAMPLE LENGTH (m):100

AVERAGE WIDTH (m):5.7

AVERAGE DEPTH (m):0.28

PERCENT GRADIENT: 0.75

SUBSTRATE COMPOSITION:

% SAND:23.3

% GRAVEL:32.0

% RUBBLE:34.7

% BOULDER:10.0

PERCENT STREAM SHADE: 12.1

PERCENT STREAM FISH HABITAT: 60.5

GREENLINE--PERCENT VEGETATIVE COMMUNITY TYPES:

31.5% *Salix exigua*

9.0% *Salix exigua/Eleocharis*

7.0% *Salix exigua/Clematis ligusticifolia/Rosa Woodsii*

1.0% *Salix lutea* 1.0% *Ribes aureum* 1.5% *Cornus stolonifera*

7.0% *Rosa woodsii/Ribes aureum/Clematis ligusticifolia*

27.5% *Eleocharis*

3.5% *Leersia oryzoides* 11.0% *Bromus tectorum*

## REDBAND TROUT STREAM SAMPLING SYNOPSIS

STREAM SEGMENT NAME: MARYS04.2

DATE:10/2/95

LOCATION: T13S R5E S12 NW SW  
LAT/LONG: N 42 18.74' W 115 49.55'

SITE DESCRIPTION: From crossing of Grasmere Road of Marys Creek go downstream to the rock outcropping at the first bend. About 200 m below where you can park your vehicle.

TROUT POPULATION ESTIMATE: 0

DENSITY/100M<sup>2</sup> : 0      DENSITY TROUT >100mm/100M<sup>2</sup> :

### WATER QUALITY MEASUREMENTS:

TEMP:9.4

pH:8.3

CONDUCTIVITY uS/cm:120

HARDNESS mg/l:80

ALKALINITY mg/l:200

### HABITAT VARIABLES:

SAMPLE LENGTH (m):61.5

AVERAGE WIDTH (m):4.4

AVERAGE DEPTH (m):0.13

PERCENT GRADIENT: 0.76

### SUBSTRATE COMPOSITION:

% SAND:15.8

% GRAVEL:14.3

% RUBBLE:57.8

% BOULDER:12.0

PERCENT STREAM SHADE: 8.1

PERCENT STREAM FISH HABITAT: 46.5

### GREENLINE--PERCENT VEGETATIVE COMMUNITY TYPES:

74.0% *Salix exigua*

5.3% *Salix exigua/Eleocharis*

1.0% *Salix exigua/Poa*

19.7% *Eleocharis*

## **APPENDIX B.**

**Water temperatures recorded by electronic water temperature recorders in three sites in upper Jordan Creek, Owyhee County, Idaho.**

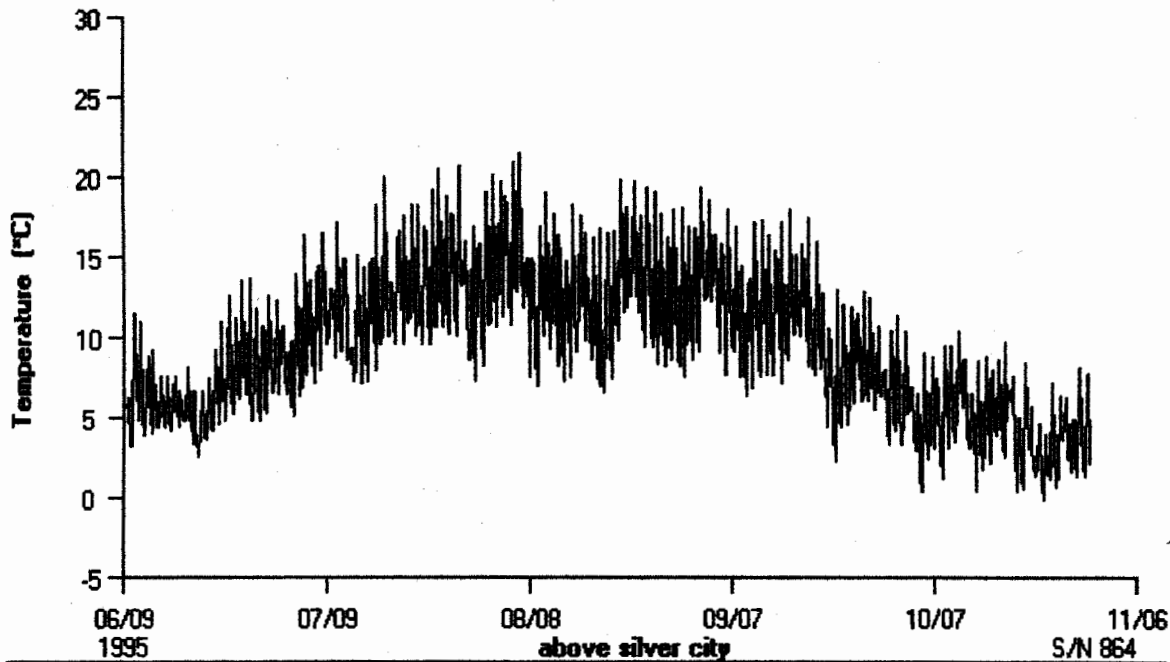


Figure B1. Recording thermograph data from upstream Silver City on Jordan Creek, Owyhee County, Idaho.

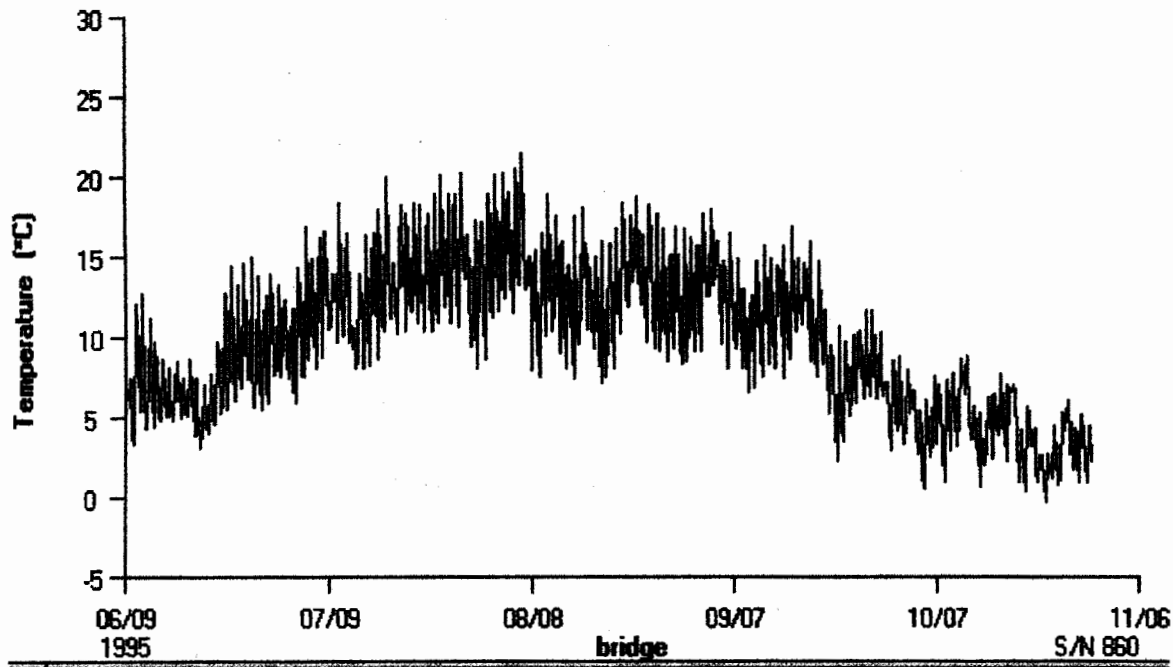


Figure B2. Recording thermograph data from below Silver City on Jordan Creek in Owyhee County, Idaho.

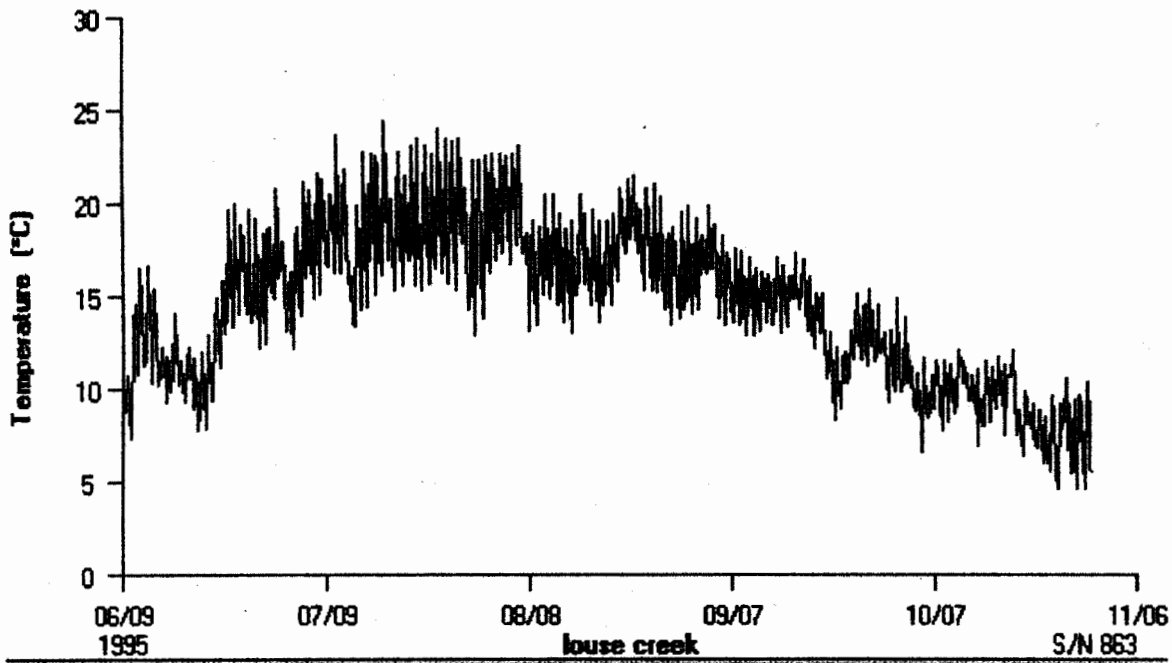


Figure B3. Recording thermograph data from near the confluence with Flint Creek and Jordan Creek, Owyhee County, Idaho.

Table B1. Site location of recording thermographs in Jordan Creek, Owyhee County, Idaho.

<b>SITE DESCRIPTION</b>	<b>LEGAL DESCRIPTION</b>	<b>STREAM MILEAGE</b>	<b>ELEVATION (m)</b>
No. 1 Upsteam of Silver City	T4S R3W S7	JORDA97.6	1902
No. 2 Bridge crossing below Silver City	T4S R3W S31	JORDA95.4	1814
No. 3 Bridge crossing on Triangle road	T6S R4W S19	JORDA70.8	1414