

State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

STANDING STOCKS OF FISHES
IN SECTIONS OF BIG GRIZZLY CREEK
PLUMAS COUNTY, 1981

by

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INTRODUCTION

The Department of Water Resources (DWR) initiated an instream flow program in 1976 to identify streams that would benefit from flow enhancement, to assess instream values, and identify actions such as habitat manipulation that could enhance these streams. The Northern District of DWR selected Big Grizzly Creek below Lake Davis (Figure 1) as one of the streams to study under this program.

Previous sampling effort on Big Grizzly Creek has been conducted by Department of Fish and Game (DFG) biologists. Initial estimates of rainbow trout (Oncorhynchus mykiss) populations were made by the DFG in 1976 (Brown 1976). The DFG also surveyed the creek in 1981 and 1986 to estimate standing stocks of brown trout (Salmo trutta) and rainbow trout in selected stations (Bumpass et al. 1989).

The objective of this study is to estimate the number, age and growth of trout in stations established in 1976. The stations were originally established to set baseline conditions with which future changes in seasonal stream flow or other elements of habitat would be compared. A report discussing twenty-five years of fisheries studies on Big Grizzly Creek will be prepared in the year 2001.

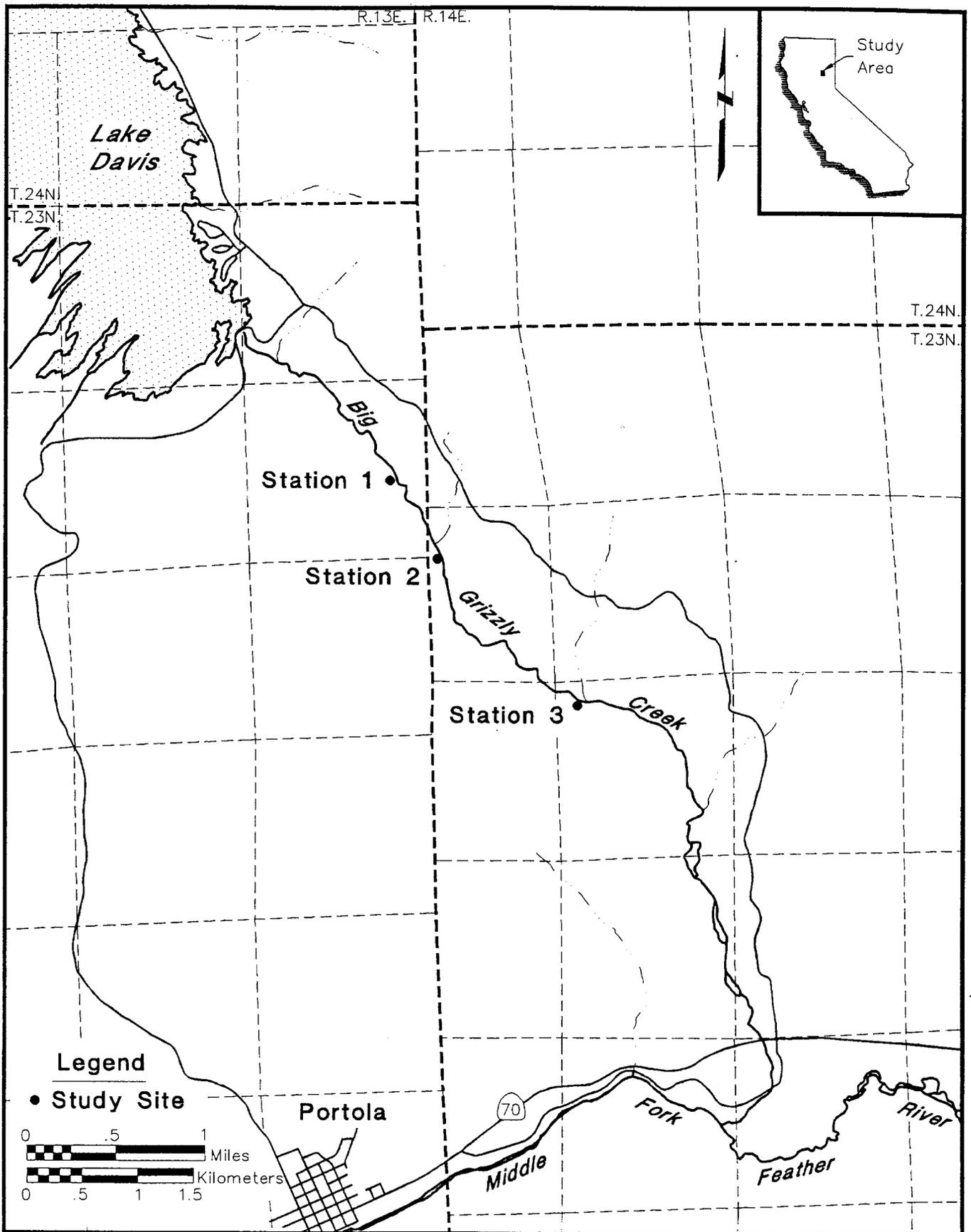


Figure 1. Stations sampled to estimate standing crop of trout in Big Grizzly Creek, 1981.

METHODS

Standing stocks of fishes were estimated in three stations in Big Grizzly Creek (Figure 1) in Plumas County. Fish were sampled in riffles and small pools. Stations varied in length from 20.6 to 35.1 meters, according to the availability of suitable sampling water (Appendix 1). The length, average width, and average depth of each section were measured with a cloth tape. Fish were captured with a battery-powered backpack electroshocker (Smith-Root, Type VII) in stream sections blocked by seines. Captured fish were removed from the net-enclosed section on each pass.

Standing stock estimates were developed using the two-count method of Seber and LeCren (1967) or the multiple-pass method of Leslie and Davis (1939) with limits of confidence computed using a formula proposed by DeLury (1959).

The fork length (FL) of each fish was measured to the nearest millimeter. The weights of rainbow trout and brown trout were determined by displacement. Weights were also measured for Sacramento sucker (Catostomus occidentalis) and brown bullhead (Ictalurus nebulosus).

Scales were dry mounted between microscope slides and their images were projected on a NCR microfiche reader at a magnification of 42X. Scale measurements for the calculation of growth were recorded to the nearest millimeter along the anterior radius of the anterior-posterior axis of the scale.

Geometric mean functional regressions were used to describe the body-scale and length-weight relationships (Ricker 1975). Estimation of true mean growth rate was calculated using methods of Ricker (op. cit.).

Distribution of all fish caught is listed according to location. Standing crops of rainbow trout, brown trout, and nongame fishes were calculated for individual stations. Age, growth, and mean individual growth were calculated for rainbow trout and brown trout. Age and catch percentages as well as length and weight relationships were determined for rainbow trout and brown trout. The coefficient of condition and 95 percent confidence intervals were calculated for rainbow trout and brown trout.

RESULTS

Distribution

Rainbow trout were caught in each station. Brown trout were only caught in station 1. Sacramento suckers were caught in station 1 and 3. Brown bullhead were caught in station 2 (Table 1).

TABLE 1. Distribution of Fishes in Sections of Big Grizzly Creek Plumas County, 1981.

	Station Number			
	1	2	3	
Distance below Grizzly Valley Dam (km)		2.5	3.2	4.8
Brown trout	X			
Rainbow trout	X		X	X
Brown bullhead			X	
Sacramento sucker	X			X

Standing Crop

Rainbow trout were the most common game fish caught in Big Grizzly Creek. Biomass averaged 1.8 g/m² in three stations (Table 2). Catchable rainbow trout (≥ 127 mm FL) biomass averaged 1.8 g/m². We found brown trout in only one station. Biomass in that station was 0.5 g/m² (Table 3). No catchable brown trout was caught. Biomass was estimated for Sacramento suckers and brown bullheads (Table 4).

TABLE 2. Estimate of Rainbow Trout Standing Crop in Big Grizzly Creek, Plumas County, 1981.

Distance Below Grizzly Valley Dam (km)	Population Estimate	95% Confidence Interval	Biomass (g/m ²)	Estimate of Catchable Trout (≥ 127 mm FL)	Biomass of Catchable Trout (g/m ²)
2.5	8	7-11	0.4	2	0.4
3.2	3	3-3	1.1	3	1.1
4.8	4	3-11	4.0	4	4.0

TABLE 3. Estimate of Brown Trout Standing Crop in Big Grizzly Creek, Plumas County, 1981.

Distance Below Grizzly Valley Dam (km)	Population Estimate	95% Confidence Interval	Biomass (g/m ²)	Estimate of Catchable Trout (≥ 127 mm FL)	Biomass of Catchable Trout (g/m ²)
2.5	27	27-31	0.5	0	0.0

TABLE 4. Estimate of Standing Crop of Nongame Fishes in Big Grizzly Creek, Plumas County, 1981.

Distance Below Grizzly Valley Dam (km)	Species	Population Estimate	95% Confidence Interval	Biomass(g/m ²)
2.5	Sacramento sucker	3	3-3	0.01
3.2	Brown bullhead	5	5-5	0.7
4.8	Sacramento sucker	59	57-61	7.9

Length and Weight

Age group 0+ rainbow trout represented 43 percent of the 14 rainbow trout caught. Ages 1+ and 2+ comprised 36 percent and 21 percent respectively (Figure 2 and Appendix 2). Age group 0+ brown trout made up 100 percent of the 22 brown trout caught (Figure 3 and Appendix 3).

The relationship between fork length (L) and weight (W) of rainbow trout for Big Grizzly Creek is:

$$\text{Log}_{10}W = -5.0 + 3.0 \text{ Log}_{10}L$$

$$r^2 = 0.99$$

$$N = 14 \quad (\text{Figure 3 and Appendix 4})$$

The same relationship for brown trout is:

$$\text{Log}_{10}W = -4.8 + 2.9 \text{ Log}_{10}L$$

$$r^2 = 0.99$$

$$N = 22 \quad (\text{Figure 5 and Appendix 5})$$

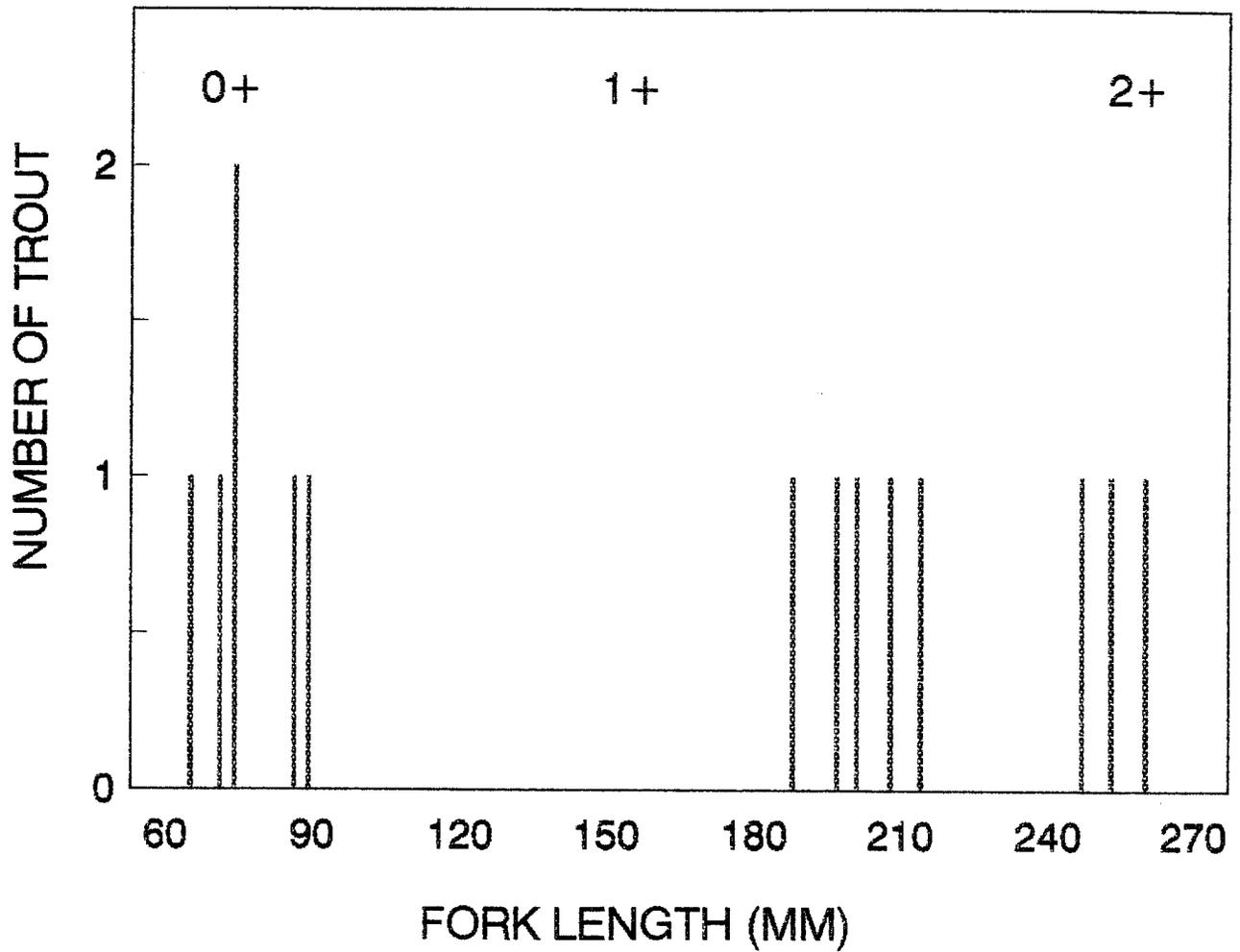


FIGURE 2. Length, observed frequency, and age of rainbow trout caught in Big Grizzly Creek, Plumas County, 1981.

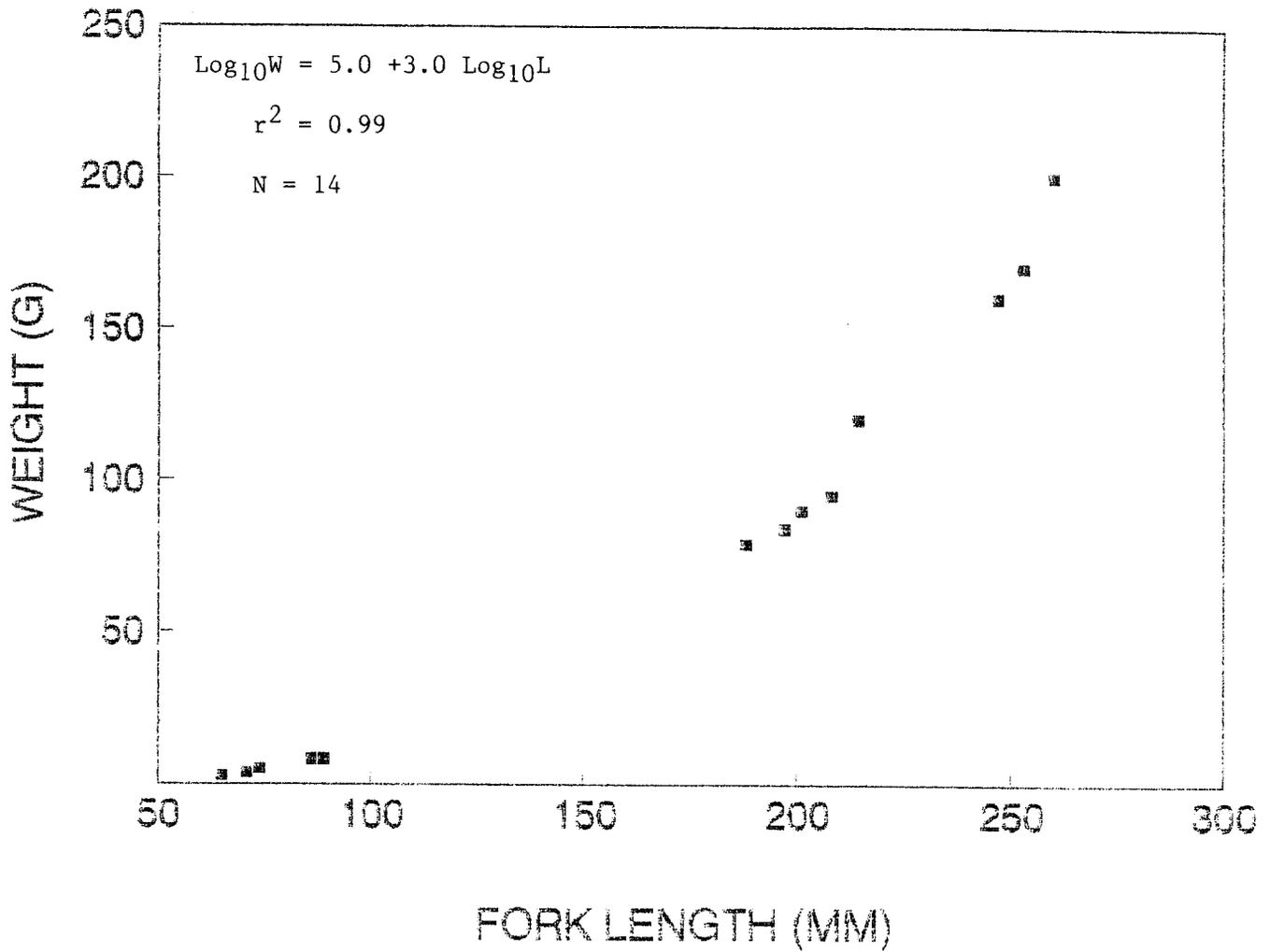


FIGURE 3. The relationship between length and weight of rainbow trout caught in sections of Big Grizzly Creek, 1981.

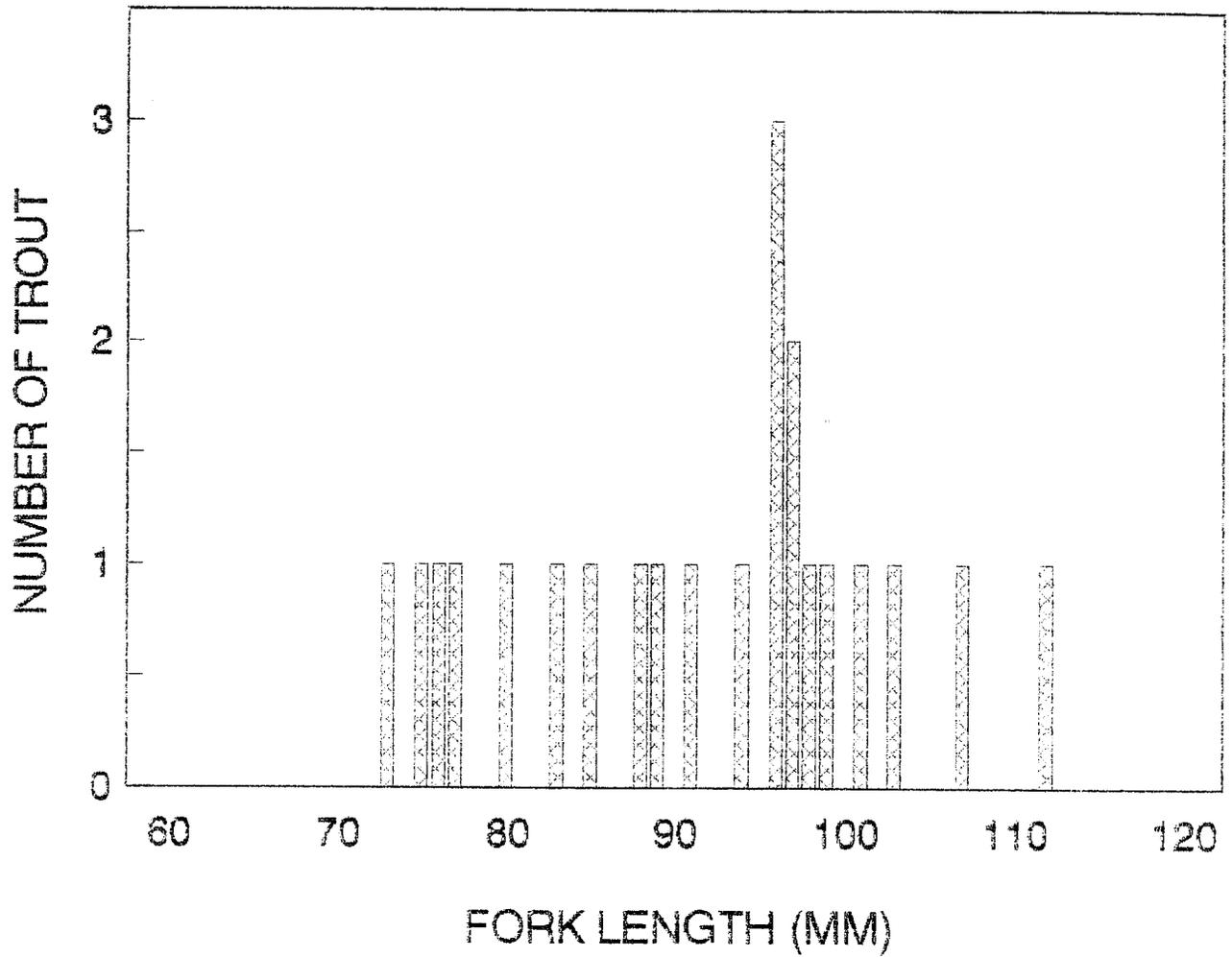


FIGURE 4. Length and observed frequency of age 0+ brown trout caught in Big Grizzly Creek, Plumas County, 1981.

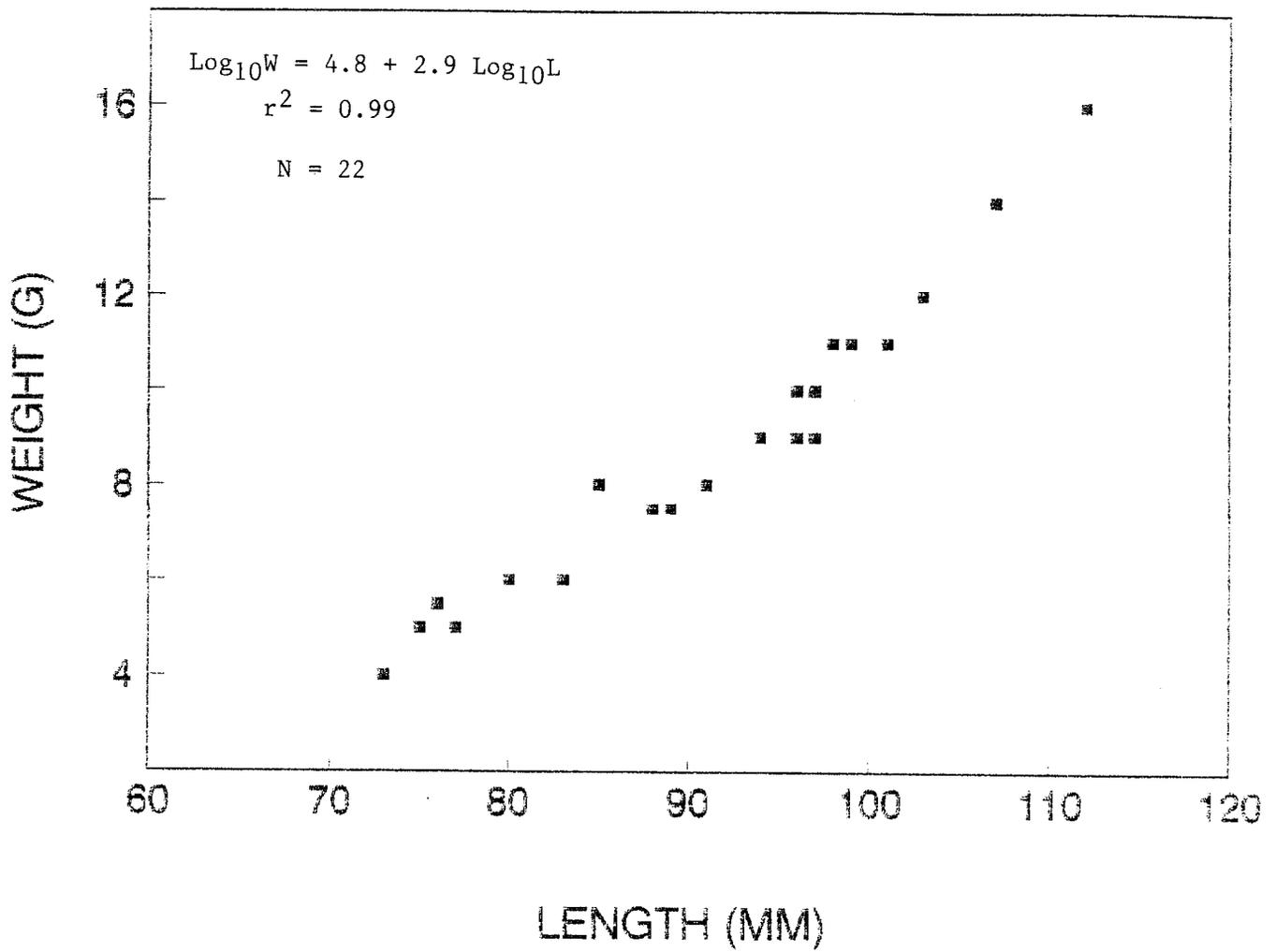


FIGURE 5. The relationship between length and weight of brown trout caught in sections of Big Grizzly Creek, 1981.

Age and Growth

The formula $L = -56.9 + 0.4 S$ describes the relationship between the fork length (L) and enlarged scale radius (S) of 7 rainbow trout caught in Big Grizzly Creek. The coefficient of correlation (r^2) is 0.82. No relationship was developed for brown trout because only two scales could be successfully read.

Instantaneous population growth for rainbow trout was greater than instantaneous mean individual growth (Table 5). Growth rates were not calculated for brown trout.

TABLE 5. Growth Rates for Rainbow Trout Caught in Big Grizzly Creek, 1981.

Age	<u>Population Growth</u>			<u>Mean Individual Growth</u>		
	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx	Length Interval (mm)	Difference of Natural Logarithms	Instantaneous Growth Rate Gx
1-2	99-186	0.631	1.892	103-186	0.591	1.773

Age 1+ rainbow trout averaged 180 mm fork length and age 2+ rainbow trout averaged 244 mm fork length (Table 6).

TABLE 6. Calculated Fork Length of Rainbow Trout from Big Grizzly Creek, 1981.

Age	Number of Fish	Length at Capture	Length at Successive Annulus	
			1	2
1	5	180	99	
2	3	253	98	193
Number of back-calculations			8	3
Weighted means (mm)			99	193
Increments (mm)			99	94

Coefficient of Condition

The average coefficient of condition for 14 rainbow trout was 1.1196 and 1.1138 for 22 brown trout. Brown trout had slightly higher coefficients of condition than rainbow trout (Table 7).

TABLE 7. Condition of Rainbow Trout and Brown Trout in Big Grizzly Creek, 1981.

<u>Age Group</u>	<u>Number of Fish</u>	<u>Coefficient of Condition</u>	<u>95% Confidence Interval</u>
Rainbow trout			
0+	6	1.1248	0.8604-1.3891
1+	5	1.1352	1.0137-1.2568
2+	3	1.0831	1.0066-1.1597
Combined	14	1.1196	0.9248-1.3114
Brown trout			
0+	22	1.1138	0.9714-1.2558

LITERATURE CITED

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APPENDIX 1

PERMANENT FISH POPULATION STATIONS FOR BIG GRIZZLY CREEK, PLUMAS COUNTY SEPTEMBER, 1981

Station 1 (Stream Gage Station) - Station 1 is located 2.5 stream km below Grizzly Valley Dam and just downstream from an abandoned USGS stream gage at an elevation of 1622 m MSL. The station is located 21 m downstream from the concrete weir of the stream gage (UTM) 170 167. The stream within the station is a steep rapid area (67%) with several split channels and small pocket pools that ends in a long, shallow pool (33%). It is 33.5 m long and has a surface area of 485.8 m² at 0.56 cms. Substrate is 75% boulders, 15% rubble, and 10% sand.

Station 2 (IFN Station) - Station 2 is 3.2 stream km below Grizzly Valley Dam. The site located at UTM 176 156 at an elevation of 1610 n MSL. The upper end of the station is a steep rapid (55%) followed by two deep pools (45%) separated by short rapids. The substrate is mostly rubble (60%), boulder (20%), gravel (10%), with areas of sand (10%) in the pools. The station is 35.1 m long with a surface area of 147.4 m² at 0.56 cms.

Station 3 (3-Mile Station) - Station 3 is located 4.8 km downstream from Grizzly Valley Dam at an elevation of 1549 m MSL at UTM 189 141. The station begins in a steep rapid followed by more gradual rapids (75%) with pocket pools and two larger pools (25%) near the lower end. Substrate is boulder (65%), rubble (20%), sand (10%), and gravel (5%). The station is 20.6 m long and has a surface area of 333.7 m² at 0.56 cms.

APPENDIX 2

LENGTH AND NUMBER OF RAINBOW TROUT
CAUGHT IN BIG GRIZZLY CREEK, 1981

Fork Length (mm)	Frequency of Occurrence	Fork Length (mm)	Frequency of Occurrence
65	1	197	1
71	1	201	1
74	2	208	1
86	1	214	1
89	1	247	1
188	1	253	1
		260	1

APPENDIX 3

LENGTH AND NUMBER OF BROWN TROUT
CAUGHT IN BIG GRIZZLY CREEK, 1981

Fork Length (mm)	Frequency of Occurrence	Fork Length (mm)	Frequency of Occurrence
73	1	94	1
75	1	96	3
76	1	97	2
77	1	98	1
80	1	99	1
83	1	101	1
85	1	103	1
88	1	107	1
89	1	112	1
91	1		

APPENDIX 4

LENGTH AND WEIGHT OF RAINBOW TROUT
CAUGHT IN BIG GRIZZLY CREEK, 1981.

Fork Length (mm)	Displacement (ml)	Fork Length (mm)	Displacement (ml)
65	2.5	197	84
71	3.5	201	90
74	5	208	95
74	5	214	120
86	6	247	160
89	8	253	170
188	79	260	200

APPENDIX 5

LENGTH AND WEIGHT OF BROWN TROUT
CAUGHT IN BIG GRIZZLY CREEK, 1981.

Fork Length (mm)	Displacement (ml)	Fork Length (mm)	Displacement (ml)
73	4	96	10
75	5	96	9
76	5.5	96	10
77	5	97	10
80	6	97	9
83	6	98	11
85	8	99	11
88	7.5	101	11
89	7.5	103	12
91	8	107	14
94	9	112	16