

State of California
The Resources Agency
DEPARTMENT OF FISH AND GAME

STANDING STOCKS OF FISHES IN SECTIONS
OF INDIAN CREEK, PLUMAS COUNTY, 1995

by

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INTRODUCTION

In 1976, the Department of Water Resources (DWR) initiated an instream flow study to identify streams that would benefit from flow enhancement to assess instream values required to enhance these streams. The Northern District of DWR selected Indian Creek below Antelope Reservoir (Figure 1) as one of the streams to study under this program. Initial flow studies by DWR indicated that flow augmentation could double trout habitat in the first 16 km of Indian Creek below the dam and increase habitat by 25 percent in lower reaches (DWR 1979). As a result of this study, DWR and the Department of Fish and Game (DFG) reoperated Antelope Reservoir beginning in March 1978 to increase flow releases from 0.1 cms to 0.6 cms year-round during normal and wet years to enhance recreation and fishery values (Hinton 1983). Brown (1993) reported that increased flows had increased trout standing stocks and numbers of catchable trout.

Sampling of salmonids was begun in Indian Creek at six different stations in 1977. Sampling continued through 1982 on a yearly basis to provide baseline data for salmonid biomasses (Brown 1978, Brown and Haines 1979, Haines and Brown 1980, Villa and Brown 1981, Villa 1982, Bumpass et. al. 1987a). Fish were not sampled in 1983, 1984, or 1985. Sampling resumed in 1986 and continued in 1987, 1988, 1989, and 1990 (Bumpass et. al. 1987b, Bumpass and Smith 1989, Bumpass and Brown 1989, Brown 1991a, Brown 1991b, and Brown 1993).

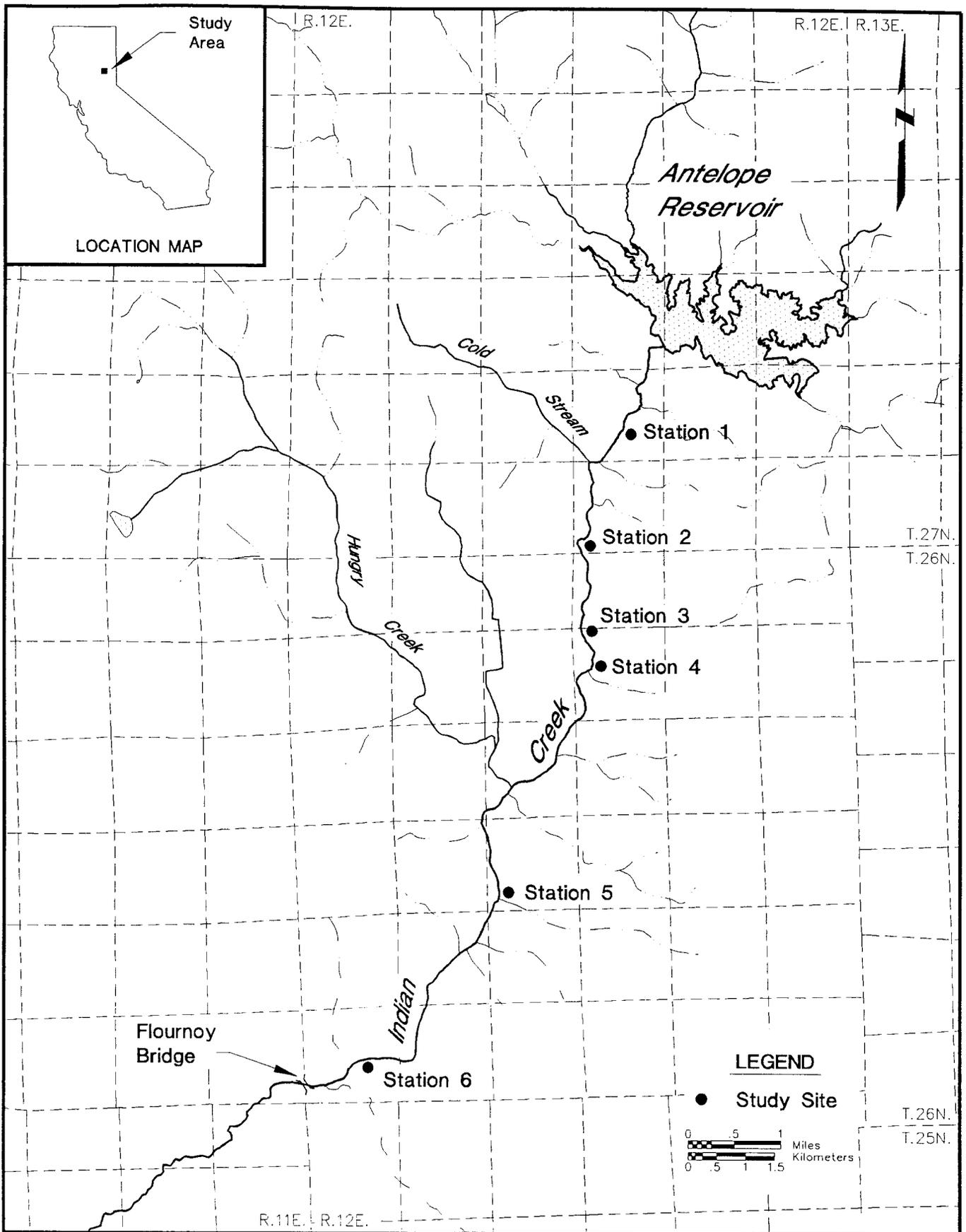


Figure 1. Stations sampled to determine biomass of fishes in Indian Creek, Plumas County, September 1995.

The objective of this study is to estimate the number, age, and growth of trout in previously established stations. 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 summarizing fisheries studies on Indian Creek was published in 1993 (Brown 1993).

STUDY AREA

The Indian Creek study area extends from the stream at the base of Antelope Dam to Flournoy Bridge (Figure 1). The stream flows through rocky canyons and grassy meadows. Elevation in the study area averages 1464 m. Steep hillsides surrounding the stream are covered with pine, cedar, and fir trees. Trees that border the stream are predominantly alder. Indian Creek averages 7m in width in the study area.

Stream flow is a combination of releases from Antelope Dam and inflow from tributaries such as Cold Stream and Hungry Creek. Storms and snow melt can raise flows to flood levels in February, March, April, or May. Significant flooding occurred in 1982, 1983, and 1986. Summer flow is largely comprised of releases from the dam. Flow is 0.14 cms in very dry years, 0.28 cms in dry years, and 0.6 cms in normal or wet years (Hinton and Haines 1981).

Water quality and benthic organisms were sampled in six stations in 1979 in the study area by personnel from the Water Quality and Biology Unit of the Northern District of DWR. Dissolved oxygen averaged 9.8 ppm while pH averaged 7.3. Alkalinity was 44 mg\L as CaCO₃ while turbidity averaged 1.2 FTU. Dominant benthic macroinvertebrates were mayflies of the genus Baetis, stoneflies of the genus Hydropsyche, flies of the subfamily Chironominae, and flies of the genus Simulium (Boles 1980).

NAMES OF FISHES

The following species of fishes were caught in this study: rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), Sacramento sucker (*Catostomus occidentalis*), redear sunfish (*Lepomis microlophus*) and largemouth bass (*Micropterus salmoides*).

METHODS

Physical Measurements

Standing stocks of fishes were estimated at seven stations in Indian Creek (Figure 1 and Appendix 1). Stations were initially selected to be near stations sampled in previous DFG studies (Gerstung 1973). Markers had previously been placed in trees along the stream to identify station boundaries. Stations varied in length from 34.0 to 71.0 m. The length and width of each station was measured with metric tape measures. The depth of water was determined by measuring water depth at the center of five equally spaced intervals across five transects at each station.

Biological Measurements

Fish were captured with a battery-powered electroshocker in stream sections blocked by seines as described by Platts et al (1983). 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 (1951).

The weights of trout and nongame fishes were measured by displacement. Fork length (FL) of each fish caught was measured to the nearest millimeter.

Scale samples were taken from brown trout and rainbow trout over 100 mm in length. Scales were taken just above the lateral line between the dorsal and adipose fin (Scarnecchia 1979) and placed in a piece of paper inserted in a small coin envelope (Drummond 1966). Scales were mounted dry 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. Estimation of instantaneous population growth rate was calculated (Ricker 1975) with significant values of correlation coefficients taken from a table (Steel and Torrie 1960).

$$\text{Instantaneous population growth rate} = b(\log_e l_2 - \log_e l_1)$$

b = between ages functional slope

l_1 = initial length for the last complete year of growth

l_2 = final length for the last complete year of growth

Standing crops of brown trout and rainbow trout were calculated for individual stations where each species was caught and then combined for the entire creek. Age and growth was calculated for the population (Everhart et al. 1975). Length-weight relationships were determined for both brown trout and rainbow trout (Lagler 1956). The coefficient of condition and 95 percent confidence intervals were calculated for all trout (Carlander 1969).

Distribution of all fish caught is listed according to location.

RESULTS

Distribution

Brown trout were caught at stations 1 through 5. Rainbow trout were caught at stations 5 and 6. A channel catfish was caught at station 4. Sacramento suckers and Sacramento squawfish were also caught in station 6 (Table 1).

TABLE 1. Distribution of fishes in sections of Indian Creek, Plumas County, 1995.

| Station Number | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> |
|----------------------------------|----------|----------|----------|----------|----------|----------|
| Distance below Antelope Dam (km) | 1.3 | 3.9 | 5.3 | 6.6 | 12.3 | 21.0 |
| Brown trout | X | X | X | X | X | |
| Rainbow trout | | | | | X | X |
| Sacramento sucker | | | | | | X |
| Sacramento squawfish | | | | | | X |
| Channel catfish | | | | X | | |

Standing Crop

Brown trout were the most common game fish caught in Indian Creek. Biomass averaged 4.5 g/m² at six stations. Biomass for brown trout large enough for anglers to catch and keep (127 mm FL and larger) averaged 4.2 g/m² (Table 2). Rainbow trout biomass averaged 0.4 g/m², while the biomass for catchable trout averaged 0.3 g/m² (Table 3).

TABLE 2. Estimates of brown trout standing crop in Indian Creek, Plumas County, 1995.

| Distance Below Antelope Dam (km) | Population Estimate | 95 Percent Confidence Interval | Biomass (g/m ²) | Estimate of Catchable Trout (≥ 127 mm FL) | Biomass of Catchable Trout (g/m ²) |
|----------------------------------|---------------------|--------------------------------|-----------------------------|---|--|
| 1.3 | 9 | 9-10 | 5.9 | 9 | 5.9 |
| 3.9 | 44 | 43-47 | 5.9 | 40 | 5.9 |
| 5.3 | 32 | 31-36 | 2.9 | 31 | 2.9 |
| 6.8 | 19 | 19-20 | 9.7 | 14 | 8.7 |
| 12.3 | 12 | 11-18 | 1.5 | 7 | 1.5 |
| 21.0 | 0 | 0 | 0 | 0 | 0 |

TABLE 3. Estimates of rainbow trout standing crop in Indian Creek, Plumas County, 1995.

| Distance Below Antelope 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) |
|----------------------------------|---------------------|-------------------------|-----------------------------|---|--|
| 12.3 | 19 | 19-21 | 1.1 | 9 | 0.9 |
| 21.0 | 9 | 9-10 | 1.3 | 7 | 1.1 |

Age and Growth

The formula $FL = 54.8 + 3.3 S$ describes the relationship between the fork length and enlarged scale radius (S) of 136 brown trout caught in Indian Creek. The coefficient of correlation (r^2) is 0.52. The formula was $FL = 97.7 + 2.6 S$ for 12 rainbow trout caught, while the value for r^2 is 0.25.

Both the population instantaneous growth rate and the mean individual instantaneous growth rate were faster in age 1+ brown trout than in age 2+ trout. Population growth was faster than mean individual growth in 1+ fish (Table 4).

Population growth was faster than mean individual growth in age 1+ rainbow trout (Table 5).

TABLE 4. Growth rates for brown trout caught in Indian Creek, Plumas County, 1995.

| Age Interval | Population Growth | | | Mean Individual Growth | | |
|-----------------|----------------------------|--|------------------------------------|----------------------------|--|------------------------------------|
| | Length Interval (mm) | Difference of Natural Logarithms | Instantaneous Growth Rate Gx | Length Interval (mm) | Difference of Natural Logarithms | Instantaneous Growth Rate Gx |
| 1-2 | 85-192 | 0.815 | 2.445 | 91-192 | 0.747 | 2.240 |
| 2-3 | 192-288 | 0.405 | 1.216 | 197-288 | 0.380 | 1.140 |

TABLE 5. Growth rates for rainbow trout caught in Indian Creek, Plumas County, 1995.

| Age Interval | Population Growth | | | Mean Individual Growth | | |
|-----------------|----------------------------|--|------------------------------------|----------------------------|--|------------------------------------|
| | Length Interval (mm) | Difference of Natural Logarithms | Instantaneous Growth Rate Gx | Length Interval (mm) | Difference of Natural Logarithms | Instantaneous Growth Rate Gx |
| 1-2 | 69-141 | 0.715 | 2.144 | 86-141 | 0.494 | 1.483 |

Age 1+ brown trout averaged 160 mm in fork length; 2+ fish averaged 230 mm and 3+ trout averaged 316 mm (Table 6). Age 1+ and 2+ rainbow trout measured 138 mm and 214 mm, respectively (Table 7).

TABLE 6. Calculated fork length of brown trout from Indian Creek, Plumas County, 1995.

| Age | No. of Fish | Length at Capture (mm) | Calculated Lengths at Successive Annuli | | |
|-----------------------------|-------------|------------------------|---|-----|-----|
| | | | 1 | 2 | 3 |
| 1 | 79 | 160 | 85 | - | - |
| 2 | 30 | 230 | 91 | 192 | - |
| 3 | 6 | 316 | 91 | 197 | 288 |
| Number of back-calculations | | | 115 | 30 | 6 |
| Weighted means (mm) | | | 87 | 193 | 288 |
| Increments (mm) | | | 87 | 106 | 95 |

TABLE 7. Calculated fork length of rainbow trout from Indian Creek, Plumas County, 1995.

| Age | No. of Fish | Length at Capture (mm) | Calculated Lengths at a Successive Annuli | |
|-----------------------------|-------------|------------------------|---|-----|
| | | | 1 | 2 |
| 1 | 21 | 138 | 69 | - |
| 2 | 3 | 214 | 86 | 141 |
| Number of back-calculations | | | 22 | 1 |
| Weighted means (mm) | | | 70 | 141 |
| Increments (mm) | | | 70 | 71 |

Length and Weight

Age group 0+ brown trout represented 8 percent of the catch. Ages 1+ and 2+ fish represented 63 percent and 24 percent, respectively, while 3+ fish made up 5 percent (Figure 2). Age group 0+ rainbow trout represented 18 percent of the catch. Ages 1+ and 2+ trout made up 67 percent and 12 percent, respectively, while 3+ fish made up 3 percent (Figure 3). (Appendices 2 and 4).

The relationship between length (L) and weight (W) of brown trout is:

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

$$r^2 = 0.99$$

$$N = 129 \text{ (Figure 4 and Appendix 3)}$$

The same relationship for rainbow trout is:

$$\text{Log}_{10} W = -5.0 + 3.1 \text{Log}_{10} L$$

$$r^2 = 0.99$$

$$N = 33 \text{ (Figure 5 and Appendix 5)}$$

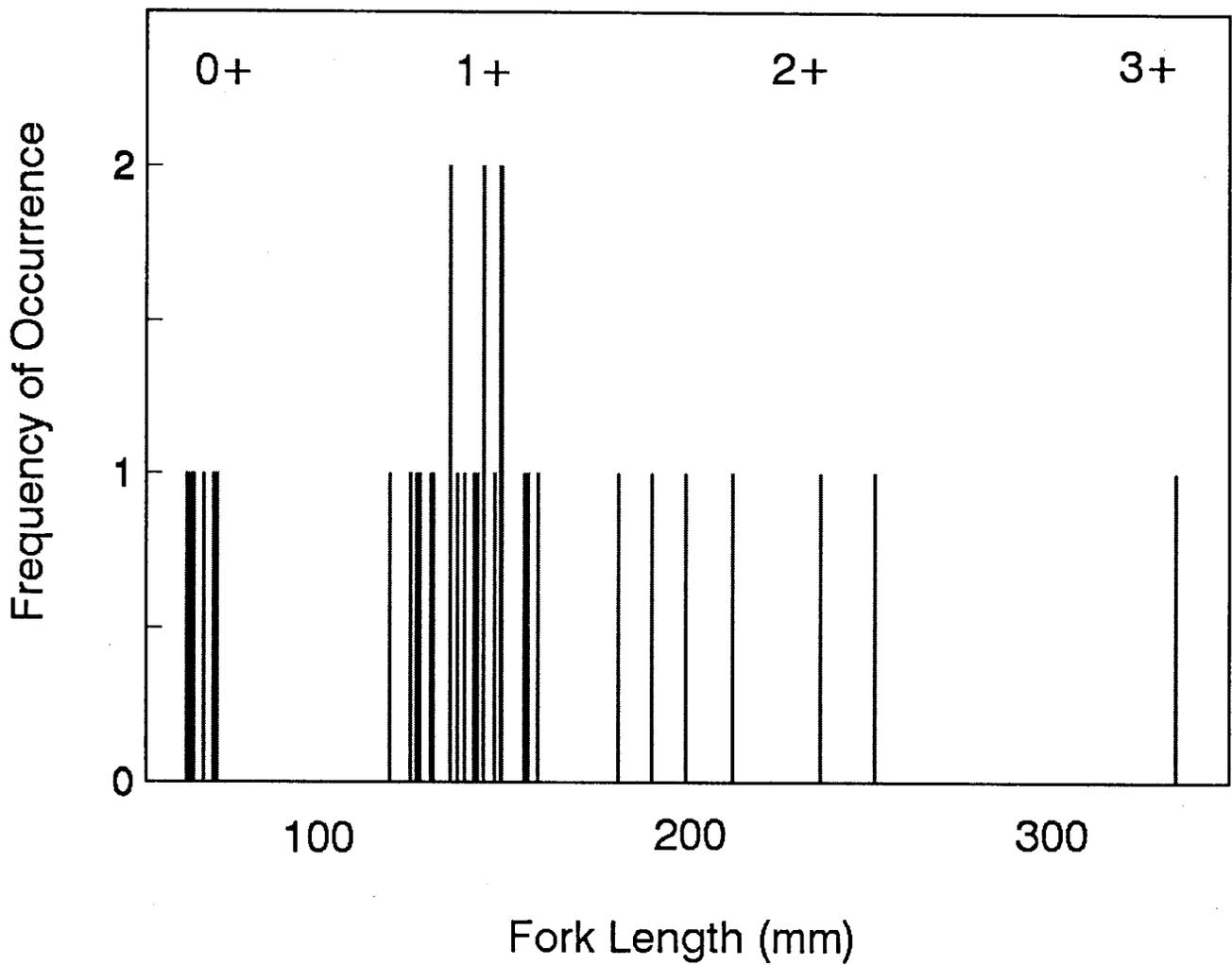


FIGURE 3. Length, observed frequency, and age of rainbow trout caught in Indian Creek, Plumas County, 1995.

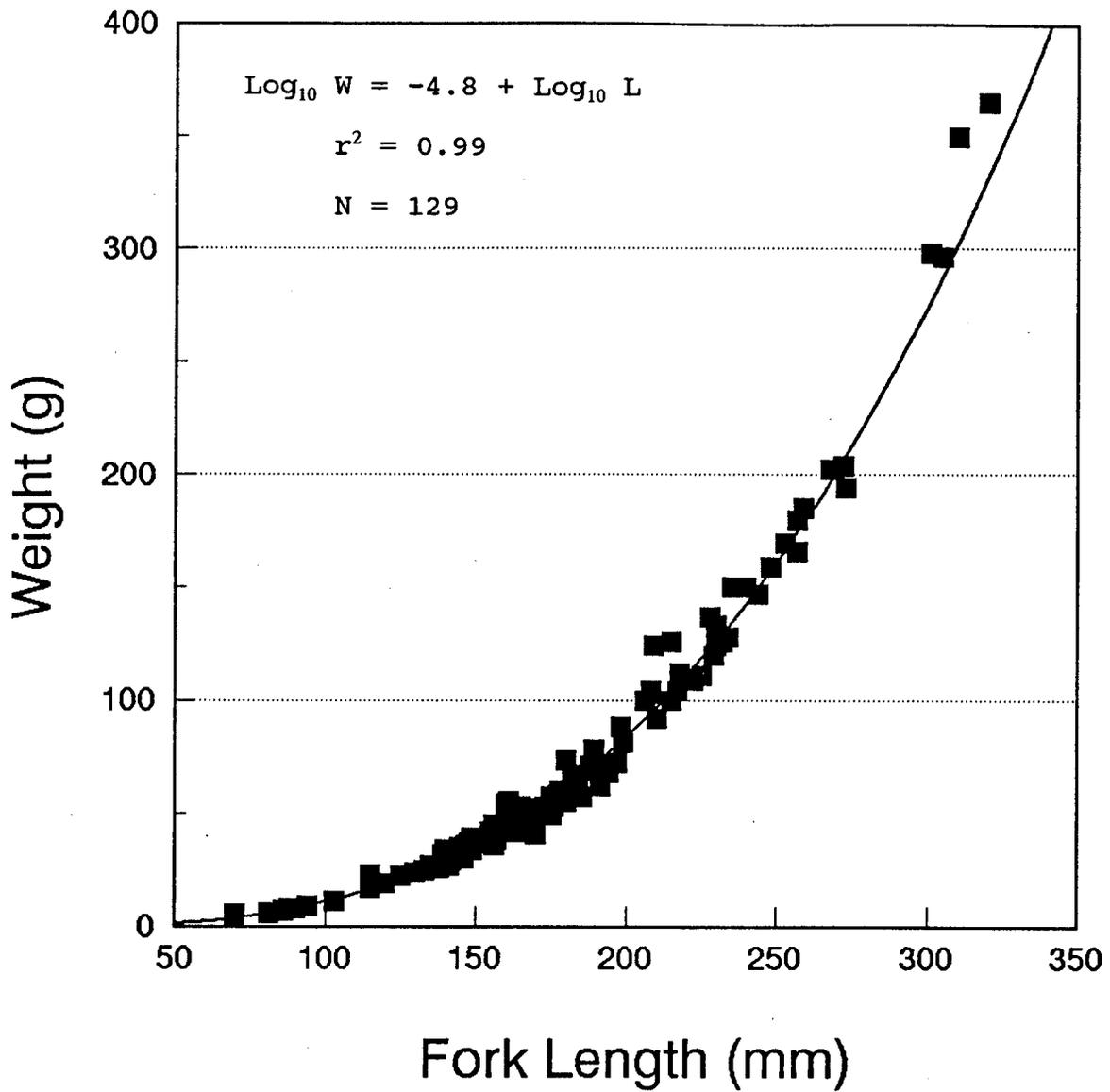


FIGURE 4. The relationship between length and weight of brown trout caught in sections of Indian Creek, Plumas County, 1995.

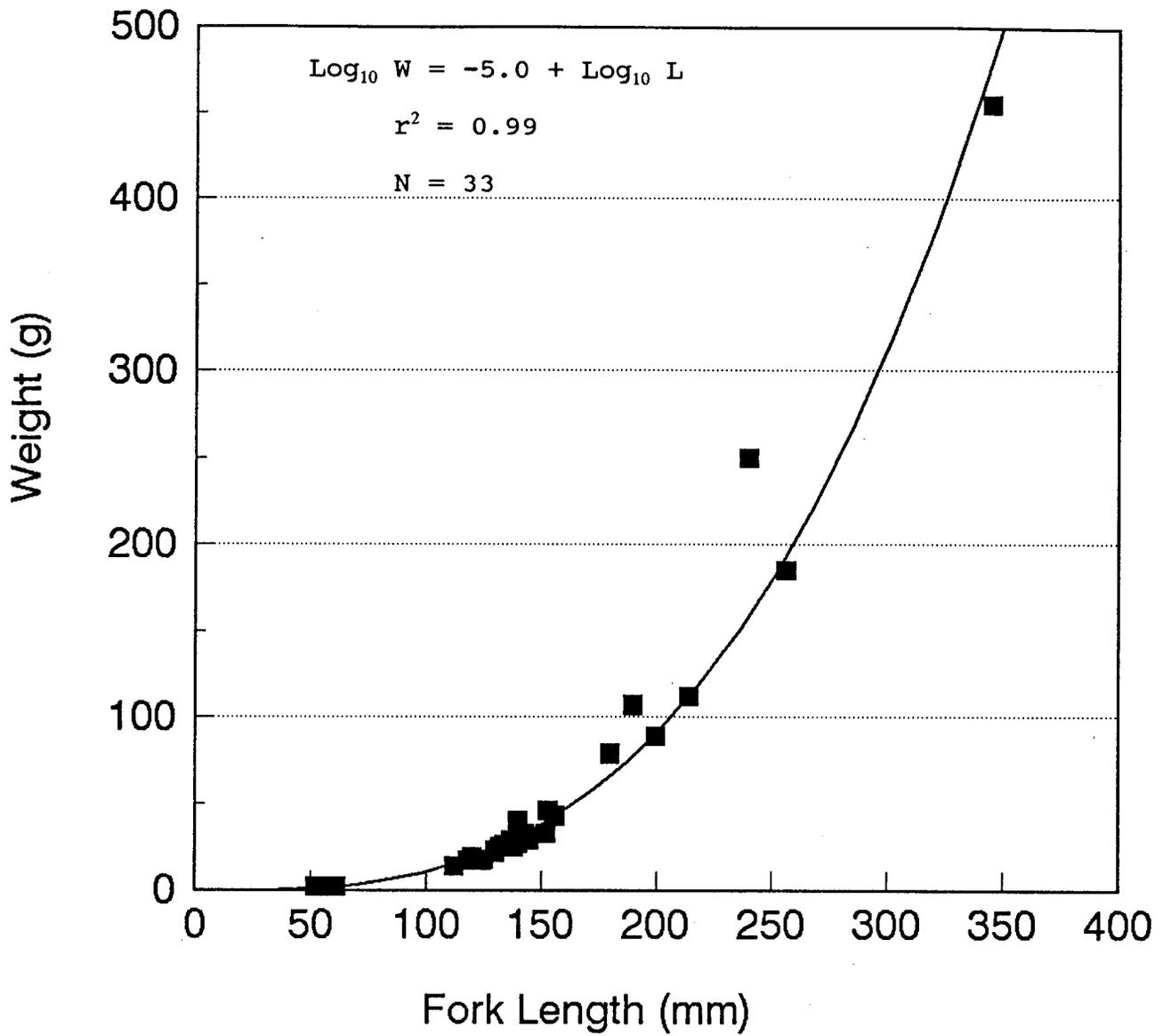


FIGURE 5. The relationship between length and weight of rainbow trout caught in sections of Indian Creek, Plumas County, 1995.

Coefficient of Condition

We calculated the coefficient of condition and 95 percent confidence limits for a total of 129 brown trout and 33 rainbow trout (Table 8).

TABLE 8. Condition of brown trout and rainbow trout in Indian Creek, Plumas County, 1995.

| Age Group | Number of Fish | Coefficient of Condition | 95% Confidence Interval |
|---------------|----------------|--------------------------|-------------------------|
| Brown trout | | | |
| 0+ | 10 | 1.1341 | 0.9104-1.3578 |
| 1+ | 85 | 1.0608 | 0.8599-1.2616 |
| 2+ | 30 | 1.0671 | 0.8967-1.2375 |
| 3+ | 4 | 1.1602 | 1.0141-1.1982 |
| Combined | 129 | 1.0693 | 0.8719-1.2668 |
| Rainbow trout | | | |
| 0+ | 6 | 1.1538 | 0.7531-1.5545 |
| 1+ | 23 | 1.0932 | 0.7661-1.4204 |
| 2+ | 3 | 1.3513 | 0.7202-1.9824 |
| 3+ | 1 | 1.1080 | |
| Combined | 33 | 1.1282 | 0.7202-1.5293 |

DISCUSSION

Population estimates and biomass of both brown and rainbow trout were below most values for previous years (Table 9). Trout populations have not fully recovered from low streamflow that was a result of drought conditions in the early 1990s. Low summer flows reduced available rearing habitat and limited production. Summer flow and trout habitat are related in Indian Creek (Hinton and Haines 1981). The relationship between summer flow and brown trout populations is highly significant ($p < 0.01$), while the relationship between flow and population of all trout is also significant ($p < 0.05$). Catchable-sized trout greatly benefit from higher summer flows. The correlations between flow and catchable brown and rainbow trout are significant ($p < 0.01$) (Brown 1993).

TABLE 9. Population estimates and biomass of rainbow and brown trout in Indian Creek, 1977-1995.

| Date | Rainbow trout | | Brown trout | |
|------|--------------------------------|--|--------------------------------|--|
| | Biomass (g/m ²) | Population Estimate (no/m ²) | Biomass (g/m ²) | Population Estimate (no/m ²) |
| 1977 | 0.7 | 0.01 | 5.7 | 0.16 |
| 1978 | 0.4 | 0.01 | 5.0 | 0.07 |
| 1979 | 1.2 | 0.02 | 4.9 | 0.42 |
| 1980 | 2.7 | 0.07 | 5.8 | 0.16 |
| 1981 | 0.7 | 0.01 | 5.0 | 0.19 |
| 1982 | 0.4 | 0.05 | 4.4 | 0.09 |
| 1986 | 0.9 | 0.04 | 2.8 | 0.03 |
| 1987 | 2.1 | 0.01 | 4.6 | 0.18 |
| 1988 | 0.3 | 0.01 | 5.6 | 0.67 |
| 1989 | 0.6 | 0.01 | 5.7 | 0.12 |
| 1990 | 2.2 | 0.02 | 4.2 | 0.17 |
| 1993 | 0.5 | 0.01 | 4.0 | 0.07 |
| 1995 | 0.4 | 0.01 | 3.9 | 0.07 |
| Mean | 1.1 | 0.02 | 4.8 | 0.19 |

Indian Creek was subjected to high flow during spring of 1995. Few age 0 brown or rainbow trout survived. The abundance of young brown and rainbow trout in Indian Creek is significantly ($P < 0.05$) correlated with spring floods (Brown 1993). Spring floods devastated age 0 trout in Indian Creek in 1982, 1986, and 1993 based on population sampling the following September. High flows in spring destroyed redds, killing eggs, and washing newly emerged trout out of the study area. Spring floods can decimate eggs and young of fall spawning trout (Seegrist and Gard 1972, Hansen and Waters 1974, Harvey 1987). Young-of-the-year brown trout are more strongly affected by floods than adults because of their limited swimming ability and small size. Young-of-the-year rainbow trout are also negatively affected by spring floods (Pearsons et al. 1992). Floods can result in the loss of multiple year classes of rainbow and brown trout due to destruction of eggs and fry and mortality of older trout due to loss of habitat (Hansen and Waters 1974).

Rates of instantaneous population growth were above average for brown and rainbow trout in 1995 (Table 10). Growth was high because the relatively few trout that survived years of low flow were exposed to greatly improved rearing habitat in 1995 as summer flow was increased to 0.57 cms. Growth in Indian Creek could be related to flow because increased flows increase useable habitat for the two elements of food production and cover (Hinton and Haines 1981). These two elements influence productivity, standing crops, and growth (Saunders and Smith 1963, Lewis 1969, Mesick 1968, Wesche et al. 1987, Jowett 1992).

TABLE 10. Estimates of instantaneous population growth rate (g) of brown trout and rainbow trout in Indian Creek.

| Year | Brown trout | | Rainbow trout | |
|------|-------------|---------------|---------------|---------------|
| | <u>I-II</u> | <u>II-III</u> | <u>I-II</u> | <u>II-III</u> |
| 1978 | 2.214 | 0.938 | | |
| 1979 | 1.394 | 1.670 | | |
| 1980 | 2.086 | 1.219 | | |
| 1981 | 1.850 | 1.505 | | |
| 1982 | 2.029 | - | 1.541 | |
| 1986 | 1.777 | 0.965 | 1.242 | 1.151 |
| 1987 | 1.974 | 1.012 | 2.080 | 1.070 |
| 1988 | 2.616 | 0.605 | 1.329 | |
| 1989 | 2.288 | - | 1.856 | |
| 1990 | 2.154 | 1.776 | 2.378 | |
| 1993 | 2.535 | 0.981 | 1.943 | |
| 1995 | 2.445 | 1.216 | 2.144 | |
| Mean | 2.114 | 1.189 | 1.814 | 1.111 |

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APPENDIX 1

FISH POPULATION STATIONS ON INDIAN CREEK,
PLUMAS COUNTY, SEPTEMBER 1995 AT 0.56 CMS

| <u>Station</u> | <u>Distance below Antelope Dam (km)</u> | <u>UTM</u> | <u>Surface Length(m)</u> | <u>area(m²)</u> |
|----------------|---|------------|------------------------------|----------------------------|
| 1 | 1.3 | 035 493 | 45.7 | 297.1 |
| 2 | 3.9 | 025 467 | 55.2 | 452.6 |
| 3 | 5.3 | 024 453 | 39.6 | 249.5 |
| 4 | 6.6 | 010 423 | 67.1 | 342.2 |
| 5 | 12.3 | 009 409 | 48.8 | 444.1 |
| 6 | 21.0 | 982 377 | 37.5 | 213.8 |

APPENDIX 2

LENGTH AND NUMBER OF BROWN TROUT CAUGHT
IN INDIAN CREEK, SEPTEMBER 1995

| <u>Fork Length (mm)</u> | <u>Frequency</u> | <u>Fork Length (mm)</u> | <u>Frequency</u> | <u>Fork Length (mm)</u> | <u>Frequency</u> |
|-------------------------|------------------|-------------------------|------------------|-------------------------|------------------|
| 70 | 1 | 172 | 1 | 268 | 1 |
| 81 | 1 | 173 | 1 | 269 | 1 |
| 86 | 1 | 174 | 1 | 272 | 1 |
| 88 | 1 | 175 | 3 | 273 | 1 |
| 90 | 4 | 176 | 1 | 301 | 1 |
| 94 | 1 | 177 | 1 | 305 | 1 |
| 103 | 1 | 178 | 2 | 310 | 1 |
| 115 | 2 | 180 | 2 | 320 | 1 |
| 120 | 1 | 182 | 1 | | |
| 125 | 1 | 184 | 2 | | |
| 130 | 1 | 185 | 1 | | |
| 133 | 1 | 188 | 2 | | |
| 135 | 1 | 189 | 1 | | |
| 138 | 1 | 191 | 2 | | |
| 139 | 1 | 192 | 1 | | |
| 140 | 2 | 194 | 1 | | |
| 141 | 1 | 197 | 1 | | |
| 142 | 2 | 198 | 1 | | |
| 143 | 2 | 199 | 1 | | |
| 145 | 1 | 206 | 1 | | |
| 146 | 1 | 208 | 2 | | |
| 147 | 1 | 209 | 1 | | |
| 148 | 1 | 201 | 1 | | |
| 149 | 2 | 215 | 2 | | |
| 150 | 2 | 217 | 1 | | |
| 153 | 2 | 218 | 1 | | |
| 154 | 1 | 222 | 1 | | |
| 155 | 4 | 225 | 1 | | |
| 156 | 4 | 228 | 1 | | |
| 157 | 5 | 229 | 1 | | |
| 158 | 1 | 230 | 2 | | |
| 160 | 4 | 232 | 1 | | |
| 161 | 1 | 234 | 1 | | |
| 162 | 1 | 235 | 1 | | |
| 164 | 2 | 240 | 1 | | |
| 165 | 1 | 244 | 1 | | |
| 167 | 1 | 248 | 1 | | |
| 168 | 5 | 253 | 1 | | |
| 169 | 2 | 257 | 2 | | |
| 170 | 2 | 259 | 1 | | |

APPENDIX 3

LENGTH AND WEIGHT OF BROWN TROUT
CAUGHT IN INDIAN CREEK, SEPTEMBER 1995

| <u>Fork Length (mm)</u> | <u>Weight (g)</u> |
|-------------------------|-------------------|-------------------------|-------------------|-------------------------|-------------------|-------------------------|-------------------|
| 70 | 5 | 155 | 42 | 180 | 55 | 259 | 185 |
| 81 | 6 | 156 | 36 | 180 | 73 | 268 | 202 |
| 86 | 7 | 156 | 39 | 182 | 64 | 269 | 202 |
| 88 | 8 | 156 | 40 | 184 | 58 | 272 | 204 |
| 90 | 8 | 156 | 45 | 184 | 67 | 273 | 194 |
| 90 | 8 | 157 | 38 | 185 | 57 | 301 | 298 |
| 90 | 8 | 157 | 39 | 188 | 69 | 305 | 296 |
| 90 | 8 | 157 | 40 | 188 | 71 | 310 | 305 |
| 94 | 9 | 157 | 41 | 189 | 78 | 230 | 365 |
| 103 | 11 | 157 | 43 | 191 | 62 | | |
| 115 | 17 | 158 | 44 | 191 | 68 | | |
| 115 | 23 | 160 | 42 | 192 | 71 | | |
| 120 | 19 | 160 | 43 | 194 | 68 | | |
| 125 | 22 | 160 | 45 | 197 | 72 | | |
| 130 | 24 | 160 | 54 | 198 | 88 | | |
| 133 | 25 | 161 | 45 | 199 | 81 | | |
| 135 | 27 | 162 | 50 | 206 | 100 | | |
| 138 | 26 | 164 | 42 | 208 | 103 | | |
| 139 | 32 | 164 | 49 | 208 | 104 | | |
| 140 | 32 | 165 | 53 | 209 | 124 | | |
| 140 | 34 | 167 | 46 | 210 | 92 | | |
| 141 | 27 | 168 | 44 | 215 | 100 | | |
| 142 | 29 | 168 | 48 | 215 | 126 | | |
| 142 | 31 | 168 | 49 | 217 | 104 | | |
| 143 | 31 | 168 | 50 | 218 | 112 | | |
| 143 | 33 | 168 | 51 | 222 | 109 | | |
| 145 | 35 | 169 | 50 | 225 | 111 | | |
| 146 | 30 | 169 | 52 | 228 | 137 | | |
| 147 | 36 | 170 | 41 | 229 | 120 | | |
| 148 | 37 | 170 | 48 | 230 | 124 | | |
| 149 | 34 | 172 | 49 | 230 | 133 | | |
| 149 | 39 | 173 | 53 | 232 | 126 | | |
| 150 | 38 | 174 | 52 | 234 | 128 | | |
| 150 | 39 | 175 | 49 | 235 | 150 | | |
| 153 | 37 | 175 | 55 | 240 | 150 | | |
| 153 | 37 | 175 | 57 | 244 | 147 | | |
| 154 | 39 | 176 | 53 | 248 | 159 | | |
| 155 | 37 | 177 | 58 | 253 | 170 | | |
| 155 | 37 | 178 | 58 | 257 | 166 | | |
| 155 | 40 | 178 | 60 | 257 | 180 | | |

APPENDIX 4

LENGTH AND NUMBER OF RAINBOW TROUT
CAUGHT IN INDIAN CREEK, SEPTEMBER 1995

| <u>Fork Length (mm)</u> | <u>Frequency</u> |
|---------------------------------|------------------|
| 52 | 1 |
| 53 | 1 |
| 54 | 1 |
| 57 | 1 |
| 60 | 1 |
| 61 | 1 |
| 112 | 1 |
| 118 | 1 |
| 120 | 1 |
| 121 | 1 |
| 124 | 1 |
| 125 | 1 |
| 130 | 1 |
| 130 | 1 |
| 132 | 1 |
| 134 | 1 |
| 137 | 1 |
| 138 | 1 |
| 140 | 2 |
| 143 | 1 |
| 145 | 2 |
| 152 | 1 |
| 153 | 1 |
| 156 | 1 |
| 180 | 1 |
| 190 | 1 |
| 200 | 1 |
| 214 | 1 |
| 240 | 1 |
| 256 | 1 |
| 345 | 1 |

APPENDIX 5

LENGTH AND WEIGHT OF RAINBOW TROUT
CAUGHT IN INDIAN CREEK, SEPTEMBER 1995

| <u>Fork Length (mm)</u> | <u>Weight (g)</u> |
|---------------------------------|-----------------------|
| 52 | 2 |
| 53 | 2 |
| 54 | 2 |
| 57 | 2 |
| 60 | 2 |
| 61 | 2 |
| 112 | 14 |
| 118 | 17 |
| 120 | 19 |
| 121 | 18 |
| 124 | 17 |
| 125 | 18 |
| 130 | 23 |
| 130 | 22 |
| 132 | 25 |
| 134 | 26 |
| 137 | 29 |
| 138 | 25 |
| 140 | 27 |
| 140 | 40 |
| 143 | 33 |
| 145 | 29 |
| 145 | 30 |
| 152 | 33 |
| 153 | 46 |
| 156 | 43 |
| 180 | 79 |
| 190 | 107 |
| 200 | 89 |
| 214 | 112 |
| 240 | 250 |
| 256 | 185 |
| 345 | 455 |