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FISH & GAME DEPARTMENT

Joseph C. Greenley, Director

SNAKE RIVER FISHERIES INVESTIGATIONS

Job Performance Report

Project F-63-R-3

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Job III-b (Part I). Survey of Fish Populations in the Snake River from Grandview, Idaho to C. J. Strike Dam

Period Covered: 1 March 1974 to 28 February 1975

by

Harry Gibson
Senior Fishery Research Biologist

May, 1975

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JOB PERFORMANCE REPORT

State of Idaho Name: SNAKE RIVER FISHERIES INVESTIGATIONS

Project No. F-63-R-3 Title: Survey of Fish Populations in the Snake River from Grandview, Idaho to C. J. Strike Dam

Job No. III-b, (Part I)

Period Covered: 1 March 1974 to 28 February 1975

ABSTRACT:

We used electrofishing equipment to assess fish species distribution and relative abundance in the Snake River from Grandview, Idaho to C. J. Strike Dam.

This river section contains at least 14 fish species. Game fish total seven species of which principal species of catchable size are mountain whitefish, black crappie and largemouth bass. Both wild and hatchery rainbow trout are present in this river section although we captured only hatchery rainbow of catchable size.

Catchable size game fish composed 11.7% of the total electrofishing sample or 80.7% of the game fish sample. Nongame fish comprised 85.5% of our sample with carp and suckers occurring most frequently in our electrofishing catch.

Most of the captured game fish species were well distributed in the study area although concentrated in preferred habitat types. Black crappie were the most equally distributed of the game fish. Mountain whitefish, found in most sections of the study area, were captured in largest numbers from a pool immediately below C. J. Strike Dam.

Hook and line catches of white sturgeon indicate a viable reproducing population of this game species.

We completed the first facet of this project from the Brownlee flow line to the proposed Guffey Dam site (near Murphy, Idaho) in 1973.

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RECOMMENDATIONS:

Although bank access is plentiful in this section of the river, a boat ramp, usable at all flows, is needed for boat access both up and downstream from Grandview, Idaho.

Place brush piles in locations where they will not wash away at high flows. As we also found in the Snake River in 1973 (Gibson 1974), game fish occupied predominately brush-type habitat.

As the white sturgeon is rare and endangered in Idaho, we should initiate further research that would contribute to the proper management and perpetuation of this species. This research should include age and growth, food habits and movement and population estimates.

OBJECTIVES:

To survey fish populations in the Snake River from Grandview, Idaho to C. J. Strike Dam.

INTRODUCTION:

The overall objective of the Snake River fisheries investigation is to make a physical and biological survey of the Snake River upstream from the Brownlee Reservoir flow line (Cobb Rapids). This survey will provide data to fishery managers for planning the assessment of the impact of proposed water projects. In addition, the data will provide a basis for evaluation of some future physical, chemical and biological changes in the Snake River.

This report covers a fish population survey from Grandview to C. J. Strike Dam (Fig. 1). We completed the portion of the study from the Brownlee flow line to the proposed Guffey Dam site in 1973 (Gibson 1974).

TECHNIQUES USED:

We achieved good success in using electrofishing equipment for fish collections in the Snake River in 1973 (Gibson 1974), and we continued using the same type of apparatus: a variable voltage pulsator (0-600 DC) powered by a 2000 watt portable generator. This equipment was mounted in a 4.9 m (16 ft) aluminum jet boat (Gibson 1974). Our negative electrodes, two strips of aluminum, 3.4 m (11 ft) long, 15.2 cm (6 in) wide, were insulated and fixed to the bottom of the boat. The bow capture net was the positive electrode.

We obtained our greatest fish capturing efficiency with half-pulsed direct current for 2 to 5 seconds and automatically switching to cortinuous direct current until we broke the circuit. Fish in an electrical field of pulsed direct current exhibit stronger galvanonarcosis (inability of fish to swim due to narcosis), and those in continuous direct current show more galvanotaxis (tendency to swim toward the positive electrode). Fish in half-pulsed direct

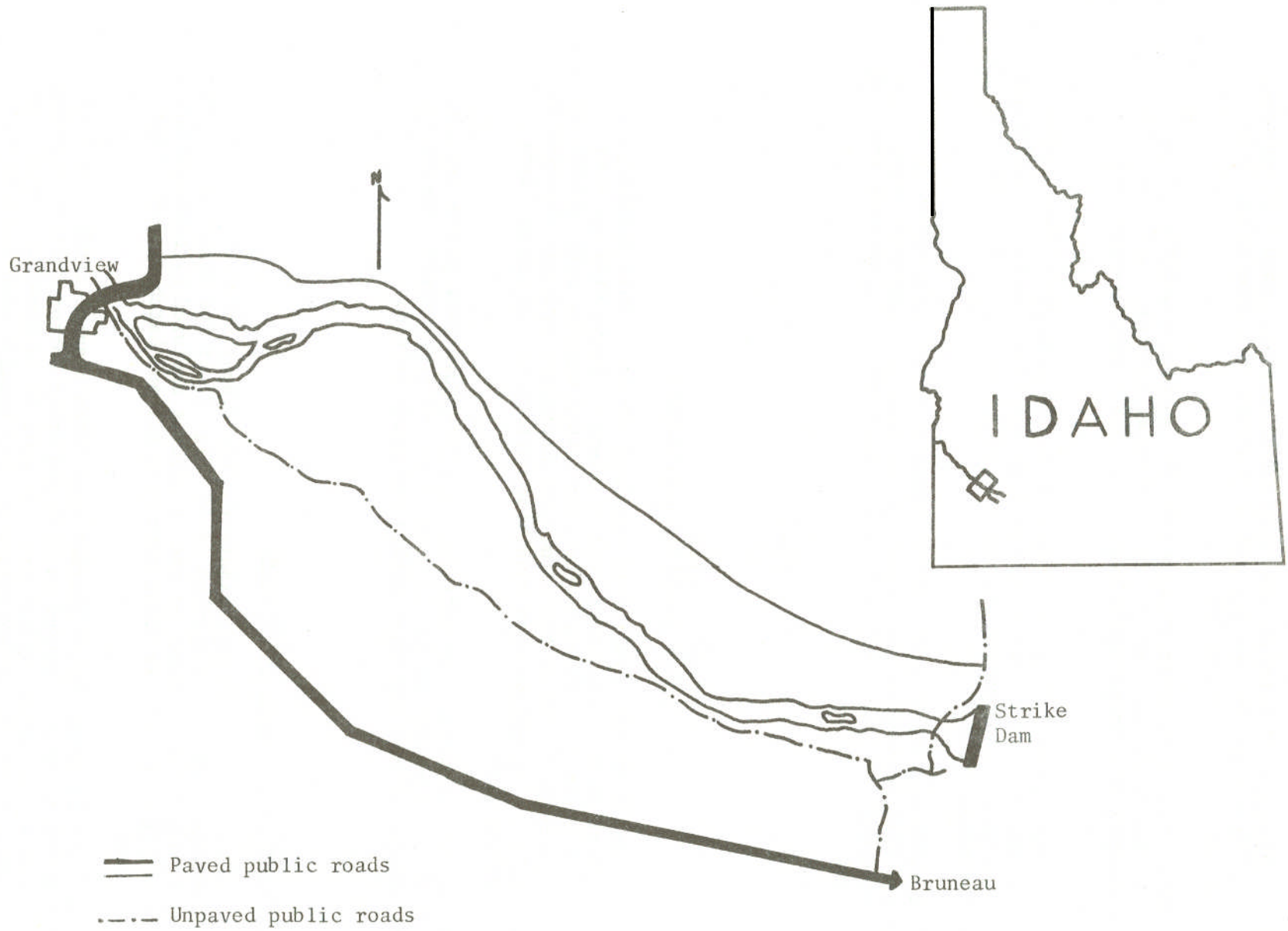


Figure 1. Snake River study area from Grandview, Idaho upstream to C. J. Strike Dam, 1974.

current exhibit greater galvanotaxis but less galvanonarcosis than full-pulsed direct current. Fish were stunned and unable to escape the electrical field and then attracted to the positive net.

All captured fish were enumerated by species, section and habitat type, and their total length was measured to the nearest millimeter. All game fish species were weighed on a triple beam balance to obtain length-weight relationships.

I assessed the age of salmonids, centrarchids and coregonids from scales removed from a sample of fish. We collected stomachs from a sample of whitefish for food habit studies. Nongame fish greater than 300 mm (11.8 in) were enumerated but not taken aboard.

The fish condition factor indicates suitability of an environment or is used to compare fish between areas, or within the same area (between changes in time or environment). I calculated condition factors (K) for game fish from the following formula:

$$K = \frac{10^5 W}{L^3}$$

W = weight in grams
L = total length in millimeters

Rounsefell and Everhart (1953) used standard length in this formula, but I used total length as most fish measurements taken by Idaho Fish and Game personnel are total length. As fish grow older, they usually gain proportionately more in weight than in length so the value of K increases with age (Rounsefell and Everhart 1953). I assessed mean condition factors for age groups from a sample of collected fish.

We collected fish population data on 9 and 10 August 1974 from 8 sections at 1.8 km (1.1 mi) intervals in the 12.9 km (8 mi) of study river. We electrofished both shorelines and any coves within the study section.

FINDINGS:

Fish species and relative abundance

We captured 1,467 fish in approximately 2,812 lineal meters (3,075 yds) of electrofishing. Game fish comprised 14.4° (Fig. 2) of the sample at a catch rate of 45.1 fish per hour. Seven of the 14 species captured by electrofishing were game fish (Table 1), and we found both wild (2) and hatchery (5) rainbow trout in the study area.

Goodnight (1972) found that fishermen also catch channel catfish in this section of the Snake River. Channel catfish and other bottom dwelling species such as sculpins and bullhead catfish are difficult to capture by electrofishing as they are difficult to see on the bottom and are usually swept away by the current.

Table 1. Catch per hour and per 91.4 m (100 yd) section for the 14 fish species captured by electrofishing on the Snake River from Grandview, Idaho to C. J. Strike Dam, 1974.

	Species	Fish per hour electrofishing	Fish per 91.4 m (100 yd) electrofishing
Carp	*Cyprinus carpio*	138.7	21.2
Sucker	*Catostomus sp.*	119.9	17.1
Mountain whitefish	*Prosopium williamsoni*	23.6	3.6
Black crappie	*Pomoxis nigromaculatus*	13.8	2.1
Northern squawfish	*Ptychocheilus oregonensis*	11.5	1.8
Peamouth	*Mylocheilus caurinus*	4.3	0.6
Largemouth bass	*Micropterus salmoides*	2.9	0.5
Pumpkinseed	*Lepomis gibbosus*	1.3	0.2
Bluegill	*Lepomis macrochirus*	1.1	0.16
Rainbow trout (hatchery)	*Salmo gairdneri*	1.1	0.16
Yellow perch	*Perca flavescens*	0.8	0.10
Rainbow trout (wild)	*Salmo gairdneri*	0.4	0.06
Chiselmouth	*Acrocheilus alutaceus*	0.2	0.03
Sculpin	*Cottus sp.*	0.2	0.03
Redside shiner	*Richardsonius balteatus*	0.2	0.03

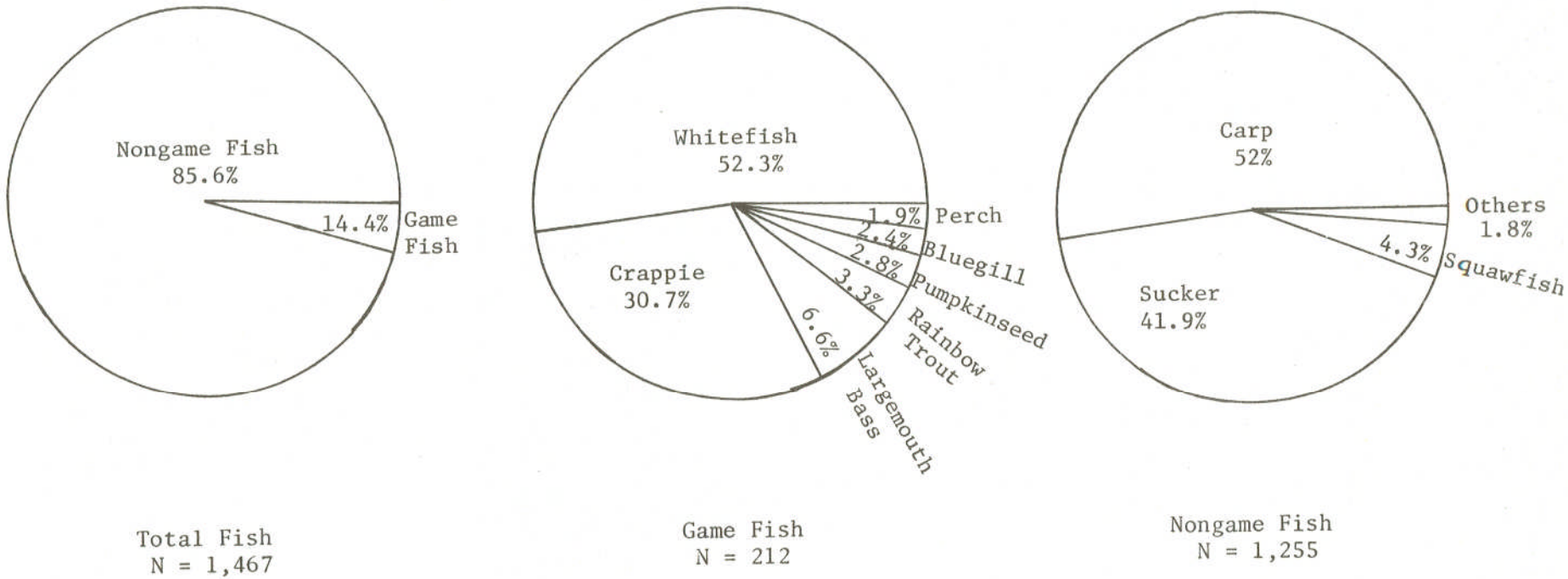


Figure 2. Percentage composition for total fish, game fish and nongame fish in an electrofishing sample, Snake River (Grandview, Idaho to C. J. Strike Dam), 1974.

In 1972 we captured brown bullhead by electrosampling (Goodnight and Bowler 1973) in that section of the Snake River below Grandview, Idaho. This species is probably present in the section from Grandview upstream to Strike Dam as these two river sections are uninterrupted and similar in bank cover and bottom type.

Mountain whitefish and black crappie were the most prevalent game fish, while carp and suckers occurred most often in the nongame fish sample. In this section of the river, we always found crappie if the preferred habitat was present: water greater than .6 to .9 m (2 to 3 ft) deep with abundant subsurface brush.

Hatchery fish plants

From October 1972 to August 1974, the U. S. Hagerman Hatchery planted this section of the Snake River with rainbow trout 10 times (County Fish Planting Summary 1973 and 1974). The last planting date in this interval was 5 March 1974. A total of 6,812 catchables, over 150 mm (6 in) long, or 1,456 kg (3,211 lb) were planted in the period from October 1973 to August 1974, and 4,000 catchables or 552 kg (1,216 lb) were planted from October 1972 to September 1973.

Channel catfish were planted once during the October 1972 to August 1974 period by the U. S. Miles City Hatchery (County Fish Planting Summary 1973 and 1974). On 10 September 1973, they planted 9,976 fingerlings 76 to 150 mm (3 to 6 in) or 26 kg (58 lb).

Length data

Five game fish species (Table 2) caught had individual fish of catchable size, 150 mm (6 in) or more, which totaled 80.7% of captured game fish. Only one captured whitefish was less than 280 mm (11 in) (Fig. 3). Black crappie ranged from 36 to 230 mm (1.4 to 9.1 in) in total length (Fig. 3), and large-mouth bass from 50 to 418 mm (2.0 to 16.5 in) (Fig. 3). Hatchery rainbow trout were greater than 270 mm (10.6 in) and predominately in the 300 to 380 mm (11.8 to 15.0 in) size class. Two of the four perch captured were of catchable size and the maximum size was 210 mm (8.3 in).

The 2 wild rainbow trout were 110 and 130 mm (4.3 and 5.1 in) in length. The 6 pumpkinseed ranged from 60 to 120 mm (2.4 to 4.7 in), and the 5 bluegill were from 70 to 130 mm (2.8 to 5.1 in) in total length.

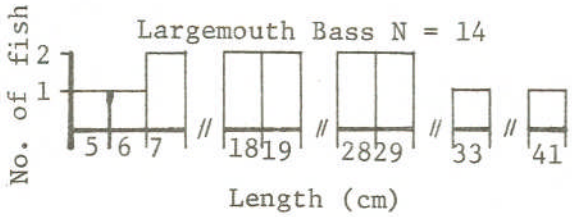
Carp, suckers and squawfish (Fig. 4) are largely represented by adults over 300 mm (11.8 in). The single chiselmouth, redside shiner and sculpin were 250 mm (9.8 in), 140 mm (5.5 in) and 80 mm (3.1 in), respectively, in total length. The 20 peamouth captured ranged in size from 40 to 80 mm (1.6 to 3.1 in) (Fig. 4).

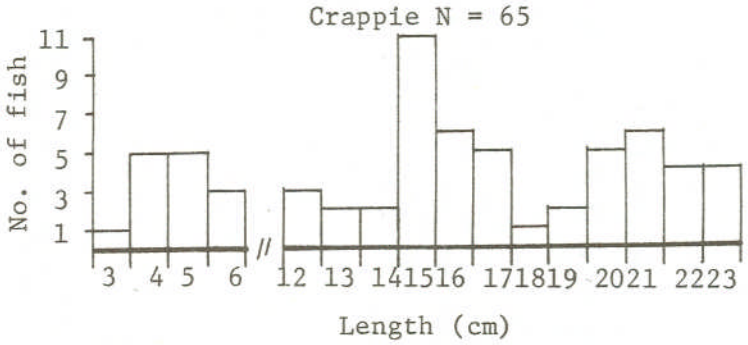
Fish condition and age

I calculated condition factors for the game fish I could definitely age. Most scales from fish over 6 years old contained indistinct and crowded annuli

Table 2. Number of catchables, 150 mm (6 in) or more total length, and percent as catchables of five game fish species captured by electrofishing in the Snake River (Grandview upstream to C. J. Strike Dam), 1974.

Species	Number of catchables	Percent as catchables
Mountain whitefish	110	99
Black crappie	44	68
Largemouth bass	10	71
Rainbow trout (hatchery)	5	100
Perch	2	50





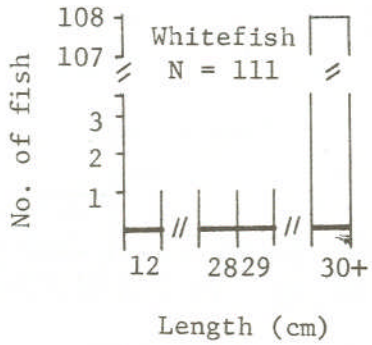


Figure 3. Length frequencies for mountain whitefish, black crappie and largemouth bass in an electrofishing sample from the Snake River (Grandview, Idaho to C. J. Strike Dam), 9 and 10 August 1974.

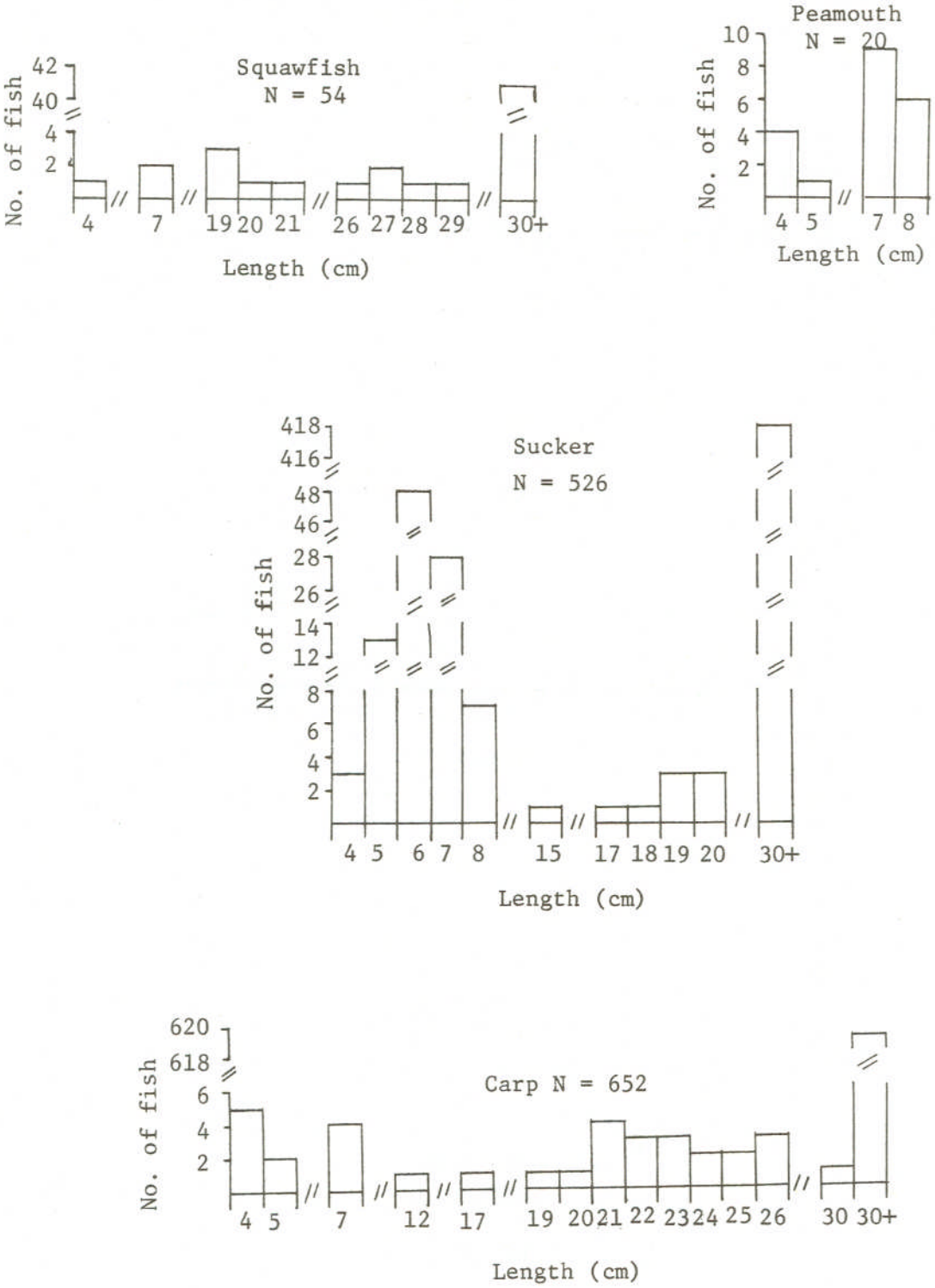


Figure 4. Length frequencies for carp, sucker, northern squawfish and peamouth in electrofishing sample from the Snake River (Grandview, Idaho to C. J. Strike Dam), 9 and 10 August 1974.

and I was unable to read them with certainty. The condition factor was then averaged for each species age group (Table 3).

The average condition factor (my calculation) for eight mountain whitefish, 117 to 416 mm (4.6 to 16.4 in) total length from the Logan River, Utah (Sigler 1951) was 1.00. Except for one 0+ fish, whitefish in our sample are similar in condition to those reported by Sigler.

The K factors of largemouth bass in our sample are similar to those reported by Lynch et. al. (1953) for bass in Two Buttes Reservoir, Colorado (K = 1.60, my calculation). However, our sample of bass are in better condition than those noted by Beckman (1949) in Michigan averaging 1.21 (my calculation).

Ritchie (1973) reported the following condition factors he averaged from other researchers work: black crappie (300 mm) 1.42 and bluegill (200 mm) 2.23. The K factors in our sample of black crappie are higher than Ritchie's, whereas those for our bluegill are lower than Ritchie's averages.

Carland (1944) established standards for the condition of pumpkinseed in Minnesota. He considered those pumpkinseed with a K condition factor (my conversions) less than 1.85 in poor condition, those from 2.20 to 2.76 in average condition and those with a K of 3.05 in excellent condition. The few pumpkinseed we captured were poor to average in condition in comparison with this species in Minnesota.

The condition of the yellow perch in our sample was average to excellent when compared with the Carlander (1944) standards (my conversions) for perch of poor, under 1.13; average 1.19-1.36; and excellent, over 1.47.

Length-weight relationships

We captured only three game fish species in large numbers suitable for length-weight relationships: black crappie and mountain whitefish (Fig. 5), and largemouth bass (Fig. 6). Length-weight relationships of black crappie and largemouth bass we collected in 1974 are very similar to those plotted by Gibson (1974) for fish species captured in the Snake River from the Brownlee flow line to the proposed Guffey Dam site. We captured fewer whitefish less than 300 mm (11.8 in) than did Gibson in 1973 making it difficult to compare relationships.

Species distribution

We found most captured game fish species well distributed in the study area, but some species were found in large numbers in "preferred" sections. Whitefish were found predominately below C. J. Strike Dam in a 5-ft or deeper pool with a spring inflow. Crappie were the most equally distributed of the game fish and were found in water greater than 1.5 m (3 ft) deep with heavy brush cover (Fig. 7). Largemouth bass preferred this same type habitat but were not as equally distributed as crappie.

Hatchery rainbow trout were found only below the dam in the deeper and faster water while the 2 wild rainbow trout were found near Grandview and about 1.6 km (1 mi) below the dam. Perch, pumpkinseed and bluegill, captured in small

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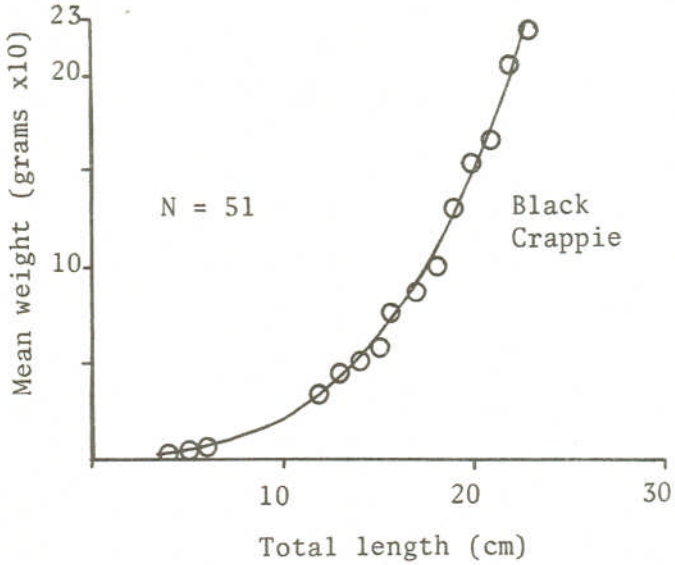

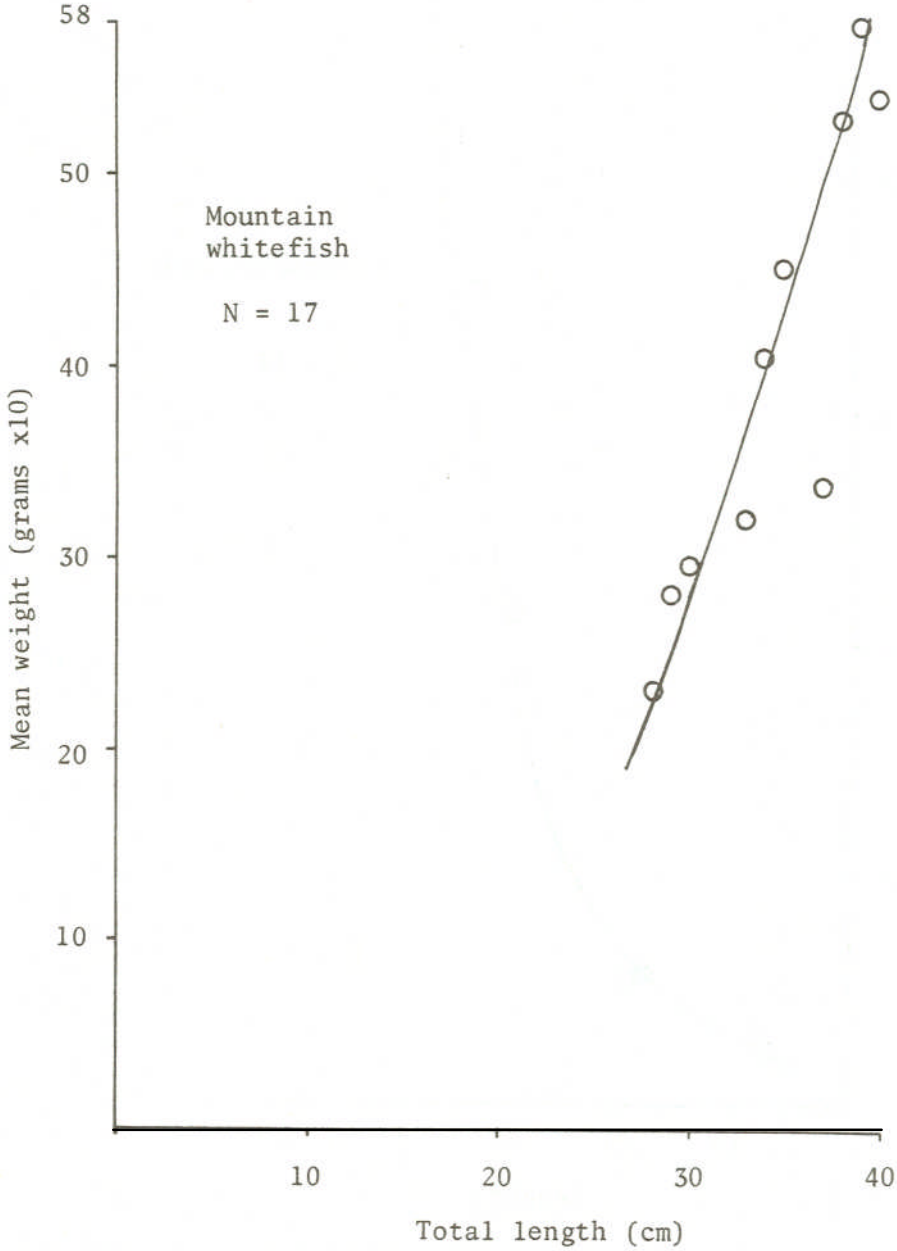

Figure 5. Length-weight relationship for mountain whitefish and black crappie in electrofishing sample from the Snake River (Grandview, Idaho to C. J. Strike Dam), 9 and 10 August 1974.

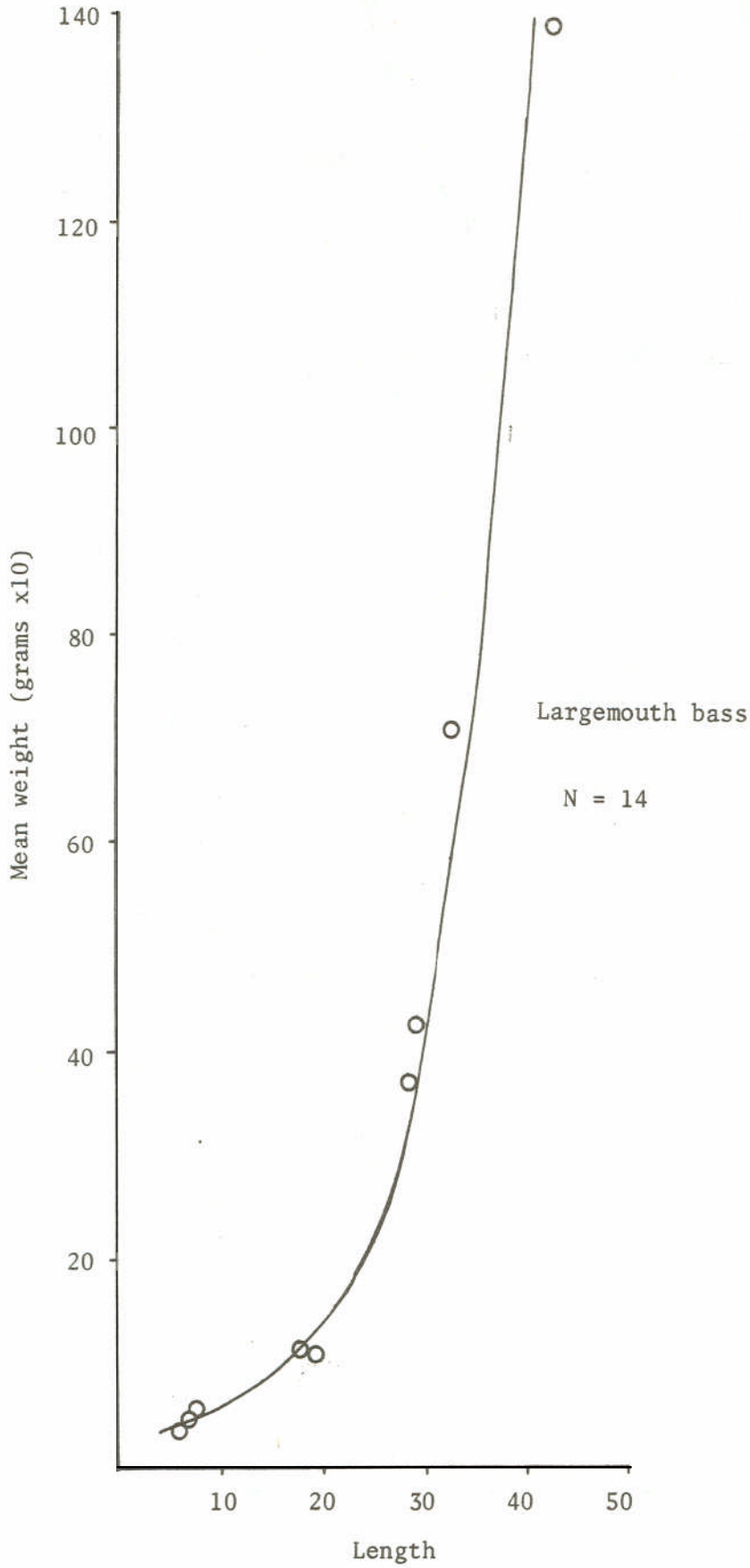

Figure 6. Length-weight relationship for largemouth bass in electrofishing sample from the Snake River (Grandview, Idaho to C. J. Strike Dam), 9 and 10 August 1974.

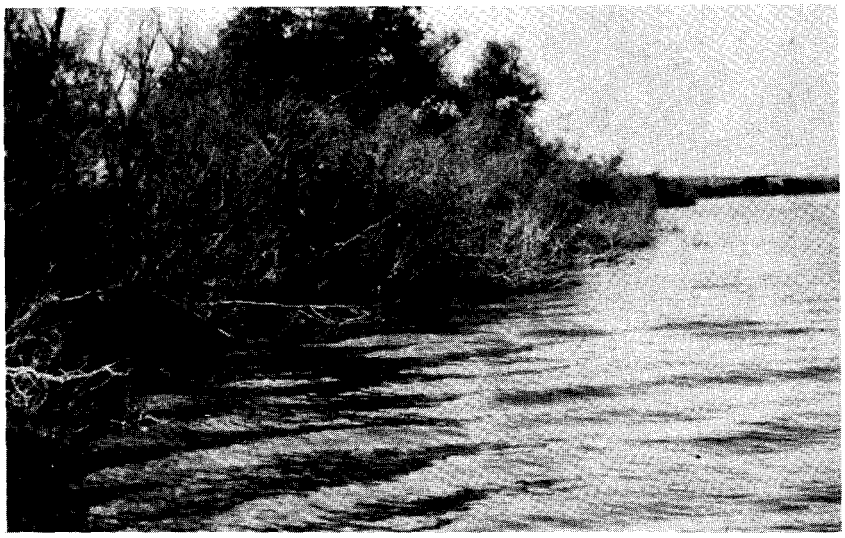

Figure 7. Habitat type water occupied by game fish species in the Snake River (Grandview, Idaho to C. J. Strike Dam) 1974.

Figure 8. Habitat type water usually occupied only by nongame fish species in the Snake River (Grandview, Idaho to C. J. Strike Dam) 1974.

numbers, were also found near Grandview and 1.6 km (1 mi) downstream from the dam in deep brushy-type water.

Carp, suckers and squawfish, the three most common nongame fish species, were captured in all electrosampling sections in the study area. They preferred the shallow sloping beaches with mud or sand bottom and no cover (Fig. 8). Few game fish were found on these beaches.

Sturgeon presence

In 1971, a fisherman captured a 965 mm (38 in) white sturgeon, *Acipenser transmontanus*, from this section of the Snake River (Goodnight 1972). To determine the continued presence of sturgeon, Herb Pollard (Region 3 Fishery Manager) initiated a study to hook and line capture, and tag sturgeon in this river section. Sixteen sturgeon, from 355 mm (14 in) to 660 mm (26 in) in length, were captured plus one recapture.

These smaller fish indicate a viable, reproducing population of sturgeon in this free-flowing river section below C. J. Strike Dam. It should be noted that the regulated flows below the dam limit the production of a staple food in the sturgeon diet, the freshwater mussel, to the minimum flow line, Because of the decreasing food supply, research should be initiated to monitor the future well being of the sturgeon in this area.

Food habits of mountain whitefish

We collected 15 whitefish stomachs from mountain whitefish captured by electrofishing in a deep pool below C. J. Strike Dam. Ten stomachs were empty, one from a 401 mm (15.8 in) fish and nine from 201 to 300 mm (7.9 to 11.8 in) whitefish. A 285 mm (11.2 in) whitefish had consumed only green alga, *Spirogyra sp*. In the 201 to 300 mm (7.9 to 11.8 in) size class, two fish had consumed only sticks, one consumed grass and one had eaten an immature Lepidoptera (aquatic moth) of the family Pyralidae.

Access evaluation

Only one constructed boat ramp is located in the Snake River from Grandview, Idaho, upstream to C. J. Strike Dam. This concrete ramp, in Grandview, is in poor condition and is usable only at high flows because of the deep drop off at the lower end.

There are many spots where a fisherman can bank fish after obtaining permission from the owner. Idaho Power Company also furnishes bank access to the river immediately below the dam.

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