IDAHO
DEPARTMENT OF FISH & GAME

Jerry M. Conley, Director

FEDERAL AID TO FISH AND WILDLIFE RESTORATION

Job Performance Report

Project F-73-R-2

SUBPROJECT IV: RIVER & STREAM INVESTIGATIONS

Study VII. Snake River Fisheries Investigations

Job I a. Survey of Fish Populations in Snake River, Lower Salmon Falls Dam to Bliss Dam

Job I b. Survey Status of White Sturgeon Population in Snake River, Bliss Dam to CJ Strike Dam

Period Covered: 1 March 1979 to 29 February 1980

by

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August, 1980

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ACKNOWLEDGMENTS

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JOB PROGRESS REPORT

State of Idaho

Name: SNAKE RIVER FISHERIES INVESTIGATIONS

Project No. F-73-R-2

Title: Survey of Fish Populations in Snake River, Lower Salmon Falls Dam to Bliss Dam

Job No. I a

Period Covered: 1 March 1979 to 28 February 1980

ABSTRACT

Electroshocking equipment was used to assess fish species distribution and relative abundance in the Snake River between Lower Salmon Falls Dam and Bliss Dam. The study section encompasses 20.8 km (12.9 mi) of Snake River of which 12.7 km (7.9 mi) is free flowing.

Eleven fish species were observed, two of which were game fish, rainbow trout and mountain whitefish. Nongame fish comprised 97.1% of total fish in the free flowing section and 99.6% of fish in Bliss Pool.

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RECOMMENDATIONS

Smallmouth bass have been documented in the Snake River between Lower Salmon Falls Dam and Bliss Dam, but the population is apparently small. Suitable habitat such as rocky and sandy areas in moderately shallow water, rocky shoals, talus slopes and submerged boulders are found in both the free flowing and reservoir environments. Preferred food items of subadult smallmouth bass such as aquatic and terrestrial insects, and of adult smallmouth bass such as forage fish species, crayfish and insects, are available in relatively large quantities.

Because there is a potential for establishing an excellent smallmouth bass fishery in both environmental types, it is recommended that a bass stocking program be undertaken in the Snake River from Bliss Dam upstream to Lower Salmon Falls Dam. The recommended stocking rate for Bliss Pool would be 200 bass fingerlings per surface acre or approximately 50,000 fish with additional releases of as many adults (greater than 25.5 cm) as possible. These fish should be distributed equally in each quarter of the reservoir. Stocking of smallmouth bass in the free flowing section should be made at sites of large pools which provide potential spawning habitat and either during the fall or early spring months so that adult fish may establish themselves prior to spring spawning. The recommended stocking sites and rates for the free flowing section of river are given below.

River Kilometer	Stocking Rate Adult (>25.5 cm)	Fingerlings
904.6	160	1600
908.0	400	4000
909.6	240	2400
912.0	80	800
915.2	30	300
916.0	160	1600

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 backwaters of Brownlee Dam (Fig. 1). Fish and Game Department personnel collected fish population data from 1971 to 1976 in various river sections from Brownlee Reservoir upstream to American Falls Dam (Goodnight 1972, Reid 1972, Reid et al. 1973, Gibson 1975, Gibson and Mate 1976). The data collected will assist regional biologists with basic management data, and help assess impacts of proposed water projects.

Due to a shift in priorities for fisheries investigations, the Snake River project was terminated in 1975, but was reinstated in 1979. The section of river to be investigated from 1979 to 1981 will be from C.J. Strike Reservoir upstream to Upper Salmon Falls Dam. During 1979, the study was limited to that section of river between

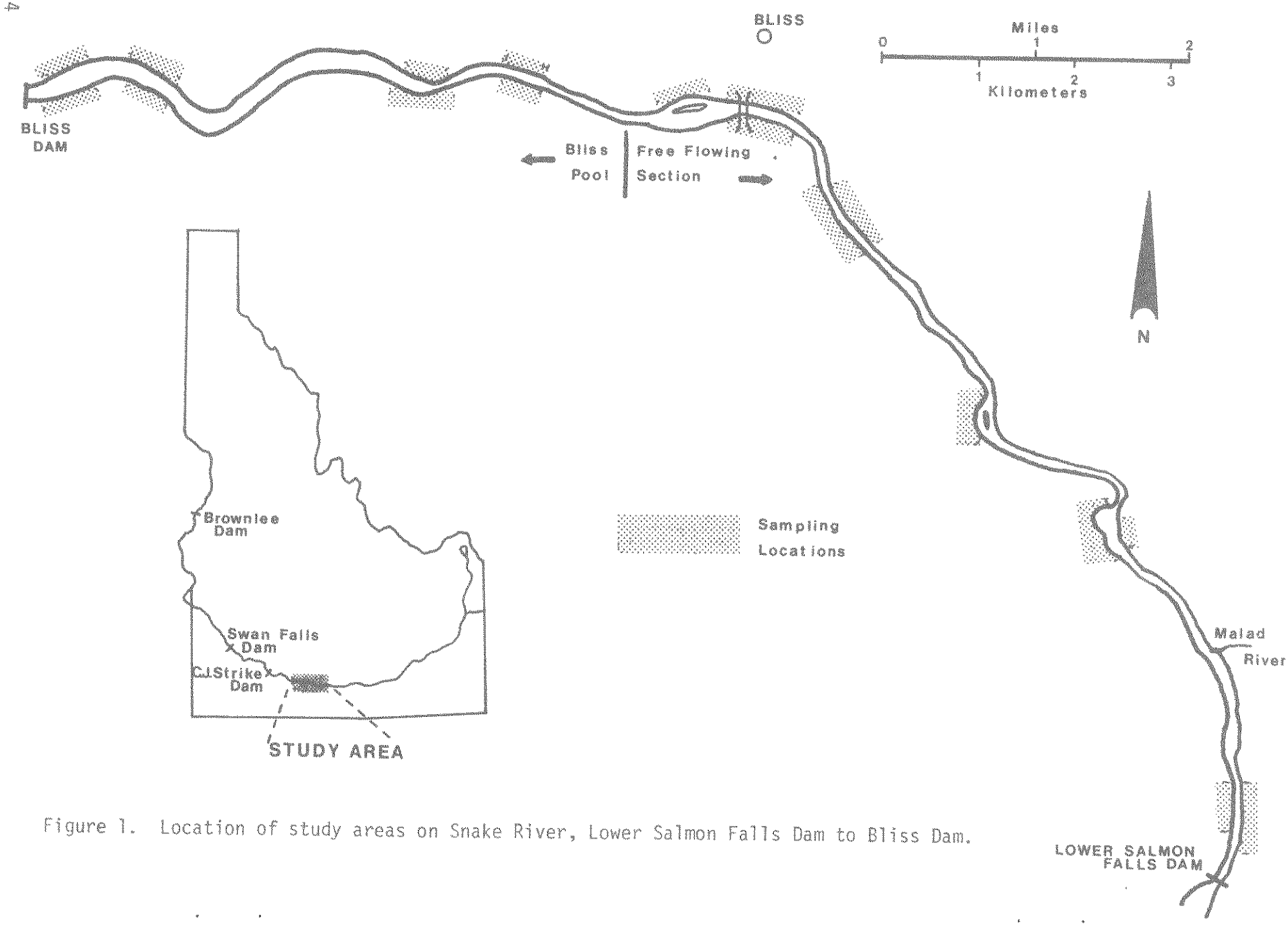

Figure 1. Location of study areas on Snake River, Lower Salmon Falls Dam to Bliss Dam.

Bliss Dam and Lower Salmon Falls Dam.

DESCRIPTION OF STUDY AREA

The study section of Snake River from Lower Salmon Falls Dam to Bliss Dam encompasses 20.8 km (12.9 mi) of Snake River, 12.7 km (7.9 mi) of which is free flowing. The reservoir behind Bliss Dam is 8.1 km (5.0 mi) in length and characterized by steep sagebrush covered banks in the lower 5.0 km and by steep, boulder shrouded banks in the upper end. The free flowing section has a gradient of 4.1 m/km (21.6 ft/mi) and is characterized by fast moving water, deep runs, and a few large deep (up to 15 m) pools. Throughout the free flowing section, there are numerous springs, the largest of which is Malad Springs flowing 35.4 cu m/s (1,250 cfs). Most of the springs are less than 0.14 cu m/s (5 cfs).

TECHNIQUES USED

Electrofishing techniques were employed to survey the fish populations. A variable voltage pulsator (0-600 DC) powered by a 2,000-watt portable gasoline generator was mounted in 4.9-m (16-ft) aluminum jet boat for use in Bliss Pool. Negative electrodes consisted of five, 1.5-meter flexible electrical conduits positioned on the side of the boat by plastic pipe. The bow capture net was the positive electrode. The use of the jet boat was not practical in the free flowing section due to the physical nature of the stream.

To survey fish populations in the flowing section, the electroshocking equipment was mounted in a wooden drift boat with the negative electrodes consisting of two flexible electrical conduits positioned on the stern of the boat.

Sampling sites were selected on the basis of the habitat types found in each section (pool versus free flowing) of the study stretch. Six sites were selected in the free flowing section and four sites in the pool. An attempt was made to electrofish 20 minutes near each bank of a selected site, however, depending on the nature of the river, sampling times and lengths varied. Each transect was sampled three times during the study; July 1979, October-November 1979 and March 1980.

All results are interpolated to express fish sampled per 100 m of stream bank. Game fish were enumerated by species, section and habitat type, and total lengths were measured to the nearest millimeter.

Non-game fish were enumerated as to species, but not removed from the water.

FINDINGS

Eleven fish species (Tables 1 and 2) were sampled, two of which were game fish. Non-game species comprised 97.1% of fish in the free flowing section and 99.6% of the fish in Bliss Pool. Two sucker species, largescale and bridgelip, were identified but due to the large numbers, no attempt was made to enumerate each species, and they are listed as one group. Bridgelip suckers were not observed in Bliss Pool. Suckers, as a group, were the most abundant fish, comprising over 73% of the total fish observed.

Table 1. Relative abundance of total fish sampled in free-flowing section of Snake River study sections.

Species		Total Fish Observed No.	Percent
Largescale sucker Bridgelip sucker	*Catostomus macrocheilus* *Catostomus columbianus*	1717	72.9
Northern squawfish	*Ptychocheilus oregonensis*	180	7.6
Peamouth chub	*Mylocheilus caurinus*	153	6.5
Carp	*Cyprinus carpio*	106	4.5
Redside shiner	*Richardsonius balteatus*	99	4.2
Mountain whitefish	*Prosopium williamsoni*	35	1.5
Rainbow trout	*Salmo gairdneri*	33	1.4
Leopard Dace	*Rhinichthys falcatus*	21	0.9
Sculpin, mottled Sculpin, Shoshone	*Cottus bairdi* *Cottus greenei*	6 5	0.3 0.2

Table 2. Relative abundance of total fish electroshocked in Bliss Pool on Snake River.

Species		Total Fish Observed No.	Percent
Largescale sucker	*Catostomus macrocheilus*	206	73.0
Carp	*Cyprinus carpio*	35	12.4
Northern squawfish	*Ptyochocheilus oregonensis*	27	9.6
Redside shiner	*Richardsonius balteatus*	8	2.8
Peamouth chub	*Mylocheilus caurinus*	5	1.8
Rainbow trout	*Salmo gairdneri*	1	0.4

For each sampling period greater numbers of fish per 100 m of stream bank were observed in the free flowing section (Table 3). Fish numbers were the greatest during March in the free flowing section and during August in Bliss Pool. Game fish were most abundant in the October/November sample. The only game fish sampled in Bliss Pool was a 315 mm (12.4 in) rainbow trout during November.

Rainbow trout and mountain whitefish were the two game fish observed in the free flowing section. Rainbow trout were found in each sampling period but were most abundant during November. Trout ranged from 77 mm (3.0 in) to 430 mm (16.9 in) with a mean length of 274.5 mm (10.8 in). Trout were only found at spring areas and riffle sites.

Mountain whitefish were collected in November 1979 and March 1980, with only one fish in the March collection. Whitefish were observed only at the upper sampling location within 1 km of Lower Salmon Falls Dam. Whitefish ranged in length from 210 mm (8.3 in) to 410 mm (16.1 in) with a mean of 360.0 mm (14.2 in).

Seventeen sculpin were observed during the study. Nine were mottled sculpin (Cottus bairdi) and eight were shoshone sculpin (Cottus greenei). Eleven of the fish were captured from spring areas and six were sampled from a riffle site near river kilometer 916.6 (river mi 565.8).

DISCUSSION

Nongame fish species comprise the majority of the fish populations in the Snake River. In previous studies, nongame species comprised 85.6% to 94.5% of fish, as compared to over 97% of total fish in this study. Salmonids (trout and whitefish) were the only game fish observed above Bliss Dam, while in lower sections of Snake River, centrachid were the predominant game fish. Absence of the centrachid group in the 1979-80 study area is apparently due to lack of preferred habitat types described in previous studies. Gibson (1974, 1975) described preferred habitat types of largemouth bass, catfish, crappies and sunfish as areas of mud/silt substrate with vegetative instream cover or brush overhangs. This type of habitat is relatively nonexistent in the Snake River between Bliss Dam and Lower Salmon Falls Dam.

Smallmouth bass habitat as described by Scott and Crossman (1973) is typical in both Bliss Pool and the free flowing study section. This fish was not observed in electroshocking samples, but has been caught by project personnel by hook and line, and was reported in sportsmen's creels by Gibson and Mate (1976).

Irving and Culpin (1956) described a more diverse game fish population in Bliss Pool, that was not found in the present study. In 1953 and 1954, they found rainbow trout, mountain whitefish, brown bullhead, bluegill sunfish, yellow perch, channel catfish, green sunfish, and largemouth bass in the Bliss Dam impoundment. Rainbow trout comprised 3% of total fish population in 1953 and 10% in 1954, however it should be recognized that over 11,000 legal-size trout were stocked in the impoundment during those 2 years. The one rainbow trout captured in Bliss Pool during this study is apparently an exception rather than being an integral part of the reservoir fish population.

As expected, no white sturgeon were captured with electroshocking gear. There is a sturgeon population of unknown status in the Snake River between Lower Salmon Falls and Bliss Dam based on unconfirmed reports of two sturgeon being caught by local sportsmen during 1979.

Table 3. Fish electroshocked during each sampling period in Snake River study area.

	Carp	Sucker	Redside Shiner	Northern Squawfish	Sculpin	Leopard Dace	Peamouth Chub	Rainbow Trout	Mountain Whitefish	Total Fish Per 100 m	Game Fish Per 100 m
August											
Free-flowing	53	516	16	13	11	19	4	11	0	8.98	0.15
Bliss Pool	22	99	5	13	0	0	0	0	0	3.15	0.0
Oct./Nov.											
Free-flowing	16	349	1	46	0	0	20	17	34	7.31	0.77
Bliss Pool	6	55	1	0	0	0	3	1	0	1.49	0.02
March											
Free-flowing	37	852	99	121	1	2	129	5	1	11.96	0.10
Bliss Pool	7	52	2	14	0	0	2	0	0	2.13	0.0

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JOB PROGRESS REPORT

State of Idaho Name: SNAKE RIVER FISHERIES INVESTIGATIONS

Project No. F-73-R-2 Title: Survey Status of White Sturgeon Population in Snake River, Bliss Dam to C. J. Strike Dam

Job No. I b

Period Covered: 1 March 1979 to 28 February 1980

ABSTRACT

During the study period, 431 white sturgeon were captured using hook and line methods and set lines. Of the total fish captured, 118 were recaptures. Sturgeon ranged in length from 45.0 cm to 270.5 cm. Population composition of captured fish indicates that 78.7% were sturgeon less than 91.5 cm and 3.2% were sturgeon greater than 183 cm.

Local sportsmen contributed length information on an additional 75 sturgeon ranging in length from 45.7 to 281.9 cm.

Fishing success was best during May and September with over 0.5 sturgeon caught per hour.

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INTRODUCTION

White sturgeon (Acipenser transmontanus) are found in the Snake River in Idaho upstream to Shoshone Falls which is the natural upstream extent of the fish's range. Limited information is available regarding the white sturgeon, and only in the past 10 years have studies been conducted on the fish in Idaho. Reid, et al. (1973) took a cursory look at sturgeon in the Snake River below Swan Falls Dam, and Coon (1977) studied the sturgeon population in the middle Snake below Hells Canyon Dam.

Concern for the fate of white sturgeon in Idaho has been increasing for many years, as evidenced by the continually restrictive fishing regulations since 1930 (Table 1). Prior to 1943, there were no restrictions as to fishing methods and harvest limits. Regulations became more restrictive, culminating in 1970 when the Snake River was managed for a catch-and-release sturgeon fishery.

In 1979, the Idaho Department of Fish and Game in cooperation with the Idaho Department of Water Resources initiated a fisheries research project to collect information on white sturgeon in the Snake River from C.J. Strike Dam upstream to Shoshone Falls (Fig. 1). During the first 2 years of the project, the study will be limited to the section from C. J. Strike Reservoir upstream to Bliss Dam.

The section of Snake River from Shoshone Falls downstream to King Hill contains perhaps the last free-flowing white-water habitat above Hells Canyon. In this river section there are presently three hydroelectric facilities (Bliss Dam, Lower Salmon Falls Dam and Upper Salmon Falls Dam). That section of river below Bliss Dam to King Hill has been described as the best white sturgeon habitat in the Snake River above Hells Canyon (Bell 1979).

OBJECTIVES

To obtain life history information on white sturgeon in Snake River from C. J. Strike Reservoir upstream to Bliss Dam.

DESCRIPTION OF STUDY AREA

The 109 km of the study area (Fig. 1) is divided into two habitat types. The upper section is located in the Snake River Canyon (22.5 km) and is characterized by a relatively high gradient (1.01 m/km) with fast, deep (10 m) runs, limited riffle areas, and approximately eight deep (up to 22m) holes which have been in the past and are presently traditional sturgeon fishing holes for local sportsmen. In contrast, the lower 86.5 km (52.7 mi) of the study area is relatively flat (0.32 m/km gradient) with few distinguishable shallow riffles, long runs (up to 1.5 m) and thirteen traditional sturgeon fishing holes. Aquatic vegetation in the lower section is quite prevalent during the warmer months and large drifting masses of vegetation are a deterent to fishing.

TECHNIQUES USED

Sturgeon were captured using conventional fishing gear and set lines. Set lines were constructed of 10 m of 500-kg (1,100-lb) test rope with hooks attached by 0.5-kg

Table 1. Summary of white sturgeon regulations in Idaho 1943-79.

Year	Bag Limit	Other Regulations
1943-44	2 in possession, no yearly limit	Commercial fishing prohibited
1948	1 in possession, no yearly limit	1 setline permitted
1950	1 in possession, 30" minimum, no yearly limit	1 setline permitted
1955-56	1 in possession, 40" minimum,	Setline allowed except in Hells Canyon
1956-57	1 in possession, 40" minimum, 2 fish per year	No setlines, except in Kootenai River
1959	1 in possession, 40" minimum, 2 fish per year	
1960	1 in possession, 36" to 72", 2 fish per year	
1961-63	3 sturgeon in possession or annually in boundary waters, 2 fish elsewhere 36" to 72"	
1964-70	1 in possession, 36" to 72", 2 fish per year	
1970	Catch and release on Snake River; 1 fish per day and 2 per year in Kootenai River, 36" to 72", 1 setline	
1979	Tag required on Kootenai	

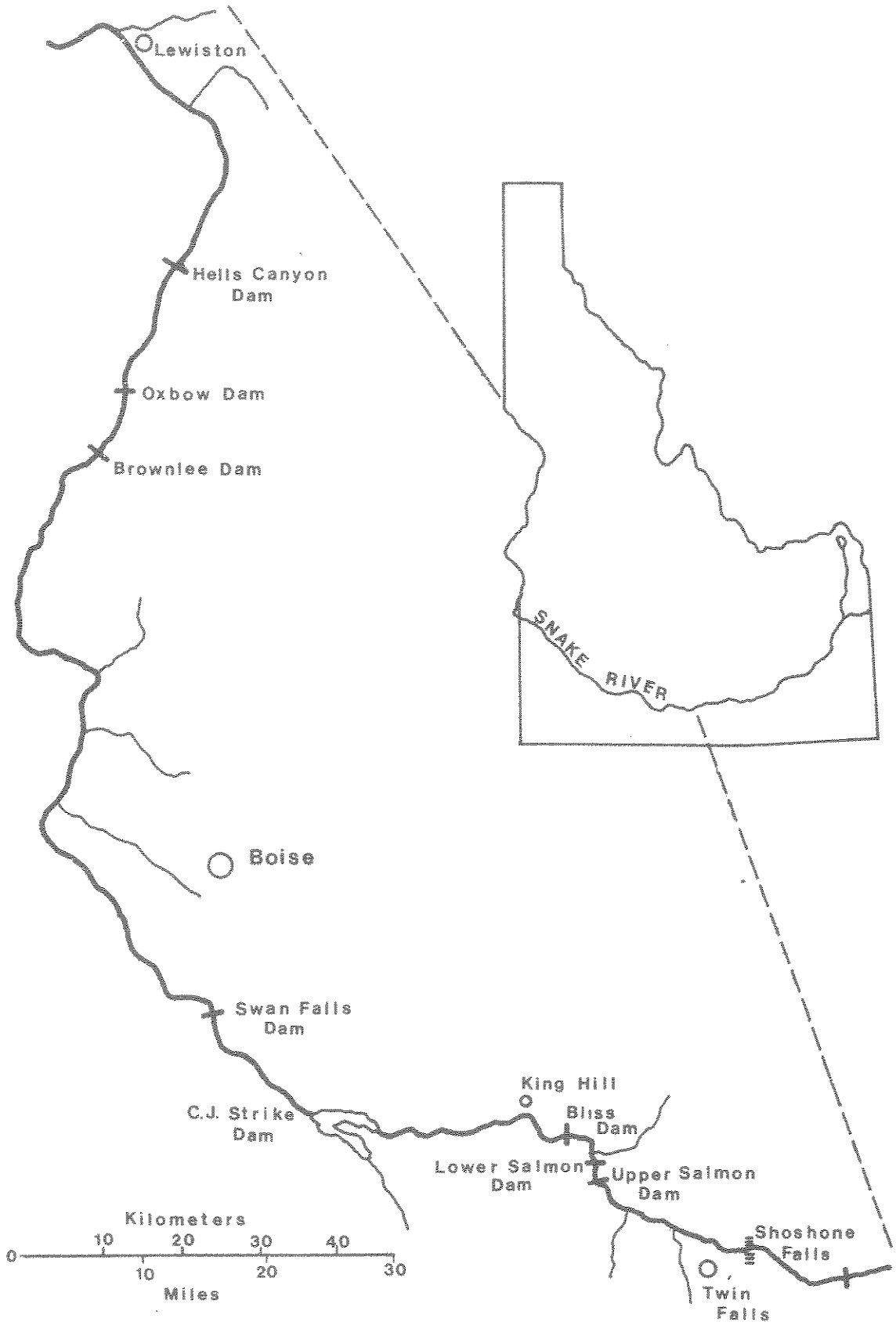

Figure 1. White Sturgeon range in Snake River, Idaho.

(1.1 lb) test dropper lines spaced 2m apart. Weights were attached to each end of the main line with a float line attached to one end. Hook sizes used for both conventional and set line gear ranged from 2/0 to 5/0. A variety of baits (nightcrawlers, smelt, fish, etc.) were used initially, but nightcrawlers produced the best results and were used exclusively the last 9 months of the study.

Time of day and location of capture were recorded for each sturgeon caught. All fish were measured to the nearest 0.5 cm (0.2 in) either with the use of a 1-m measuring board or with a steel measuring tape stretched dorsally from the tip of the nose to the end of the caudal fin. Weights were recorded to the nearest 0.1 kg (.22 lb) for fish under 6.0 kg (13.2 lb) and to the nearest 0.5 kg for larger fish. Small fish were weighed with a small hand scale and larger fish were weighed with warehouse scales, sling and tripod apparatus.

All fish were marked with a three digit tatoo placed either on the caudal fin or ventral surface of the rostrum or a self-locking plastic loop spaghetti tag attached at the dorsal fin.

A small section of the leading ray of the left pectoral fin was removed for use in age and growth determinations. This ray segment was removed and processed in accordance with procedures described by Currier (1960).

Twelve local sportsmen were solicited to provide pertinent information on sturgeon caught in the study section. These individuals were supplied with data sheets and instructions for the type of data to be recorded.

FINDINGS

During the study period, 431 white sturgeon were caught and released alive, 118 of which were recaptures. Three hundred and five sturgeon were caught on rod and reel while set lines accounted for the remaining 126 fish (Table 2). Eighteen of the 21 identified traditional sturgeon fishing holes were sampled, and twelve yielded sturgeon. Two hundred and sixty-two (60.7%) of the total 431 fish were caught at two locations. A fishing site in the canyon area (river km 901.2) yielded 161 sturgeon with 70 recaptures, and a site in the flat area (river km 816.7) yielded 101 fish with 3 recaptures.

In the canyon area, sturgeon lengths ranged from 46.5 cm (18.3 in) to 270.5 cm (106.5 in) with a mean of 70.5 cm (27.8 in) and mode of 56-60 cm (Fig. 2). Fish lengths in the flat area ranged from 45.0 cm (17.7 in) to 236.0 cm (92.9 in) with a mean 97.4 cm (38.3 in) and a mode of 86.0 cm. Sturgeon less than 91.5 cm (3 ft) comprised 79.7% of the catch while fish over 183 cm (6 ft) comprised 3.2% of total fish (Table 3).

Local sportsmen contributed information for an additional 75 sturgeon, twelve of which were recaptures (Fig. 3). These fishermen used large tackle and bait, and consequently were selective for large sturgeon. The fish ranged in length from 45.7 cm (18.0 in) to 281.9 cm (111 in) with a mean of 126.3 cm (49.7 in). Sportsmen captured all but four of the sturgeon in the canyon area.

The average weights for sturgeon under 91.5 cm was 1.6 kg (3.5 lb), 92-183 cm was 11.1 kg (24.5 lb), and over 183 cm was 59.3 kg (130.3 lb) (Table 4).

Table 2. Total white sturgeon captured in study area.

Date	Canyon (Bliss Dam to King Hill) Rod and Reel	Canyon (Bliss Dam to King Hill) Set Line	Flat (King Hill to C.J. Strike Dam) Rod and Reel	Flat (King Hill to C.J. Strike Dam) Set Line
1979				
March	30	3	0	0
April	72	0	14	0
May	36	7	11	13
June	27	1	22	7
July	10	22	3	7
August	6	7	5	17
September	6	9	7	13
October	21	6	2	10
November	7	2	1	1
December	2	0	4	0
1980				
January	2	0	2	1
February	4	0	11	0
Totals	223	57	82	69

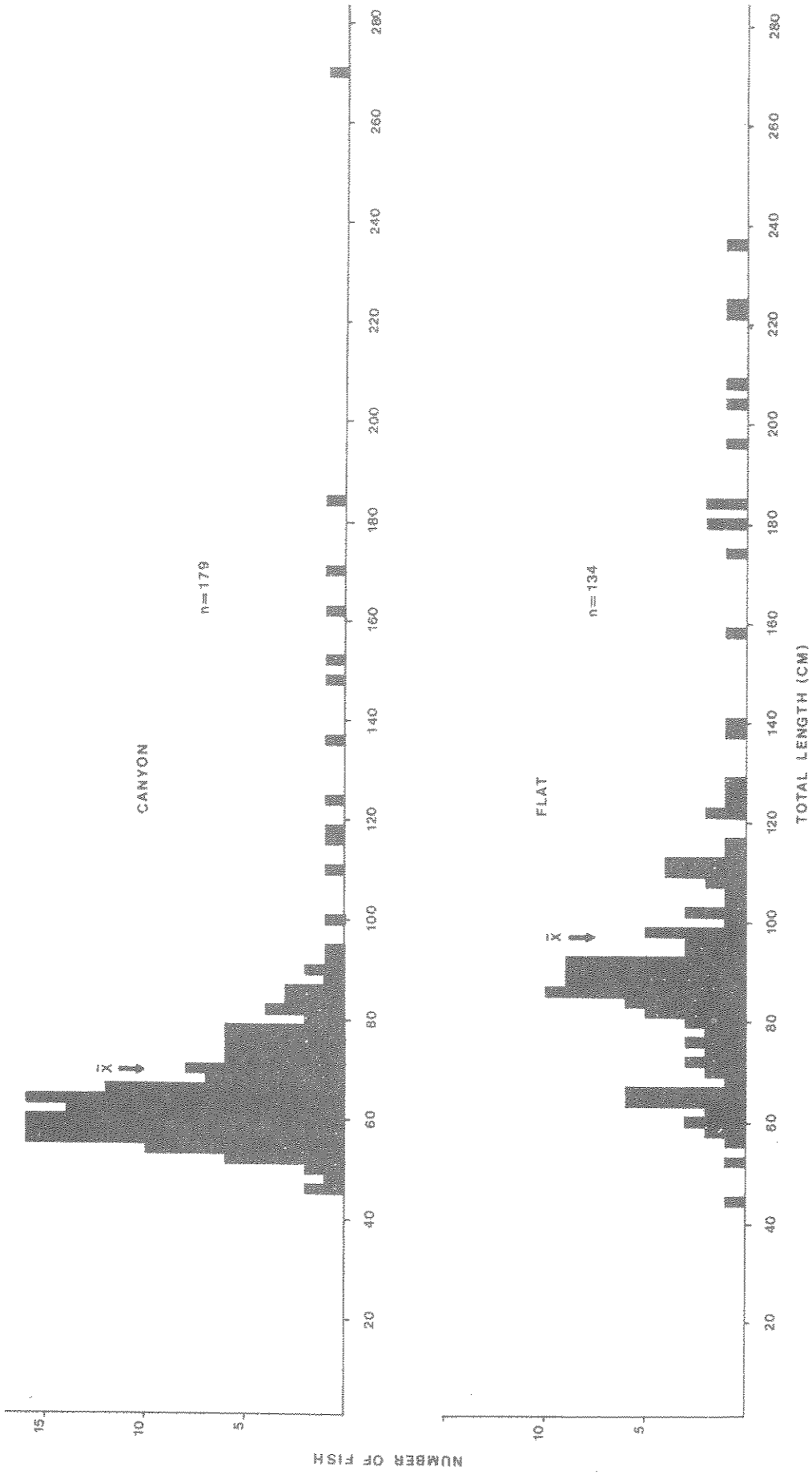

Figure 2. Length-frequency of white sturgeon captured by Fish and Game personnel in each subsection of Snake River study area.

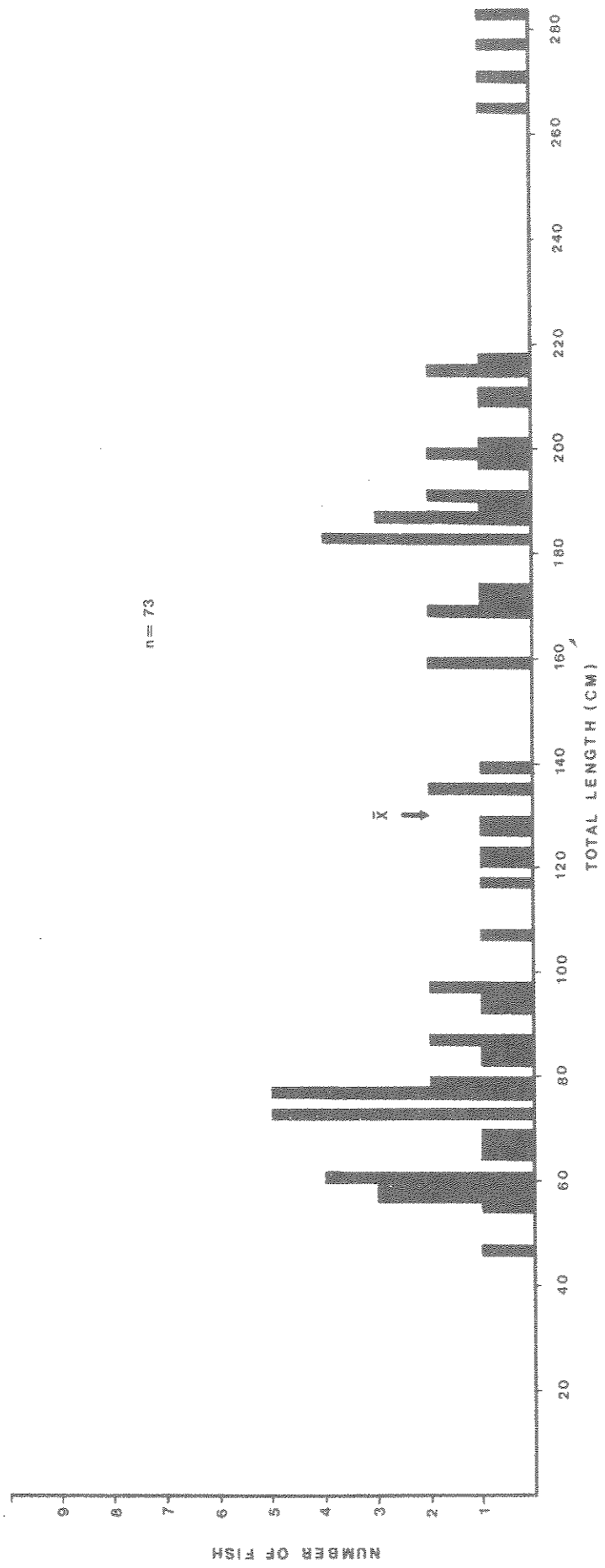

Figure 3. Length-frequency of white sturgeon captured by sportsmen in the Snake River study area.

Table 3. Length composition for three size classes of white sturgeon.

	Canyon		Flat		Total	
	No. of Fish	Percent	No. of Fish	Percent	No.	Percent
45- 91.5 cm	164	92.11	83	61.0	247	78.7
92-183 cm	12	6.74	45	33.1	57	18.1
183.5-270 cm	2	1.12	8	5.9	10	3.2

Table 4. Average weights (kg) of white sturgeon in three length classes.

	Canyon		Flat		Total	
	$\bar{X}$	n	$\bar{X}$	n	$\bar{X}$	n
45-91.5 cm	1.22	134	2.33	69	1.60	203
92-183 cm	16.10	11	9.91	44	11.14	55
183-270 cm	69.55	2	56.67	8	59.25	10

Table 5. Movement of recaptured white sturgeon in the study area.

Tag No.	Size (cm)	Initial Capture		Recapture		Kilometers moved
		River kilometer	Date	River kilometer	Date	
101	81.0	895.9	3/19/79	873.9	5/29/79	22.0 downstream
105	54.0	897.9	3/19/79	896.1	7/25/79	0.9 downstream
137	81.0	892.4	4/10/79	897.0	5/22/79	4.6 upstream
186	56.5	897.0	4/26/79	895.9	7/25/79	1.1 downstream
337	65.0	895.0	8/09/79	897.0	11/20/79	2.0 upstream

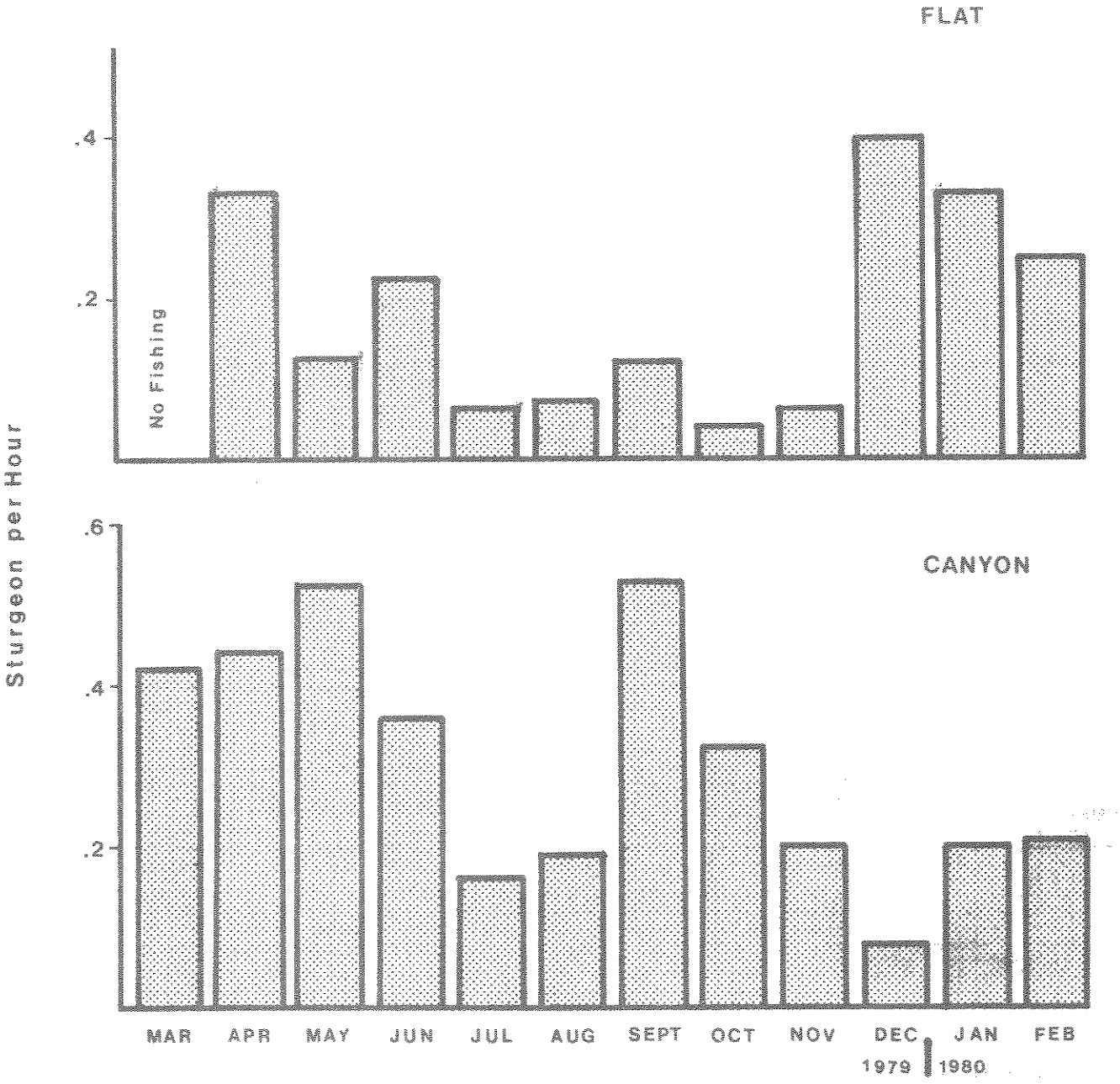

Figure 4. Rod and reel fishing success (sturgeon per hour) by month.

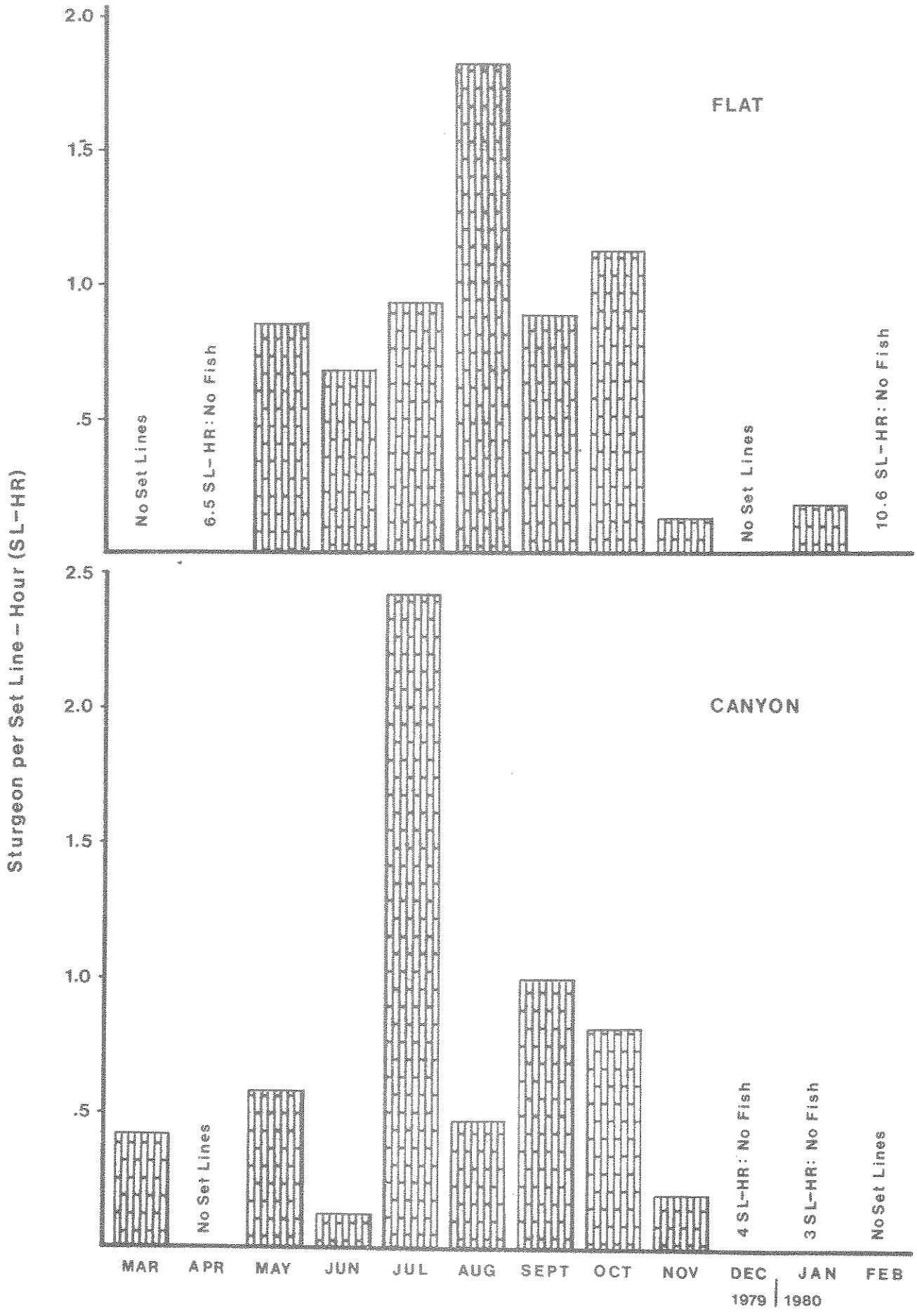

Figure 5. Set line fishing success (sturgeon per set line-hour) by month.

Five of the 118 recaptures were caught at locations different than sites of initial tagging (Table 5). The greatest distance moved was by fish No. 101, which was recaptured 22.0 km (13.7 mi) downstream 2 months later. Sturgeon that had migrated when recaptured ranged in length from 54.0 cm (21 in) to 81.0 cm (32 in).

Fifteen sturgeon were caught more than two times, and one fish was recaptured at the site of initial tagging five times. The largest fish to be recaptured was a 270.5 cm (106.5 in) caught three times at the same fishing site within an 8-month period.

Fishing success for sturgeon (sturgeon per hour) by rod and reel was better in the canyon area with the best fishing occurring during September (0.53 sturgeon per hour) and May (0.53 sturgeon per hour) (Fig. 4). December (0.40 sturgeon per hour and April (0.33 sturgeon per hour) were the most productive months in the flat area.

Fishing success with set lines is expressed in number of fish caught per hour of fishing individual set line (sturgeon per set line hour). Sixty-nine fish were caught in the flat area as compared to 54 in the canyon, however, fishing effort was more than double in the flat. Set lines were most effective in the canyon in July (2.44 sturgeon per set line hour) while in the flat best success was in August with 1.82 sturgeon per set line hour (Fig. 5).

DISCUSSION

The 1979-80 field season was the first of a multiple year study of the white sturgeon in the Snake River. Complete analysis of data will be best achieved at the termination of the project when a discussion of movement patterns, population estimates and age and growth information will be included in the completion report.

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