

X-Y-3 MDPWP Kalmik

6

WYOMING

OBSERVATIONS ON THE LONGNOSE SUCKER IN  
YELLOWSTONE LAKE

C. J. D. BROWN

*Zoology and Entomology Department, Montana State College  
Bozeman, Montana*

AND

RICHARD J. GRAHAM

*Montana Fish and Game Department  
Bozeman, Montana*

Reprinted from Volume 83 (1953), Transactions of the American Fisheries Society.  
Published 1954. Printed in U.S.A.

# OBSERVATIONS ON THE LONGNOSE SUCKER IN YELLOWSTONE LAKE<sup>1</sup>

C. J. D. BROWN

Zoology and Entomology Department, Montana State College  
Bozeman, Montana

AND

RICHARD J. GRAHAM

Montana Fish and Game Department  
Bozeman, Montana

## ABSTRACT

An investigation was made of the food, spawning runs, age and growth, and distribution of the longnose sucker *Catostomus catostomus* in Yellowstone Lake during the summers of 1951 and 1952. This fish was probably accidentally introduced into Yellowstone Lake by bait fishermen in the early thirties. As many as 2,000 specimens were observed with the annual cutthroat-trout runs in Pelican Creek during the early forties. A total of 1,150 was counted there in 1951. The food of suckers captured in the mouths of tributary streams showed an incidence of 69 percent algae, 40 percent higher aquatic plants, and numerous aquatic insects, particularly Diptera. During the spawning run the largest number of suckers entered the traps on the days when water temperatures were highest. Females were significantly larger than males. The average time spawning fish stayed in Pelican Creek was 19 days for females and 17 days for males. The average loss of weight for spawning females was 4.7 ounces and for males 1.8 ounces. A sample of sucker fry captured on July 9 averaged 13 millimeters in total length. Young taken October 11 averaged 30.5 millimeters. The calculated total lengths for each year of life based on 525 specimens were as follows: first year—2.0 inches; second—4.8; third—8.5; fourth—11.7; fifth—13.6; sixth—15.8; seventh—17.4; eighth—18.1. Females grew more rapidly than the males and reached a larger size. Tagging experiments showed that suckers have a rather restricted range and are frequently taken by pelicans.

## INTRODUCTION

The best available reports indicate that the longnose sucker was not native to Yellowstone Lake in Yellowstone National Park, Wyoming. It is presumed that this species was accidentally introduced into this lake by live-bait fishermen from adjacent habitat streams such as the Shoshone or Yellowstone (below the falls).

According to Mr. William Dunn, superintendent of the fisheries station on the lake, the first suckers observed were captured by seine on the shoal

<sup>1</sup>Contribution from Montana State College, Agricultural Experiment Station Project No. MS 844, Paper No. 314, Journal Series and the Montana Fish and Game Department.

near the museum at Fishing Bridge during the early thirties (1931-1933). By the mid-thirties a few appeared along with the spawning runs of cutthroat trout in Pelican Creek, which enters the lake about one and one-half miles to the east of the lake outlet, and by the late thirties these runs increased to 300-400 specimens (Simon, 1939, reports 382 for 1938). In the early forties there was estimated to be 1,500-2,000 suckers in each year's run. During this period the fish-traps were kept in operation after the regular trout run was over for the express purpose of capturing the later run of suckers. All suckers captured were destroyed.

Rough counts of specimens made by the hatchery crews at the Pelican Creek traps for the years 1947, 1949, and 1950 were 1,863, 1,057 and 1,302, respectively. The number counted by the junior author in 1951 was 1,150.

Although no early distribution records were kept, it appears that the place of introduction of the sucker was in the vicinity of the lake outlet near Fishing Bridge. All specimens known to have been taken came from this area even though fish-cultural operations were being carried out on tributaries in other parts of the lake.

In 1948 Mr. Dunn reported a few suckers in Clear Creek, which enters the lake approximately 10 miles east of the lake outlet. About 20 were taken in 1950-1951 in Chipmunk Creek which is tributary to the South Arm, approximately 20 air miles from the lake outlet. Four adult specimens were captured in 1951 in Arnica Creek, tributary to the Thumb region, and about 60 young specimens were collected from another small creek in this vicinity by "shocking" in 1952.

The sucker is pretty well distributed around the lake at the present time, although the main concentration is found in the vicinity of the lake outlet and the mouth of Pelican Creek.

An investigation of the longnose sucker in Yellowstone Lake was made during the summer of 1951 and in the early summer of 1952 to secure information on the food habits, life history, and distribution of this species in the lake. Some scale samples used in the age and growth study were collected by Dr. Oliver B. Cope in the summer of 1950. This project was in cooperation with the U. S. Fish and Wildlife Service and the Yellowstone National Park Service. Dr. Oliver B. Cope assisted in directing the study and much valuable information was furnished by Mr. William Dunn. Specimens were positively identified by Dr. Robert R. Miller.

## FOOD HABITS

The food habits of the sucker were ascertained by stomach examinations of 74 specimens collected in the mouths of two tributary streams: Pelican Creek and a small unnamed creek which enters the West Thumb. Efforts to secure specimens from the lake proper were futile, largely because the use of gill nets was prohibited. Only five lake specimens containing food were available for study. It would not be safe to conclude that the food of suckers living in the lake is the same as that of individuals in the tributaries.

The writers are not acquainted with any extensive food studies for this species. Simon (1939) reports that longnose suckers are specialized feeders in that their diet consists principally of plant materials (algae). Neave and Bajkov (1929) examined the stomachs of about 100 *Catostomus catostomus lacustris* from Annette Lake in Jasper Park, Alberta, and found the copepod *Canthocampus* to be the most abundant item, followed closely by Chironomidae.

The numerous accounts of food taken by the white sucker, *C. commersoni* (Simon, 1946, Couey, 1935, and others) indicate that this species utilizes molluscs, midges and other insect larvae, and the various entomostercans in lakes. According to these reports the food of the white sucker consists mostly of bottom forms including much detritus, but often plankton and the more pelagic insects were included.

The kinds, percentage of occurrence, and estimated percentage of volume of food of suckers taken in streams tributary to Yellowstone Lake are given in Table 1. Of 74 stomachs with food, 69 percent contained algae which constituted about one-third of the volume of all items. Pieces of higher aquatic

TABLE 1.—Percentage frequency of occurrence and estimated percentage of total volume of food items eaten by the longnose sucker in tributaries of Yellowstone Lake

Item	Unnamed tributary of West Thumb	Pelican Creek	Pelican Creek (Trap)			
Details concerning samples studied						
Dates of collection....	June, 1952	Aug. 20-Sept. 7, 1951	July 1-30, 1951-52			
Number of stomachs....	35	24	50			
Number with food....	34	19	21			
Range of total lengths of suckers examined	3.6-8.4	3.3-7.1	12.2-19.5			
Percentage of occurrence and of volume of food items						
Food organism	Occurrence	Volume	Occurrence	Volume	Occurrence	Volume
Algae.....	97	43	68	35	24	12
Higher aquatic plants.....	80	22	5	Tr. <sup>1</sup>	5	Tr.
Mollusca.....	3	Tr.	..	..	..	..
Ephemeroptera.....	6	1	42	19	86	48
Coleoptera.....	34	3	32	9	24	5
Trichoptera.....	9	2	37	9	38	11
Diptera.....	74	20	37	7	38	7
Arachnoidea.....	11	Tr.	..	..	..	..
Unidentified and debris.....	74	9	100	21	81	17

<sup>1</sup> Tr. = trace

plants occurred in 40 percent of the stomachs and composed about 10 percent of the volume. The orders of aquatic insects found included Ephemeroptera, Coleoptera, Trichoptera and Diptera. Their percentages of occurrence in all stomachs were 38, 31, 25, and 55, respectively. A few stomachs contained snails, fingernail clams, and water mites but the volumes of these items were too small to estimate. Debris and unidentified plant

and animal remains were found in 80 percent of the stomachs. The volume of this material made up about 15 percent of the total. There was no marked difference between the kinds and abundance of items found in the small and the large fish, except that the larger specimens more frequently contained Ephemeroptera and Trichoptera larvae.

Five of the eight specimens collected in the lake contained food in their stomachs. Crustacea (*Gammarus* and *Daphnia*) was the most important item with Diptera (Chironomidae) being a close second. The only other identifiable item was a few Ephemeroptera. The bottom and plankton crustaceans were probably very important in the diets of suckers feeding in the lake, while aquatic insects were the most important animal foods in the streams.

The high incidence and volume of algae and higher aquatic plants is convincing evidence that these are important in the diet of this species. There is insufficient evidence from this study to show that the sucker is an important food competitor of trout although a certain amount of competition is evident.

#### SPAWNING RUNS OF PELICAN CREEK

There is a definite run of suckers from the lake into the tributary streams at the time of spawning. According to Mr. Dunn, this run usually begins in late June in Pelican Creek and continues through most of July. The early part of this run coincides with the latter part of the cutthroat-trout run. In 1951, the first suckers were noticed on June 15, and approximately 300 entered the fish traps during June 16-18. Only a few entered the traps on June 19 and 20. This reduction is believed to have resulted from a change in the weather (warm and clear for several days prior to June 19 with a sudden change to wet and cold). There is evidence to show that sucker movement was influenced by water temperature changes (Fig. 1). Marked increases or decreases in water temperature were associated with similar increases or decreases in the number of fish that entered the trap. The sucker run was largely over by July 12 and consequently the increase in temperature following this date was not accompanied by an increase in the number of suckers. Dence (1948) showed that the spawning activity of the dwarf sucker *Catostomus commersoni utawana* was influenced by temperature.

Measurements were made on random samples of male and female suckers taken in the spawning runs of 1950 and 1951 (Fig. 2). The 365 males in these samples ranged in total length from 10.6 to 17.9 inches with an average of 14.0. Their weight ranged from 0.31 to 2.25 pounds with an average of 1.18. The 342 females varied in length from 13.6 to 20.1 inches with an average of 17.0 inches. Their weight ranged from 1.19 to 3.16 pounds with an average of 2.07. The average size of the females was significantly larger than the males.

An attempt was made to determine the length of time spawning suckers remained in Pelican Creek. A total of 328 (277 males, 51 females) upstream migrants was tagged in 1951 at the Pelican Creek trap with Peter-

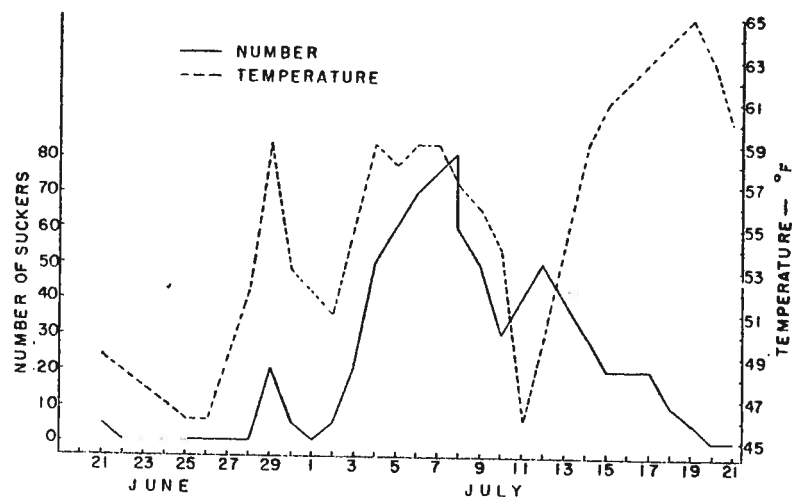


FIGURE 1.—Relationship between water temperatures and the number of longnose suckers observed each day of the 1951 season at Pelican Creek traps.

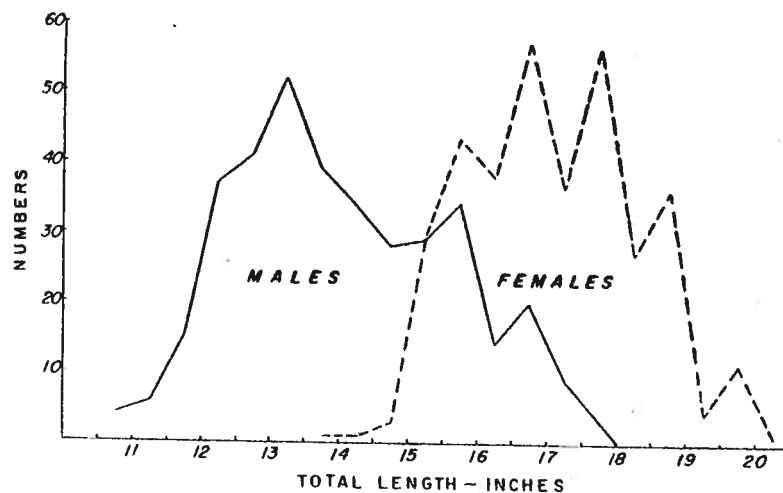


FIGURE 2.—Total lengths of male and female longnose suckers in the spawning runs of Pelican Creek, 1950 and 1951.

son disc tags. This project was seriously handicapped by a limitation imposed by the Park Service on the number of females which could be released. Their policy is to destroy all suckers that are captured.

A total of 17 tagged suckers (11 males and 6 females) returned to the traps on their way back to the lake. The time between release and recovery ranged from 14 to 25 days (average 19 days) for the females and from 5 to 39 days (average 17 days) for the males.

The fish were weighed at the time of tagging and again upon recovery. The loss of weight for nine males varied between 0.5 and 4.5 ounces (1.8 average) while the females' loss of weight varied from 3.0 to 6.5 ounces (4.7 average). It is not known whether this loss of weight was due entirely to spawning or in part to the irritation caused by the Peterson discs which were placed in the region below the dorsal fin.

Random samples of suckers comprising 253 males and 222 females from the spawning runs of 1950 and 1951 were aged (Table 2). This information indicates that male suckers rarely spawn before they are four years old, and females do not become sexually mature before they are five. Most of

TABLE 2.—Age composition of 253 male and 222 female suckers from the spawning runs at Pelican Creek, 1950 and 1951  
(Roman numerals indicate number of completed annuli)

Item	Sex	Age group					
		III	IV	V	VI	VII	VIII
Number	Males	1	50	130	64	8	...
	Females	...	1	33	100	82	6
Percentage	Males	0.4	19.7	51.4	25.3	3.2	...
	Females	...	0.5	14.9	45.0	36.9	2.7

the males (51.4 percent) were in the five-year group while the majority of the females (45.0 percent) were in the six-year class. Eight males and 82 females were in the seven-year group, and six females and no males were eight years old. These data indicate that males mature a year younger than females and that the latter live to be older (at least those that appeared in the runs were older).

#### FRY AND FINGERLINGS

The first sucker fry observed in the summer of 1951 were taken on July 9 when vast numbers were found near the banks of Yellowstone River, about 300 yards below the lake. These fishes were confined to the quieter water harboring aquatic vegetation. They ranged in total length from 11 to 15 millimeters with an average of 13 millimeters. Another sample of young was taken at this same place on September 7, and these specimens ranged in length from 19 to 30 millimeters (average 23.5). On October 11, a collection of small fingerlings was taken from Pelican Creek less than a mile from its mouth. These suckers had an average length of 30.5 millimeters with a range of 25–38 millimeters.

The smallest fish known to have scales was 38 millimeters in total length. It is suspected that because of the small size of some of these young suckers,

they may go through their first winter in Yellowstone Lake without scales as was found to be true of some cutthroat trout (Brown and Bailey, 1952).

#### AGE AND GROWTH

The age and growth of the longnose sucker in Yellowstone Lake were based on 525 specimens (253 males, 222 females taken 1950, 1951 in Pelican Creek trap, and 50 immature specimens taken 1951, 1952 from Pelican Creek and unnamed tributary of West Thumb). These individuals ranged in total length from 3.3 to 19.7 inches, and represented all of the age groups from one to eight inclusive. Ages were determined by counting the annuli on the scales. Because of an obvious difference between the growth of males and females the results were tabulated separately (Table 3).

The average calculated total length at each annulus shows the males to be consistently smaller than the females. The difference is small in each of the first four years of life (0.1–0.4 inch) but is approximately one inch in each of the next three years. It is not known whether fish less than one year old show a differential in growth between the sexes.

Kathrein (1951) studied the growth of the longnose sucker from the Missouri River in Montana. He did not calculate the growth of males and females separately. A comparison between his data for the sexes combined (first figure) and those from Yellowstone Lake (second figure) is as follows: first year of life—3.0 and 2.0; second—5.5 and 4.8; third—8.1 and 8.5; fourth—10.4 and 11.7; fifth—12.3 and 13.6; sixth—13.7 and 15.8; seventh—14.7 and 17.4; eighth—15.5 and 18.1. The Missouri River specimens grew more rapidly than those from Yellowstone Lake during their first year of life. Thereafter the latter grew more rapidly and by the third year exceeded the Missouri specimens in total length. It is interesting to note that suckers of this species had a maximum age of eight years in both the Yellowstone and Missouri River samples. Clemens (1939) reported two *C. catostomus* from Okanagan Lake, where they were probably introduced, to be 11 3/8 and 16 1/2 inches in length, and apparently in their fourth and fifth summers respectively.

From the available information on the growth of this species, it is safe to conclude that the longnose sucker grows at an average rate or better in Yellowstone Lake.

#### DISTRIBUTION

A tagging project to determine the movement and distribution of suckers was initiated in 1951. This experiment failed because of certain administrative restrictions already mentioned. A total of 403 suckers (306 males and 97 females) was tagged at the traps in Pelican Creek in that year. This includes the 328 upstream migrants plus 75 downstream migrants. Of these, 74 have been accounted for as follows: 41 tagged fish were found dead on the Pelican Creek traps; 23 were found in pelican droppings on Molly Island which supports a rookery of these birds; 10 have been recov-

TABLE 3.—Average calculated total lengths (inches) of longnose suckers collected in 1950–51–52 from Yellowstone Lake and tributaries  
(M = male; F = female)

Age group	Number	Average total length (inches) at capture	Year of life															
			1		2			3			4			5			6	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
I	144		12.2															
II	16		11.8															
III	1		3.3		15.4		10.6											
IV	50	1	2.2	2.8	7.5	7.3	9.7	10.5	12.2	14.3								
V	130	33	12.3	15.2	5.9	5.3	8.3	8.9	11.3	12.0	13.3	14.5						
VI	64	100	13.4	15.6	2.1	4.4	5.0	8.0	11.3	12.0	13.7	14.4	15.0	16.1				
VII	8	82	15.3	16.7	4.4	4.5	7.5	8.5	10.8	11.9	13.3	14.3	15.1	16.2	16.4	17.5		
VIII		6	16.4	17.7	1.7	1.9	4.1	4.5	8.1	11.3								
			18.2															
Grand averages (by sex)	253	222	1.9	2.0	4.7	4.9	8.4	8.7	11.5	11.9	13.4	14.4	15.0	16.1	16.4	17.5	18.1	
Grand averages (all fish)	525		2.0		4.8		8.5		11.7		13.6		15.8		17.4		18.1	

1: Immature fish — not sexed and not included in totals or averages of males and females but included in the grand averages of all fish.

ered by fishermen in the area between Fishing Bridge and the mouth of Pelican Creek. The large number of suckers taken by pelicans is not very significant when it is known that many of these fish were in a very weakened condition as a result of being retained in the fish traps before their release.

## LITERATURE CITED

- BROWN, C. J. D., and JACK E. BAILEY  
1952. Time and pattern of scale formation in Yellowstone cutthroat trout *Salmo clarkii lewisii*. Trans. Am. Micros. Soc., Vol. 71, No. 2, pp. 120-124.
- CLEMENS, W. A.  
1939. The fishes of Okanagan Lake and nearby waters. Bull. Fish. Res. Bd. Canada, Bull. 56, pp. 27-38.
- COUEY, FAYE M.  
1935. Fish food studies of a number of northern Wisconsin lakes. Trans. Wis. Acad. Sci., Vol. 29, pp. 131-172.
- DENCE, W. A.  
1948. Life history, ecology and habits of the dwarf sucker, *Catostomus commersonnii utawana* Mather, at the Huntington Wildlife Station. Roosevelt Wildlife Bull., Vol. 8, No. 4, pp. 81-150.
- KATHREIN, JOSEPH W.  
1951. Growth rate of four species of fish in a section of the Missouri River between Holter Dam and Cascade, Montana. Trans. Am. Fish. Soc., Vol. 80(1950), pp. 93-98.
- NEAVE, F., and A. BAJKOV  
1929. Reports of the Jasper Park Lake investigations, 1925-26. V. Food and growth of Jasper Park fishes. Contrib. Canad. Biol. and Fish., Vol. 4, No. 16, pp. 199-217.
- SIMON, JAMES R.  
1939. Yellowstone fishes. The Yellowstone Library and Museum Assn. Yellowstone Park, Wyoming. 39 pp.  
1946. Wyoming Fishes. Bull. 4, Wyo. Game and Fish Dept., Cheyenne, Wyo. 129 pp.
-