MONTANA

Fish and Game Commission

THE FORT PECK RESERVOIR

FISHERY SURVEY

MONTANA FISH AND GAME COMMISSION

P R O G R E S S R E P O R T

OF

THE FORT PECK RESERVOIR FISHERY SURVEY

By

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TABLE OF CONTENTS

TABLES

FIGURES

INTRODUCTION

This report covers the participation of the Montana State Department of Fish and Game in a cooperative program for the investigation of the fishery of Fort Peck Reservoir. The program consists of management studies by the Department of Fish and Game and the Department of Zoology and Entomology of Montana State College, and creel census and economic surveys by the MRBS (Missouri River Basin Studies of the U. S. Fish and Wildlife Service).

The cooperative program is designed to make the best possible use of the personnel and equipment of each agency in order to accelerate the study of the biological and other conditions required in the development of a management plan for the reservoir.

The field work was done by Mr. H. William Newman, B. S., Montana State University, beginning June 9, 1949, and ending September 2, 1949. Our appreciation is extended to the Missouri River Basin Studies for their cooperation throughout the duration of the study.

The present paper brings to the attention of the Commission an analysis of certain data gathered. This paper is a general progress report. Data not included herein will be given further and more complete attention and will be presented in future reports where it will be of maximum value for management.

DESCRIPTION OF FORT PECK RESERVOIR

Neither a detailed description of the reservoir's physical features nor discussion of its history will be given here but rather a few facts pertinent to the scope of the present paper.

Created primarily to provide storage water for navigation and flood control on the lower Missouri River, with irrigation and hydroelectric power as secondary considerations, Fort Peck Reservoir is a main stem impoundment of the Missouri River, located in northeastern Montana. The gates were closed in 1939, and the reservoir was filled for the first time in 1947. Fort Peck Reservoir has a maximum surface area of 245,000 acres, is about 110 airline miles long, has a maximum clear width of about 16 miles, has a shoreline of about 1600 miles, and has a maximum depth of about 200 feet. The Missouri and Musselshell Rivers are the only important streams entering the reservoir. The maximum recorded flow of the Missouri River entering the reservoir is about 63,000 second-feet and the minimum, 1200 second-feet. (Missouri River Basin Studies, 1948)

STUDIES IN FORT PECK RESERVOIR

Collection of Material.

Twenty-seven separate gill net sets varying in length from 125 to 1000 feet were made in the reservoir proper, at Bear Creek and Rock Creek, near

the spillway, off the dike, and from the dike to Duck Creek. Sampling gill nets were used with five different mesh sizes in each net, these being 3/4-, 1-, 1 1/4-, 1 1/2-, and 2-inch square mesh. Two thousand five hundred and forty-five (2,545) fish were taken. Most of these fish were weighed and measured. Some scale and otolith samples were taken, and a few of the fish were preserved for taxonomic study.

General Observations.

The largest single catch was 331 fish taken in a floating set off the dike on July 18-19, while the smallest catch, 2 fish, was made August 19-20, in 67 to 110 feet of water off the dike.

Goldeye appeared in 25 of the 27 sets, yellow perch in 22, sauger in 17, shovelnose sturgeon in 12, and rainbow trout in 5. Table 1 shows the number of each species of fish taken in the reservoir gill net sets and the percentage composition of the catch.

In examining Table 1, one must remember that it does not necessarily show a true picture of the relative abundance of the species; in fact, it very likely does not. Getting a representative sample of fish from any body of water, and especially from one as large as Fort Peck Reservoir, is a most difficult task. A gill net is selective. It will catch one kind of fish more

Table 1.--Catch Composition of 27 Sampling Gill Net Sets in Fort Peck Reservoir, Summer, 1949.

Species	Number	Percent
Yellow perch	1,169	45.93
Goldeye	1,108	43.54
Sauger	113	4.44
Sucker	70	2.75
Shovelnose sturgeon	24	0.94
Burbot (Ling)	19	0.75
Carp	17	0.67
Rainbow trout	9	0.35
Channel catfish	7	0.27
Flathead chub	4	0.16
Brown trout	1	0.04
Buffalo	1	0.04
Bullhead	1	0.04
Black crappie	1	0.04
Freshwater drum	1	0.04
	2,545	100.00

easily than another. Also the gill net is limited in the size fish it may catch, the 2-inch mesh being too small to catch other than the smallest fish of certain species and the 3/4-inch mesh being too large to catch other than the largest fish of other species. Again, an insignificantly small part of the reservoir was sampled, and the frequency of sampling any one place was too limited to be significant. Thus, it must be kept in mind that Table 1 does not necessarily give the relative abundance of the fishes in Fort Peck Reservoir.

Table 2 is an analysis of the catch of the three major species by mesh size. The number of each species caught in each size mesh is given. "Percent by species" shows, for each species, the relative number taken in each mesh size, while "percent by mesh size" shows the relative number of each of the three species taken in a given mesh size.

Yellow Perch and Goldeye.

In Table 1 the perch is seen to be slightly more numerous than the goldeye. Anyone who has made gill net sets knows that perch are easily caught. The head with its long, concave profile, scaled cheeks and spinous operculum and the perch's spiny fins and rough exterior make it particularly easy to become gilled and entangled in the nets. While the comparative ease with which the perch and goldeye are gilled is not known, it would appear that the goldeye would be less easily caught. It has a short head, no spines, smooth exterior and scaleless cheeks. From this it seems logical to conclude that perch are more easily caught in gill nets than goldeye and that on this basis alone goldeye would be more numerous in the areas sampled than perch.

Table 2 also offers evidence that goldeye are more numerous than perch. A normal population of fishes is one where there are many more young, small fish than old, large ones. Each year fewer and fewer fish of a given year class survive after fishing and natural mortality take their toll. The picture of the perch catch shown in Table 2 and Figure 1 fits the expected normal. There were 608 of the smaller fish taken in the smallest mesh. Less and less were caught in the larger meshes until the 2-inch mesh took only fourteen perch. The goldeye catch does not fit this norm. As the mesh size increased, there were more and more of the larger ones caught up to 417 taken in the 1 1/2-inch mesh. Then the catch dropped sharply to sixteen taken in the 2-inch mesh. This suggests that the entire goldeye population large enough to be taken in 3/4-, and 1-inch meshes was not sampled. Large numbers of small goldeye were present in the area, as verified by seine hauls. From this then, we may, with some justification, assume that the goldeye population at the lower end of Fort Peck Reservoir is larger than the perch population.

Figure 2 is a length frequency of 801 perch taken by sampling gill net. Age studies by Brown and Hays (1950) show the modes at 5.6 and 6.7 inches correspond with the mean length of the second and third age groups, respectively.

Figure 3 presents a length frequency of 1097 goldeye. Comparing the age-group average lengths (Brown and Hays, 1950) with Figure 3, it appears that the few fish at the left of the graph are from the one-year-old group, those from 8.5 to 9.4 inches, two year olds, and the mode at 11.1 inches arises largely from the three year olds.

Table 2.-- Catch of Goldeye, Yellow Perch, and Sauger by Mesh Size From 18 Sampling Gill Net Sets in Fort Peck Reservoir.

Species	Goldeye					Yellow Perch					Sauger				
Mesh Size (Inch Sq.)	3/4	1	1¼	1½	2	3/4	1	1¼	1½	2	3/4	1	1¼	1½	2
Number Caught	13	85	407	417	16	608	200	199	82	14	9	9	19	25	43
% by Species	1.4	9.1	43.4	44.4	1.7	55.1	18.1	18.1	7.4	1.3	8.5	8.5	18.9	22.6	40.5
% by Mesh Size	2.1	28.9	65.0	79.6	21.9	96.5	68.0	31.8	15.6	19.2	1.4	3.1	3.1	4.8	58.9

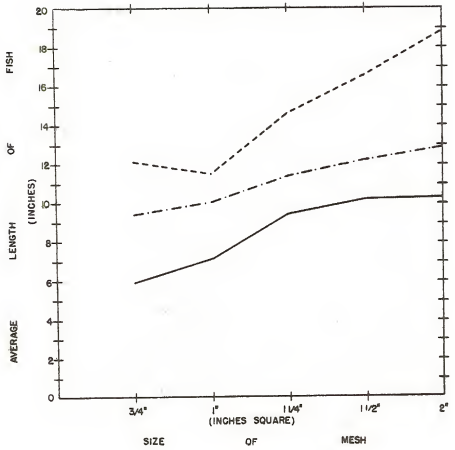

Figure 1.-- Relationship between the size mesh of gill nets and the average length of fish taken. Yellow perch _____. Goldeye -.-.-.-.-.-.-, and Sauger - - - - - - - - - - - -.

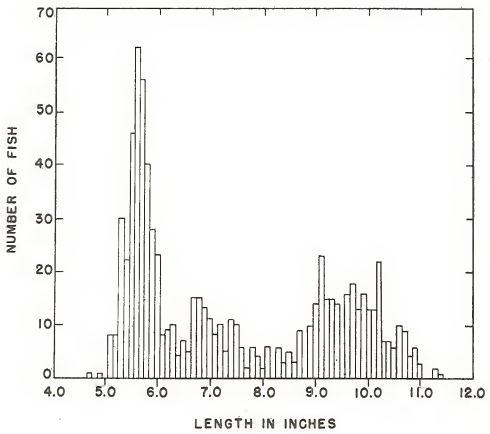

Figure 2.-- Length frequency of 801 yellow perch taken by gill net in Fort Peck Reservoir, summer, 1949.

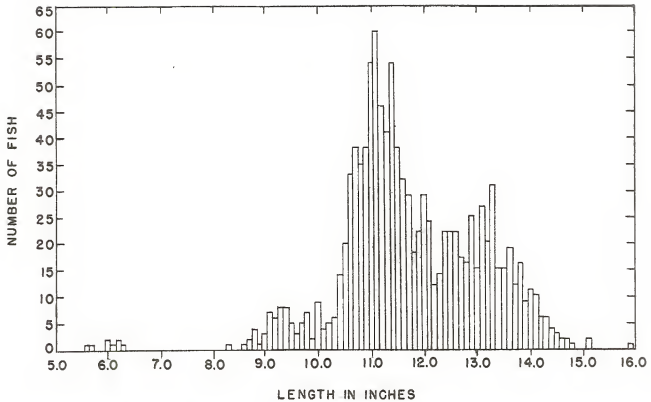

Figure 3.-- Length frequency of 1097 goldeye taken by gill net in Fort Peck Reservoir, summer, 1949.

Age studies (Brown and Hays, 1950) indicate that the four-year-old perch should have been about 8.2 inches long and that the four-year-old goldeye should have been about 12.3 inches long. The five year olds for the perch and goldeye average, respectively, 9.2 and 13.1 inches long. Comparing these age-group average lengths with Figures 2 and 3, it is seen in both figures that the fourth age groups lie in a recession in the length frequency curves. This might indicate that conditions in 1945 were unfavorable for spawning or for survival of the zero age class of these two fishes and might account in part for the less successful perch fishing the last two years as is rumored by the reservoir's anglers. The portion of the curve in Figure 2 around 6.7 inches also seems low as compared with those at 5.6 inches and 9.1 to 10.2 inches. If the third and fourth age classes are low, this would certainly contribute to poor fishing success.

Sauger.

One hundred and thirteen sauger (Table 1) were taken by gill net during the summer of 1949, in Fort Peck Reservoir. This is about 10 percent of the number of perch and of goldeye taken. Table 2 shows

that more and more sauger were taken as the mesh size increased. Again it appears that the population was not well sampled. Since the largest percent of the sauger taken were gilled in the 2-inch mesh, it is reasonable to believe that many of the older, larger sauger (Figure 1) escaped capture because of net selectivity. For the same reason cited for the goldeye, it would appear that the smaller sauger also escaped capture. While there are no figures available on the comparative ease with which perch and sauger are taken in a gill net, it does appear because of the selectivity in size of sauger caught that it is more numerous, compared with the perch, than the figures indicate. The average length of the sauger catch was 16.3 inches with the mode being about 18 inches. The indication is that the bulk of the gill-net catch was from the fifth age group and over. (Brown and Hays, 1950).

Other Species.

So few of the other species were taken in the gill nets that nothing may be concluded about their abundance. Certainly, the mere fact that they were not caught to any degree does not indicate that they were not abundant. Gill nets are selective to species. On August 19, a set was made off the dike. Carp were seen swimming around the nets, and yet none was caught. The catch was 164 goldeye and one perch.

Large numbers of carp have been observed. A member of the MRBS creel census crew estimated he saw over 500 carp in Water Sports Bay on August 26. On each trip of the MRBS cruiser to The Pines and Hell Creek, numerous carp were observed at the water surface. On August 27, while conducting aerial count of fishermen, an MRBS crew member counted 300 schools of carp in the middle of the reservoir. Because of lack of time, he counted no further.

Depth Distribution of Sauger, Goldeye, and Yellow Perch.

Eightsen samples were taken in the reservoir from July 7 to August 27 and analyzed for depth distribution. All of these samples were taken in close proximity to the dam from Bear Creek on the east to Duck Creek on the west. The same nets, 250 foot by 6 foot with graded mesh, were used for all sets. The data are summarized in Figure 4. Net sets were made in water varying in depth from the surface to 155 feet.

No goldeye, sauger, or perch were taken at the greater depths. The perch were most abundant at depths of 15 to 20 feet with considerable numbers between 10 and 35 feet. Very few were taken near the surface. Sauger were taken in greatest numbers at about 10 to 15 feet, with progressively fewer being caught as the depth increased. None was caught near the surface. Goldeye, on the other hand, were taken in greatest numbers near the surface, with progressively fewer being taken at greater depths.

The Upper Reservoir.

Most of the effort was concentrated at the lower end of the reservoir, but toward the end of the season, one trip was made to the U-L Bend near the upper end of the reservoir. Work was done at the Towne Ranch.

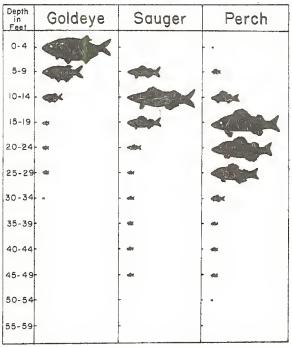

Figure 4.-- Depth distribution of goldeye, sauger, and yellow perch in the vicinity of the dam, Fort Peck Reservoir, July and August, 1949.

On the night of September 1, an 80-foot trammel net and three set lines with a total of approximately 200 hooks were set. The following morning two lines were checked and one catfish weighing 10.8 pounds and measuring 29.7 inches long was taken. In the afternoon all lines and the net were lifted. The following eight fish were taken:

80 foot trammel net, in water 22.5 hours.			
	Channel catfish	13.7 inches	0.60 pounds
	Sauger	15.1 "	0.90 "
	Sauger	15.8 "	0.90 "
	Sauger	14.2 "	0.70 "
	Sauger	13.4 "	0.50 "
80 foot set line in water 21 hours.			
	No fish.		
60 foot set line in water 20.5 hours.			
	Channel catfish	29.7 inches	10.80 pounds
	Channel catfish	14.6 "	0.60 "
	Channel catfish	21.8 "	3.25 "
60 foot set line in water 22.5 hours.			
	No fish.		

On September 2, a school of more than 200 paddlefish was observed at Sec. 24, T 21 N, R 29 E. The Towne brothers stated that the school had been in that vicinity the entire summer.

The Towne brothers stated that in pre-impoundment days, catfish up to twenty pounds were commonly taken, but that in recent years fishing has become poorer. In connection with the decline in the catfish catch in the upper reservoir reported not only by the Townes but by many others as well, the following is quoted from the Tennessee Valley Authority (1947): "The spoonbill fishery (in TVA impoundments) has definitely declined since 1943, but that loss has been made up by an increase in the catch of catfish--in some respects a more desirable species. Most people find it better eating, and adult catfish do not compete with young game fish for food." Forbes and Richardson (1920) have made the following observation for Illinois: "It (paddlefish) thus becomes a rival, for food, of all the other species in our waters, living continuously upon objects which all of them must have for at least a part of their lives." Thus, if, since pre-impoundment days, the paddlefish haveincreased in abundance in the upper reservoir, the catfish might well have decreased in abundance.

Collection of Small Fish.

Small fish collections were made on occasions in various bays with a 12-foot minnow seine. Specimens were preserved for taxonomic studies. On June 14 at Rock Creek, the catch consisted of minnows, small bullheads and perch fry. Catches of a few minnows and a large number of perch fry were made July 14 in the small bays in Duck Creek.

The MRBS crew carried a minnow seine on the boat trips to the outlying fishing areas. They found perch fry throughout the summer, and by August crappie fry were being caught. Crappie were noted in all seine hauls from August 14 to 17 at Hell Creek, Snow Creek and The Pines. At The Pines, goldeye fry were present in 50 percent of the catches, pike (10 inches and less) in 8 percent, minnows in 15 percent and perch in 70 percent.

Temperature Data.

While no concentrated efforts were made to gather temperature records, water temperatures of the reservoir were obtained from three sources. (1) When convenient, one or more surface and bottom temperature readings were made with a Foxborough resistance thermometer at the times the gill nets were lifted. (2) Two series of readings were made from the Missouri River Basin Studies launch. (3) Temperature records were obtained from the Army Engineers.

While the temperature readings at the time of gill net lifting were not taken in a manner conducive to analyzation, general statements can be made. Goldeye were taken in water from 59 to 71 degrees Fahrenheit. The most consistent catches were made in water warmer than 66 degrees. Perch were taken in water from 58 to 71 degrees and sauger from 59 to 68 degrees.

On July 13, 1949, nineteen series of readings were made from the surface to the bottom (Figure 5), starting at the point at the north side of the entrance to Duck Creek, thence running to the southwestern point at the entrance to Big Dry Creek, thence across the mouth of Big Dry Creek to the point

Figure 5.— Surface temperatures together with locations of temperature and chemical stations, Fort Peck Reservoir, July 13, 1949. Chemical determinations were made at Stations X and Y.

between Big Dry and Bear Creeks, north across Bear Creek, and thence across the spillway bay to the point between the dam and spillway. The United States Weather Bureau reported a south wind averaging about 3 miles per hour, July 13, and the records of the Army Engineers show the average outflow of the spillway was 9560 c.f.s. At most stations, the temperature readings were made at 5-foot depth intervals to the 30-foot level, and at 10-foot intervals from there to the bottom.

Figure 5 shows the approximate locations of the temperature stations and the surface temperatures at those points. While the temperature records are not extensive enough to plot current patterns, it is evident that the surface draw off of the spillway does affect the thermal pattern of the adjacent waters, such as Bear Creek Coulee.

There was much less variation in the temperature at the 5-foot level than at the surface, the readings in open water varying from 65 to 66 degrees. At the northeast shore of Big Dry Creek these rose to as high as 67.8 degrees.

The coldest temperature recorded was 45.8 degrees at the bottom, 154 feet, halfway across the main stem from the Duck Creek point. At the deepest point sounded, halfway between the island and the east shore of Big Dry Creek, the temperature was 47.2 degrees at 163 feet. The general pattern below the 5-foot level for this set of readings was an average temperature decrease of 1.6 degrees in 15 feet to the 20-foot level, followed by a nearly linear regression of 2.1 degrees per ten feet to the 80-foot level where the rate of decrease dropped. From 110 feet to the deeper waters in the three cases studied, the rate of decrease was 0.1, 0.5, and 0.7 degrees per ten feet. The above rates of decrease were for 163, 116, and 154 feet, respectively.

There is evidently no thermal stratification of thermocline magnitude over the reservoir as a whole, although on July 13, 1949, thermoclines were noted at a few stations. By definition (Welch, 1935), to constitute a thermocline, the rate of decrease of temperature with increase in depth must be 1 degree centigrade per meter or about 2.7 degrees Fahrenheit per 5 feet of depth. One hundred fifty feet south of the north point of entry to Duck Creek, there was a 5.9 degree Fahrenheit drop in temperature in the first five feet of water; a quarter of a mile south of this point, 4.2 degrees; halfway across the main stem, 4.8 degrees; and three quarters of the way across the main stem arm, 4.7 degrees. The drop in the first five feet of water off the northwest point of entry to Big Dry Creek was only 1.8 degrees, but at the stations from this point to the east shore of Big Dry Creek, the drops were 4.2, 4.5, 4.1, and 3.5 degrees, respectively. The drop 500 feet off the east shore was 2.2 degrees. Except for one case, midway across Bear Creek Coulee with a drop of 2.9 degrees, the remainder of the differences in temperature between the surface and 5-foot level was less than 2.7 degrees.

Thus, at least at certain times when there is little wind action on the surface waters, there is a thermocline at the surface with the epilimnion absent. This is especially evident away from the zone of immediate effect of the spillway.

A subsurface thermal stratification of thermocline magnitude was noted at four stations: (1) In 25 feet of water, 300 feet off the point separating the Big Dry Creek arm and the main stream channel, there was a 4.2 degree drop

in temperature from the 5- to the 10-foot levels ; (2) about a mile east of the large island near the junction of the Big Dry Creek arm and the main stem of the reservoir in 93 feet of water, besides the surface thermocline there was a 3.2-degree drop in temperature from the 25- to the 30-foot level; (3) besides the surface thermocline at the center of Bear Creek Coulee over 96 feet of water, there were 2.8- and 3.9-degree drops in temperature, respectively, between the 50- and 55- and between the 55- and 60-foot depths, and (4) about 2000 feet off the point midway between the dam and spillway over 100 feet of water, the drops in temperature were as follows:

Depth in Feet	Temperature Change
50 - 55	0.8
55 - 60	2.7
60 - 65	1.6
65 - 70	2.7
70 - 75	1.8

It is evident in a reservoir of this type with a large inflow, a large, fluctuating, controlled outflow from two points (ie., the spillway and tunnels), a reservoir with such large size, flooding rough terrain, and exposed to violent wave action, that the thermal patterns must be complex and varying. It is also evident that, in order to obtain an idea of the thermal picture and current flows, even one well versed in limnology would needs spend much time and effort studying the reservoir.

In addition to the series of readings just discussed, on August 5, 1949, five sets of readings from the surface to the bottom were made across the mouth of the upper spillway cut. One other reading was made that day in the reservoir 1000 feet south of the spillway entrance in midstream. The flow through the spillway was 11,610 c.f.s. The surface temperature varied from 70 degrees at the west shore to 75 degrees at the center and back down to 73.3 on the east shore. At the station in the reservoir, the surface temperature was 75 degrees.

Proceeding across the spillway channel from west to east, between the surface and 5-foot depth the following drops in temperature were noted: 0.5, 2.8, 5.4, 4.8, and 3.7 degrees. The first reading was taken 20 feet from the west shore and the last reading 30 feet from the east shore in 3 feet of water. There was a 4.9-degree drop in the reservoir.

The following were the bottom temperatures and depths for the same stations, respectively: 69.0 degrees, 12 feet; 66.7 degrees, 24 feet; 67.2 degrees, 27 feet; 69.3 degrees, 12 feet; 69.6 degrees, 3 feet, and 66.0 degrees, 43 feet. The latter reading was at the station in the reservoir.

The last source of temperature data to be discussed was taken from the records of the Army Engineers. They made readings at intervals throughout the year at Station 1, one half mile off shore at the dam, and Station 2, five miles above the dam in the main stem. No thermocline was noted from these readings. It is interesting to note that bottom temperatures varied, with one exception, from 38.0 degrees at Station 2, May 10, 1949, to 50.8 degrees at Station 1, October 18, 1948. On January 12, 1949, the bottom

temperature at Station 1 was 34.8 degrees, a value considerably below the point of maximum density. The warmest bottom temperatures at both stations occurred in October, with summer bottom temperatures of about 47 to 48 degrees.

Chemical Data.

Dissolved oxygen and pH values were determined on July 13, 1949, halfway across the main stem of the reservoir (station X on Figure 5) and are recorded in Table 3.

Table 3.-- Dissolved Oxygen and Chemical Records Determined July 13, 1949, in the Main Stem of Fort Peck Reservoir.

Depth	Dissolved Oxygen	pH
Surface	8.6 p.p.m.	8.1
50 feet	8.8 p.p.m.	8.1
100 feet	9.4 p.p.m.	8.1

Another series of samples was taken three-fourths of the distance into Bear Creek Coulee July 13, 1949 (station Y, Figure 5). The dissolved oxygen was 8.9 p.p.m. at 25 feet and 8.9 p.p.m. at 55 feet.

On August 11, 1948, Dr. C. J. D. Brown of Montana State College, Bozeman, took temperature-chemical data on Fort Peck Reservoir at a station about one quarter mile from the dam, east of the intake port. These findings are recorded in Table 4.

Taxonomic Studies.

Specimens were preserved and sent to Dr. C. J. D. Brown, Montana State College, and Dr. G. F. Weisel, Montana State University, for identification. Field identification was made except in the case of small minnows. Table 5 lists the species as identified in the field and is subject to revision when laboratory identification is completed. The table also includes specimens taken on collecting trips to the Milk River at Nashua on August 14, and in the barrow pits below Fort Peck Dam.

STUDIES BELOW FORT PECK RESERVOIR

The barrow pits are an extension of the main river channel below the dam, formed by removal of sand in the dam construction. On August 3, the surface temperature was 70 degrees while the bottom temperature at 21 feet varied from 64 to 66 degrees. On August 16, the surface temperature was 71.5 degrees, and the bottom temperature at 14 feet was 67.4 degrees.

Table 4.-- Temperature-Chemical Data Taken on Fort Peck Reservoir August 11, 1948, at a Station About One Quarter of a Mile From the Dam and East of the Intake Port by Dr. C. J. D. Brown, Montana State College, Bozeman.

Depth (feet)	Temperature Degree C.	Degree F.	pH	Dis. O_2 (p.p.m.)	Alkalinity (p.p.m.) phth.	MO.
Surface	22.7	73	8.4	8.2	6.0	130
5	20.8	69				
10	20.4	69				
15	19.8	68				
20	19.4	67				
25	19.1	66				
30	18.9	66				
35						
40	17.4	63				
45						
50	16.8	62	8.2	7.6	4.0	136
55	15.6	60				
60	14.9	59				
65						
70	12.9	55				
75						
80	11.9	53				
85						
90						
95						
100	10.9	52				
105						
110	10.4	51	7.8	8.5	1.0	138
115						
120	10.0	50				
125						
130	9.8	50				
135						
140	9.5	49				
145						
150	9.3	49	8.0	8.8	0.0	142
155						
160	8.8	48				
165						
170	8.6	47				
175						
180	8.5	47	About 1 foot off bottom.			

Table 5.-- A Partial List of the Species Taken in Fort Peck Reservoir and Adjacent Waters as Identified from Field Examination*.

Genus	Species	Common Name	Location**
Polydon	spathula	Paddlefish	B
Scaphirhynchus	platorynchus	Shovelnose sturgeon	R
Lepisosteus	platostomus	Shortnose gar	B
Amphiodon	alosoides	Goldeye	M,R,B
Salmo	trutta	Brown trout	R
Salmo	gairdnerii	Rainbow trout	R
Carpiodes	sp. (several)	Carpsucker	M,R,B
Megastomatobus	cyprinella	Bigmouth buffalofish	R,B
Ictiobus	bubalus	Smallmouth buffalofish	R,B
Cycleptus	sp.	Blue sucker	M,R,B
Pantosteus	sp.	Mountain sucker	R,B
Cyprinus	carpio	Carp	M,R,B
Platygobio	sp.	Flathead chub	M,R,B
Couesius	plumbeus	Lake chub	R
Ameiurus	sp.	Bullhead	R
Ictalurus	lacustris	Channel catfish	R,B
Noturus	flavus	Stonecat	M
Perca	flavescens	Yellow perch	R,B
Stizostedion	canadense	Sauger	R,B
Poecilichthys	exilis	Iowa darter	R
Pomoxis	nigro-maculatus	Black crappie	M,R,B
Aplodinotus	grunniens	Freshwater drum	M,R
Lota	lota	Burbot (Ling)	R

* Many minnows are not included herein. The table is tentative and subject to revision.

** B - barrow pits
R - reservoir
M - Milk River

Two gill net sets, each with 250 feet of graded net, composed of two 125-foot nets, 4 ½ feet deep, were made in the dredge pits during the summer. The first was a bottom set, laid in a depth of 9 to 21 feet the night of August 2, 1949. The following fish were caught:

Channel catfish	10
Shovelnose sturgeon	7
Goldeye	5
Carpsucker	4
Sauger	2
Sucker	1
Freshwater drum	1
Yellow perch	1

On the night of August 15, a surface set was made in water from 1 to 14 feet deep. The catch was as follows:

Goldeye	100
Channel catfish	53
Carpsucker	5
Sauger	4
Sucker	2
Carp	2
Smallmouth buffalofish	1
Shovelnose sturgeon	1
Black crappie	1

While the samples are decidedly inadequate, it is curious to note that the average length of the 100 goldeye in the August 15 sample is 10.9 inches as compared with 11.7 inches for the 1097 reservoir-caught goldeye. The mode for the barrow pit goldeye frequency is about 10.1 inches as compared with 11.1 for the reservoir-caught fish.

There are several small bays on the west side of the barrow pits with sandy beaches and reed patches. On August 1 approximately 18 gar were observed among the reeds in water of one-foot depth.

UTILIZATION OF OUR PROBLEM FISH

It has already been noted that the goldeye is very likely more abundant than the perch in that portion of the reservoir sampled. The angler in Montana doesnot look with favor upon the goldeye. It is a nuisance fish. Fishermen have repeatedly stated that the goldeye bite before the hook has reached a depth where the perch or sauger are biting. Most of the goldeye caught are discarded.

Properly prepared, the goldeye is considered a delicacy in Canada. The following is quoted from Sprules (1947):

"There has been an increasing demand for smoked goldeye, (Amphiodon alosoides), in recent years as its reputation as a table delicacy has spread throughout the continent. During the same period the commercial catch, which comes almost exclusively from Manitoba, has fallen from over one million pounds annually to less than one half this figure. The resultant scarcity of the product has aroused public interest in the fate of this popular fresh water fish."

Mr. Sprules, Associate Biologist, FisheriesResearch Board of Canada, Winnipeg, has kindly given his permission to quote the following from a letter to the writer, dated September 27, 1948:

"I feel the people in this part of the continent would be only too glad to find their rivers sufficiently filled with goldeye to consider them a problem. We are faced with a dwindling supply and increased demand. The marketed fish are considered a delicacy by epicureans and demand high prices. The fish are prepared by gutting and scaling. Thence they are dipped into a brine solution containing a red analine dye and smoked for several hours. The fish are hung on a thin metal rod pushed through the eye sockets and for this reason the isthmus is not cut when gutting or gills removed as this weakens the neck region and some fish fall off the rods. The prepared fish is served whole and served with the head, tail, fins, and skin on. In general, the fish is merely heated in an oven on paper to absorb fat or in a shallow pan with a little water in it. The smoking process seems to cook the fish sufficiently that this warming procedure is all that is needed to prepare it for the table."

Is it possible that people from Montana and Manitoba who are similar in their likes and dislikes to such a great degree and who are separated geographically by so few miles could have such different tastes for food, or have the people in Montana simply not been apprised of this taste treat?

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