ESTABLISHMENT OF AQUATIC BASELINES IN LARGE INLAND IMPOUNDMENTS

Segment 2 Report

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ABSTRACT

Fisheries and related aquatic studies to establish baseline information in the Big Dry Arm of Fort Peck Reservoir were continued during 1978. Monitoring and tagging of primarily adult fish during spring spawning movements was done in areas near the head of the Big Dry Arm, and larval fish were sampled in several key spawning and nursery areas in this Arm. Walleye and northern pike were the most predominate species trapped with about 17 percent of the walleye and 9 percent of the northern pike recaptures from previous years tagging. Larval fish sampling indicated substantial reproduction of walleye occurred near the head of the Big Dry Arm and yellow perch and Catostomidae sp. were prevalent in most areas sampled. Tag return information was obtained from sportfishermen primarily in the Nelson Creek area by creel censusing and also through the use of tag return boxes along fishing access roads to the Big Dry Arm. Beach seining was done in several areas of the reservoir during late summer in several areas of the reservoir to assess reproductive success of game, commercial and forage fish species. Monitoring of the goldeye population, which is an important commercial species and vulnerable to over harvesting, was continued. Several important game and commercial species were collected from various areas of the reservoir and flesh samples removed for total mercury analysis. Game fish species generally exhibited higher mercury levels than commercial species. Commercial fishing activities on the reservoir and commercial catches were checked periodically. Records of commercial landings were maintained. Bottom samples of benthos organisms were taken from several areas of the Big Dry Arm. Results indicated a paucity in both numbers of organisms and taxonomic groups.

INTRODUCTION

Major emphasis during this report period included intensive sampling of adult and larval fish in key reproductive and nursery areas of the Big Dry Arm during spring, 1978. Adult fish were trapped and tagged and larval fish were sampled with one-half meter nets near the head and in several bays of the Big Dry Arm.

A sport fishing harvest survey was conducted primarily in the Nelson Creek area of the Big Dry Arm during April and May, and tag return boxes were placed along major access roads to this Arm to aid in the recovery of fish tags from fishermen.

Other work included the sampling of Age 0 and forage fish in several areas of the reservoir and the monitoring of goldeye in lower areas of the reservoir. Several sport and commercial fish species were sampled for total mercury content. Commercial fishing harvest data was compiled and benthos was sampled in several areas of the Big Dry Arm.

MATERIALS AND METHODS

Larval fish were collected by means of one-half meter nets (#00 mesh) with attached bucket. A digital flow meter (TSK) was installed in the center of the mouth of each half-meter net and a 30-pound torpedo-shaped weight was attached to each net to provide ballast to keep nets under the surface during towing operations. Water temperature, Secchi disk readings, and climatic conditions were recorded prior to each towing operation. Paired tows were made at each sampling site for a 10-minute period at constant engine rpm. Nets were dropped and pulled simultaneously and all timing was done with the aid of a stopwatch. At the completion of each tow, buckets were removed and all material washed into quart canning jars and preserved in five percent formalin solution containing biological staining dye (Phloxine-B). All tows were made during the day. Samples were later examined in sorting trays and larval fish removed and stored in 50-dram plastic jars until identification. Larval fish were identified with the aid of a stereomicroscope (Southern Precision Model 1839) using transmitted light and various larval fish keys. A collection of identified larval fish (North Central Reservoir Investigations, U.S. Fish and Wildlife Service, Yankton, South Dakota) was also used to help in the identification.

Frame traps, 4 feet x 6 feet x 11 feet in length, with 1-inch square webbing were used to capture primarily adult fish for tagging purposes. Traps were emptied every two or three days depending on fish movement and concentration.

Walleye and northern pike were tagged with numbered tags (Floy FD-68B) and all other fish were tagged with unnumbered anchor tags (Floy FD-67F). A sample of walleye and northern pike were weighed and measured.

Goldeye were sampled in lower areas of the reservoir using two 300- x 8-foot monofilament floating gill nets. One net consisted of three 100-foot

panels each of 1 1/4-, 1 1/2-, and 1 3/4-inch bar mesh. The other net consisted of three 100-foot panels each of 1 1/4-, 1 1/2-, and 1 5/8-inch bar mesh. One hundred twenty-five by six-foot experimental sinking nylon gill nets were also used. These nets consisted of five 25-foot panels with one each of 3/4-, 1-, 1 1/4-, 1 1/2-, and 2-inch bar mesh sizes. Nets were set during the afternoon, picked the following morning and all goldeye weighed, measured and sexed. Sampling of a commercial goldeye catch was done at the fish plant site on the day of the catch. A sub-sample of goldeye was randomly picked from tubs of fish and weighed, measured and sexed.

Sampling of Age 0 fish was done by use of a 100- x 10-foot beach seine consisting of 1/4-inch square nylon mesh. Seining sites were selected according to shoreline morphology usually near heads of bays and along shorelines with gradual sloping bottoms. The seine was set with the aid of a boat and seining deck for each haul. Upon completion of each haul, species were identified and counted.

Benthos sampling was done with a standard Ekman dredge (6- x 6- x 6-inches) near the heads of bays and near the head of the Big Dry Arm. Five square feet of material was collected at each station. Contents were washed into quart canning jars and preserved in five percent formalin with biological staining dye added. Organisms were separated in sorting trays and identified at a later time.

Fish used for total mercury determinations were captured by trapping, gill nets or hook and line in several areas of the reservoir and at various times. A small sample of flesh was removed dorsal to the lateral line in the anterior portion of the body. Samples were placed in plastic bags, marked, placed in an iced cooler and frozen later the same day. All fish were weighed, measured and sexed when possible. Fish of various age and size groups were selected for sampling. The mercury analysis was done by Chem Lab at Bozeman, Montana.

TRAPPING

Monitoring of adult fish populations in the Nelson Creek and upper Big Dry Arm areas was done using frame traps during the period April 17 through May 5, 1978 for a total of 81 trap-days. The reservoir elevation increased 1.2 feet during this period. Trapping sites 1, 2, and 5 were established April 17 and maintained through April 28; sites 3 and 4 were established April 17 and maintained through May 5; site 6 was used from April 28 through May 5; site 7 was used from April 28 through May 1; site 8 was used from May 1 through May 5 (Figure 1). A total of 3,522 fish were captured (43.5 fish per trap-day) of which 416 or 11.8 percent were recaptures from previous years marking (Table 1).

Walleye were the most abundant species caught with a total of 1,839 captured (22.7 per trap-day) of which 17.4 percent were recaptures from previous years tagging. Approximately 68 percent of the total were caught during the week of April 19 through April 26 with 1,126 or 89.7 percent taken at trapping sites 3, 4, and 5.

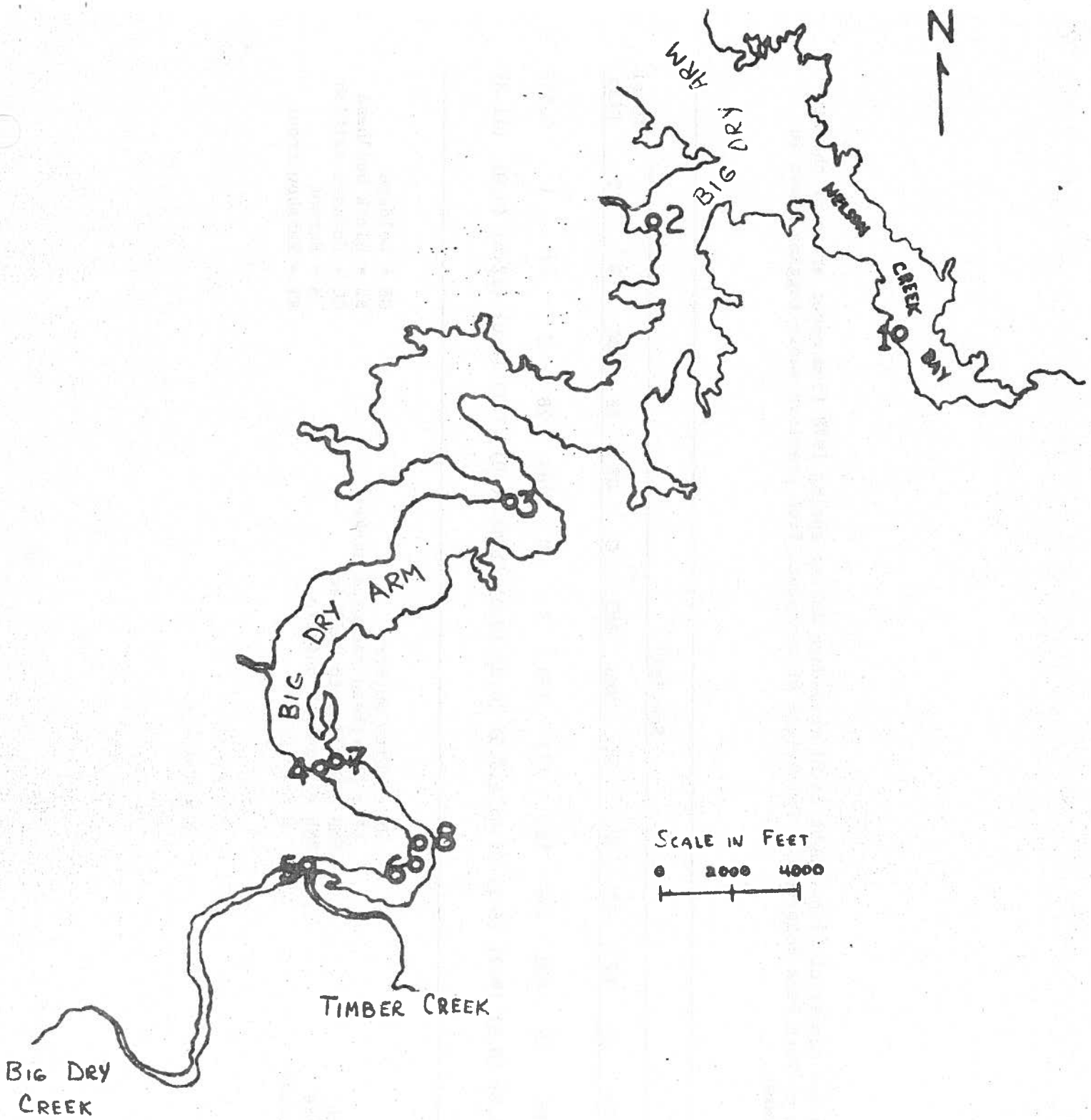

Figure 1. Map of upper Big Dry Arm showing trapping locations used during spring, 1978.

Table 1. Species and number of fish caught in 81 trap-days during spring 1978 from upper areas of the Big Dry Arm of Fort Peck Reservoir. Percentage of recapture from previous years tagging shown in parentheses.

	Species[1]															
Date	WE	SG	YP	NP	RC	WS	SR	SMB	BMB	C	GE	BB	CC	B	RT	Total Fish
4/17-5/5	1,839	83	26	400	246	193	133	180	7	71	265	28	3	47	1	3,522
	(17.4)	(4.8)	(0.0)	(9.2)	(6.1)	(2.6)	(19.5)	(0.0)	(0.0)	(1.4)	(0.0)	(7.1)	(0.0)	(12.8)	(0.0)	(11.8)

[1]WE = Walleye
SG = Sauger
YP = Yellow perch
NP = Northern pike
RC = River carpsucker
WS = White sucker
SR = Shorthead redhorse sucker
SMB = Smallmouth buffalo
BMB = Bigmouth buffalo
C = Carp
GE = Goldeye
BB = Black bullhead
CC = Channel catfish
B = Burbot
RT = Rainbow trout

Northern pike were the second most abundant species trapped with a total of 400 captures (9.2 per trap-day) of which 9.2 percent were recaptures from previous years tagging. Sixty-four percent were trapped at sites 1 and 2 during the period April 17 through April 28.

A total of 265 goldeye were trapped (3.3 per trap-day) with about 48 percent captured at sites 4, 6, and 8 from May 3 through May 5. No previously marked fish were caught.

Two hundred forty-six river carpsucker were trapped (3.0 per trap-day) with 197 or 80 percent captured during the period April 19 through April 28. The majority of these fish were caught at sites 1 and 2. A total of 6.1 percent were marked in previous years.

The highest percentage of recaptures occurred with the shorthead redhorse suckers where a total of 133 were trapped (1.6 per trap-day) of which 26 or 19.5 percent were marked the previous year. Burbot also showed a relatively high number of recaptures with a total of 47 captured (0.6 per trap-day) of which 6 or 12.8 percent were marked the previous year.

A total of 193 white sucker (2.4 per trap-day) and 180 smallmouth buffalo (2.2 per trap-day) were also trapped. Recaptures of white sucker from previous years marking amounted to 2.6 percent while none of the smallmouth buffalo showed evidence of previous marking.

Less than one fish per trap-day of black bullhead, carp, channel catfish, yellow perch, bigmouth buffalo and rainbow trout were captured and of these only black bullhead, 7.1 percent, and carp, 1.4 percent, were recaptures from the previous year.

LARVAL FISH SAMPLING

Sampling of larval fish was done periodically from May 11 through June 27, 1978 in the Big Dry Arm. A total of 37 paired tows were made during daylight hours at upper and middle stations. Upper stations included the area near the mouth of Timber Creek, areas approximately one mile and five miles downstream from Timber Creek and an area near the head of Nelson Bay. Middle stations were near the heads of McGuire, Bug and Black Coulee Bays on the east side of the Big Dry Arm and Short and Lonetree Bays on the west side.

Only three species of larval fish, yellow perch, walleye and burbot, were captured in 1977. Yellow perch were the most abundant in all three areas sampled ranging from an average low of 5.9 fish in Box Elder Bay to a high of 2428.9 fish per thousand cubic meters of water in Nelson Creek Bay (Table 2). The highest combined average of yellow perch, 1012.0, were captured in the three upper stations, while the lowest combined average, 65.8, were captured in the four lower stations. Walleye were found at only one station each in the upper and middle areas and averaged less than one fish per thousand cubic meters at both stations. Burbot were found at

Table 2. Average number of larval fish captured per 1,000 cubic meters of water from Upper, Middle and Lower areas of the Big Dry Arm during 1977.

Area	Day Tows				Night Tows	
	No. Tows	Species[1] YP	WE	BUR	No. Tows	Species YP
UPPER AREA						
Stone	6	98.8	0.0	---	2	54.2
Antelope	7	215.7	0.0	---	2	93.1
Nelson	7	2428.9	0.4	---	2	974.8
Average		1012.0	0.1	---		409.1
MIDDLE AREA						
McGuire	6	819.5	0.5	0.0		
Lonetree	6	574.9	0.0	0.0		
Bug	6	295.9	0.0	0.5		
Lost	6	249.0	0.0	0.0		
Intake	5	97.0	0.0	0.0		
Average		420.3	0.1	0.1		
LOWER AREA						
Rock	4	109.3	---	0.0		
Box	4	67.8	---	0.0		
Sand Arroyo	4	64.0	---	0.7		
Box Elder	3	5.9	---	0.0		
Average		65.8	---	0.2		

[1]YP = Yellow perch
WE = Walleye
BUR = Burbot

only two stations, one each in middle and lower areas and also averaged less than one fish per thousand cubic meters of water.

The Intake sampling site, included in the middle area data, averaged the least number of larval yellow perch per thousand cubic meters of water among the five sampling sites. This area, located along the main arm of the Big Dry, was sampled since it may be the primary site for an intake pumping station which would provide water for a proposed fertilizer plant. The physical aspects of this area differ considerably from those encountered near the embayment heads and probably accounts for the lower catch of yellow perch. Generally, the water is much deeper and less turbid than near the heads of the bays, and also there is little submerged brush or aquatic vegetation in this area which would provide cover and spawning substrate for yellow perch.

Larval fish were sampled at night in only the upper stations during 1977 to determine if catch rates and species composition would differ significantly from day tows. The data shows only yellow perch were caught and also that the average number per thousand cubic meters was considerably fewer than sampled during day tows at all three stations.

During 1978 only the upper and middle areas of the Big Dry Arm were sampled for larval fish (Table 3). It was possible to sample farther towards the head of the Arm since the spring reservoir level was several feet higher in 1978 than 1977. Larval suckers (primarily white) and buffalo (primarily smallmouth) were found in greater abundance at the two sampling sites near the head of the Big Dry Arm and were also the most numerous in the upper area. However, these species were found in only two sampling sites in the middle area and in much fewer numbers. Walleye larvae, which were found in only two sampling sites in 1977, one each at Nelson and McGuire Bays, were captured at all upper stations in 1978 but none were taken at any of the middle stations. Larval yellow perch were captured at all upper sampling sites and all stations in the middle area except one, but the number captured was significantly fewer than in 1977. Larvae of freshwater drum and carp were captured in three of the four sampling sites in the upper area, but drum were absent from all middle area stations and carp were found in only two sampling sites. Larval emerald shiners were captured at two upper and also in two middle sampling sites, while larval goldeye and crappie were found at only one site each in the upper area.

FISH MARKING AND TAG RETURNS

A total of 3,085 fish were marked during spring trapping in the Big Dry Arm in 1978. Walleye and northern pike were marked with numbered tags while all other species were tagged with unnumbered flag tags. Species and number of fish marked were: walleye--1,564; northern pike--356; goldeye--260; river carpsucker--232; white sucker--179; smallmouth buffalo--176; shorthead redhorse sucker--107; carp--77; sauger--44; burbot--38; black bullhead--21; yellow perch--20; bigmouth buffalo--7; channel catfish--3; rainbow trout--1. All fish were marked in order to obtain information regarding movement, harvest and population densities.

Table 3. Average number of larval fish captured per 1,000 cubic meters of water from Upper and Middle areas of the Big Dry Arm during 1978.

Area	No. Tows	Species[1] S-B	WE	YP	FD	C	ES	GE	CR
UPPER AREA									
Timber	3	194.1	14.3	1.1	2.1	2.8	0.0	1.0	0.0
Rookery	6	196.2	132.4	0.6	24.4	9.9	7.5	0.0	0.0
Antelope	5	9.1	25.0	15.4	9.1	0.6	0.0	0.0	0.0
Nelson	6	4.0	8.6	119.8	0.0	0.0	1.1	0.0	0.6
Average		90.6	50.5	40.2	12.6	3.4	1.7	0.1	0.1
MIDDLE AREA									
McGuire	6	1.1	-----	342.0	----	1.1	0.0	---	---
Lonetree	6	16.1	-----	257.1	----	2.3	0.6	---	---
Short	2	0.0	-----	8.6	----	0.0	1.1	---	---
Black	1	0.0	-----	2.8	----	0.0	0.0	---	---
Bug	1	0.0	-----	0.0	----	0.0	0.0	---	---
Average		6.8	-----	225.8	----	1.1	0.6	---	---

[1]S-B = Sucker and buffalo sp.
WE = Walleye
YP = Yellow perch
FD = Freshwater drum
C = Carp
ES = Emerald shiner
GE = Goldeye
CR = Crappie

Tag returns of walleye and northern pike were primarily from sport fishermen. A total of 325 tags (20.8 percent) from the 1978 walleye group were recovered and of these 314 (97.0 percent) were from walleye caught within the Big Dry Arm. Two tags were returned from walleye caught in Hell Creek Bay, which is about 45 miles upreservoir from the dam in the main arm of Fort Peck Reservoir. This was the furthest recorded distance from original point of tagging, approximately 85 miles. A total of 60 tags (16.8 percent) from the 1978 northern pike group were recovered and of these 52 (87.0 percent) were from fish caught within the Big Dry Arm. One tag was recovered about 65 miles from the original point of tagging, while the other seven tags were from northern pike caught in the vicinity of the dam.

Percentage of tag returns from other species marked in 1978 were as follows: sauger--18.2; ling--13.2; goldeye and white sucker--less than 1 percent each.

All of the sauger, ling and white sucker were caught in the Nelson Creek area of the Big Dry Arm during April and May within a few miles from the point of tagging. The goldeye tag return was taken from the Duck Creek area during May by a commercial fisherman, approximately 50 miles from point of tagging. No other commercial species (river carpsucker, smallmouth and bigmouth buffalo, carp) tagged in 1978 were reported caught by commercial fishermen.

In an effort to retrieve tags from sport fishermen, a creel census was conducted primarily in the Nelson Creek area of the Big Dry Arm during April and May, 1978. Tag return boxes were also installed at five major access roads to the Big Dry Arm at Nelson, McGuire, Black Coulee, Little Bug and Rock Creek area; these were checked periodically throughout the fishing season.

Creeling was conducted a total of 35 days with 1,310 fishermen interviews. A total of 1,247 walleye were recorded of which 190 (15.2 percent) were tagged. A slightly higher percentage of tagged walleye were caught in April than in May, 15.9 percent as compared to 15.0 percent. However, more walleye were caught in May than in April. A total of 90 northern pike were creeled of which 12 (13.3 percent) were tagged. Only 11 northern pike were checked in April as compared to 79 during May.

Results from the tagging boxes showed a total of 1,483 walleye were caught by fishermen of which 211 (14.2 percent) were tagged. Also, 286 northern pike were reported caught and 27 (10.1 percent) of these were tagged. More than half (66.2 percent) of the walleye were caught in the Nelson and McGuire Creek areas while 142 (53.0 percent) of the northern pike were caught in the Bug Creek area.

Residency of fishermen was noted during the creel census, and it was found 98.6 percent of those using this area during April and May were Montana residents.

REPRODUCTION AND FORAGE FISH ASSESSMENT

Sampling of Age 0 and forage minnows was done in Nelson Creek Bay during July and in four other bays during August, 1978 in the Big Dry Arm (Table 4). Areas suitable for beach seining were severely limited due to a near maximum reservoir level.

Yellow perch were the most abundant species captured, averaging a total of 48.2 fish per haul, while carp, freshwater drum and crappie were the least abundant species, each averaging a total of only 0.1 fish per haul. Walleye, carp, smallmouth buffalo and freshwater drum were each captured in two bays and black crappie were found only in Bug Creek Bay. Northern pike averaged a total of 0.3 fish per haul and were found in all bays except Nelson Creek Bay. Forage minnows were found in all bays and averaged a total of 44.5 fish per haul with 86.8 percent of this total being emerald shiners.

Hell Creek Bay, located approximately 40 miles upstream from the dam, was sampled during August, 1978, and Duck Creek Bay, located a few miles west of the dam, was sampled during September, 1978 (Table 5). In Hell Creek Bay, only three species of fish were caught with yellow perch the most abundant, averaging 586.3 fish per haul. Northern pike and emerald shiner were the other species captured and averaged 0.2 and 0.6 fish per haul, respectively. Five species of fish were captured in Duck Creek Bay with yellow perch again the most abundant, averaging 327.5 fish per haul. Black crappie averaged 14.5 fish per haul with emerald shiners, northern pike and walleye averaging 2.3, 1.9 and 0.9 fish per haul, respectively.

A total rise in the reservoir level of eight feet occurred during May and June, 1978. This should have provided favorable spawning conditions for many of the species found in Fort Peck Reservoir which rely on flooded shoreline vegetation for successful spawning. This would include particularly buffalo, carp and northern pike. The relatively few Age 0 buffalo and carp captured by beach seining in the Big Dry Arm and the fact that none were caught in either Duck Creek or Hell Creek Bays indicated poor reproduction for these species. However, northern pike reproduction appeared favorable as they were captured in all areas except one. Forage minnows appeared to be severely lacking in all areas seined with the exception of emerald shiners.

GOLDEYE MONITORING

Standard goldeye sampling sites in Duck Creek Bay were monitored July 21 and July 26, 1978. Goldeye were also sampled in Hell Creek Bay August 16, 1978. This bay is located about 40 miles upreservoir from Duck Creek Bay. Both bays are closed to commercial fishing of goldeye the entire year.

Two floating 300- x 8-foot monofilament gill nets were used at standard sampling sites in Duck Creek Bay. Both nets consist of 100-foot panels, one each of 1 1/4-inch and 1 1/2-inch bar mesh and a 100-foot panel of

Table 4. Average number of Age 0 fish and adult forage minnows captured by beach seining in the Big Dry Arm of Fort Peck Reservoir during July and August, 1978.

Area	Date	No. of Hauls	Species[1]								
			YP	WE	NP	C	SMB	WS	FD	CR	FM
Nelson Creek Bay	7/27	8	33.8	1.0	---	0.3	0.6	6.3	0.3	---	89.1
Little Bug Creek Bay	8/31	5	49.8	0.2	0.6	---	---	1.8	0.2	---	24.2
Bug Creek Bay	8/31	5	42.4	---	0.2	---	0.2	---	---	0.4	11.8
Black Coulee Bay	8/31	3	41.0	---	1.0	---	---	---	---	---	0.7
S.F. Rock Creek Bay	8/31	3	101.3	---	0.3	0.4	---	1.3	---	---	57.3
Totals		24	48.2	0.4	0.3	0.1	0.2	2.6	0.1	0.1	44.5

[1]YP = Yellow perch
WE = Walleye
NP = Northern pike
C = Carp
SMB = Smallmouth buffalo
WS = White sucker
FD = Freshwater drum
CR = Black crappie
FM = Forage minnow species including emerald shiner, lake chub, and fathead and silvery minnows.

Table 5. Average number of Age 0 fish and adult emerald shiner captured by beach seining in Hell and Duck Creek Bays during August and September, 1978.

Area	Date	No. of Hauls	Species[1]				
			YP	WE	NP	CR	ES
Hell Creek Bay	8/17	9	586.3	---	0.2	----	0.6
Duck Creek Bay	9/1	10	327.5	0.9	1.9	14.5	2.3

[1]YP = Yellow perch
WE = Walleye
NP = Northern pike
CR = Black crappie
ES = Emerald shiner

1 5/8-inch bar mesh in one net (net I) and a similar panel of 1 3/4-inch bar mesh in the other (net II). In addition to these nets, two 125- x 6-foot nylon sinking gill nets were used in Hell Creek Bay. These nets consist of five 25-foot panels, one each of 3/4-inch, 1-inch, 1 1/4-inch, 1 1/2-inch, and 2-inch bar mesh.

The results of the floating nets show more goldeye were caught per net in Hell Creek, but that the average size of both sexes was smaller in all mesh sizes in this area with the exception of males in the 1 1/2-inch bar mesh in net I (Table 6). Females averaged larger than males in all mesh sizes of both nets in both areas. Size differences between sexes is especially apparent in the 1 5/8-inch and 1 3/4-inch bar meshes where a total of only 6 males were caught compared to a total of 57 females.

Two sinking 125-foot experimental gill nets set in Hell Creek Bay August 17, 1978 captured a total of 115 goldeye. Males (45 fish) averaged 11.2 inches in total length and 0.49 pounds, and females (68 fish) averaged 11.8 inches in total length and 0.58 pounds. The smaller average size of these fish compared with those captured in the 300-foot nets is a reflection of the different mesh sizes used in the 125-foot nets; i.e., smaller goldeye were selected for in the 3/4-inch and 1-inch bar mesh and only four goldeye were caught in the 2-inch bar mesh, two males and two females.

One commercial catch of goldeye was sampled June 16, 1978 at the cleaning and storage plant site. A total of 209 females averaged 13.2 inches in total length and 0.82 pounds. A total of 11 males averaged 12.4 inches in total length and 0.72 pounds. The preponderance of females in the catch (95 percent) is a result of the exclusive use of 1 3/4-inch bar mesh nets used by the commercial fishermen for harvesting goldeye.

MERCURY ANALYSIS

Three important sport fish species, walleye, sauger and northern pike, and two of the major commercial fish species, smallmouth buffalo and goldeye, were collected for mercury analysis from Fort Peck Reservoir during June, July, and August, 1978 (Table 7). Fish were captured by netting, trapping, and hook and line and were taken from several different areas of the reservoir. FDA guidelines for mercury content in fish flesh for human consumption indicate mercury levels should not exceed 0.50 ppm. The results show that 5 walleye, 3 sauger, 3 northern pike, and 1 smallmouth buffalo exceeded this level. No goldeye sampled contained mercury in excess of the acceptable level.

It is known mercury accumulates in fish throughout their lives and is generally higher in piscivorous fish than in nonpredatory fish. Although ages were not determined for the fish sampled, 4 of the 5 walleye and 2 each of both the 3 sauger and northern pike containing excessive mercury levels were among the largest fish sampled in each group and were also probably the oldest fish. This was also shown in the goldeye sampled.

Table 6. Results of 300- x 8-foot floating monofilament gill nets for monitoring goldeye in Duck Creek Bay during July and Hell Creek Bay during August, 1978.

NET I

Area	Month	No. of Sets	1 1/4-inch Bar Mesh				1 1/2-inch Bar Mesh				1 5/8-inch Bar Mesh				Avg. No. of Goldeye Caught Per Net
			Sex	No.	Avg. T.L.	Avg. Wt.	Sex	No.	Avg. T.L.	Avg. Wt.	Sex	No.	Avg. T.L.	Avg. Wt.	
Duck Cr. Bay	July	2	M	26	12.3	0.64	M	12	12.4	0.64	M	2	12.9	0.79	72.5
			F	38	12.9	0.73	F	46	13.0	0.76	F	21	13.4	0.87	
Hell Cr. Bay	Aug.	1	M	30	12.3	0.62	M	15	12.4	0.66	M	2	11.8	0.63	121
			F	30	12.7	0.70	F	33	12.5	0.69	F	11	12.7	0.78	

NET II

Area	Month	No. of Sets	1 1/4-inch Bar Mesh				1 1/2-inch Bar Mesh				1 3/4-inch Bar Mesh				Avg. No. of Goldeye Caught Per Net
			Sex	No.	Avg. T.L.	Avg. Wt.	Sex	No.	Avg. T.L.	Avg. Wt.	Sex	No.	Avg. T.L.	Avg. Wt.	
Duck Cr. Bay	July	2	M	22	12.2	0.61	M	27	12.3	0.64	M	1	13.1	0.79	71.5
			F	42	12.7	0.72	F	32	13.0	0.76	F	19	13.6	0.87	
Hell Cr. Bay	Aug.	1	M	24	11.8	0.55	M	20	12.1	0.60	M	1	13.0	0.74	107
			F	32	12.3	0.64	F	24	12.5	0.68	F	6	13.0	0.81	

Table 7. Results of mercury analysis of fish species collected in Fort Peck Reservoir during June, July, and August, 1978.

Species	No. Sampled	Avg. T. L. (Range)	Avg. Wt. (Range)	Avg. ppm Hg (Range)	No. ≥0.50 ppm Hg (Percent)
Walleye	16	16.5 (8.3-21.8)	1.52 (0.16-3.58)	0.36 (0.08-0.83)	5 (31.2)
Sauger	15	16.7 (12.7-23.1)	1.33 (0.57-3.51)	0.38 (0.12-0.92)	3 (20.0)
Northern pike	16	29.2 (20.3-40.6)	6.59 (1.81-15.35)	0.33 (0.11-0.60)	3 (18.7)
Smallmouth buffalo	14	23.6 (17.7-25.9)	6.97 (3.06-9.40)	0.35 (0.10-0.52)	1 (7.1)
Goldeye	21	13.1 (10.6-14.9)	0.77 (0.38-1.09)	0.22 (0.13-0.37)	0 (0.0)

While none exceeded the acceptable mercury limit, the 3 largest goldeye by length (14.5 to 14.9 inches) ranged from 0.33 to 0.37 ppm mercury. All other goldeye had less than 0.30 ppm mercury.

Tagging of the species examined for mercury in the reservoir has shown them to move throughout the lake, although walleye tagged in the Big Dry Arm tend to remain in this area. The fact that the 5 walleye, 1 sauger, 2 northern pike, and 1 smallmouth buffalo which had excessive mercury levels were all sampled in the Big Dry Arm may indicate this area of the reservoir has a higher mercury background level than other areas of the reservoir. There is no known point-source of mercury near or within any of the tributaries to or the reservoir itself.

COMMERCIAL FISHING

Four commercial fishing licenses were issued in 1978 to fish Fort Peck Reservoir, three to residents and one to a nonresident fisherman. Two of the residents fished exclusively for goldeye and the other resident licensee fished primarily for buffalo but also harvested river carpsucker and goldeye. The nonresident fisherman did not fish the reservoir during 1978. Total landings (round weight) for the year are as follows: buffalo--243,166 pounds; river carpsucker--6,075 pounds; goldeye--105,919 pounds.

BENTHOS SAMPLING

Benthos samples were taken at four stations in the Big Dry Arm; one near its head, and others near the heads of Nelson, McGuire, and Lonetree Bays. Five square feet were removed at each location and organisms counted and identified. Only four orders were found. Diptera (Tendipedidae) were the most abundant and averaged 1.10 per foot-square. Annelida (Oligocheata), Ephemeroptera and Nematoda were the other orders identified and averaged 0.20, 0.15 and 0.05 per foot-square, respectively.

DISCUSSION

Spring trapping near the head of the Big Dry Arm indicates the importance of this area for reproduction for a variety of species. Walleye, which comprised over half the total fish captured, are particularly drawn to this area and there is some suspicion this may be related to the influence of spring flows in Big Dry Creek. The fact that larval walleye were captured at the extreme head end of the Big Dry Arm may be an indication of hatching occurring in the stream with subsequent drift into the reservoir. Further investigation is needed to substantiate this premise with efforts directed towards the capture of both adult and larval walleye within Big Dry Creek.

Marking of fish captured during trapping operation will be continued since this is providing some important information regarding the density,

movement and harvest for a number of species. The moderately high number of walleye recaptures, about 17 percent, may indicate a relatively low adult population and should be closely monitored in the future. Also, a minimum of almost 21 percent of the walleye tagged in 1978 were harvested by sport fishermen (based on actual tag returns) during 1978 which is perhaps another indication of a low adult population. Increased fishing pressure in the Big Dry Arm has occurred and may be partially responsible for a reduction in adult walleye numbers. However, suspected poor reproduction of this species during the past few years is also a possible contributing factor.

Monitoring of commercial species, particularly goldeye, indicates substantial populations are present within the reservoir and should continue to support a commercial fishery in the future at present harvest levels. Several concerns to be considered include adequate reproduction of commercial species, particularly smallmouth and bigmouth buffalo. These species depend on fast rising spring reservoir levels to flood shoreline vegetation for optimal reproduction and Fort Peck Reservoir continues to have major problems meeting this requirement. While the goldeye population appears adequate to sustain a continued fishery, it must be kept in mind the catch consists of predominately females and may, in time with increased harvest, substantially reduce the population in the reservoir. Continued monitoring is necessary to observe if any downward trends in the population occur.

Although mercury determinations of Fort Peck fish were not considered in the original project proposal, it was felt this type of information, which is of a baseline nature, would be important for future reference if and when the coal related industrial complex planned for the Big Dry area is constructed.

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