ESTABLISHMENT OF AQUATIC BASELINES IN LARGE INLAND IMPOUNDMENTS

Completion Report

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INTRODUCTION

The purpose of this project was to provide baseline information relative to the aquatic ecosystem in Fort Peck Reservoir with special emphasis on the Big Dry Arm and also to monitor commercial fishing activities and harvest rates within the reservoir.

A particular need for this project became evident after plans were announced by Burlington Northern, Inc., to build an industrial complex based on abundant coal reserves in an area near the Big Dry Arm to produce ammonium fertilizer and light fuels. Original plans called for pumping water from the Big Dry Arm to the industrial site for use in the manufacturing processes.

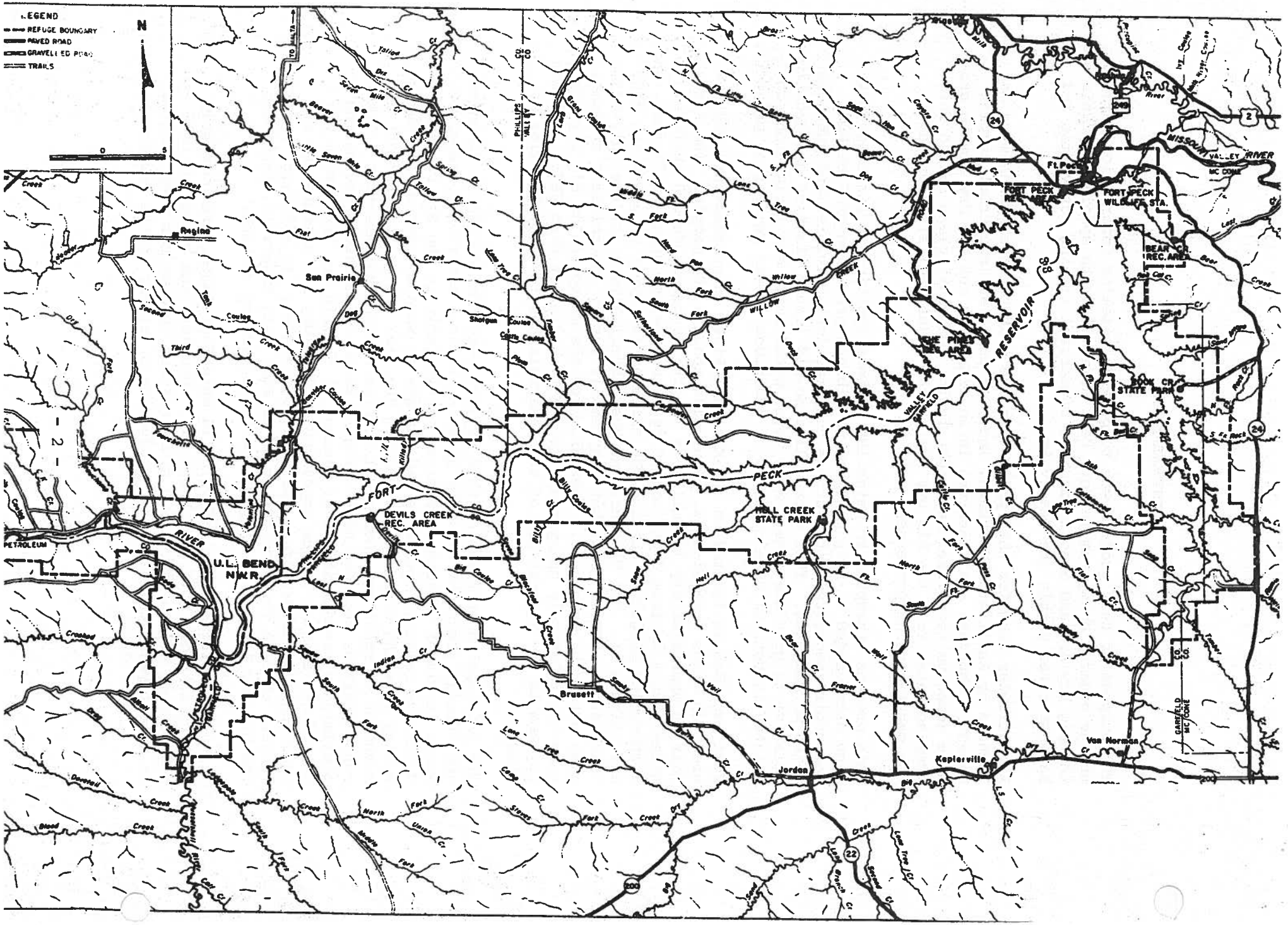
This project attempted to establish various aquatic and fisheries baseline data needed to help minimize possible degradation of Fort Peck Reservoir associated with various construction activities and subsequent water withdrawals. This data will also aid future planning and decisions relative to possible other major water withdrawals for irrigation, coal-related industrial developments, or additional power generation projects.

Fort Peck Dam is located on the Missouri River in northeastern Montana about 20 miles from Glasgow, population about 4,500 people. The reservoir is approximately 134 miles in length, contains 246,000 surface acres, has a maximum depth of 220 feet, an average depth of 79 feet, and a shoreline length of about 1,600 miles at full pool or elevation 2250 msl (Figure 1). The Missouri and Musselshell Rivers are the only major tributaries of Fort Peck, but many small, mostly intermittent streams, also enter the reservoir. However, with the exception of Big Dry Creek, they are relatively unimportant to the fisheries of Fort Peck. The Big Dry Arm is the largest arm of the reservoir and is about 35 miles in length.

The principal objectives of this project were to: determine spawning and nursery areas and evaluate spawning success relative to reservoir water levels of important species, particularly in the Big Dry Arm; determine relative abundance and changes in species composition during spring spawning movements in the Big Dry Arm; and monitor harvest and movement of sport and commercial species within the reservoir. Other considerations included monitoring of water temperatures and making preliminary investigations of benthos in the Big Dry Arm. Work was also done relative to the importance of Big Dry Arm tributaries as spawning and nursery areas for reservoir fishes. In addition, several species of fish from various areas of Fort Peck Reservoir, including the Big Dry Arm, were analyzed for total mercury content.

Forty-four fish species, of which 14 were introduced, are currently thought to be in Fort Peck Reservoir. However, the status of coho and kokanee salmon is unknown since neither species has been planted in recent years and natural reproduction of either in the reservoir or

Figure 1. Map of Fort Peck Reservoir



tributaries is very doubtful. Smallmouth bass were introduced in 1981 and are expected to eventually become an important addition to the game fish population. Spottail shiner will be stocked in the Big Dry Arm in 1982 in an attempt to augment the forage supply for predator species, particularly walleye. A list of fishes found in Fort Peck Reservoir is shown in the Appendix, Table 1.

MATERIALS AND METHODS

Frame traps, 4- x 6- x 11-feet in length were used beginning in early spring to capture fish for monitoring and tagging purposes. Traps were equipped with 50-foot leads which were staked to the shore with webbing of 1-inch or 1 1/2-inch square nylon. Traps were emptied each 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). Samples of fish were also weighed and measured.

Larval fish were collected with one-half meter nets (#00 mesh). A digital flow meter (TSK) was installed at the center of each net and a 30-pound torpedo-shaped weight was attached to each net which allowed the nets to be towed just under the surface. Paired tows were made at each sampling site for a 10-minute period at a constant engine rpm. All material collected in the net-buckets was washed into one-quart canning jars and preserved with five percent formalin solution containing biological dye (Phloxine-B). All tows were made during daytime except in 1977 when some night tows were made. Samples were later examined and larval fish removed and stored in 50-dram plastic jars. Identification of larval fish was done using a stereomicroscope (Southern Precision Model 1839) using transmitted light.

Continuous water temperature records were made using Taylor 31-day spring-wound thermographs (Model 23-3).

Sampling for young-of-the-year fish in late summer and early fall was done using a 100- x 10-foot beach seine with 1/4-inch square nylon webbing. This seine was set with the aid of a boat and seining deck for each haul. Species were identified and counted after each haul was made.

Goldeye were sampled using 300- x 8-foot floating gill nets comprised of various mesh sizes ranging from 1 1/4-inch square to 1 3/4-inch square mesh. One hundred twenty-five by six-foot experimental sinking gill nets were also used. These nets consisted of five 25-foot panels, one each of 3/4-, 1-, 1 1/4-, 1 1/2-, and 2-inch square mesh sizes. Nets were usually set during the afternoon and picked the following morning; all goldeye were sexed, weighed, and measured. Sampling of commercial goldeye catches was done at the plant site on the day of catch.

Benthos sampling was done using an Ekman dredge (6- x 6- x 6-inches) near embayment heads in the Big Dry Arm. Five square feet of material was collected at each sampling site. Contents were washed into one-quart canning jars and preserved in five percent formalin with biological dye. Organisms were later sorted and identified.

Total mercury determinations were made on several species of fish captured by trapping, gill nets or hook and line from several areas of the reservoir. A sample of flesh was removed dorsal to the lateral line in the anterior one-third of the body. Samples were placed in plastic bags, cooled, and frozen later the same day. The analyses were done by Chem Lab in Bozeman, Montana.

TRAPPING AND TAGGING

Trapping and tagging of fish near the head of the Big Dry Arm was done during the period March 31 through April 28, 1981. Lack of any appreciable runoff and little precipitation resulted in a low, generally stable reservoir level in March and April; the level decreased 0.72 during these two months. Generally, this type of pattern is considered to be detrimental to early spring spawning fish.

A total of 140 trap-days captured 1,374 fish for an average of 9.8 fish per trap-day (Table 1). This was the lowest average number of fish caught per trap-day during the five springs of trapping in this area (Appendix, Tables 2-5). Average size data and ranges are shown in Table 2.

Walleye were the most abundant fish captured with a total of 374, or an average of 2.7 fish per trap-day. Walleye were unable to move into Big Dry Creek for spawning due to the lack of any substantial flows and low reservoir level. A total of 209 male walleye were captured and averaged 19.2 inches total length and 2.27 pounds. Males ranged from 11.2 to 22.4 inches total length and 0.39 to 3.50 pounds, and comprised 55.9 percent of the total walleye captured. Only 96 female walleye were captured and averaged 22.8 inches total length and 3.70 pounds. Females ranged from 17.0 to 27.0 inches total length and 1.30 to 7.70 pounds and made up 25.7 percent of the total walleye catch. An additional 66 walleye were captured which were not in spawning condition, and sex determinations were not made. These walleye averaged 17.9 inches total length and 1.96 pounds, and comprised 18.4 percent of the total walleye captured. Recaptures from previous years marking were 17.5 percent of the total walleye caught. All walleye, except recaptures with complete, intact tags, were tagged with color-coded and numbered Floy tags.

The second most abundant game fish captured were northern pike with a total of 98 trapped. Forty-six males were captured and averaged 23.9 inches total length and 3.04 pounds. Size ranges were from 19.9 to 32.7 inches total length and from 1.73 to 8.50 pounds. Forty-five female northern pike were trapped and averaged 30.3 inches total length and 8.18 pounds. These ranged in size from 23.2 to 39.9 inches total length and 2.70 to 16.80 pounds. Seven northern pike could not be sexed.

Table 1. Species, number and percent of recaptures from previous years marking caught in 140 trap-days during spring, 1981 from upper areas of the Big Dry Arm of Fort Peck Reservoir; number of fish caught per trap-day is shown in parentheses.

Date		Species[1]												Total* Fish
		WE	SG	YP	NP	RC	WS	SR	SB	C	GE	CC	B	
3/31-4/28	No. Caught	371	73	76	98	121	215	99	48	95	114	16	44	1,374
		(2.7)	(0.5)	(0.5)	(0.7)	(0.9)	(1.5)	(0.7)	(0.3)	(0.7)	(0.8)	(0.1)	(0.3)	(9.8)
	% Recaptures	17.5	2.7	0.0	14.0	5.0	10.2	20.2	2.1	3.2	0.0	0.0	4.5	9.8

[1] WE = walleye; SG - sauger; YP = yellow perch; NP = northern pike; RC = river carpsucker; WS = white sucker; SR = shorthead redhorse sucker; SB = smallmouth buffalo; C = carp; GE = goldeye; CC = channel catfish; B = burbot

*Total includes following species, less than 0.1 fish caught per trap-day: 3 bigmouth buffalo, 1 rainbow trout. None were previously marked.

Table 2. Average length and weight of fish species trapped in the Big Dry Arm during spring, 1981. Ranges shown in parenthesis.

Species	Number	Average Total Length	Average Weight
Walleye ♂	209	17.6 (11.2-22.4)	1.62 (0.39-3.50)
Walleye ♀	96	22.7 (17.0-27.0)	3.70 (1.30-7.70)
Sauger ♂	37	16.0 (13.6-22.6)	1.04 (0.64-3.02)
Sauger ♀	22	19.2 (14.5-22.2)	2.08 (0.84-2.92)
Northern pike ♂	46	23.9 (19.9-32.7)	3.04 (1.73-8.50)
Northern pike ♀	45	30.3 (23.2-39.9)	8.18 (2.70-16.80)
Yellow perch	66	7.6 (5.6-10.2)	0.19 (0.08-0.42)
River carpsucker	75	17.6 (10.7-23.1)	3.40 (0.70-7.80)
Shorthead redhorse sucker	24	17.3 (10.3-20.6)	2.17 (0.37-3.83)
White sucker	98	15.6 (11.2-17.9)	1.62 (0.63-2.90)
Smallmouth buffalo	10	22.0 (16.5-26.6)	5.67 (2.40-10.40)
Carp	12	18.4 (17.2-20.3)	2.75 (2.13-3.63)
Channel catfish	13	16.9 (7.4-27.5)	2.39 (0.11-9.30)
Burbot	38	22.9 (15.2-28.9)	2.34 (0.57-4.38)

Recaptures from previous years tagging amounted to 14.0 percent. All northerns were tagged in a similar manner as the walleye.

Seventy-four sauger were captured of which 2.7 percent were recaptures from previous years marking. Males averaged 16.0 inches total length and 1.04 pounds based on 37 fish. Size ranges were from 13.6 to 22.6 inches total length and 0.64 to 3.02 pounds. Females averaged 19.2 inches total length and 2.08 pounds based on 22 fish. Size ranges were from 14.5 to 22.2 inches total length and 0.84 to 2.92 pounds. Fifteen sauger of unknown sex were also captured. These fish averaged 16.9 inches total length and 1.26 pounds. All unmarked fish were tagged.

A total of 44 burbot were captured of which 4.5 percent were recaptures from previous years tagging. Thirty-eight burbot averaged 22.9 inches total length and 2.34 pounds. These fish ranged from 15.2 to 28.9 inches total length and 0.57 to 4.38 pounds. Sexes were not differentiated.

Sixteen channel catfish were trapped and none were recaptures. Thirteen of these fish averaged 16.9 inches total length and 2.39 pounds and ranged from 7.4 to 27.5 inches total length and 0.11 to 9.30 pounds. Sexes were not determined.

The only other game fish species captured was one rainbow trout.

A total of 215 white suckers were trapped and were the most abundant nongame species captured; 10.2 percent were recaptures from previous years marking. Totals of other nongame species captured were 121 river carpsucker (5.0 percent recaptures), 114 goldeye, 99 shorthead redhorse sucker (20.2 percent recaptures), 95 carp (3.2 percent recaptures), 76 yellow perch, and 48 smallmouth buffalo (2.1 percent recaptures).

Trapping and tagging were also done in mid-areas of the Big Dry Arm in Lonetree, McGuire, Bug, and Lost Creek bays during the period April 14-April 27. Lower areas of the reservoir, including Bear and Duck Creek bays, the spillway, Rainbow and Sturgeon bays were sampled from May 4 to May 22. Twenty-four trap-days in the mid-area of the Big Dry Arm captured a total of 139 fish (5.8 fish per trap-day). Northern pike were the most numerous with 67 (6.0 percent recaptures from previous years marking) captured. Thirty-one males averaged 22.9 inches total length and 2.55 pounds and ranged from 18.6 to 30.1 inches and 1.28 to 5.6 pounds. Six females averaged 37.2 inches total length and 13.28 pounds and ranged from 19.6 to 44.5 inches and 1.55 to 23.7 pounds. Carp were the next most abundant with a total of 41 trapped. Other fish captured included 8 walleye, 5 sauger, 1 yellow perch, 3 river carpsucker, 1 shorthead redhorse sucker, 3 smallmouth buffalo, 2 white sucker, and 8 burbot. Only one walleye and one burbot were recaptures from previous marking. Eighteen trap-days in the lower areas of the reservoir captured a total of 135 fish (7.5 fish per trap-day). Northern pike were again the most abundant species captured with a total of 96 fish. Sixty-five males averaged 23.1 inches total length and 3.07 pounds and ranged from 18.4 to 29.8 inches and 1.16 to 6.80 pounds. Twenty-one females averaged 30.0 inches total length and 7.80 pounds and

ranged from 22.9 to 38.9 inches and 2.15 to 18.40 pounds. Other fish trapped were 12 white sucker, 11 carp, 5 goldeye, 4 sauger, 3 each of burbot and black crappie, and 1 shorthead redhorse sucker. No recaptures were found.

LARVAL FISH SAMPLING

Sampling of larval fish in several areas of the Big Dry Arm was done during May, 1981. The results are shown in Table 3. Yellow perch were the only species captured and were present in all areas sampled. Numbers per 1,000 m^3 ranged from a low of 5.5 near the head of the Big Dry Arm to a high of 143.9 in the Intake area. The poor reproduction of yellow perch and the apparent lack of any reproduction by walleye was probably a result of the low, almost stable reservoir condition and the absence of any appreciable runoff. Eyed eggs, 65.6/m^3, were taken in one sample from near the head of the Big Dry Arm May 28, and were probably the pelagic eggs of freshwater drum. Results of larval sampling for years 1977 through 1980 are shown in the Appendix, Tables 6-11.

Table 3. Mean number per 1,000 m^3 and size ranges of larval fish captured in the Big Dry Arm of Fort Peck Reservoir during May, 1981.

Area	Date	Species Yellow Perch	Size Range (mm)
Head of Big Dry Arm	5/21	5.5	7.3 - 10.0
	5/28	8.6	12.9 - 14.4
Nelson - east side	5/21	96.6	8.3 - 11.4
	5/28	32.5	9.5 - 13.7
Nelson - west side	5/21	11.4	10.2 - 11.5
Nelson Bay	5/21	20.2	8.8 - 10.4
	5/28	57.4	11.2 - 12.8
Intake	5/21	143.9	7.6 - 10.3
	5/28	14.2	10.8 - 11.6
Short Bay	5/28	122.9	9.0 - 14.3
McGuire Bay	5/21	14.7	7.3 - 8.9
	5/28	6.0	9.4 - 11.3
Lonetree Bay	5/21	116.7	7.9 - 12.3
	5/28	90.1	9.0 - 13.3

REPRODUCTION AND FORAGE FISH ASSESSMENT

Sampling of Age 0 and forage minnows was done in the Big Dry Arm and lower and upper areas of the main reservoir during late summer and early fall of 1981. The results are shown in Table 4.

A total of 56 seine hauls were made in various areas of the Big Dry Arm. Yellow perch were the most abundant species captured, averaging 24.2 fish per haul. Buffalo sp. (smallmouth and bigmouth) and carp were the next most common species seined and averaged 16.6 and 16.2 fish per haul, respectively. These were the greatest numbers found in all areas seined. Forage minnows, including creek and lake chubs, emerald shiner, silvery/plains and fathead minnows, longnose dace and plains killifish, averaged 12.1 fish per haul, which was the lowest average for all areas seined. Emerald shiner comprised 77.6 percent of the total. Creek chub (1) and plains killifish (3) were captured only in Nelson Creek bay and longnose dace (1) was captured only near the head of the Big Dry Arm. Seventeen young-of-the-year walleye were taken in six of the eight areas sampled. It is not known if these were a result of natural reproduction or from plants of walleye fry made in the Big Dry Arm during May, 1981. Four northern pike were captured and it is assumed these were a result of natural reproduction since none were planted in the Big Dry Arm during 1981.

Fifty-four seine hauls were made in lower areas of the reservoir with an average catch of 143.9 fish per haul. Crappie sp. were the most abundant species captured and averaged 56.3 fish per haul. Yellow perch were the next most abundant species taken and averaged 44.0 fish per haul. Forage minnows averaged 29.3 fish per haul which was the highest average for all areas seined. Emerald shiner were again the most abundant forage species and comprised 98.5 percent of the total captured. The only other forage species captured were lake chub (21) and silvery/plains minnows (3). White sucker young-of-the-year averaged 4.7 fish per haul and was the highest average number for this species in all areas sampled. Fifteen young-of-the-year walleye were captured and it is believed these were a result of earlier fry plants made in the area. Fourteen young-of-the-year northern pike were captured and were most likely the result of earlier spring fry plants.

A total of 32 seine hauls were made in upper areas of the reservoir and averaged 242.3 fish per haul, which was the highest for all areas sampled. Yellow perch were the most abundant species captured and averaged 136.5 fish per haul with 97.8 percent of these fish taken in Hell Creek bay. Goldeye and freshwater drum were the next most abundant species captured and averaged 38.9 and 22.3 fish per haul, respectively. These were the highest number captured in all areas seined. The greatest number of goldeye, 93.3 percent, were seined in Jim Wells and Soda Creek bays which are located near the head of the reservoir. The highest number of freshwater drum, 71.7 percent, were taken in Hell Creek bay. Nineteen smallmouth bass were also captured in Hell Creek bay and were the result of a first-time introduction of this species in Fort Peck Reservoir. This plant was made in July, 1981. Forage minnows averaged 17.0 per haul

Table 4. Species and number of Age 0 and forage species captured by beach seining in Fort Peck Reservoir during 1981; average number per haul in parentheses.

Area	No. of Hauls	Species[1] WE	SG	YP	NP	GE	C	RC	B	SS	WS	LS	CC	BU	CR	FD	SB	FM[2]	U	Totals
Big Dry Arm[3]	56	17 (0.3)	1 (<0.1)	1,358 (24.2)	4 (0.1)	0	908 (16.2)	394 (7.0)	928 (16.6)	48 (0.9)	196 (3.5)	0	2 (<0.1)	1 (<0.1)	40 (0.7)	138 (2.5)	0	678 (12.1)	6 (0.1)	4,719 (84.3)
Lower Areas[4]	54	15 (0.3)	14 (0.3)	2,374 (44.0)	14 (0.3)	113 (2.1)	13 (0.2)	17 (0.3)	63 (1.2)	0	251 (4.7)	0	0	1 (<0.1)	3,041 (56.3)	271 (5.0)	0	1,584 (29.3)	0	7,771 (143.9)
Upper Areas[5]	32	1 (<0.1)	55 (1.7)	4,367 (136.5)	0	1,246 (38.9)	126 (3.9)	74 (2.3)	261 (8.2)	27 (0.8)	4 (0.1)	1 (<0.1)	8 (0.3)	0	307 (9.6)	713 (22.3)	19 (0.6)	545 (17.0)	0	7,754 (242.3)

[1]
WE = walleye
SG = sauger
YP = yellow perch
NP = northern pike
GE = goldeye
C = carp
RC = river carpsucker
B = buffalo sp.
SS = shorthead redhorse sucker
WS = white sucker
LS = longnose sucker
CC = channel catfish
BU = burbot
CR = crappie sp.
FD = freshwater drum
SB = smallmouth bass
FM = forage minnows
U = unknown

[2]FM, Big Dry Arm = creek chub, lake chub, emerald shiner, silvery minnow, fathead minnow, longnose dace, plains killifish.
FM, Lower Areas = lake chub, emerald shiner, silvery minnow.
FM, Upper Areas = flathead chub, lake chub, emerald shiner.

[3]Big Dry Arm = Nelson, McGuire, Lonetree, Bug, Sand Arroyo, South Fork Rock Creek, Box Elder, Stone House bays.

[4]Lower Areas = Bear, Spillway, North Fork Duck, Rainbow, Pines, Gilbert bays.

[5]Upper Areas = Hell, Jim Wells, Soda, Crooked, Musselshell bays.

with emerald shiner again the most abundant, comprising 73.8 percent of the total. Flathead chubs made up 25.1 percent of the total and were found primarily in Crooked Creek and Musselshell bays. The only other minnow species found were lake chubs (6). Only one walleye and no northern pike young-of-the-year fish were seined in this area of the reservoir. However, 55 sauger (1.7 fish per haul) were captured which was the highest number for all areas sampled and is indicative of the more abundant sauger population found in this area of Fort Peck.

Results of beach seining for Age 0 and forage minnows in Fort Peck Reservoir for years 1977-80 are shown in the Appendix, Tables 12-15.

GOLDEYE MONITORING

Two standard goldeye sampling sites in the North Fork of Duck Creek bay were monitored once each during June, July, and October, 1981. This bay was closed the entire year to all commercial goldeye netting. Two 300- x 8-foot floating monofilament gill nets were used in sampling. These nets were set in the afternoon of one day and picked the following morning. The nets consisted of three 100-foot panels, each of a different mesh size to sample various age and size groups of goldeye. Net I panels were 1 1/2-, 1 5/8-, and 1 3/4-inch bar mesh, and Net II were 1 1/4-, 1 1/2-, and 1 3/4-inch bar mesh.

The results in Table 5 show that Net I caught an average of 101.3 fish per set (74.7 percent females) as compared to 79.7 fish per set (43.0 percent females) in Net II. This is indicative of the general size structure of the adult goldeye population, particularly in lower areas of the reservoir, as adult females are of a larger average size than males and are therefore selected for by the bigger mesh sizes (1 5/8- and 1 3/4-inch bar). Note that females averaged larger in all mesh sizes of both nets. The average number of males was higher than females in Net II (45.7 males and 34.0 females per net) and is somewhat surprising since netting data in 1978 and 1979 (Appendix, Tables 16-18) shows that significantly more females than males were captured in Net II. This may be a result of the intensive commercial goldeye fishing occurring in the reservoir and the record-high goldeye landings in 1979 and 1980.

Commercial goldeye catches were also periodically sampled at a cleaning and storage plant site during 1981. Catches from both lower and upper areas of the reservoir were sampled with upper areas considered as those over about 30 miles from Fort Peck Dam. All commercial goldeye were harvested with floating monofilament gill nets which are about 300- x 12-feet long and of 1 3/4-inch bar mesh. The results are shown in Table 6. Both males and females were of a larger average size from lower areas than those from upper areas and females were significantly larger, averaging a half-inch in length and almost one-tenth in weight, than females from upper areas. Also, females comprised 87.5 percent of the total catch from lower areas and 85.6 percent from upper areas. Results of commercial goldeye sampling for years 1977 through 1980 is shown in

Table 5. Results of goldeye sampling at standard monitoring sites in Duck Creek bay using 300- x 8-foot floating monofilament gill nets during summer and fall, 1981.

NET I

No. of Sets	1 1/2-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	1 5/8-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	1 3/4-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	Total	Avg. No. Per Set
3	M	42	12.8	0.68	M	28	12.8	0.69	M	7	13.1	0.76	77	25.7
	F	78	13.3	0.76	F	86	13.4	0.80	F	63	13.7	0.83	227	75.7
	Total	120	13.1	0.73		114	13.3	0.77		70	13.6	0.83	304	101.3

NET II

No. of Sets	1 1/4-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	1 1/2-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	1 3/4-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	Total	Avg. No. Per Set
3	M	60	12.6	0.63	M	60	12.7	0.65	M	17	12.8	0.67	137	45.7
	F	35	13.0	0.72	F	39	13.4	0.79	F	28	13.5	0.83	102	34.0
	Total	95	12.7	0.66		99	13.0	0.70		45	13.2	0.77	239	79.7

the Appendix, Table 19. Females have comprised over 85.0 percent of the catch in all years except in 1980, when 83.0 percent were recorded for the lower areas. Also, in 1981, females made up 85.6 percent of the catch from upper areas, which was the first time the female catch was less than 90 percent from these areas.

Table 6. Sampling results of commercial goldeye catches from lower and upper areas of Fort Peck Reservoir during 1981.

Area	Sex	Number	Average Total Length	Average Weight	Percent* Composition
Lower	Male	118	13.2	0.77	12.5
	Female	708	13.7	0.89	87.5
	Total	826	13.63	0.87	100.0
Upper	Male	158	12.9	0.72	14.4
	Female	912	13.2	0.80	85.6
	Total	1,070	13.2	0.79	100.0

*Based on additional numbers of goldeye sexed from random sampling of total catch.

COMMERCIAL FISHING

Four commercial fishing permits were issued for Fort Peck Reservoir during 1981. Three of the permittees were residents and one was a nonresident. The nonresident did not fish Fort Peck during the year. Most of the reservoir was open to commercial fishing with the exception of the Big Dry Arm and several other areas in the vicinity of cabin developments or popular recreational fishing sites. Also, the lower 30 miles of the reservoir was closed to goldeye fishing, with the exception of three bays, from June 12 to September 14. This was done to reduce possible sport-commercial fishing conflicts during the summer months as well as

provide reduced pressure on the goldeye population in this area. Commercial landings (round weight) for 1981 were: goldeye, 244,322 pounds; buffalo (smallmouth and bigmouth), 260,389 pounds; river carpsucker, 6,473 pounds; carp, 20,788 pounds; freshwater drum, 301 pounds. Table 7 shows the total commercial harvest from Fort Peck Reservoir for years 1957 through 1981.

DISCUSSION

Work accomplished during the project period indicates the importance of the Big Dry Arm to the fisheries of Fort Peck Reservoir. Spring spawning species are attracted to areas generally near the head of this Arm and spawning runs of walleye are particularly keyed to this area. Five years of trapping results showed walleye were the most abundant species captured during April and early May and comprised 38.3 percent of the total fish caught (12,444 fish). River carpsucker and northern pike were the next two most abundant species trapped and made up 14.2 and 12.0 percent of the catch, respectively. The best trapping year was 1978 when an average of 43.2 fish were captured per trap-day, and 1981 was the poorest with an average of 9.8 fish per trap-day.

Evidence that walleye migrate to the head of the Big Dry Arm and ascend Big Dry Creek for spawning purposes occurred in 1979, when both walleye eggs and larval fish were captured in lower reaches of this stream. During the majority of years, reservoir levels are down considerably in early spring and runoff is minimal, a combination which prevents walleye or other species from entering Big Dry Creek. However, during March, 1979, the reservoir level in Fort Peck rose 5.5 feet and was within 4 feet of maximum storage capacity (2,250 msl) and further rose an additional foot in April. Also, flows in Big Dry Creek averaged 1,268 cfs during March (maximum 4,000 cfs) and 826 cfs in April (maximum 2,340) according to USGS information (USGS Water Data Report, 1980). This high reservoir level, together with strong inflows from Big Dry Creek, provided access for walleye as well as other species from Fort Peck Reservoir for spawning purposes. Similar conditions occurred in 1978 and significant numbers of larval walleye were sampled within the reservoir in areas near the head of the Big Dry Arm. No sampling was done in Big Dry Creek during that year.

In years characterized by low reservoir levels and lack of appreciable runoff, as happened in years 1977, 1980 and 1981, fish were not able to enter Big Dry Creek. These years represented total year-class failures for walleye and also a number of other species. Larval fish sampling in the Big Dry Arm indicated a complete absence of walleye in 1980 and 1981, while in 1977, only two were captured.

The importance of both Big Dry and Little Dry Creeks as critical spawning and nursery streams for a variety of species cannot be overemphasized. Summer sampling in both streams during 1979 showed significant numbers of Age 0 walleye, channel catfish, white and shorthead redhorse suckers, river carpsucker, and carp were present as well as several minnow species

Table 7. Total pounds (round weight) of commercial species harvested from Fort Peck Reservoir by commercial fishermen for years 1957 through 1981.

Year	Buffalo sp.	River Carpsucker	Carp	Carp & R.* Carpsucker	Channel** Catfish	Goldeye	Freshwater Drum	Sucker sp.	Total
1957	15,308	7,200	1,500	---	---	---	---	---	24,008
1958	176,091	---	---	25,837	100	17	107	---	202,152
1959	154,770	2,687	13,850	---	462	---	1,875	62	173,706
1960	26,435	11,500	50	---	585	---	---	---	38,570
1961	15,950	950	610	---	790	---	---	---	18,300
1962	130,842	---	---	---	22,215	---	---	---	153,057
1963	263,696	3,440	5,707	---	15,576	49	688	---	289,156
1964	145,706	3,775	1,012	---	7,492	---	1,350	---	159,335
1965	184,003	---	1,400	---	11,666	---	550	---	197,619
1966	266,142	---	---	22,935	16,879	42	2,581	---	308,579
1967	389,083	---	---	35,775	10,066	56,050	4,012	---	494,986
1968	452,230	---	---	100,774	7,749	53,318	5,445	1,625	621,141
1969	323,648	64,718	13,719	---	4,503	199,279	11,759	186	617,812
1970	437,308	49,731	8,944	---	10,619	68,384	19,287	56	594,329
1971	279,831	31,658	1,403	---	13,746	186,310	8,019	1,429	522,396
1972	474,025	40,327	10,992	---	8,060	61,830	9,228	141	604,603
1973	546,657	13,045	3,975	---	2,704	130,061	8,018	---	704,460
1974	376,850	16,719	---	---	1,011	93,825	94	---	500,638
1975	274,091	6,512	---	---	668	129,299	---	---	390,252
1976	402,543	8,456	---	---	---	91,358	---	---	502,357
1977	343,930	8,500	---	---	---	121,868	---	---	474,298
1978	243,166	6,075	---	---	---	105,919	---	---	355,160
1979	224,200	12,862	4,475	---	---	258,780	---	---	500,317
1980	178,777	8,454	5,662	---	---	356,755	509	---	550,157
1981	260,389	6,473	20,788	---	---	244,322	301	---	532,273
Total	6,585,671	303,082	94,087	185,321	134,891	2,157,466	73,823	3,499	9,537,840

*Not differentiated by commercial fishermen when reported.
**Not allowed as commercial species after June 30, 1975.

common to Fort Peck (Appendix, Figure 1 and Table 20). Follow-up sampling in 1980, which was a poor water year with a low spring reservoir level, showed an almost complete absence of the Age 0 species found in 1979. No walleye were captured, and the only Age 0 fish found were white suckers and channel catfish. Both species have resident populations in Big Dry and Little Dry Creeks.

Marking of fish caught during each spring's trapping efforts provided information regarding movements, relative abundance, and harvest of some species, particularly walleye and northern pike. Tagging of walleye and northern pike had been done prior to 1977 and accounts for the presence of recaptures in the 1977 trapping data. Some commercial species, smallmouth and bigmouth buffalo and goldeye, were also tagged before 1977, but do not figure significantly in the percentage of recaptures reported for this project.

The greatest percentage of recaptures for all species occurred in 1977, when 31.5 percent of the total walleye captured (1,700) were fish marked in prior years (1974, 1975, and 1976). Relatively high percentages of marked walleye were found in subsequent years of trapping and ranged from 15.7 percent in 1980 to 17.9 percent in 1979. Overall, walleye recaptures were greater than for any other species of fish and indicates a relatively small population of fish. One other inference from the high number of recaptures may be that the walleye were homing to Big Dry Creek for spawning purposes. Fishermen harvest data showed over 80 percent of the sport catch of walleye occurred in the Big Dry Arm, which indicates the majority of these fish were residents of the Big Dry Arm. Generally, recaptures of other species of marked fish were relatively few except in some years. During 1978 and 1981, shorthead redhorse suckers had a higher percentage of recaptures (19.5 and 20.2 percent, respectively) than any other species. However, it would appear this is a rather small population since the greatest number trapped was in 1977, when 185 were captured. Northern pike recaptures were greatest in 1979 and 1981 (14.8 and 14.0 percent, respectively), except in 1977 when two of six fish trapped in mid-areas of the Big Dry Arm were tagged (33.3 percent). Northerns were seeking areas of flooded vegetation for spawning purposes during this time. Normally, the Big Dry Arm and the rest of the reservoir as well, has little northern pike spawning substrate in early spring due to reservoir fluctuations and lack of shoreline vegetation growth. Recaptures of commercial species occurred in all years except 1977, but were generally few in number. No marked goldeye were recaptured and only a relatively few river carpsucker and smallmouth buffalo were recaptured. However, spawning times for goldeye and buffalo normally occur after trapping has been terminated, which would result in fewer marked fish being recaptured.

Sampling of larval fish in the Big Dry Arm was done each spring throughout the duration of the project. Mid and upper areas in the main reservoir were also sampled in 1980. Yellow perch were the most abundant species sampled in all years and were usually the earliest species captured. However, in 1979, larval walleye were captured prior to the appearance of yellow perch, and in 1980, burbot were the first species

sampled. Other species such as buffalo, goldeye, carp, freshwater drum, and carp usually appeared later as warmer water temperatures occurred. Significant numbers of larval walleye were captured only in areas near the head of the Big Dry Arm in May, 1978 and 1979; a result of the larvae drifting down Big Dry Creek and into the reservoir. This was corroborated in 1979 when sampling in Big Dry Creek revealed the presence of drifting walleye eggs and larvae.

Larval fish sampling is probably the best method for determining the success or failure of reproduction for several of the important species in Fort Peck Reservoir. It is particularly applicable in the Big Dry Arm due to its size, morphometry, and relatively easy access. The main reservoir poses real logistic problems to intensive larval sampling due to its great size and generally poor access.

Beach seining to assess reproduction and distribution of some fish species was done each year beginning in late summer. Emphasis was placed on the Big Dry Arm, but other areas of the reservoir were also seined. Generally, the sampling has shown a decrease in yellow perch numbers, particularly in the Big Dry Arm, and emerald shiners, an important forage species, has also shown a marked decline in population levels. Possibly, a deterioration of spawning substrate as the reservoir ages may account for the decline in yellow perch, but the reason for the apparent decrease in emerald shiner numbers is not clear. Similar declines in both yellow perch and other forage species have been documented in several of the downstream, mainstem reservoirs in North and South Dakota.

Mercury analyses were done on walleye, sauger, northern pike, goldeye, and smallmouth buffalo during 1978 (Appendix, Table 21). Samples were collected throughout the summer from various areas of the reservoir. Results showed that 5 walleye, 3 sauger, 3 northern pike, and 1 smallmouth buffalo exceeded the recommended FDA guideline for human consumption (0.50 ppm maximum). All the walleye, 2 northern pike, and 1 each of sauger and smallmouth buffalo, exceeding 0.50 ppm, came from the Big Dry Arm. There is no known point-source of mercury near or within any of the tributaries to, or the reservoir itself.

Benthos samples were taken at four areas of the Big Dry Arm during 1978. Samples (5 square feet) were collected in water less than 10 feet deep at each location. Only four orders of invertebrates were found and included Diptera (Tendipedidae, 1.10 per foot-square), Annelida (Oligochaeta, 0.20 per foot-square), Ephemeroptera (0.15 per foot-square), and Nematoda (0.05 per foot-square). Fluctuating water levels in Fort Peck probably make shallow water sampling results for benthos somewhat unreliable.

Goldeye commercial catches were sampled periodically throughout the course of the project. This was done primarily to monitor any sudden changes or shifts in the goldeye population which might have been a result of intensive commercial fishing activity. The goldeye harvest in both 1979 and 1980 were record landings for the reservoir, and it

is not known what effects, if any, these harvests will have on the population. No clear indications of changes in population size or structure is apparent from the commercial sampling data.

Thermographs were installed at two locations in the Big Dry Arm in 1977 and 1979. These areas were chosen because of intensive spring fish activity related to spawning movements. One location was near the head of the Big Dry Arm, a relatively narrow, shallow, turbid area with underlying deposits of silt. The other area was in Nelson Creek bay, which is somewhat typical of the embayments in the Big Dry Arm. The results are shown in the Appendix (Tables 22 and 23).

The average minimum and maximum water temperatures near the head of the Big Dry Arm during April, 1977 were 49° F and 56° F (range 37°-70° F) while in 1979, they were 50° F and 53° F (range 50°-55° F). Average minimum and maximum water temperatures in this area during May, 1977 were 59° F and 65° F (range 50°-72° F) and in 1979 were 55° F and 59° F (range 45°-70° F). The 1979 spring was characterized by extended periods of cold weather and a later than normal ice-out. Walleye spawn in Big Dry Creek during April and probably into early May and larval studies in 1978 and 1979, indicated the peak of the walleye hatch occurred around mid-May. The highest recorded maximum water temperatures near the head of the Big Dry Arm were in July in both years, 83° F in 1977, and 82° F in 1979.

The average minimum and maximum water temperatures in Nelson Creek bay during April, 1977 were 47° F and 59° F (range 38°-74° F) and in 1979 were 37° F and 41° F (range 36°-43° F). The averages during May, 1977 were 54° F and 63° F (range 47°-75° F) and in 1979 were 48° F and 52° F (range 41°-68° F). Larval fish studies indicated significant numbers of yellow perch spawned in this area during April and early May. Hatching also occurred in April and lasted into May. The highest recorded maximum water temperatures in Nelson Creek bay were 83° F in June, 1977 and 78° F in July, 1979.

A P P E N D I X

Table 1. List of native and introduced fishes of Fort Peck Reservoir.

1. Pallid sturgeon
2. Shovelnose sturgeon
3. Paddlefish
4. Goldeye
5. Mountain whitefish
6. *Coho salmon
7. *Kokanee salmon
8. *Rainbow trout
9. *Brown trout
10. *Lake trout
11. *Northern pike
12. *Carp
13. Northern redbelly dace
14. Longnose dace
15. Emerald shiner
16. Sand shiner
17. *Spottail shiner
18. Fathead minnow
19. Plains minnow
20. Silvery minnow
21. Brassy minnow
22. Lake chub
23. Creek chub
24. Flathead chub
25. River carpsucker
26. Blue sucker
27. Smallmouth buffalo
28. Bigmouth buffalo
29. Shorthead redhorse
30. Longnose sucker
31. White sucker
32. Black bullhead
33. Channel catfish
34. Stonecat
35. Burbot
36. *Plains killifish
37. *Smallmouth bass
38. *White crappie
39. *Black crappie
40. *Yellow perch
41. Sauger
42. *Walleye
43. Iowa darter
44. Freshwater drum

*Introduced

Table 2. Species, number, and percent of recaptures of walleye and northern pike from previous years marking caught during spring, 1977 from upper and middle areas of the Big Dry Arm of Fort Peck Reservoir; number of fish caught per trap-day is shown in parentheses.

Area	Date	Trap-Days		Species[1] WE	SG	YP	NP	RC	WS	SR	SB	C	BLB	CC	B	FD	Total Fish
UBDA[2]	4/12-5/24	295	No. Caught	1,700 (5.8)	43 (0.2)	145 (0.5)	415 (1.4)	654 (2.2)	139 (0.5)	185 (0.6)	67 (0.2)	223 (0.8)	377 (1.3)	36 (0.1)	46 (0.2)	22 (0.1)	4,070[4] (13.8)
			% Recaptures	31.5			2.3										
MBDA[3]	4/19-4/25	15	No. Caught	8 (0.5)			6 (0.4)		4 (0.3)		1 (0.1)	7 (0.5)			1 (0.1)	1 (0.1)	28 (1.9)
			% Recaptures	37.5			33.3										

[1] WE = walleye, SG = sauger, YP = yellow perch, NP = northern pike, RC = river carpsucker, WS = white sucker, SR = shorthead redhorse sucker, SB = smallmouth buffalo, C = carp, BLB = black bullhead, CC = channel catfish, B = burbot, FD = freshwater drum

[2] UBDA = Upper Big Dry Arm.

[3] MBDA = Middle Big Dry Arm.

[4] Includes 1 rainbow trout, 2 bigmouth buffalo, 14 goldeye, 1 black crappie.

Table 3. Species, number and percent of recaptures from previous years marking caught in 81 trap-days during spring, 1978 from upper areas of the Big Dry Arm of Fort Peck Reservoir; number of fish caught per trap-day is shown in parentheses.

Date		Species[1]															Total Fish
		WE	SG	YP	NP	RC	WS	SR	SB	BB	C	GE	BLB	CC	B	RT	
4/17-5/5	No. Caught	1,839	83	26	400	246	193	133	180	7	71	265	28	3	47	1	3,522
		(22.7)	(1.0)	(0.3)	(4.9)	(3.0)	(2.4)	(1.6)	(2.2)	(0.1)	(0.9)	(3.3)	(0.3)	(<0.1)	(0.6)	(<0.1)	(43.2)
	% Recaptures	17.4	4.8		9.2	6.1	2.6	19.5			1.4		7.1		12.8		11.8

[1] WE = walleye
SG = sauger
YP = yellow perch
NP = northern pike
RC = river carpsucker
WS = white sucker
SR = shorthead redhorse sucker
SB = smallmouth buffalo
BB = bigmouth buffalo
C = carp
GE = goldeye
BLB = black bullhead
CC = channel catfish
B = burbot
RT = rainbow trout

Table 4 . Species, number and percent of recaptures from previous years marking caught in 75 trap-days during spring, 1979 from upper areas of the Big Dry Arm of Fort Peck Reservoir; number of fish caught per trap-day is shown in parentheses.

Date		Species[1]											Total* Fish
		WE	SG	YP	NP	RC	WS	SR	SB	C	GE	B	
4/28-6/1	No. Caught	325	39	15	283	139	13	8	119	161	121	30	1,261
		(4.3)	(0.5)	(0.2)	(3.8)	(1.8)	(0.2)	(0.1)	(1.6)	(2.1)	(1.6)	(0.4)	(16.8)
	% Recaptures	17.8	2.6		14.8	4.3		12.5	0.8			3.3	8.7

[1] WE = walleye, SG = sauger, YP = yellow perch, NP = northern pike, RC = river carpsucker, WS = white sucker, SR = shorthead redhorse sucker, SB = smallmouth buffalo, C = carp, GE = goldeye, B = burbot

*Total includes 5 black bullhead, 3 channel catfish, 1 mountain whitefish, 2 bigmouth buffalo; none were recaptures.

Table 5. Species, number and percent recaptures from previous years marking caught in 97 trap-days during spring 1980 from upper areas of the Big Dry Arm of Fort Peck Reservoir; number of fish caught per trap-day shown in parentheses.

Date		Species[1.]											Total* Fish
		WE	SG	YP	NP	RC	WS	SR	SB	C	GE	B	
4/14-5/16	No.	535	57	63	301	612	177	142	112	98	12	70	2,222
		(5.5)	(0.6)	(0.6)	(3.1)	(6.6)	(1.8)	(1.5)	(1.2)	(1.0)	(0.1)	(0.7)	(22.9)
	% Recaptures	15.7	3.5		7.8	2.6		8.4	0.9				6.3

1. WE = walleye, SG = sauger, YP = yellow perch, NP = northern pike, RC = river carpsucker, WS = white sucker, SR = shorthead redhorse sucker, SB = smallmouth buffalo, C = carp, GE = goldeye, B = burbot

*Includes following species; less than 0.1 fish caught per trap-day: bigmouth buffalo (14), shovelnose sturgeon (1), blue sucker (1), channel catfish (5), black bullhead (1), freshwater drum (1).

Table 6. Average number of larval fish captured per 1,000 m^3 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			2	54.2
Antelope	7	215.7			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			
Lonetree	6	574.9				
Bug	6	295.9		0.5		
Lost	6	249.0				
Intake	5	97.0				
Average		420.3	0.1	0.1		
LOWER AREA						
Rock	4	109.3				
Box	4	67.8				
Sand Arroyo	4	64.0		0.7		
Box Elder	3	5.9				
Average		65.8		0.2		

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

Table 7. Average number of larval fish captured per 1,000 m^3 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

Table 8. Average number of larval fish captured per 1,000 m^3 of water near the head of the Big Dry Arm during May and June, 1979.

Area	Date	Water Temp. °F.	Walleye	Yellow Perch	Freshwater Drum
Head	5/04	50			
	5/09	54			
	5/14	62	208.3		
	5/18	61	84.5		
	5/22	60	14.3		
	5/24	70	33.9		
	5/31	64		16.9	
	6/15	70			
	6/28	72			17.0
Rookery	5/04	50			
	5/09	52			
	5/14	59		2.7	
	5/18	60	93.2	58.2	
	5/22	59	60.6	190.5	
	5/24	64	221.2	128.0	
	5/31	64	23.5	82.1	
	6/15	69			
	6/28	70			23.0
Antelope	5/09	51			
	5/14	56			
	5/18	61	8.5	8.5	
	5/24	61	2.8	402.0	
	5/31	62		8.4	
	6/15	64		2.8	

Table 9. Average number of larval fish captured per 1,000 m^3 of water in mid and lower areas of the Big Dry Arm during May and June, 1979.

Area		Date Sampled	Surface Water Temp. °F.	Species			
				Walleye	Yellow Perch	Burbot	Buffalo
MID:	Nelson	5/09	48				
		5/14	56				
		5/22	57			2.8	
		5/31	60		202.4		
		6/15	70		494.4		
		6/28	67		195.5		
	McGuire	5/22	53				
		6/15	66		684.0		
		6/28	66		20.7		
	Lonetree	6/15	61		289.2		
		6/28	68		172.1		
LOWER:	NF Rock	6/11	68		417.6		
		6/21	66	2.9	519.9		
	SF Rock	6/11	70		1,247.9		
		6/21	65		406.7		
	Box	6/11	61		2.7	2.7	
		6/21	59		112.3		
	Sand Arroyo	6/11	63		150.8	5.5	
		6/21	64		204.3		8.5
	Box Elder	6/11	60			67.7	
	Spring	6/11	67		26.0		

Table 10. Average number of larval fish captured per 1,000 m^3 of water in the Big Dry Arm during 1980.

Area	Date	Species		
		Yellow Perch	Burbot	Freshwater Drum
Head of Big Dry Arm	4/28		5.7	
	5/2	700.0	2.9	
	5/9	514.5		
	5/16	893.6		
	5/30	388.5		22.7
	6/6	93.4		
Nelson Bay	5/2	3.1	18.3	
	5/9	52.7	5.9	
	5/16	75.7		
	5/30	451.0		
	6/6	398.8		
McGuire Bay	5/9	31.7		
	5/30	463.8		
	6/6	117.1		
Lonetree Bay	5/9	22.6		
	5/30	513.6		
	6/6	508.4		
Intake Area	5/30	1,406.5		
	6/6	731.0		
Sand Arroyo Bay	5/21			
Box Elder Bay	5/21			

Table 11. Average number of larval fish captured per 1,000 m^3 of water in Fort Peck Reservoir during 1980.

Area	Date	Species					
		Yellow Perch	Sucker Sp.	Crappie Sp.	Fresh-water Drum	Goldeye	Carp
Sutherland Bay	6/10	163.2					
Hell Creek Bay	6/10	2,181.2					
Fourchette Bay	6/11	222.8		5.8			
Musselshell Bay	6/11	30.4			2.8		
UL Bend Mid-Reservoir	6/11		2.8			2.8	
UL Bend South Shore	6/11		8.3				19.4

Table 12. Species and number of Age 0 fish and forage minnows captured by beach seining in Fort Peck Reservoir during 1977; average number per haul in parentheses.

Area	No. of Hauls	Species[1] YP	WE	NP	FD	CC	CR	WS	RC	ES	SM	FC	FM	LC	LD	CB	Total
Big Dry Arm[2]	58	6,413 (110.6)	13 (0.2)	0	2,586 (44.6)	5 (0.1	159 (2.7)	9 (0.2)	1 (<0.1)	2,787 (48.1)	196 (3.4)	6 (0.1)	11 (0.2)	51 (0.9)	1 (<0.1)	1 (<0.1)	12,239 (211.0)
Lower[3]	25	7,043 (281.7)	19 (0.8)	5 (0.2)	12 (0.5)	0	454 (18.2)	851 (34.0)	0	9,388 (375.5)	1 (<0.1)	2 (0.1)	4 (0.2)	9 (0.4)	0	0	17,788 (711.5)

[1] YP = yellow perch
WE = walleye
NP = northern pike
FD = freshwater drum
CC = channel catfish
CR = crappie sp.
WS = white sucker
RC = river carpsucker
ES = emerald shiner
SM = silvery minnow
FC = flathead chub
FM = fathead minnow
LC = lake chub
LD = longnose dace
CB = creek chub

[2] Big Dry Arm = Head, Nelson, McGuire, Lonetree, Lost, Bug, Rock bays.

[3] Lower = Spillway, North Fork Duck, Dam, Rainbow bays.

Table 13. Species and number of Age 0 fish and forage minnows captured by beach seining in Fort Peck Reservoir during 1978; average number per haul in parentheses.

Area	No. of Hauls	Species[1] YP	WE	NP	C	B	WS	FD	CR	BU	ES	FM	Total
Big Dry Arm[2]	24	1,158 (48.3)	9 (0.4)	8 (0.3)	3 (0.1)	6 (0.3)	63 (2.6)	3 (0.1)	2 (0.1)	0	926 (38.6)	141 (5.9)	2,319 (96.6)
Lower[3]	10	3,275 (327.5)	9 (0.9)	19 (1.9)	0	0	0	0	145 (14.5)	1 (0.1)	23 (2.3)	0	3,472 (347.2)
Hell Creek Bay	9	5,277 (586.3)	0	2 (0.2)	0	1 (0.2)	0	0	409 (45.4)	0	3 (0.3)	0	5,692 (632.4)

[1]YP = yellow perch
WE = walleye
NP = northern pike
C = carp
B = buffalo sp.
WS = white sucker
FD = freshwater drum
CR = crappie sp.
BU = burbot
ES = emerald shiner
FM = forage minnows: includes lake chub, silvery minnow, fathead chub

[2]Big Dry Arm = Nelson, Little Bug, Bug, Black Coulee, South Fork Rock Creek bays.

[3]Lower = North Fork Duck bay.

Table 14. Species and number of Age 0 fish and forage minnows captured by beach seining in Fort Peck Reservoir during 1979; average number per haul in parentheses.

Area	No. of Hauls	Species[1] YP	WE	SG	NP	B	WS	SH	CR	FD	ES	LC	SM	FM	SS	LD	Totals
Big Dry Arm[2]	27	2,069 (76.6)	5 (0.2)	0	1 (<0.1)	1 (<0.1)	0	1 (<0.1)	0	60 (2.2)	70 (2.6)	17 (0.6)	0	0	0	1 (<0.1)	2,225 (82.4)
Lower[3]	17	4,121 (179.2)	0	0	13 (0.6)	0	13 (0.6)	0	94 (4.1)	0	33 (1.4)	0	0	0	0	0	4,274 (251.4)
Upper[4]	17	571 (33.6)	0	3 (0.2)	0	0	2 (0.1)	0	259 (15.2)	13 (0.8)	223 (13.1)	1 (0.1)	9 (0.5)	6 (0.4)	2 (0.1)	0	1,089 (64.1)

[1] YP = yellow perch
WE = walleye
SG = sauger
NP = northern pike
C = carp
B = buffalo sp.
WS = white sucker
SH = shorthead redhorse sucker
CR = crappie sp.
FD = freshwater drum
ES = emerald shiner
LC = lake chub
SM = silvery minnow
FM = fathead minnow
SS = sand shiner
LD = longnose dace

[2] Big Dry Arm = Timber, Nelson, Lonetree, McGuire bays.

[3] Lower = Rainbow, Sturgeon, North Fork Duck, Fourth, Pines bays.

[4] Upper = Hell, Timber bays.

Table 15. Species and number of Age 0 fish and forage minnows captured by beach seining in Fort Peck Reservoir during 1980; average number per haul in parentheses.

Area	No. of Hauls	Species[1]																				
		YP	WE	SG	NP	C	B	WS	SH	CR	FD	CC	GE	ES	LC	FM	SM	SS	LD	ND	BM	PK	Total
Big Dry Arm[2]	36	1,671 (46.4)	2 (0.1)	0	0	5 (0.1)	0	0	3 (0.1)	3 (0.1)	79 (2.2)	3 (0.1)	3 (0.1)	31 (0.9)	20 (0.6)	0	5 (0.1)	0	2 (<0.1)	1 (<0.1)	1 (<0.1)	1 (<0.1)	1,830 (50.8)
Lower[3]	39	2,044 (52.4)	2 (0.1)	3 (0.1)	2 (0.1)	10 (0.3)	19 (0.5)	157 (4.0)	0	297 (7.6)	5 (0.1)	0	5 (0.1)	99 (2.5)	1 (<0.1)	0	0	0	0	0	0	0	2,644 (67.8)
Hell[4]	8	5,657) (707.1)	0	0	0	0	0	3 (0.4)	0	376 (47.0)	12 (1.5)	0	0	81 (10.1)	0	3 (0.4)	0	1 (0.1)	1 (0.1)	0	0	0	6,134 (766.8)

[1] YP = yellow perch, WE = walleye, SG = sauger, NP = northern pike, C = carp, B = buffalo sp., WS = white sucker, SH = shorthead redhorse sucker, CR = crappie sp., FD = freshwater drum, CC = channel catfish, ES = emerald shiner, LC = lake chub, FM = fathead minnow, SM = silvery minnow, SS = sand shiner, LD = longnose dace, ND = northern redbelly dace, BM = brassy minnow, PK = plains killifish

[2] Big Dry Arm = Timber, Nelson, Lonetree, McGuire, Lost bays.

[3] Lower = Spillway, Rainbow, Sturgeon bays.

[4] Hell - Hell bay.

Table 16. Results of goldeye sampling at standard monitoring sites in Duck Creek Bay using 300- x 8-foot floating nylon gill nets during summer and fall, 1977.

Date	1 1/4-inch Bar Mesh				1 1/2-inch Bar Mesh				1 3/4-inch Bar Mesh			
	Sex	No.	Avg. T.L.	Avg. Wt.	Sex	No.	Avg. T.L.	Avg. Wt.	Sex	No.	Avg. T.L.	Avg. Wt.
6/29[1]	M	12	12.2	0.60	M	29	12.6	0.65	M	0	----	----
	F	10	11.7	0.60	F	12	12.9	0.75	F	3	14.1	0.94
8/9	M	14	11.8	0.59	M	28	12.6	0.65	M	5	12.8	0.75
	F	6	11.5	0.49	F	23	13.1	0.79	F	21	13.6	0.90
9/29	M	11	12.0	0.58	M	11	12.4	0.63	M	1	13.2	0.80
	F	10	12.2	0.59	F	12	13.0	0.75	F	11	13.8	0.97
Total	M	37	12.0	0.58	M	68	12.5	0.64	M	6	12.9	0.76
	F	26	11.9	0.56	F	47	13.0	0.77	F	35	13.7	0.92
6/29[2]									M	3	12.9	0.79
									F	23	13.6	0.88
8/9									M	3	13.3	0.79
									F	29	13.6	0.88
9/29									M	1	13.0	0.81
									F	20	13.4	0.87
Total									M	7	13.1	0.79
									F	72	13.5	0.88

[1]Shallow sets.
[2]Mid-bay sets.

Table 17. Results of goldeye sampling in Hell and Duck Creek bays using 300- x 8-foot floating monofilament gill nets during summer, 1978.

NET I

Area	No. of Sets	1 1/2-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	1 5/8-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	1 3/4-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	Total No. of fish
Duck Cr. Bay	2	M	26	12.3	0.64	M	12	12.4	0.64	M	2	12.9	0.79	40
		F	38	12.9	0.73	F	46	13.0	0.76	F	21	13.4	0.87	105
Hell Cr. Bay	1	M	30	12.3	0.62	M	15	12.4	0.66	M	2	11.8	0.63	47
		F	30	12.7	0.70	F	33	12.5	0.69	F	11	12.7	0.78	74

NET II

Area	No. of Sets	1 1/4-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	1 1/2-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	1 3/4-inch Bar Sex	No.	Avg. T.L.	Avg. Wt.	Total No. of fish
Duck Cr. Bay	2	M	22	12.2	0.61	M	27	12.3	0.64	M	1	13.1	0.79	50
		F	42	12.7	0.72	F	32	13.0	0.76	F	19	13.6	0.87	93
Hell Cr. Bay	1	M	24	11.8	0.55	M	20	12.1	0.60	M	1	13.0	0.74	45
		F	32	12.3	0.64	F	24	12.5	0.68	F	6	13.0	0.81	62

Table 18. Results of goldeye sampling at standard monitoring sites in Duck Creek Bay using 300- x 8-foot floating monofilament gill nets during summer and fall, 1979.

NET I

No. of Sets	1 1/2-inch Bar				1 5/8-inch Bar				1 3/4-inch Bar				Total No. Fish	Avg. No. Per Net
	Sex	No.	Avg. T.L.	Avg. Wt.	Sex	No.	Avg. T.L.	Avg. Wt.	Sex	No.	Avg. T.L.	Avg. Wt.		
5	M	106	12.6	0.66	M	99	12.7	0.68	M	21	12.8	0.74	226	45.2
	F	135	13.0	0.76	F	180	13.2	0.81	F	144	13.3	0.83	459	91.8
	Total	241	12.8	0.71		279	13.1	0.76		165	13.2	0.82	685	137.0

NET II

No. of Sets	1 1/4-inch Bar				1 1/2-inch Bar				1 3/4-inch Bar				Total No. Fish	Avg. No. Per Net
	Sex	No.	Avg. T.L.	Avg. Wt.	Sex	No.	Avg. T.L.	Avg. Wt.	Sex	No.	Avg. T.L.	Avg. Wt.		
5	M	100	12.5	0.65	M	61	12.8	0.72	M	20	12.9	0.76	181	36.2
	F	118	13.0	0.78	F	110	13.2	0.80	F	87	13.4	0.85	315	63.0
	Total	218	12.8	0.72		171	13.1	0.77		107	13.3	0.83	496	99.2

Table 19. Summary of sampling results of commercial goldeye catches from Fort Peck Reservoir during years 1977-1980.

Area	Year	Sex	Number	Avg. T.L.	Avg. Wt.	Percent Composition
Lower[1]	1977	M	33	13.0	0.77	14.0
		F	198	13.6	0.88	86.0
Lower	1978	M	11	12.4	0.72	5.0
		F	209	13.2	0.82	95.0
Lower	1979	M	43	12.6	0.73	9.3
		F	419	13.5	0.85	90.7
Upper[2]	1979	M	65	12.7	0.72	7.6
		F	787	13.2	0.83	92.4
Lower	1980	M	252	13.1	0.77	17.0
		F	1,233	13.6	0.87	83.0
Upper	1980	M	18	13.0	0.79	6.4*
		F	179	13.2	0.84	93.6*

[1]Lower = Areas in lower 30 miles of main reservoir.

[2]Upper = Areas from 30 to 70 miles above Fort Peck Dam.

*Based on additional numbers of goldeye sexed from random sampling of total catch.

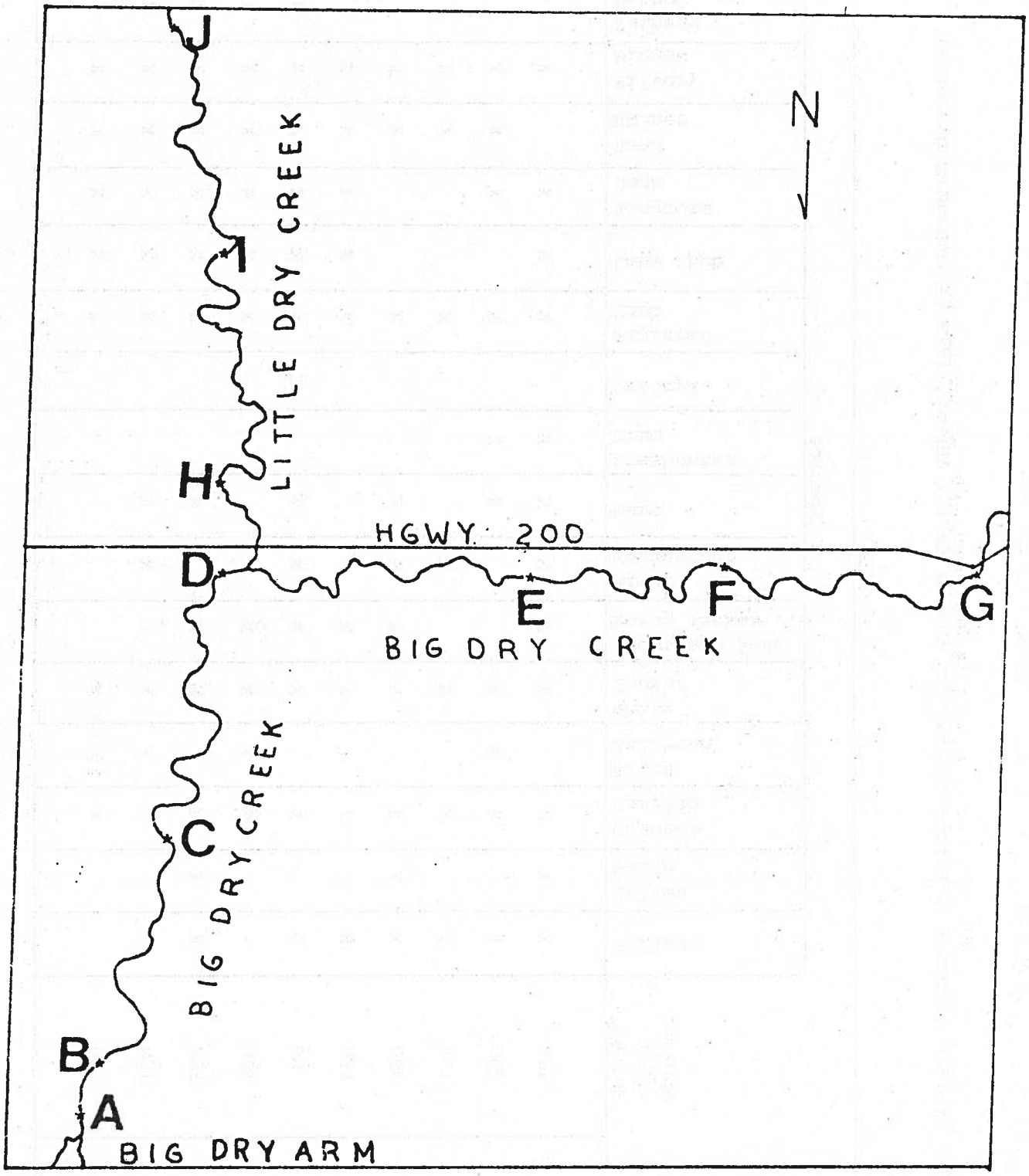


Figure 1. Stations seined in Big Dry and Little Dry Creeks during 1979 to determine presence of fish species common to Fort Peck Reservoir.

Table 20. Species captured in Little and Big Dry Creeks during August, 1979 (X indicates presence).

Station	Approx. Feet Seined	Species																
		Walleye	Yellow Perch	Channel Catfish	Black Bullhead	White Sucker	Shorthead Redhorse Sucker	River Carpsucker	Carp	Freshwater Drum	Goldeye	Flathead Chub	Lake Chub	Longnose Dace	Sand Shiner	Silvery Minnow	Fathead Minnow
A	200	X	X	X		X	X	X	X	X		X	X	X		X	
B	200	X		X	X	X			X	X		X		X	X	X	
C	170	X		X		X		X				X			X	X	
D	300	X	X	X		X	X	X	X			X			X	X	
E	150	X		X		X	X					X	X	X	X	X	
F	60	X		X		X	X	X	X		X	X	X	X	X	X	X
G	120			X	X	X	X					X	X	X	X	X	X
H	160	X	X	X		X	X		X			X	X	X	X	X	X
I	120			X	X	X	X	X	X			X	X	X	X	X	X
J	160			X		X						X	X	X	X	X	X

Table 21. Results of mercury analysis of fish species collected in Fort Peck Reservoir during summer, 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)

Table 22. Average minimum and maximum temperatures and ranges recorded in the Big Dry Arm of Fort Peck Reservoir during 1977.

Month	No. of Days	Average Min. (°F)	Average Max. (°F)	Range (°F)
UPPER BIG DRY ARM:				
April	25[1.]	49	56	37-70
May	31	59	65	50-72
June	30	66	73	60-80
July	31	67	74	61-83
August	31	63	70	56-77
September	19[2.]	58	66	47-78
NELSON CREEK BAY:				
April	23[1-3.]	47	59	38-74
May	31	54	63	47-75
June	30	63	73	53-83
July	31	67	72	63-79
August	25[4.]	64	68	59-73
September	19[2.]	60	64	56-71

1. Thermographs installed April 6.
2. Thermographs removed.
3. Temperatures not recorded for 2 days due to machine malfunction.
4. Temperatures not recorded for 6 days due to machine malfunction.

Table 23. Average minimum and maximum temperatures recorded in the Big Dry Arm of Fort Peck Reservoir during 1979. Temperature ranges are in parentheses.

Month	I - Head of Big Dry Arm		II - Nelson Bay	
	Average Minimum °F.	Average Maximum °F.	Average Minimum °F.	Average Maximum °F.
April	50 (50-51)	53 (52-55)	37 (36-40)	41 (39-43)
May	55 (45-66)	59 (48-70)	48 (41-57)	52 (42-68)
June	64 (59-70)	68 (62-75)	59 (53-65)	64 (57-72)
July	71 (67-74)	76 (70-82)	66 (57-71)	71 (63-78)
August	67 (60-72)	72 (63-76)	68 (63-72)	70 (64-75)
September	62 (57-68)	66 (61-73)	63 (59-67)	65 (61-71)
October	53 (50-57)	58 (56-60)	55 (53-58)	57 (54-59)