ESTABLISHMENT OF AQUATIC BASELINES IN LARGE INLAND IMPOUNDMENTS

Segment 4 Report

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ABSTRACT

A total of 2,222 fish were trapped of which 1,777 were tagged in the Big Dry Arm during spring 1980. Walleye and northern pike were the predominate game fish species captured and river carpsucker and white sucker predominated the nongame species catch. Walleye recaptures from previous years tagging were 15.7 percent and northern pike recaptures were about 8 percent. No spawning run of walleye entered Big Dry Creek due to lack of spring run-off and a low reservoir level. Larval fish sampling in the Big Dry Arm captured only yellow perch, burbot and freshwater drum and indicated a complete walleye year-class failure. Other areas in the main reservoir were also sampled for larval fish and only yellow perch, sucker and crappie species, freshwater drum, goldeye and carp were captured. Yellow perch were the most abundant species found. Beach seining in several areas of the reservoir to assess reproduction indicated Age 0 yellow perch were the most abundant and ranged from an average of 46.4 per haul in the Big Dry Arm to 707.1 per haul in Hell Creek bay. Crappie were the second most abundant species captured and ranged from an average of 0.1 to 47.0 fish per haul. Forage minnows and commercial young-of-the-year species appeared to be relatively scarce in all areas seined. Monitoring of commercial fish populations, particularly goldeye, was continued. Sampling of commercial goldeye landings indicated females comprised 83 percent from lower areas and about 94 percent from upper areas of the total catch. The goldeye harvest made up about 65 percent of the total commercial landings of about 550,000 pounds.

INTRODUCTION

Efforts were directed towards obtaining baseline information on fisheries and related aquatic aspects in the Big Dry Arm of Fort Peck Reservoir during 1980. Objectives during this segment's work were: (1) Monitor and tag fish during spring spawning movements near the head of the Big Dry Arm and in Big Dry Creek; (2) Assess reproductive success of sport, commercial and forage species in Big Dry Creek and various areas of the reservoir; (3) Monitor water temperatures throughout the field season in Big Dry Creek; and (4) Monitor commercial fish populations, particularly goldeye, and commercial fish harvest data.

Trapping and tagging of primarily adult fish was done near the head of the Big Dry Arm during April and early May. Trapping in Big Dry Creek was attempted for a short period of time but due to extremely low spring flows and a low reservoir level, no spawning run of fish from the reservoir occurred. Sampling of larval fish was done in the Big Dry Arm and several other areas of the reservoir during May and June. Age 0 fish were captured by beach seining in several areas of the reservoir during August and September to assess reproduction of sport, commercial and forage species. A thermograph was installed at Big Dry Creek near its confluence with the Big Dry Arm during April and maintained into October. Goldeye in the lower portion of the reservoir were sampled with floating gill nets at standard sampling sites. Commercial goldeye catches were checked periodically to obtain size and sex composition information from lower, mid and upper areas of the reservoir. Commercial harvest data for the year was compiled and analyzed.

TRAPPING AND TAGGING

Movements of fish near the head of the Big Dry Arm were monitored using frame traps from April 14 through May 6, 1980. Lack of spring run-off and almost no precipitation combined to produce a low and generally stable reservoir level during March, April and May. The reservoir rose only 1.67 feet during this period.

A total of 97 trap-days caught 2,222 fish or an average of 22.9 fish per trap-day (Table 1). Data on average size and size ranges is shown in Table 2.

Walleye were the most abundant game fish captured with a total of 535. Approximately 100 of these fish were sacrificed for an independent mercury study. The walleye were unable to move into Big Dry Creek for spawning due to the lack of any substantial flows in the creek as well as the relatively low level of the reservoir. Flows averaged 36.4 cfs in March and dropped to an average of 8.8 and 2.3 cfs during April and May, respectively, in Big Dry Creek (USGS--Water--Data Report). Male walleye averaged 17.9 inches total length (range 13.3 to 22.3 inches) and 1.77 pounds (range 0.72 to 3.32 pounds) based on 247 fish. Females averaged 21.7 inches total length (range 17.6 to 27.1 inches) and 3.43 pounds (range 1.60 to 7.25 pounds) based on 122 fish. Recaptures from previous years tagging amounted to 15.7 percent.

A total of 301 northern pike were captured of which 7.8 percent were recaptures from previous years tagging. Males averaged 23.3 inches in total length (range 18.2 to 31.8 inches) and 3.24 pounds (range 1.29 to 8.22 pounds) based on 143 fish. One hundred fifty-two females averaged 26.1 inches total length (range 19.8 to 41.6 inches) and 5.10 pounds (range 1.51 to 19.55 pounds).

A total of 57 sauger were captured of which 3.5 percent were recaptures from previous years tagging. Twenty-three males averaged 16.0 inches total length (range 13.7 to 18.3 inches) and weighed 1.15 pounds (range 0.64 to 1.89 pounds). Twenty-six females averaged 19.5 inches total length (range 15.6 to 23.7 inches) and 2.28 pounds (range 1.26 to 4.45 pounds).

Seventy burbot were captured and none had been previously tagged. Forty-two burbot averaged 24.0 inches total length (range 16.7 to 32.4 inches) and weighed 2.75 pounds (range 0.75 to 7.30 pounds). Sexes were not differentiated.

Other game species captured were five channel catfish and one shovelnose sturgeon.

A total of 642 river carpsucker were captured and were the most abundant nongame species captured. Recaptures from previous years tagging were 2.6 percent. Totals of other nongame species captured included 177 white sucker, 142 shorthead redhorse suckers (8.4 percent recaptures), 112 smallmouth buffalo (0.9 percent recaptures), 98 carp, 63 yellow perch, 12 goldeye, 4 bigmouth buffalo, and 1 each of blue sucker, black bullhead and freshwater drum.

Table 1. 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.

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
	No./Trap-Day	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 2. Size measurements of fish species captured during trapping of Big Dry Arm in spring, 1980. Length and weight ranges shown in parenthesis.

Species	Number Measured	Average Total Length	Average Weight
Walleye ♂	247	17.9 (13.3 - 22.3)	1.77 (0.72 - 3.32)
Walleye ♀	122	21.7 (17.6 - 27.1)	3.43 (1.60 - 7.25)
Sauger ♂	23	16.0 (13.7 - 18.3)	1.15 (0.64 - 1.89)
Sauger ♀	26	19.5 (15.6 - 23.7)	2.28 (1.26 - 4.45)
Northern Pike ♂	143	23.3 (18.2 - 31.8)	3.24 (1.29 - 8.22)
Northern Pike ♀	152	26.1 (19.8 - 41.6)	5.1 (1.51 - 19.55)
Yellow Perch	12	7.2 (6.0 - 9.2)	0.18 (0.08 - 0.42)
River Carpsucker	84	17.9 (12.1 - 24.1)	3.20 (0.91 - 7.60)
Shorthead Redhorse Sucker	11	18.0 (16.0 - 19.0)	2.26 (1.49 - 2.83)
White Sucker	57	14.8 (7.6 - 17.6)	1.46 (0.18 - 2.70)
Smallmouth Buffalo	25	21.9 (13.8 - 25.8)	6.24 (1.39 - 9.85)
Carp	15	18.9 (10.2 - 26.2)	3.04 (0.50 - 7.40)
Burbot	42	24.0 (16.7 - 32.4)	2.75 (0.75 - 7.30)

A total of 294 walleye, 265 northern pike and 13 sauger were tagged with color-coded and numbered FD-67B Floy tags. Size data, date and release location were recorded on these fish prior to tagging and release. Harvest of these fish, obtained primarily from fishermen tag returns, was 10.5 percent for walleye (31 tags), 18.1 percent for northern pike (48 tags) and 7.7 percent for sauger (1 tag).

All other species, including 34 sauger, were tagged with unnumbered colored Floy Flag tags. No tags from these fish were returned during 1980. Species and number of fish tagged during 1980 are shown in Table 3.

Table 3. Species and number of fish tagged during spring trapping, 1980, in the Big Dry Arm of Fort Peck Reservoir.

Species	No. Tagged
Walleye	294
Sauger	47
Yellow Perch	2
Northern Pike	265
River Carpsucker	638
White Sucker	197
Shorthead Redhorse Sucker	143
Smallmouth Buffalo	105
Bigmouth Buffalo	4
Burbot	69
Goldeye	8
Channel Catfish	5
TOTAL	1,777

WATER TEMPERATURE - BIG DRY CREEK

One thermograph was installed in Big Dry Creek near its confluence with the Big Dry Arm during April and continuous water temperatures were recorded through September, 1980. The results are shown in Table 4. Temperatures during April and May when walleye spawning and hatching would normally occur averaged 48.5°F. and 55.4°F. for minimums and 62.6°F. and 69.1°F. for maximums, respectively. However, the effects of the extreme low flows during April and May on water temperatures in this stream are difficult to judge but were probably higher to some extent than in years of adequate flows. Average minimum temperatures during June and July were in the low 60's and dropped into the high 50's in August and low 50's during September. The lowest temperature recorded was 38°F. and occurred in early April. Average maximums remained in the 70's during June, July and August with the highest average of 78.8°F. occurring during July. The high temperature of 84°F. also occurred during this month. The greatest temperature ranges for both minimums and maximums occurred in April with a 19° difference (38-57) and a 29° difference (43-72), respectively.

Table 4. Average minimum and average maximum water temperatures (°F.) recorded in Big Dry Creek during 1980. Temperature ranges are in parenthesis.

Month	Average Minimum °F.	Average Maximum °F.
April	48.5 (38 - 57)	62.6 (43 - 72)
May	55.4 (49 - 66)	69.1 (58 - 80)
June	60.1 (53 - 65)	74.3 (62 - 81)
July	62.1 (58 - 68)	78.8 (72 - 84)
August	57.8 (52 - 66)	72.2 (62 - 81)
September	51.7 (45 - 58)	63.7 (57 - 73)

LARVAL FISH SAMPLING

Sampling of larval fish was done in several areas of Fort Peck Reservoir primarily during May and June, and in Big Dry Creek near its confluence with the Big Dry Arm during May only. Sampling in the reservoir was done by towing paired one-half meter nets (#00 mesh) in selected areas at approximately three miles per hour for 10 minutes by boat. A flow meter was mounted at the net-mouth of each net to aid in determination of water volume sampled. Samples in Big Dry Creek were taken by staking the nets in the stream bed in a riffle area for 30 minutes.

The results, presented in Table 5, show that only three species of larval fish were captured in the Big Dry Arm and were predominately yellow perch. Burbot were taken twice each near the head of the Big Dry Arm and in Nelson bay and the highest number, 18.3 fish per 1,000 m^3, occurred in the latter area on May 2. Freshwater drum were captured only near the head of the Big Dry Arm and averaged 22.7 fish per 1,000 m^3 on May 30. Yellow perch were taken in all areas sampled except Sand Arroyo and Box Elder bays, which are located towards the lower end of the Big Dry Arm. However, only one tow was made in these bays, May 21, and it is possible later tows may have captured this species. Mean numbers of yellow perch ranged from 3.1 fish per 1,000 m^3 in Nelson bay to 1,406.5 fish per 1,000 m^3 in the Intake area.

Four areas in the lower portion of the main reservoir were sampled for larval fish during May. Only two species, yellow perch and burbot, were captured. Yellow perch averaged 2.9 and 3.0 fish per 1,000 m^3 in the Spillway and North Fork of Duck Creek bays, respectively, and 2.9 burbot per 1,000 m^3 were taken along the face of the dam. No larval fish were captured in Bear Creek bay.

Several areas towards and including the upper end of Fort Peck Reservoir were sampled during June. Yellow perch, sucker and crappie species, freshwater drum, goldeye and carp were captured. The results are shown in Table 6. Yellow perch were captured in four areas with the highest average, 2,181.2 fish per 1,000 m^3, occurring in Hell Creek bay. Crappie sps. were captured only in Fourchette bay and averaged 5.8 fish per 1,000 m^3. Freshwater drum were captured only in Musselshell bay and averaged 2.8 fish per 1,000 m^3, and goldeye and carp larval fish were sampled only in the UL Bend area and averaged 2.8 and 19.4 fish per 1,000 m^3, respectively. Sucker sps. also were only caught in the UL Bend area and averaged 2.8 fish per 1,000 m^3 in mid-reservoir and 8.3 fish per 1,000 m^3 in a shoreline tow.

Sampling was done in Big Dry Creek on May 9 and 27; no larval fish were captured.

REPRODUCTION AND FORAGE FISH ASSESSMENT

Sampling of Age 0 and forage minnows was done in the Big Dry Arm, lower areas of the main reservoir and Hell Creek bay during August and September, 1980. A 100- x 10-foot beach seine with 1/4-inch bar mesh was used for all sampling. The results are shown in Table 7. Big Dry Creek was sampled during October using a 25- x 6-foot seine with 1/4-inch bar mesh.

Table 5. Mean number of larval fish (number per 1,000 m^3) captured in the Big Dry Arm of Fort Peck Reservoir during 1980.

Area	Date	Species		
		Yellow Perch	Burbot	Freshwater Drum
Head of Big Dry Arm	4/28		5.7	
	5/2	700.9	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 6. Mean number of larval fish (number per 1,000 m^3) captured 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 7. Average number of Age 0 fish captured by beach seining in Fort Peck Reservoir during August and September, 1980.

Area	No. of Hauls	Species												
		WE*	SG	YP	NP	CR	FD	B	WS	SS	C	CC	GE	FM**
Big Dry Arm	36	0.1		46.4		0.1	2.2			0.1	0.1	0.1	0.1	1.7
Lower Areas	39	0.1	0.1	52.4	0.1	7.6	0.1	0.5	4.0		0.3		0.1	2.6
Hell Creek	8			707.1		47.0	1.5		0.4					10.7

*WE = walleye
SG = sauger
YP = yellow perch
NP = northern pike
CR = crappie sp.
FD = freshwater drum
B = buffalo sp.
WS = white sucker
SS = shorthead redhorse sucker
C = carp
CC = channel catfish
GE = goldeye
FM = forage minnows

**FM Big Dry -- lake chub, silvery minnow, emerald shiner, plains killifish, longnose dace, northern redbelly dace, brassy minnow.
FM Lower Areas -- emerald shiner, lake chub.
FM Hell Creek -- emerald shiner, sand shiner, fathead minnow, longnose dace.

A total of 36 seine hauls were made in the Big Dry Arm. Yellow perch were the most abundant species captured and averaged 46.4 fish per haul. Freshwater drum were the next most abundant species captured and averaged 2.2 fish per haul. All other species taken averaged only 0.1 fish per haul with the exception of forage minnows which had a combined average of 1.7 fish per haul. Forage minnow species included lake chub, silvery minnow, emerald shiner, plains killifish, longnose dace, northern redbelly dace and brassy minnow.

Thirty-nine seine hauls were made in lower areas of the main reservoir and more species, excluding forage minnows, were sampled here than anywhere else. Yellow perch were the most abundant species captured and averaged 52.4 fish per haul. Crappie sps. and white sucker were the next most common species sampled and averaged 7.6 and 4.0 fish per haul, respectively. Forage minnows averaged 2.6 fish per haul and included only emerald shiner and lake chub.

Eight seine hauls were made in Hell Creek bay and yellow perch and crappie sps. were again the most abundant species captured, averaging 707.1 and 47.0 fish per haul, respectively. Forage minnows averaged 10.7 fish per haul and included emerald shiner, fathead minnow, sand shiner and longnose dace. The only other species captured were white sucker, averaging 0.4 fish per haul.

Five areas in Big Dry Creek below its confluence with Little Dry Creek and three areas in Little Dry Creek were seined to check for Age 0 game fish (walleye, channel catfish) and also for the presence of other species common to the reservoir. The only young-of-the-year game fish seined were two channel catfish in Big Dry Creek; one adult and one yearling channel catfish were also captured in Big Dry Creek. Commercial fish species captured in Big Dry Creek were carp, river carpsucker and goldeye but were all yearling or older fish. Yellow perch and emerald shiner were found only in one area which was near the confluence of Big Dry Creek with the Big Dry Arm. Other forage minnow species including silvery and fathead minnows, sand shiner and longnose dace were common in both streams. Age 0 white sucker were found in both Big and Little Dry Creeks and flathead chub were captured only in Big Dry Creek.

GOLDEYE MONITORING

Commercial goldeye catches were periodically sampled at a cleaning and storage plant site during 1980. Catches from lower areas of the reservoir were sampled more frequently since fishermen netted these areas more often primarily because travel-time to the plant site is much less. Lower areas are considered as those located within about 30 miles of Fort Peck dam. All goldeye are harvested with floating monofilament gill nets consisting of 1 3/4-inch bar mesh. The results are shown in Table 8. A total of 1,233 females and 252 males from lower areas averaged 13.6 and 13.1 inches total length and 0.87 and 0.77 pounds, respectively. One hundred seventy-nine females and 18 males from upper areas averaged 13.2 and 13.0 inches total length and 0.84 and 0.79 pounds, respectively. Females comprised 83.0 percent of the total catch in lower areas and 93.6 percent in upper areas.

Table 8. Sampling results of commercial goldeye catches from lower and upper areas of Fort Peck Reservoir during 1980.

Area	Sex	No.	Avg. T.L.	Avg. Wt.	Percent Composition
Lower	Male	252	13.1	0.77	17.0
	Female	1,233	13.6	0.87	83.0
	Total	1,485	13.5	0.85	100.0
Upper	Male	18	13.0	0.79	6.4
	Female	179	13.2	0.84	93.6
	Total	197	13.2	0.84	100.0

COMMERCIAL FISHING

Four commercial fishing permits were issued for Fort Peck Reservoir during 1980. Three of the permittees were residents and one was a nonresident. 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 13 to September 8. 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 1980 were: goldeye, 356,755 pounds; buffalo (smallmouth and bigmouth), 178,777 pounds; river carpsucker, 8,454 pounds; carp, 5,662 pounds; freshwater drum, 509 pounds. Table 9 shows the total commercial harvest from Fort Peck Reservoir for years 1957 through 1980.

DISCUSSION

Lack of any substantial run-off together with a relatively low, stable reservoir level prevented walleye from entering Big Dry Creek for spawning purposes. No larval walleye were captured in the Big Dry Arm or Big Dry Creek indicating a complete year-class failure. The importance of adequate spring run-off and a reservoir level high enough to allow fish passage into Big Dry Creek is evident and should be taken into consideration when future demands for water withdrawals from these waters are made.

Table 9. Total pounds (round weight) of commercial species harvested from Fort Peck Reservoir by commercial fishermen for years 1957 through 1980.

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
Total	6,325,282	296,609	73,299	185,321	134,891	1,913,144	73,522	3,499	9,002,068

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

The low number of adult walleye captured during spring trapping and the fact almost 16 percent were recaptures from previous years tagging may indicate a relatively small population. Stocking of walleye should be continued in order to help maintain adequate numbers of reproduction when favorable spawning conditions occur and also to help augment the sport fishery.

The low numbers of forage fish captured by beach seining in various areas of the reservoir may indicate a severely depressed forage base in Fort Peck for predator species. Suitable spawning substrate may be a limiting factor for many forage species as the sediment load within the reservoir increases and the inundated brush and trees become buried or rot away. Also, the lack of established aquatic vegetation which provides food, cover and spawning areas for many species is limited. Possibly a new forage species, more adaptable to the changing reservoir conditions, could be introduced in order to try and improve the forage base.

The total harvest of commercial species from Fort Peck Reservoir during 1980 was over 550,000 pounds of which about 65 percent were goldeye. This was an increase of 13 percent over the previous year's harvest and represents the largest annual harvest of this species from Fort Peck. The catch is comprised primarily of females (over 80 percent) and should be closely monitored to prevent overharvesting. Quotas or other restrictions may have to be imposed in the future to reduce the harvest of goldeye in order to protect this fishery.

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