A FISHERY REVIEW AND MANAGEMENT RECOMMENDATIONS FOR WATERS OF CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

Prepared By

William Alvord

for

Montana Department of Fish, Wildlife, and Parks

November 1979

In Cooperation With U. S. Fish and Wildlife Service

Charles M. Russell National Wildlife Refuge Planning Team

Contract 14-16-0006-78-917

Cover Photo: Paddlefish weighing one hundred and thirteen pounds taken near Slippery Ann Game Station.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

A FISHERY REVIEW AND MANAGEMENT RECOMMENDATIONS FOR WATERS OF CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

The objective of this study is to review and assemble the numerous fisheries data collected on Fort Peck Reservoir and waters within the C. M. Russell National Wildlife Refuge and to develop from these data a general fisheries plan. (See Appendix A for map of refuge.)

HISTORICAL BACKGROUND AND PHYSICAL DESCRIPTION

Construction of Fort Peck Dam began in 1934 at Mile 1868 on the Missouri River and the channel was closed on June 24, 1937. Essentially, the dam was completed by 1940. It was built to impound water for hydroelectric power, for flood control and for navigation. Construction of the dam also provided sorely needed jobs during the depression years of the thirties. Recreation has proven to be an important by-product of the project.

Maximum width of the reservoir on the Missouri River is 16 miles and it extends up Big Dry Creek approximately 40 miles. Drainage area of the reservoir as reported by U. S. G. S. is 57,725 square miles. At maximum pool the reservoir has a surface area of 247,000 acres, is 135 miles in length and has a maximum depth of 220 feet. Capacity of the reservoir is 19,100,000 acre-feet. At elevation 2,234 msl the shoreline is 1,520 miles.

The reservoir shoreline is primarily exposed Bear Paw Shale with extremely sparse vegetation. The soils of the Refuge area are predominantly clayey type, with generally low water permeability and slow infiltration properties.

The area is semi-arid with an average rainfall of from 12 to 16 inches. Temperature extremes are common in both summer and winter and the growing season ranges from 104 to 132 days.

FISHES OF THE REFUGE AREA[1]

Sport Fishes[2]

Sturgeon

There are two species of sturgeon found in Fort Peck Reservoir, the pallid and the shovelnose. Both are classified as game fish under Montana law.

Pallid sturgeon--This species is present in the reservoir in very small numbers and is seldom taken by fishermen. It will occasionally take a baited hook and might also be taken in the sport fishery incidental to paddlefish snagging. Recorded specimens from the reservoir weighed up to 40 pounds; however, commercial fishermen have reported seeing pallid sturgeon over 100 pounds.

The pallid sturgeon has been classified as a threatened species by the Endangered Fishes Committee of the American Fisheries Society. In view of this classification, the Montana Department of Fish, Wildlife, and Parks is recommending a 16 pound maximum size limit.

Shovelnose sturgeon--This sturgeon is relatively abundant in the reservoir and the Missouri River. It is usually fairly small; however, a 12 pound 12 ounce specimen, the present state record, was taken from the Marias River near Loma in 1978. Normally a shovelnose of from 6 to 7 pounds would be considered quite large. They are fished for by a few anglers and, since they are bottom feeders, are usually caught on setlines. The shovelnose requires no special management measures.

Paddlefish

The paddlefish is relatively abundant in Fort Peck Reservoir and in the Missouri River above and below the lake. They are prized by fishermen for their large trophy size and also as a food fish. The paddlefish does not bite a baited hook since it is a plankton feeder and obtains its food by swimming along with its mouth open and literally straining its food from the water with its efficient gill raker system. There is, however, an important snagging fishery for paddlefish on the refuge immediately upstream from Fort Peck Reservoir. The paddlefish was classified as a game fish on July 1, 1965 with a creel limit of two fish daily. Prior

---

[1]A list of fish present including scientific names and relative abundance is given in Appendix B.

[2]Creel census information from sport fishermen is given in Appendix C.

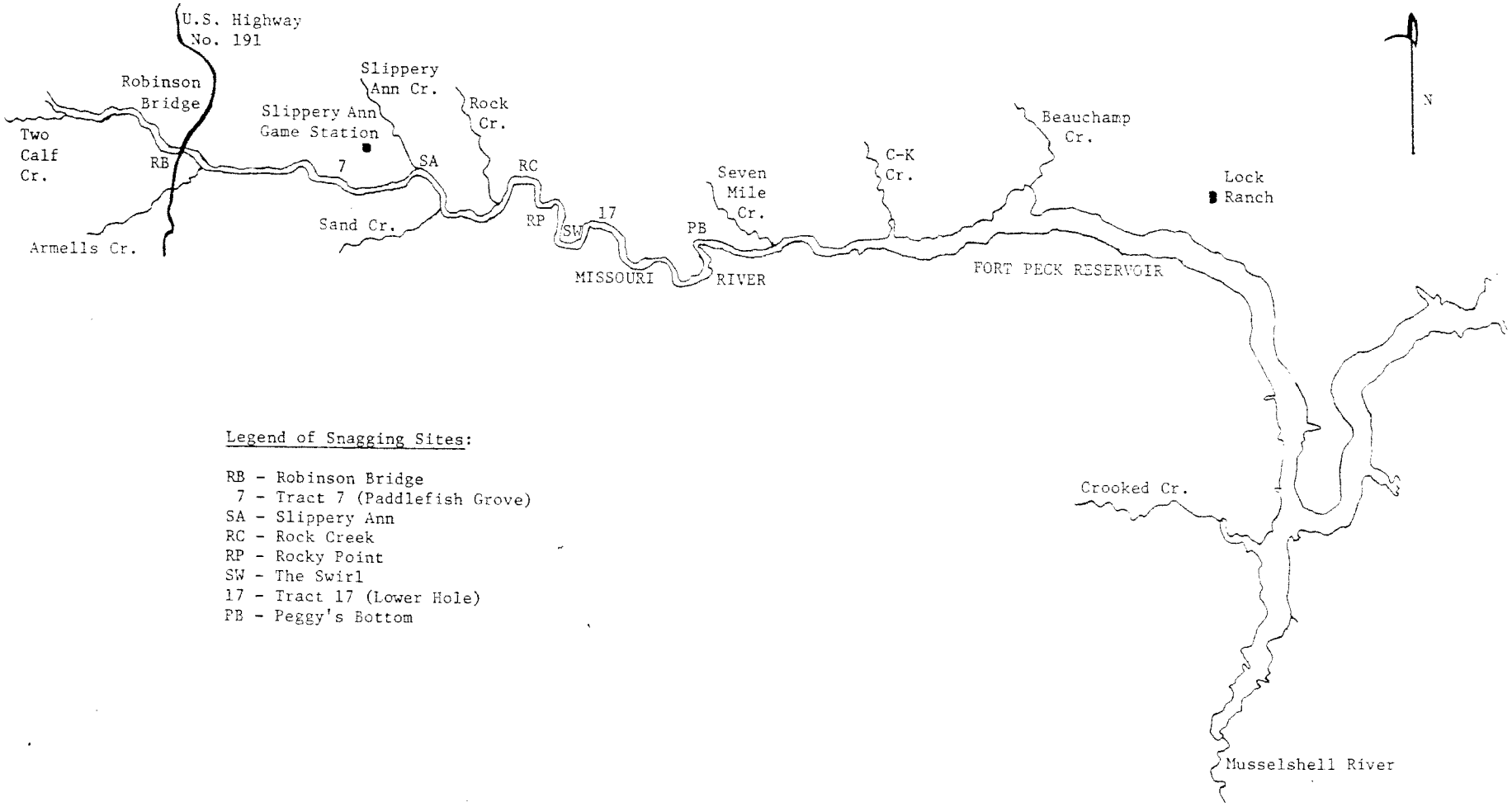


Figure 1. Map of paddlefish study area and location of popular snagging sites.

to that time, some snaggers were reportedly taking excessive numbers when the fish were available. The limit was further restricted to one fish per day and two in possession on May 20, 1978. Indications are that the paddlefish can withstand the present levels of harvest. The Montana Department of Fish, Wildlife, and Parks has requested legislation for a fee permit system for taking paddlefish. Such a system would allow greater management flexibility and assure a continuing healthy population of this unique species.

Paddlefish taken in the Fort Peck/Missouri River snag fishery are larger than reported in any other sport fishery in the country. Females average about 80 pounds; males just under 40 pounds. The state record, and possibly the North American sport record, is a 142.5 pounder that was taken on the Charles M. Russell National Wildlife Refuge in 1973.

Paddlefish are long-lived (20-year-olds are common) and relatively slow to mature (males are believed to spawn at 7-8 years, females at 12-14 years).

Investigations by Rod Berg of the Montana Department of Fish, Wildlife, and Parks has shown spawning concentrations of paddlefish migrating in the spring from the reservoir to spawning sites in the Missouri River. Concentrations were found at several locations from the upper end of Fort Peck Reservoir to a point 145 miles upstream, and in addition larval paddlefish were taken at Coal Banks 156 miles above Fort Peck Reservoir. Presently known spawning sites are all upstream from the refuge. The fish spawn over silt-free gravel bars during high spring flows. The Missouri River paddlefish represent one of the last known "stable" populations in the nation.

Regional Fisheries Manager Robert Needham, of the Montana Department of Fish, Wildlife, and Parks, netted and tagged paddlefish over a period of several years in Fort Peck Reservoir and Missouri River to obtain information on movement of the species and also their contribution to the sport fishery. A fairly intensive creel census was carried out at the same time. Tables 1 and 2 summarize the results of the tagging and the harvest.

Relatively good success in artificial propagation of the paddlefish has been achieved by some investigators, notably in Missouri. Should the Missouri River population become critically low, rearing the species in a hatchery and stocking them might prove feasible.

There are several popular paddlefish snagging sites on the Refuge area. These are indicated on Figure 1. Presently there appears generally to be no great conflict for space between the boat snaggers and those snagging from shore.

TABLE 1. A Summary of Paddlefish Tagging and Harvest Data from the Missouri River and Fort Peck Reservoir, 1973-78. The Actual Tag Return Rate (Given in Parentheses) was Derived by Adjusting for Previous Harvest of Tagged Fish. (Information Supplied by Robert Needham, Mont. Dept. of Fish, Wildlife, and Parks.)

Year	Number Tagged	Number Tagged Paddlefish Harvested						Total	Percent Harvest	Average Annual Percent Harvest[1]
		1973	1974	1975	1976	1977	1978			
1973	45	0	1 (2.22)	1 (2.27)	0	1 (2.36)	0	3	6.85	1.14
1974	55	-	3 (5.56)	0	1 (1.92)	1 (1.96)	1 (2.00)	6	11.44	2.29
1975	29	-	-	0	0	1 (3.45)	0	1	3.45	0.86
1976	23	-	-	-	1 (4.35)	1 (4.55)	2 (9.52)	4	18.42	6.14
1977	61	-	-	-	-	4 (6.56)	1 (1.75)	5	8.31	4.15
1978	226	-	-	-	-	-	4	4	1.77	1.77

1 Obtained by averaging the actual tag return rates.

TABLE 2. A Summary of Fishing Pressure, Paddlefish Harvest and Catch Rates During the Spring 1973-78. (Information Supplied by Robert Needham, Mont. Dept. of Fish, Wildlife, and Parks.)

	Total fisherman man-days			Paddlefish harvested			Catch/Fisherman/Day		
Year	Bank	Boat	Total	Bank	Boat	Total	Bank	Boat	Overall
1973	984 (64.9%)	532 (35.1%)	1,516	290 (62.1%)	177 (37.9%)	467	0.29	0.33	0.31
1974	1,422 (63.1%)	831 (36.9%)	2,253	396 (62.2%)	241 (37.8%)	637	0.28	0.29	0.28
1975	916 (61.8%)	566 (38.2%)	1,482	180 (46.7%)	205 (53.3%)	385	0.20	0.36	0.26
1977	1,429 (56.5%)	1,096 (43.4%)	2,526	322 (48.3%)	344 (51.7%)	666	0.23	0.31	0.26
1978	699 (33.1%)	1,413 (66.9%)	2,112	135 (39.6%)	207 (60.4%)	342	0.19	0.15	0.16

Salmonids

Among the trout and salmon species introduced into Fort Peck Reservoir, only the lake trout has been able to maintain its numbers through natural reproduction. The coho, kokanee, rainbow trout, and brown trout require clean gravel in cool, flowing tributaries for spawning, and these are lacking in the Refuge area. Conditions for survival and growth of the various species, however, are relatively good.

All of the trout and salmon are classified as game fish under Montana law and state fishing regulations apply.

Coho salmon -- Coho salmon were stocked in Fort Peck Reservoir with the hope that they would exhibit the phenomenal growth rate of those planted in the Great Lakes. There they at times exceeded 30 pounds in their fourth year. Close observations of the coho in Fort Peck Reservoir following their introduction showed relatively good survival but a much lower growth rate. In their third year they weighed two to three pounds. The difference in the rate of growth lies in the availability of large numbers of forage fish. It was observed in Fort Peck Reservoir that the forage fish were generally found in the shallows close to shore while the coho frequent deeper waters away from shore.

When coho were first introduced in 1969, one plant was made in the Missouri River below Morony Dam, one plant in the Marias River below Tiber Dam and one plant in the Big Dry Arm of the reservoir. The upstream plants were made with the hope of developing spawning runs. The runs failed to materialize and the only significant returns from the plants came from those stocked in the Big Dry Arm of the reservoir.

Coho Salmon Stocking in Fort Peck Reservoir[3]

5/1/69	3"	54,000	(Morony)
5/1/69	3"	38,250	(Marias)
6/17/69	6"	48,990	(Big Dry Arm)
5/1/70	3½"	178,200	
4/25/72	4"	174,132	
5/8/73	3"	71,400	

Kokanee (salmon)--The kokanee planted in Fort Peck Reservoir came from Flathead Lake stock. The species does exceptionally well in the Flathead River Drainage where it can spawn in tributary streams over loose rubble, gravel, and sand and also along many areas of lake shore. These conditions are

---

[3]All stocking records in this report are from the files of the Montana Department of Fish, Wildlife, and Parks.

not found in Fort Peck Reservoir and with no plants since 1952, the kokanee has not survived. Based on information from the Flathead Drainage, these fish will spawn in their second to sixth fall, with about 90 percent spawning in their fourth and fifth fall when they are around 12 inches in length. They die soon after spawning.

Kokanee Stocking in Fort Peck Reservoir

6/25/46	fry	55,000
6/23/47	fry	52,400
6/11/48	fry	52,000
6/24/49	fry	56,000
6/21/50	fry	57,000
6/26/51	fry	52,000
6/30/52	fry	60,000
8/5/52	3-4"	3,360

Rainbow trout -- Rainbow have been introduced into Fort Peck Reservoir from state fish hatcheries and perhaps a few rainbow move into the reservoir from the drainage above. Studies have shown that planted rainbow disperse quite widely in the reservoir waters. They feed primarily on aquatic insects and some forage fish, but, like most salmonids, will utilize what is generally available. The growth rate of the rainbow in Fort Peck Reservoir is good and some nice specimens have been caught. Since the rainbow usually spawns in the spring over clean gravel bottoms of cool streams, there is little chance of natural reproduction in Fort Peck Reservoir. To maintain a fishable population, stocking large numbers would be required. The program would be costly in that the fish disperse widely and only a small part of the entire reservoir is utilized by sport fishermen.

Rainbow Trout Stocking in Fort Peck Reservoir

1942	fry	625,000
1942	4½-6"	10,000
1943	fry	105,000
8/15/46	4½"	4,200
9/15/49	6"	3,600
9/19/49	5½"	4,800
8/28/52	4-6"	3,440
9/5/52	3-4"	2,000
7/27/54	legals	800
8/15-18/55	adults	2,846
7/11/57	adults	5,292
5/1/72-7/18/72	4-6"	251,903

Brown trout -- Limited numbers of brown trout have been stocked in Fort Peck Reservoir; the last plant was in 1949. A fall spawner, the brown trout withstands somewhat warmer temperatures than other salmonids, but it too requires flowing tributaries with gravel bottoms to successfully reproduce. The

occasional brown trout taken in the reservoir has moved down from the Missouri River or possibly the Musselshell River.

Brown Trout Stocking in Fort Peck Reservoir

1945	2-2½"	40,000
8/15/46	2½"	6,240
9/19/49	4"	1,682

Lake trout -- The lake trout, a native to Montana, was introduced into Fort Peck Reservoir in 1953 along the upstream face of the dam, where it was hoped the large rocks and deep water would approximate their natural habitat. They spawn in the fall in waters from 10 to 120 feet deep. The eggs fall into rock crevices where they develop over winter and hatch in March and April. The lake trout has apparently adapted to the reservoir situation. Fair numbers, ranging from 2 to 10 pounds each, are in the reservoir and in the river just below the dam. If more anglers were actively seeking lake trout and were using proper techniques the catch would be considerably greater. Observation of the lake trout population indicates a good representation of several year classes.

The plant made in 1978 was marked with a special dye. Returns from these fish will provide additional information on their movements and their relative contributions to the creel.

Lake Trout Stocking in Fort Peck Reservoir

5/18/53	1"	24,000
5/17/54	1"	65,659
5/19/54	1"	71,628
7/23/55	3"	7,000
5/11/56	1"	153,318
5/16/57	1"	94,000
6/15/78	3"	65,200

Northern Pike

The northern pike has been stocked in Fort Peck Reservoir and the Montana Department of Fish, Wildlife, and Parks has done a considerable amount of work to help establish the species. Annual stocking is done to improve fishing in selected areas and maintain a population of brood fish to utilize favorable spawning conditions. One of the management practices used experimentally has been to rear the tiny fry in brood ponds and then transfer them to the reservoir when they become large enough to be less susceptible to predation by the more numerous goldeye and yellow perch.

The northern pike spawns in the spring in shallow water over flooded shoreline vegetation shortly after the ice cover is gone. The small adhesive eggs stick to the vegetation and

hatch within two weeks. Since there are few vegetated littoral areas in Fort Peck Reservoir, natural reproduction of the northern pike is very limited.

The northern grows to a large size, over 25 pounds in Montana, and is highly prized by most sport fishermen. Stocking of the species in the reservoir will be continued.

Northern Pike Stocking in Fort Peck Reservoir

5/19/51	fry	300,000	
10/14/51	10"	1,200	
5/23/51	fry	250,000	
1961	fry	420,000	
6-7/69	4-5"	5,000	
6-7/70	4-6"	9,271	
5/28/71	3"	93,500	
6/15/71	4-5"	17,022	rearing pond
5/8/72	1"	119,126	
6/9/72	3"	36,000	
6/20/72	4"	2,073	rearing pond
6/7/73	3"	1,344	rearing pond
6/22/73	4"	2,415	rearing pond
6/74	4"	1,000	
6/18/75	1-2"	53,000	
5/26/76	2"	71,415	
6/11/76	4"	800	rearing pond
5/25/77	1"	100,000	in rec. area
5/26/77	2"	20,000	in Pines area
1979	2"	88,000	Dam-Duck Creek
1979	2"	15,000	in Pines area
1979	2"	11,500	Hell Creek area
6/8/79	2"	103,000	
6/15/79	2"	11,500	Hell Creek area

Information on northern pike tagging and tag returns is included in Appendix D.

Channel Catfish

The channel catfish is native to the lower Missouri River drainage and is common in Fort Peck Reservoir and the Missouri River on the Refuge area. It spawns successfully in the Musselshell River and the Missouri River above Fort Peck Reservoir. The channel catfish can grow to a large size - commercial fishermen have reported specimens up to 30 pounds. Quite a few sport fishermen fish for channel catfish using a wide variety of natural and prepared baits. One of the sites favored by catfish anglers is the mouth of the Musselshell River where it enters Fort Peck Reservoir.

The channel catfish was classified as a game fish under Montana law in 1975. Prior to that time there were no restrictions on catfish harvest and they were being taken commercially.

From 1958 through 1975 the commercial catch of catfish totalled 135,404 pounds. The annual catch ranged from a low of 100 pounds in 1958 to a high of 22,215 pounds in 1962 and averaged a little over 7,500 pounds.

Burbot

The burbot, often called the ling, is a native inhabitant of the Missouri River Drainage. It is found quite commonly in Fort Peck Reservoir and in the Missouri River on the Refuge area. The burbot is the only freshwater member of the marine cod family. They spawn randomly over a rocky bottom from mid-January into February and the eggs hatch in April and May. Rock Creek Bay in the Big Dry Arm of Fort Peck Reservoir is a suspected spawning area. In addition, Dr. James E. Liebelt collected larval burbot during spring larval netting operations in several other Big Dry Arm bays, namely Box Creek, Sand Arroyo, and Box Elder Creeks, indicating that these might also be burbot spawning areas.

Burbot are much sought after by sport fishermen and are usually taken in the winter through the ice, (spearing from dark houses furnishes excellent recreation) and into early spring. A specimen weighing 12 pounds, 9 3/4 ounces, the present state record, was taken from the Missouri River near Wolf Point in 1977. The burbot was classified as a game fish in 1975. Presently, however, there is no creel limit.

Sauger

The sauger is native to the lower Missouri River drainage and is relatively abundant in Fort Peck Reservoir and in the Missouri River on the Refuge area.

It spawns in the early spring, (April and May), when water temperatures approach 50 degrees F. The eggs are deposited randomly in tributary streams. Netting studies by Montana Department of Fish, Wildlife, and Parks personnel have shown most sauger are concentrated in the Missouri River arm of the reservoir, generally in the area between UL Bend and Hell Creek.

The excellent flavor and relatively few bones make it a highly desirable fish. It will bite on a variety of lures and on live minnows. The sauger is classified as a game fish and there is a creel limit.

Walleye

The walleye is not native to Montana but has been quite widely introduced into eastern Montana waters, including Fort Peck Reservoir. Eggs and fry of the species have been obtained from North Dakota, South Dakota, Minnesota, Wisconsin, and Saskatchewan. The walleye and sauger are very similar in appearance. Markings are slightly different and the walleye grows to a larger size than the sauger.

The walleye commonly migrates upstream into tributaries to spawn but has been known to use rocky bars in lakes as well. Good walleye spawning sites are limited in Fort Peck Reservoir though during years with good runoff they apparently have had some success in Big Dry Creek and perhaps the Musselshell River. Good runoff in April of 1979 in Big Dry Creek provided good access for the walleye. Liebelt has sampled larval walleye and walleye eggs in Big Dry Creek and in addition has found good numbers of age 0 walleye. The species apparently use Big Dry and Little Dry Creeks as rearing areas.

The walleye is eagerly sought by reservoir anglers and is caught on a variety of live baits and lures, much as the sauger. It is classified as a game fish and creel limits apply.

Walleye Stocking in Fort Peck Reservoir

5/19/51	fry	200,000	
5/22/51	fry	578,000	
6/21/51	fry	100,000	
6/7/77	1"	62,920	Spillway-Duck Dr.
5/11/78	fry	250,000	Rock Cr. State Park
6/21/78	2"	60,000	Rock Cr. State Park
6/21/78	2"	60,000	Nelson Cr.-Big Dry
6/22/78	2"	55,000	Nelson Cr.-Big Dry
6/22/78	2"	85,000	Vicinity of dam
6/19/79	2"	73,120	Dam-Duck Creek
6/19/79	2"	91,000	Rock Cr.-Bear Cr.
6/19/79	2"	103,127	Nelson Creek

Information on walleye tagging and tag returns is included in the Appendix

Commercial Fishes

Commercial fishing on Fort Peck Reservoir was first recommended in 1948 by C. K. Phenicie who was then chief fisheries biologist for the Montana Department of Fish and Game (the predecessor of the Montana Department of Fish, Wildlife, and Parks). The Fish and Game Commission decided against the recommendation at that time because channel catfish were included in the species to be taken. Catfish were later allowed in the commercial catch but were taken off the commercial fish list when classified a game fish in 1975.

During the period 1953 to 1957, sporadic attempts were made by a number of commercial fishermen to develop a profitable operation. Many of them lacked the expertise, and almost all of them the capital, needed to get started. They were ill-equipped to contend with the problems of limited access to the reservoir and markets as far away as Chicago and the west coast.

Species of fish presently harvested commercially from Fort Peck Reservoir include goldeye, carp, river carpsucker, smallmouth and bigmouth buffalo, and freshwater drum. All of the fish taken from the reservoir are used for human consumption. Commercial harvest data for Fort Peck Reservoir are presented in Appendix E; commercial fishing regulations are presented in Appendix F; and the Montana Administrative Rule on commercial fishing permits, in Appendix G.

Goldeye

The goldeye is an abundant species in Fort Peck Reservoir and the Missouri River on the Refuge. Termed locally as "skipjack" or "shiner" the goldeye is considered a nuisance fish by sport fishermen. It takes almost all baits and lures readily and puts up a good fight when caught.

The flesh of the goldeye is soft and bony and not very desirable when freshly prepared. Properly smoked, however, the flesh has an excellent flavor and consistency.

Commercial fishing for the species is regulated by the Montana Department of Fish, Wildlife, and Parks. Investigations by fisheries personnel of the Department were responsible for the development of gill netting methods which enabled the commercial fishermen to take primarily all goldeye in their nets and relatively few game species. Studies showed the goldeye to be diurnal in its vertical movement and concentrated in the upper 6 to 8 feet of water. Floating gill nets proved to be a very effective means of harvest.

Almost all of the commercial catch of goldeye is shipped to the Canadian market where the processed fish - dyed and lightly smoked - is considered a delicacy and commands a high price. The desirability of the fish in Canada would indicate a future potential market in the United States.

Little detailed information is available on the spawning activities of the goldeye though it is known that they spawn in the spring, evidently in schools. The semi-buoyant eggs are deposited at random by the female.

Commercial fishing for goldeye started in 1967 and through 1978, a total of 1,313,059 pounds were taken. The largest catch, 199,279 pounds was in 1969, the smallest 53,318 pounds in 1968. The average annual catch is 109,421 pounds.

In Canada a number of goldeye lakes have been overfished and they are slow to recover. In Fort Peck Reservoir the catch is being monitored and fishing areas are regulated so that a healthy population of this native species will be assured.

Carp

Since 1886, the earliest record of carp in Montana, the species has become abundant in most drainages east of the divide. In many parts of Europe and Asia and in some areas of the United States, the carp is esteemed as a food fish; in Montana, however, it rates poorly.

Carp are abundant in Fort Peck Reservoir but the commercial demand, as well as the price, is low. The slim body condition of the Fort Peck carp makes them less desirable in the market than larger, fatter carp from other areas. To some extent, the commercial fishermen use the carp from Fort Peck Reservoir as a backup operation. When demands are high, and the larger fish are not available to meet those demands, the carp from Fort Peck Reservoir are used.

The carp spawn from May to July as waters warm in shallow, weedy bays. Large numbers of eggs are deposited randomly over the vegetation, often with considerable splashing and wallowing.

The carp feeds largely on vegetation and detritus but will also take aquatic organisms when they are available. Their feeding habits make them particularly undesirable, as they feed on, and uproot vegetation which is already scarce in the reservoir. They also create turbidity as they feed, making waters less habitable for more desirable fish.

Bow and arrow fishing for carp provides some sport but few people pursue this activity.

As the world population increases, and with it the demand for more protein, the productive carp may meet with more favor.

River Carpsucker

The river carpsucker is abundant in Fort Peck Reservoir and is of some value as a commercial species. It is usually termed "white carp" by the commercial fishermen and, in some cases, has been listed with the carp on catch reports.

This fish spawns in the spring over vegetation in quiet waters along the shoreline. Depending on water temperatures, the eggs hatch in from 10 to 15 days. The river carpsucker feeds on small diatoms and algae with some aquatic invertebrate larvae. It can grow to quite good size, the larger specimens weighing from 10 to 11 pounds. Fisheries personnel of the Montana Department of Fish, Wildlife, and Parks have tagged a number of river carpsucker in their studies of fish numbers and movement, but tag returns have been low.

Commercial fishermen generally use trammel nets to harvest river carpsucker. Annual catches of the species have ranged

from around 1,000 pounds to nearly 65,000 pounds; the average around 17,000 pounds. These figures do not include catch records in which carp and river carpsucker were combined (Appendix E).

Buffalo

There are two species of buffalo in Fort Peck Reservoir, the smallmouth and the bigmouth. They are very similar in appearance and have similar life patterns. The main distinguishing character is in the position of the mouth - that of the smallmouth is ventral and horizontal while that of the bigmouth is terminal and oblique. Buffalo spawn randomly over vegetation in the spring, usually in June in Fort Peck Reservoir when water temperatures are around 70 degrees F. Smallmouth buffalo may reach 10 to 11 pounds in weight while the bigmouth has been reported up to 39 pounds. As an example of buffalo size, trapping by Liebelt in August of 1974 in the Big Dry Arm of the reservoir showed the following results: 94 smallmouth buffalo males averaging 21.4 inches in length and 4.98 pounds in weight; 65 females were 22.8 inches and 6.20 pounds. Ten largemouth buffalo males averaged 26.3 inches and 9.60 pounds - 16 females 30.0 inches and 15.13 pounds. The two species hybridize to some extent. Buffalo look much like carp and are commonly mistaken for them by the casual observer.

Buffalo feed largely on aquatic insects, small crustaceans, molluscs and some plant material. Since they rarely bite a baited hook, they are seldom taken by sport fishermen. The flesh of the buffalo is excellent and it is a desirable food fish. Liebelt observed in a Memphis fish market, buffalo fish steaks (strips) retailing for $1.98 per pound in March, 1979.

From 1968 through 1975, Montana Department of Fish, Wildlife, and Parks fisheries personnel tagged nearly 7,000 buffalo. Returns from the tagging operations, overall 14 percent, indicate an abundant buffalo population that is not being excessively harvested.

The buffalo are the most important commercial species in the reservoir. They are taken largely with trammel nets. In the period 1957-78 nearly six million pounds of buffalo have been commercially caught. Catches range from around 15,000 pounds to 546,000 pounds annually. The average annual catch over the 22 year period is 269,225 pounds.

Freshwater Drum

The freshwater drum, sometimes called the "sheepshead," is native to the lower Missouri River drainage in Montana. It is relatively abundant in Fort Peck Reservoir and in the river on the refuge area.

The drum spawns in May and June after surface water temperatures reach 65 to 70 degrees F. Reportedly they spawn in schools some distance from shore. The eggs released are small and buoyant and are readily distributed by wind action and water currents. The species feeds at night on bottom organisms in shallow waters. While it feeds on a large variety of aquatic invertebrates, it prefers small snails and clams which it crushes with its large pharyngeal teeth. Commercial fishermen have reported drum weighing approximately 20 pounds from Fort Peck Reservoir; however, records from elsewhere in the United States show drum reaching weights of 50 pounds and more.

The drum is not sought after by sport fishermen and when it is taken on hook and line, it is usually incidental to fishing for other species. In the 22 years of record for commercial catches from Fort Peck Reservoir drum were accounted for in 14 of those years. Catches of drum ranged from a low of around 100 pounds to over 19,000 pounds in a single year. The average annual catch for the 14 years was just over 5,200 pounds.

Other Species of Fish

The "other species" of fish found in Fort Peck Reservoir and refuge waters fall roughly into three categories - the forage species, miscellaneous species that are present in fair numbers but are of little importance to the commercial or sport fishery, and the rare species.

Forage Species

The forage fish are an important segment of the total reservoir fishery. To a large extent they are the food of the sport fishery. They may be defined as any fish used as a source of food by other fish. While the young of almost all species may at times be taken as food, fish classified as forage species seldom exceed 6 inches in length as adults and they remain a food source for other fish throughout their lives. For the most part, forage fish feed on minute organisms: plankton in mid-water, diatoms and algae in the bottom ooze. Some of the larger forage species also utilize larvae of aquatic invertebrates.

Forage species include:

Lake chub -- This species is relatively common in the reservoir - adults are 4 to 6 inches in length.

Flathead chub -- Flathead chub are taken only occasionally in the reservoir but are quite abundant in the tributaries and in the Missouri River above the reservoir - adults may measure up to 7 inches in length.

Emerald shiner -- This is the most abundant and important minnow species in the reservoir - a large adult might reach 4 inches in length but it would be exceptional. Longevity of the species is 2 to 3 years.

Silvery minnow -- This minnow is fairly common in the reservoir - adults are usually 3 to 4 inches long and 2 to 3 years old.

Fathead minnow -- This species occupies a broad natural range and is fairly common in Fort Peck Reservoir - adults are 2 to 3 inches long and breeding males are quite obvious at spawning time with their blackish heads and tubercles on the snout.

Longnose dace -- The longnose dace has a wide natural distribution. It is found only occasionally in Fort Peck Reservoir but quite commonly in the tributaries and in the Missouri River above the reservoir. Its usual habitat is riffle areas among stones and boulders. Adults may reach 4.5 inches in length.

Sand shiner -- This shiner has a wide distribution in the reservoir, but is generally found in small numbers.

Miscellaneous Species

Miscellaneous species that contribute little to the commercial or sport fishery on the refuge area include:

Blue sucker -- The blue sucker reaches quite good size in the reservoir with specimens up to 15 pounds reported by commercial fishermen. Some were taken commercially from the general area between UL Bend and Beauchamp Creek but few have been seen in that area since around 1960. They were taken off the commercial species list in 1978. Fair numbers are presently showing up in samples taken in the Missouri River above the reservoir.

The flesh of the blue sucker is of excellent quality and in areas where it is more abundant, it is highly prized as a food fish.

White sucker -- The white sucker occupies a wide variety of habitats and is abundant throughout the reservoir and the Missouri River. While the flesh is of good quality, it is extremely bony. The commercial demand for white sucker is low as is the price commercial fishermen receive for them. Young white suckers provide considerable forage for game species and are sometimes used as bait fish by anglers. Most adults observed are in the 1- to 2-pound class but record specimens up to 7 pounds have been reported.

Longnose sucker -- The longnose occurs only occasionally in Fort Peck Reservoir. It is somewhat more restricted than the white sucker in its spawning requirements, preferring clear, cold streams. It is easily distinguished from the white sucker by its much finer scale pattern. The longnose and white sucker are of similar size. The small numbers of the longnose sucker provide little forage for game species.

Shorthead redhorse -- The shorthead redhorse is found fairly commonly in Fort Peck Reservoir and the Missouri River. It has fairly large silvery scales and in adults, reddish fins. It has no particular importance in the reservoir other than that young of the species provide forage.

Black bullhead -- The black bullhead has been introduced into Fort Peck Reservoir but its numbers are few. The only significant population has been observed in the Big Dry Arm of the reservoir and all indications are that it is decreasing. Reasons for the decline are not known. Black bullheads are incidental in the sport fish catch and are not sought after as they are of small size.

Black Bullhead Stocking in Fort Peck Reservoir

1946	fingerling	49,700
1947	fingerling	3,700

Stonecat -- This small catfish is found only occasionally in Fort Peck Reservoir and then in the upper area - UL Bend and above. Usually adult stonecat are less than 7 inches long. Because it is small and few in number, it has little value as a sport or food fish.

Black crappie and white crappie -- Crappie are found generally throughout Fort Peck Reservoir. Sampling has shown some concentrations of white crappie in the turbid waters in the upper portion of the reservoir. Black crappie are more common in the lower reservoir. Seine sampling in recent years has shown a decline in the numbers of Age 0 crappies in the lower areas of the reservoir and in the Big Dry Arm. Since they build nests in littoral vegetation for spawning, loss or decline of their preferred habitat may be a factor.

Black Crappie Stocking in Fort Peck Reservoir

1940	3-4"	3,000
1941	fingerling	4,320
1946	fingerling	144,700
1947	fingerling	13,100

Yellow perch -- The yellow perch is abundant in Fort Peck Reservoir and is an occasional inhabitant of the river. They are generally of small size, most taken are in the 7- to 9-inch size range. The yellow perch matures in its

second year and spawns in the spring, usually April and May. Eggs are deposited in ribbon-like masses, generally over aquatic vegetation but they have been known to utilize silt-free sand and gravel bars also. Sampling nets set during the yellow perch spawning season are commonly well covered with the egg masses.

The yellow perch move about in schools made up of fish of approximately the same size. They bite readily on a variety of baits such as worms, maggots, minnows or strips of flesh from almost any fish. They are not classified as a game fish so there is no limit to the number anglers can take. Yellow perch are not difficult to fillet and the excellent flavor of the flesh more than makes up for the small size of the fish.

While not classified as a forage species, the yellow perch provides more forage than any other species. They are a very important source of food for walleye, sauger, burbot, and northern pike.

Yellow Perch Stocking in Fort Peck Reservoir

1938	Numbers not specified
1940	Numbers not specified

Utah chub -- The Utah chub is included, not because it is present in the refuge waters but because, in all probability, it eventually will be. First recorded from Hebgen Lake, where they were introduced by fishermen using them as bait, the Utah chub has filtered downstream as far as Hauser Reservoir where they were taken in 1970. In a 1978 study of Utah chub distribution, T. Mark Leik found that downstream dispersal rates (based on the distance from Hebgen Lake to Hauser Dam) were 4.5 miles per year. This species inhabits both streams and lakes and is definitely a nuisance fish. Its flesh is oily and bony and its contribution as forage is far overshadowed by its competition for food and space with more desirable species. The Utah chub spawns randomly over many kinds of substrate in waters less than two feet deep. Specimens eight years old and 13.5 inches in length have been taken in Montana waters. At present there is no practical method of controlling the species.

Members of sunfish family -- Mention should also be made that largemouth bass and bluegill were introduced into Fort Peck Reservoir during its early years. They did not become established and none have been reported or observed.

Largemouth Bass Stocking in Fort Peck Reservoir

1941	fingerling	4,000
1943	fingerling	19,000
1945	fingerling	25,000

Bluegill Stocking in Fort Peck Reservoir

1945	yearling	1,500
1947	fingerling	52,900

Rare Species

Rare species of fish are those known to be present from their appearance in a few isolated collections. Some are utilized by predatory fish as food but their small numbers make them of negligible importance.

Rare species include:

Northern redbelly dace -- This species reaches about 2 inches when mature.

Brassy minnow -- Adults of this species are 3 to 4 inches in length.

Brook stickleback -- Brook stickleback seldom exceeds 2 inches in length. They prefer small, clean, cold streams and springs.

Iowa darter -- Adults of this species may reach 2 inches.

Sicklefin chub -- This chub has been found in the Missouri River above Fort Peck Reservoir but has not been collected from the reservoir.

Plains killifish -- This fish is 2 to 3 inches long in 2 years.

Mountain whitefish -- Some whitefish have been taken above the reservoir; one in Big Dry Arm of the reservoir.

Shortnose gar -- Gar have been taken from below Fort Peck Dam but have not been observed in the reservoir.

FISHERIES MANAGEMENT PROBLEMS AND LIMITATIONS ON THE REFUGE AREA

The large sizes of Fort Peck Reservoir and the Missouri River limit the fisheries management tools that will be effective. Personnel of the Montana Department of Fish, Wildlife, and Parks, U. S. Fish and Wildlife Service and other agencies have conducted numerous studies on the fish population and other attributes of these waters. As a result much is known about the reservoir and river above. However, little can be done to change the basic conditions. The fishery must be managed to fit the existing situation.

Water Levels

The fluctuating shoreline of Fort Peck Reservoir precludes establishment of the extensive littoral zone vegetation so necessary for most fish life. Years of abundant or of scant recruitment to the reservoir fish populations can be predicted by the amount of vegetation present and spring water levels.

Some of the forage species are associated with vegetation throughout their lives. Many others utilize vegetation at spawning time and, for almost all, it provides shelter at some life stage. Many of the organisms upon which they feed are also dependent upon vegetation in their life cycles.

Several important game species (for example, northern pike) also require inundated shoreline vegetation for spawning and nursery areas; however, these conditions do not occur most years due to reservoir fluctuations. The primary needs of reservoir storage, power, flood control, and navigation are of higher priority than successful fish spawning.

There is an ad hoc committee of the Upper Missouri River Chapter of the American Fisheries Society which meets annually with the Army Corps of Engineers in Omaha, usually in March, to discuss and review water level problems. Members of the committee are from states on the mainstem of the Missouri River - Montana, North Dakota, and South Dakota particularly. The thrust of the meetings is that the Corps will try to help, as far as possible, the reservoir or reservoirs having the most favorable conditions for spawning that spring. That is, an effort would be made to try to bring reservoir levels up to cover the vegetation. Because Fort Peck Reservoir is the first large reservoir at the head of the system and is more subject to direct influence of high or low runoff years, it is in a poor position for special water level manipulation consideration.

Information on flows in Big Dry Creek and yearly maximum and minimum elevations of Fort Peck Reservoir are included in Appendices H and I.

Siltation

Siltation can be very detrimental to reservoir fish populations. Not only does it smother eggs and prevent hatching, it also covers bottom food organisms. In addition, light penetration in waters rendered turbid by siltation is reduced and plant growth suffers. The Missouri River is normally turbid to varying degrees due to the silt it carries. As the river enters the reservoir and the current is slowed, silt is deposited. Some miles of the upper reservoir have been affected by siltation. The lower Missouri River drainage in Montana has relatively sparse cover and erodible soils. Every runoff carries additional silt loads to the reservoir

through the river and the many small tributaries. Wind action also causes siltation and turbidity when waves wash the reservoir shoreline. In some areas the clayey type soil remains suspended in the water for a considerable time. The siltation definitely limits spawning and productivity. A graph of estimated delta growth is presented in Appendix J.

Problems Associated with Fish Stocking

There are a number of problems associated with fish stocking in Fort Peck Reservoir. The first relates to the size of the water. The numbers of fish needed to stock and successfully maintain a population of desirable fish in Fort Peck Reservoir would be enormous. Obtaining the numbers of fish required for effective stocking would be difficult and costly. The planted fish tend to disperse in the reservoir and, since only a small portion of the reservoir is fished by anglers, much of the fishery created by stocking would be wasted effort. By law, all fish eggs shipped into Montana fish hatcheries must be certified disease-free. In the case of coho salmon it is virtually impossible to obtain such eggs.

Access

At least two philosophies exist relative to access. There are some who feel present fishing access is sufficient but existing roads and sites should be improved. Most access roads are for fair weather travel only. There are others who would like to see new areas opened and more access made available. It would be difficult to defend extensive development since many available areas receive only light fishing pressure. Nevertheless, suitable access roads would greatly increase use in some areas where fish populations could sustain greater harvest.

Winter access is a problem in that some of the popular ice fishing sites can't be reached when the snow cover is heavy. No program exists to provide access to these areas.

Enforcement of Regulations

Sport fishing and commercial fishing are subject to state regulations. Again, size of the area makes enforcement of the regulations a problem.

FISHERIES OBJECTIVES AND MANAGEMENT RECOMMENDATIONS

Attainment of Favorable Water Levels

Possibly in the future, fisheries and recreational use of water will receive higher priority. Water levels have the greatest impact on spawning and survival of most reservoir species. Efforts to evaluate the impact of various water levels must continue in order to gain a basis for reservoir operation recommendations.

Water levels more favorable for fish production may be made possible through development of alternate power sources. Conceivably these could allow Fort Peck Reservoir to be operated in a manner more compatible with its fishery. Little can be done relative to flood waters as they pertain to reservoir levels; however, through cooperation of all the reservoirs on the river system, even flooding fluctuations may be made less drastic.

Maintenance of a Forage Base

Since the important sport fish depend on a suitable forage base, efforts to monitor forage abundance must continue. The forage base depends on aquatic vegetation associated with suitable water levels, particularly in the spring of the year. Should depletion of forage fish occur, as has been reported in some downstream mainstem reservoirs, introduction of exotics may be feasible, or management with less predatory species may be required.

Fish Stocking

The objectives of fish stocking are to provide a desirable sport fishery and, whenever possible, to supplement the forage base. Over the years various species of fish have been introduced into Fort Peck Reservoir. While most of the fish could survive, few were able to reproduce due to the lack of suitable spawning habitat. Some of the early plants were made simply because the fish were available. More recent introductions have been made to supplement natural reproductions. The walleye, northern pike, and lake trout are examples.

Investigations may lead to a forage species that will thrive in Fort Peck Reservoir. As in all introductions, extreme care must be taken not to stock a species that could become a nuisance through being too numerous.

Because stocked fish disperse, maintenance plants of any game species would have to be immense to greatly improve fishing. A fish hatchery could provide such numbers of fish for Fort Peck, but its cost would be difficult to justify, because there is little fishing pressure in remote areas.

Rearing ponds could also be constructed adjacent to the reservoir. Rearing ponds have been successful with northern pike and might be utilized for other species as well.

Spawning Habitat Development

As has been pointed out, the lack of spawning habitat is one of the limiting factors in the development of desirable fish populations. Theoretically, some of the lack might be overcome through artificial means; however, few practical applications are apparent.

Some species of fish would benefit through installation of anchored brush shelters in strategic areas around the reservoir. Some of the forage species and yellow perch particularly would utilize the brush shelters for spawning. Sport fishing in brush shelter areas could be quite productive.

Many species of fish spawn in cool streams with a gravel bottom, the trout and salmon particularly. Artificial spawning channels could be developed to simulate the natural streams and provide a spawning area. At suitable sites, concrete canals could be built, the bottom covered with clean gravel, and a flow of water provided by large pumps. These would operate only during the spawning period. However, the feasibility of this approach is extremely limited.

Some areas of shoreline, such as long, shallow bays, could have dikes and gates constructed at their mouths. In this way water could be held for a time at the proper level for vegetation to establish and for utilization by vegetation spawners.

Maintenance of the Commercial Fishery

Commercial fishing is a very important part of the total reservoir fishery and will continue to be in the foreseeable future. The commercial operations utilize species not sought after by sport fishermen and in so doing make a contribution to the economy of the state. Without commercial fishing operations the species being taken would simply go to waste.

For some years now, studies have been made of the commercial species of fish in Fort Peck Reservoir. These studies have been headed by a project leader, presently Dr. James E. Liebelt, whose investigation program is supported in part by the U.S. National Marine Fisheries Service (NMFS). Findings in the Fort Peck Reservoir investigations have application nationwide in other reservoirs and NMFS attempts to coordinate the information.

Much of the work done on Fort Peck Reservoir in pursuit of information on commercial species of fish also benefits the sport fishery. The larval sampling being carried out on the reservoir not only indicates numbers, locations, and abundance of commercial fishes such as the buffalo and goldeye; it also provides the same information on sport fish. The same is true for seining activities to locate and determine the numbers of Age 0 fish - the recruitment to the fishery. The trap net sampling, where adult fish are tagged and released, also provides information on both the commercial and the sport fishes. Movements and relative numbers of the various species tagged are determined by the numbers and locations of tag returns.

As means are developed to increase the numbers of sport fish in the reservoir, there will be less competition for food and space through the removal of the commercial fish species.

The commercial fishery is well regulated. Catches are monitored and population trends of commercial species of fish are checked regularly. Commercial operators can be moved, limited or stopped, as conditions may indicate. At times there has been some conflict between sport and commercial fishermen but the differences have not been great and the commercial fishermen have been given areas to fish where the sport fishermen normally do not fish. A copy of current commercial fishing regulations is in the Appendix.

At one time commercial operators were granted a contract by the Commission of the Montana Department of Fish, Wildlife and Parks and they paid the Department a fee on the pounds of fish taken. Presently they purchase a license to fish; the cost of the license returns to the State about the same amount as the fee system. A copy of the Montana Administrative Rule on commercial fishing permits is also in the Appendix.

Access

It is recommended that present access roads be improved whenever possible. Construction of additional fishing access roads should be evaluated on an individual basis to ensure compatability with other objectives of the wildlife refuge. **Opening roads in winter to popular fishing sites is also recommended.**

ADDITIONAL STUDIES NEEDED

As has been stated, much is already known about the fisheries of the Fort Peck Reservoir and to some extent the Missouri River above the reservoir. More information is needed, however, about the distribution and abundance of some species, particularly in the upper reservoir area. Additional limnological studies could also be used as time, personnel, and equipment permit. These would include more detailed profiles of reservoir temperatures and studies on the effects of temperature. Studies on plankton, algae and other bottom fauna; and studies on effects of siltation might be included.

More information is needed on the reservoir's tributaries and the part they play in spawning, migration, food production, and water temperature. Included in the studies would be the Musselshell River, the Big Dry Creek, and the Missouri River above the reservoir.

There are exotic species of fish that may have potential in Fort Peck Reservoir - white bass, Ohrid (Yugoslavian brown) trout and rainbow smelt, to name a few. Studies need to be made to determine just how some of these species would react to the reservoir habitat - whether they would be beneficial or would become problems.

And surely, effects of industrial development on the reservoir will need to be known before recommendations can be made to keep habitat loss to a minimum. Future needs for energy will dictate utilization of the coal deposits in the area and development will occur where water is available. Fort Peck Reservoir is a natural source of water for coal developments being proposed--for example, fuel and fertilizer plants. Irrigation needs are also expected to increase in the future. All of these operations will have an effect on the reservoir and it is important to know in advance what the effect will be.

SUMMARY

1. On the C.M. Russell National Wildlife Refuge the 247,000-acre Fort Peck Reservoir contributes the primary fishing water.

2. Fishes of the reservoir are classified as sport fish, commercial fish and other species.

3. Sport fish discussed are the pallid and shovelnose sturgeon, paddlefish, coho salmon, kokanee, rainbow trout, brown trout, lake trout, northern pike, channel catfish, burbot, sauger, and walleye.

4. Commercial species of fish taken from the reservoir are the goldeye, carp, river carpsucker, buffalo, and freshwater drum.

5. Other species of fish are further categorized as forage species, miscellaneous species present but of little value to the sport or commercial fishery and rare species.

6. Forage fish are defined as fish that seldom exceed 6 inches in length and remain a source of food for other fish throughout their lives. This category would include all of the minnows, the most abundant minnow being the emerald shiner.

7. Fish that are present but contribute little to sport or commercial fishing are the blue sucker, white sucker, longnose sucker, shorthead redhorse, black bullhead, stonecat, crappie, yellow perch.

8. Rare species of fish appear only in isolated collections. They are the northern redbelly dace, brassy minnow, brook-stickleback, Iowa darter, sicklefin chub, plains killifish, and mountain whitefish.

9. Largemouth bass and bluegill have been stocked in the reservoir but have not been observed.

10. The Utah chub is not present in the reservoir but likely will be in the future. It has been found in Hauser Reservoir on the Missouri River above Fort Peck Reservoir.

11. Fisheries management problems and limitations are those imposed by the large size of the waters, the fluctuating water levels, siltation, the large numbers and limited availability of fish needed for stocking and the enforcement of commercial and sport fishery regulations.

12. Objectives and management recommendations include continued efforts to obtain reservoir levels suitable for spring spawning. This would assure maintenance of a good forage base and would benefit many sport and commercial fish species.

13. Stocking of desirable species of fish in the reservoir will be continued and could be enhanced in the future through rearing ponds. A fish hatchery is not considered feasible due to excessive costs.

14. Habitat improvement recommendations include the installation of brush shelters in strategic areas, artificial spawning channels to benefit trout and salmon populations, diking at the mouths of suitable bays to provide stable water levels for the establishment of aquatic vegetation.

15. Commercial fisheries studies have been very valuable in obtaining information on the reservoir water and its fish populations. The studies have been of considerable benefit to the sport fishery.

16. The improvement of existing access is recommended before new access is opened.

17. Consideration should be given to keeping access roads to popular fishing sites open in the winter.

18. Areas in which further investigations are needed include limnology of the reservoir; the distribution and abundance of some fish species, particularly in the upper reservoir; the effects of tributaries such as the Musselshell River and Big Dry Creek; the desirability of new or exotic species of fish in the reservoir, and the effects of proposed industrial developments associated with coal deposits--for example, fuel and fertilizer plants.

SOURCES OF INFORMATION

Robert G. Needham - Regional Fisheries Manager, Region 6 - Montana Department of Fish, Wildlife, and Parks Completion reports - discussion.

Dr. James E. Liebelt - Project Leader - Commercial Fisheries Investigations - Montana Department of Fish, Wildlife, and Parks - Reports - discussion.

Montana Department of Fish, Wildlife, and Parks reports.

U. S. Fish and Wildlife Service - Reports - observations by personnel.

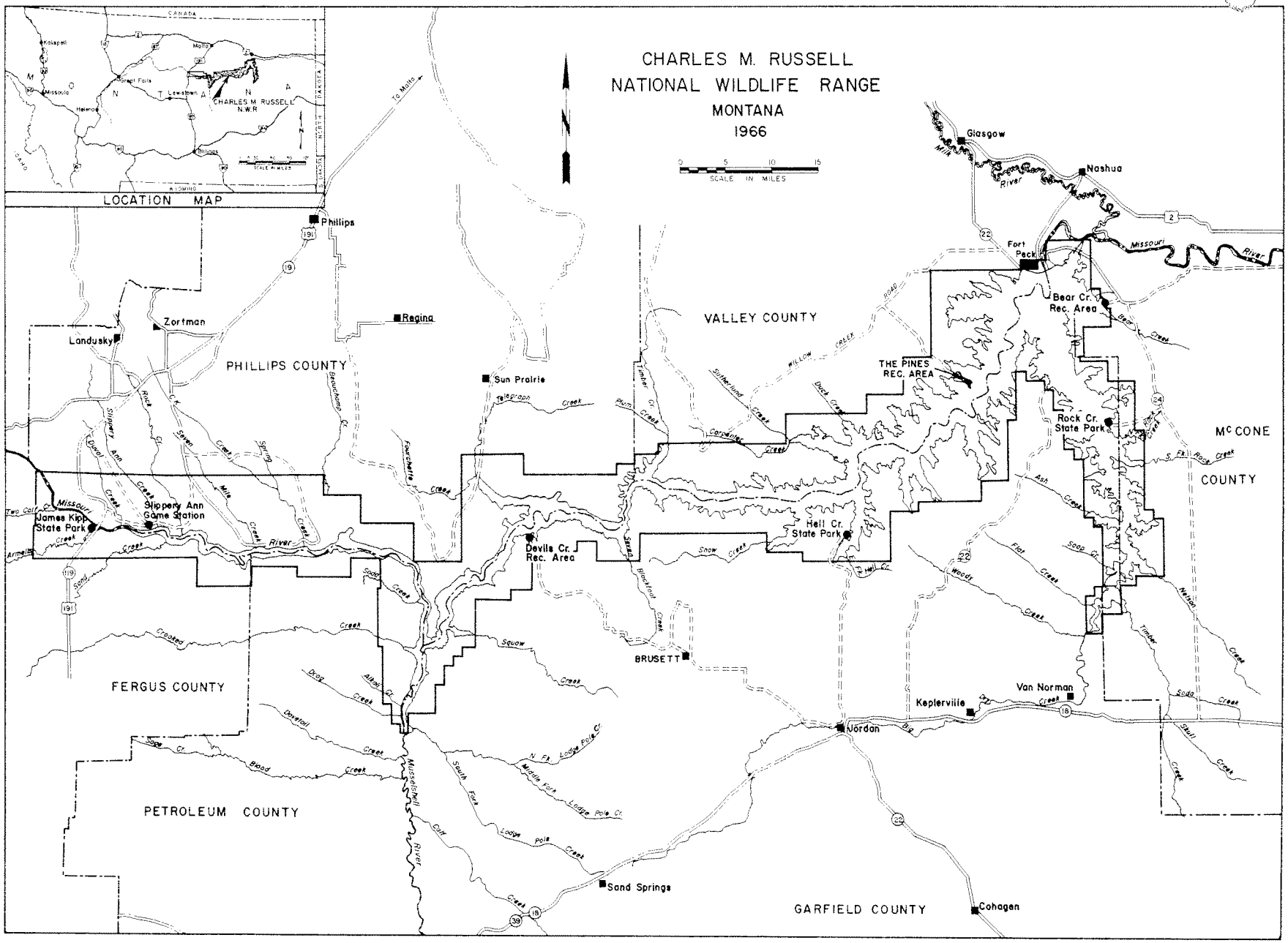
U. S. Environmental Protection Agency - reports.

U. S. Bureau of Land Management - reports.

Dr. C. J. D. Brown - Fishes of Montana.

Author's personal experience in the area.

APPENDICES



Appendix A: Map of Charles M. Russell National Wildlife Refuge.

APPENDIX B: Fish Species - Fort Peck Reservoir

Sturgeon family - Acipenseridae			
Pallid sturgeon	*Scaphirhynchus albus*	N	R
Shovelnose sturgeon	*Scaphirhynchus platorhynchus*	N	C
Paddlefish family - Polyodontidae			
Paddlefish	*Polyodon spathula*	N	A
Mooneye family - Hiodontidae			
Goldeye	*Hiodon alosoides*	N	A
Trout family - Salmonidae			
Mountain whitefish	*Prosopium williamsoni*	N	R
Coho salmon	*Oncorhynchus kisutch*	I	O
Kokanee	*Oncorhynchus nerka*	I	R
Rainbow trout	*Salmo gairdneri*	I	O
Brown trout	*Salmo trutta*	I	R
Lake trout	*Salvelinus namaycush*	N	C
Pike family - Esocidae			
Northern pike	*Esox lucius*	N	C
Minnow family - Cyprinidae			
Carp	*Cyprinus carpio*	I	A
Northern redbelly dace	*Phoxinus eos*	N	R
Flathead chub	*Hybopsis gracilis*	N	O
Lake chub	*Couesius plumbeus*	N	C
Sicklefin chub	*Hybopsis meeki*	N	R
Emerald shiner	*Notropis atherinoides*	N	A
Sand shiner	*Notropis stramineus*	N	R
Brassy minnow	*Hybognathus hankinsoni*	N	R
Silvery minnow	*Hybognathus nuchalis*	N	C
Fathead minnow	*Pimephales promelas*	N	C
Longnose dace	*Rhinichthys cataractae*	N	O
Sucker family - Catostomidae			
River carpsucker	*Carpiodes carpio*	N	A
Blue sucker	*Cycleptus elongatus*	N	O
Smallmouth buffalo	*Ictiobus bubalus*	N	A
Bigmouth buffalo	*Ictiobus cyprinellus*	N	A
Shorthead redhorse	*Moxostoma macrolepidotum*	N	C
Longnose sucker	*Catostomus catostomus*	N	O
White sucker	*Catostomus commersoni*	N	A
Catfish family - Ictaluridae			
Black bullhead	*Ictalurus melas*	I	O
Channel catfish	*Ictalurus punctatus*	N	C
Stonecat	*Noturus flavus*	N	O
Codfish family - Gadidae			
Burbot	*Lota lota*	N	A

Continued next page

APPENDIX B (concluded)

Killifish family - Cyprinodontidae			
Plains killifish	Fundulus kansae	N	R
Stickleback family - Gasterosteidae			
Brook stickleback	Culaea inconstans	N	R
Sunfish family - Centrarchidae			
White crappie	Pomoxis annularis	I	O
Black crappie	Pomoxis nigromaculatus	I	O
Perch family - Percidae			
Yellow perch	Perca flavescens	I	A
Sauger	Stizostedion canadense	N	A
Walleye	Stizostedion vitreum	I	C
Iowa darter	Etheostoma exile	N	R
Drum family - Sciaenidae			
Freshwater drum	Aplodinotus grunniens	N	A
Gar family - Lepisosteidae			
Shortnose gar	Lepisosteus platostomus	N	*
Minnow family - Cyprinidae			
Utah chub	Gila atraria	I	**

* Taken below Fort Peck Dam - possibly present in reservoir.
** Taken in Hauser Dam - will probably move down to reservoir

NATIVE - N, INTRODUCED - I
Abundant - A, Common - C, Occasional - O, Rare - R

APPENDIX C: Results of Creel Census Conducted at Nelson Creek-Big Dry Arm-Fort Peck Reservoir (Liebelt)

(Information provided by Dr. James E. Liebelt, Montana Dept. of Fish, Wildlife and Parks.)

1978 Month	No. Days Fished	No. Fisher-men	No. Walleye Caught	Tagged Walleye Caught	Percent Tagged Fish	No. No.Pike Caught	Tagged No.Pike Caught	Percent Tagged Fish	Completed Trips	Incomplete Trips
April	15	261	277	44	15.9	11	1	9.0	81	15
May	20	1,049	970	146	15.1	79	11	13.9	229	71
Total	35	1,310	1,247	190	15.3	90	12	13.3	310	86

Fishermen Residence	No. April	No. May
Circle	70	208
Glasgow	65	114
Miles City	3	33
Sidney	17	18
Richey	43	52
Wolf Point	1	18
Plentywood	14	17
Jordan	5	20
Vida	4	22
Glendive	35	389
Hinsdale		24
Terry		3
Flowing Wells		3
Livingston		4
Opheim		3
Whitefish		10
Scobey		1
Brockway		7
Fairview		4
Culbertson		8
Cut Bank		4
Great Falls		18
Billings		20
Broadus		4
Lewistown		7
Nashua		2
Fort Peck		21
Non-Resident		15
Total Resident	257	1,034
Total Non-Resident	4	15
Total	261	1,049

APPENDIX D: Total Numbers of Walleye and Northern Pike Tagged in the Big Dry Arm of Fort Peck Reservoir 1974-78. Fishermen Tag Returns & Cumulative Returns. Percent Returns in Parentheses. (Liebelt)
(Information provided by Dr. James E. Liebelt, Mont. Dept. of Fish, Wildlife and Parks.)

Year	Species	No. Tagged	1974 Returns (Percent)	1975 Returns (Percent)	1976 Returns (Percent)	1977 Returns (Percent)	1978 Returns (Percent)	Cumulative Returns (Percent)
1974	Walleye	1,393	263 (18.9)	58 (5.2)	15 (1.4)	9 (0.9)	7 (0.7)	352 (25.3)
	No. Pike	169	35 (20.7)	10 (7.5)	7 (5.6)	2 (1.7)	0 -	54 (31.9)
1975	Walleye	1,030		129 (12.5)	19 (2.1)	2 (0.2)	3 (0.3)	153 (14.8)
	No. Pike	75		15 (20.0)	3 (5.0)	0 -	1 (1.7)	19 (25.3)
1976	Walleye	1,912			106 (5.5)	99 (5.5)	91 (5.3)	296 (15.5)
	No. Pike	79			8 (10.1)	12 (16.9)	0 -	20 (25.3)
1977	Walleye	1,270				101 (7.9)	121 (10.3)	222 (17.5)
	No. Pike	393				67 (17.0)	15 (4.6)	82 (20.9)
1978	Walleye	1,564					325 (20.8)	325 (20.8)
	No. Pike	356					60 (16.8)	60 (16.8)

APPENDIX E: Total Pounds of Commercial Species Harvested From Fort Peck Reservoir by Commercial Fisherman 1957-1978*

Year	Buffalo	River-Carpsucker	Carp	Carp and River Carpsucker	Channel Catfish	Goldeye	Fresh-Water Drum	Sucker	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	676		1,136	110,654	94		506,129
1975	274,091	6,537	14,276		1,056	127,848			423,808
1976	402,543	8,456				91,538			502,537
1977	343,930	8,500				121,868			474,298
1978	243,166	6,075				105,919			355,160
	5,922,305	275,318	78,114	185,321	135,404	1,313,167	73,013	3,499	7,986,141

*(From Montana Dept. of Fish, Wildlife and Parks records.)

APPENDIX F: 1979 Commercial Fishing Regulations - Fort Peck Reservoir

Commercial fishing will be allowed in Fort Peck Reservoir from January 1 through December 31, 1979 for all commercial species (goldeye, smallmouth buffalo, bigmouth buffalo, river carpsucker, freshwater drum, carp and suckers, excluding blue suckers) with the following restrictions:

1. Closed Areas (red on map): The areas listed below will be closed the entire year to all commercial fishing.

   a. Big Dry Arm
   b. Pines Area
   c. Hell Creek Bay
   d. Devils Creek Bay
   e. Fort Peck Cabins & Marina Area
   f. Waters upstream from Turkey Joe Boat Ramp

2. Restricted Gear Areas (green on map): Gilbert Creek, Timber Creek and Crooked-Cattle Creek Bays closed to all gear except: Gill and trammel nets with a minimum of 3½-inch square mesh and seines of all mesh sizes will be allowed.

3. Goldeye Seasons:

   a. Open January 1 - June 15 and September 10 - December 31, 1979 (yellow on map).

   b. Open Entire Year (blue on map).

4. Gear:

   a. Traps and Hoop Nets: No mesh size restrictions on trap bodies. Trap leads must be constructed with a minimum of 3½-inch square mesh webbing.

   b. Seines: No mesh size restrictions.

   c. Gill Nets and Trammel Nets:

      (1) Sinking (bottom sets) must be constructed with a minimum of 3-inch square mesh, except in Gilbert Creek, Timber Creek, and Crooked-Cattle Creek Bays where a minimum of 3½-inch square mesh is required. There is no placement restrictions in regard to depth or distance from shore.

      (2) Floating (surface sets) must be constructed with a minimum of 1 5/8-inch square mesh for the area in yellow on the map and 1½-inch square mesh for the area in blue on the map. Nets must be fished at least 100 yards off shore in areas where the water's depth is at least 30 feet.

   d. All gear must be visibly labeled at the water surface with the owner's name.

APPENDIX G: Montana Administrative Rule Governing Commercial Fishing Permits

CHAPTER 18

Fisheries Division

Sub-Chapter 1

Fisheries Services Bureau

Sub-Chapter 2

Management and Research Bureau

Sub-Chapter 6

Fish Planting Policy

Sub-Chapter 1

Fisheries Services Bureau

12-2.18(1)-S1800 RAISING FISH IN PUBLIC WATERS (1) It shall be unlawful to use any public water of this state for the purpose of rearing fish in live cages without obtaining prior approval of the State Fish and Game Director. This regulation shall not apply to minnow buckets, sacks, or nets used temporarily to contain bait fish or legally captured game or nongame fish where there is no periodic feeding involved. (History: Sec. 26-813, R.C.M. 1947; NEW, Order MAC No. 12-1; Adp. 12/18/72; Eff. 12/31/72.)

12-2.18(1)-S1805 COMMERCIAL FISHING PERMIT (1) Any person desiring to harvest nongame fish from any body of water in the state for sale or commercial distribution must make written application to the director for a commercial

fishing permit upon a form furnished by the department.

(2) The form must be signed by the applicant including mailing address and residence of applicant and stating specifically the waters and species of nongame fish desired for harvest and equipment owned or controlled by applicant.

(3) If an application is approved, applicant must then give a bond to the department in favor of the State of Montana in the sum of $1,000 with corporate surety, conditioned on the faithful carrying out of the provisions of the application and permit. The department will then issue a license describing approved waters, species, seasons, and fishing methods.

(4) Commercial fishing on any water of the state, except Fort Peck Reservoir, will be limited to one operator unless the department determines that additional harvest would be beneficial. Also special regulations regarding gear, limits, seasons, closures, etc., may be imposed on any water. Existing fishermen will receive first priority for retaining present permits. If additional waters are approved for commercial fishing or existing fishermen terminate their operation, the following criteria will be used to select permits for each water.

(a) Ability of applicant to provide desired level of harvest;

(b) Number of years of commercial fishing under Montana contract or permit;

(c) Adequacy of equipment and facilities and investment in land and facilities in Montana for commercial fishing;

(d) Previous fishing experience;

(e) State of residence.

(5) Permit fees for a commercial fishing permit and species that may be taken are as follows: Class A--$500 per year which authorizes the taking of smallmouth buffalo, bigmouth buffalo, goldeye, river carpsucker, freshwater drum, white sucker, shorthead redhorse sucker, longnose sucker, carp, and black bullhead for commercial purposes; Class B--$200 per year which authorizes the taking of goldeye, river carpsucker, freshwater drum, white sucker, shorthead redhorse sucker, longnose sucker, carp, and black bullhead for commercial purposes.

(6) The permittee shall keep written records of all his operations and transactions relating to the taking, sale of, or other disposal of fish. The permittee shall make reports on commercial fishing activities to the director on forms provided by the department. These reports shall be submitted within 30 days following the end of each month.

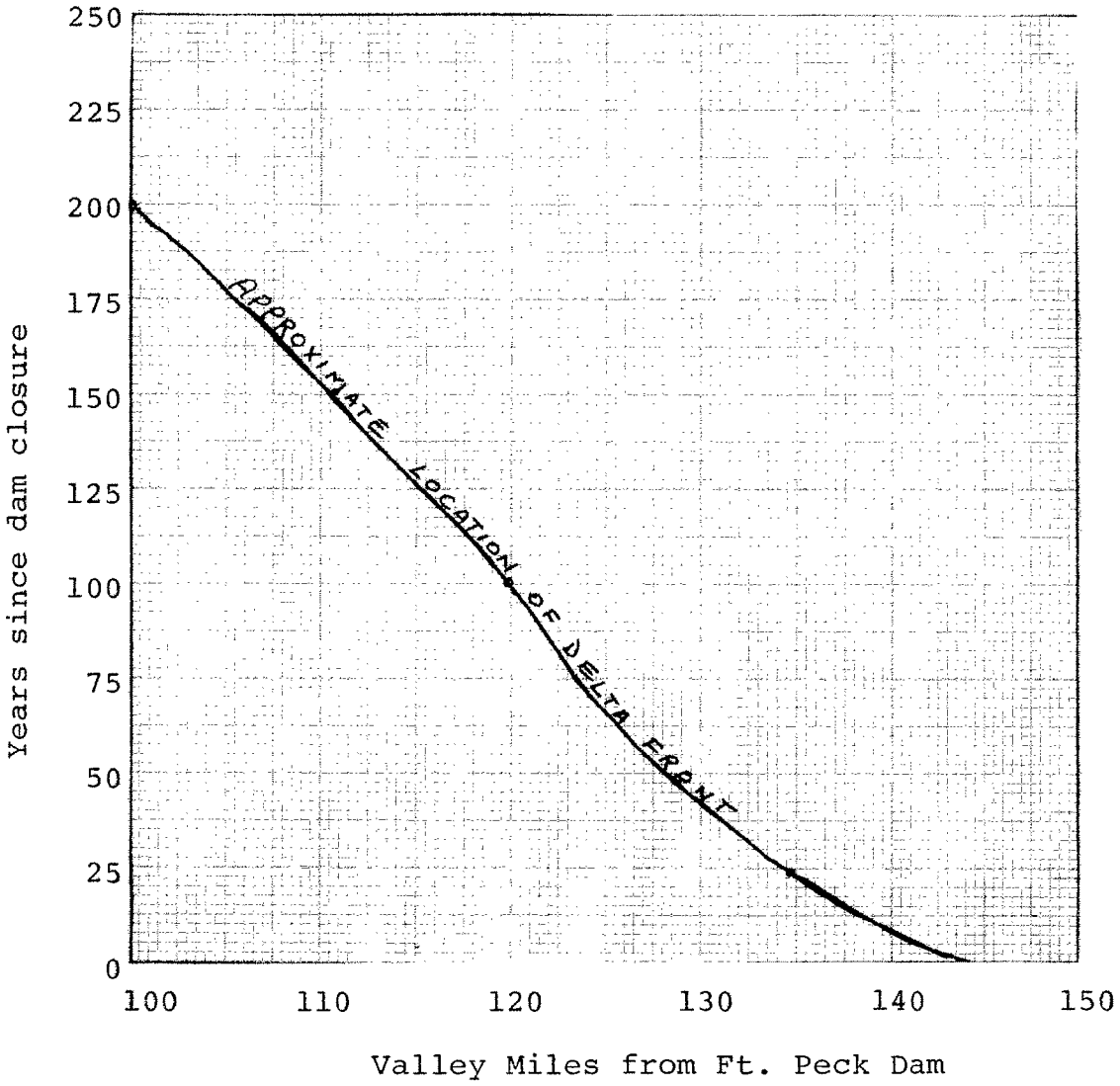
APPENDIX H: Flows in Big Dry Creek near Van Norman 1971-1977. U.S.G.S. Drainage area 2,554 sq. mi. (U.S.G.S. Records.)

		Month		
		March	April	May
1978	Total-cfs	52,884.16	6,966.0	7,751.0
	mean	1,706.0	232.0	250.0
	maximum	10,700.0	1,890.0	2,300.0
	minimum	0.0	24.0	19.0
1977	Total-cfs	170.1	82.3	115.76
	mean	5.49	2.74	3.73
	maximum	12.0	4.6	29.0
	minimum	2.5	1.2	0.20
1976	Total-cfs	1,194.0	283.2	244.9
	mean	38.5	9.44	7.90
	maximum	64.0	13.0	38.0
	minimum	12.0	6.80	3.50
1975	Total-cfs	158.2	1,711.5	9,289.0
	mean	5.1	57.0	300.0
	maximum	11.0	232.0	4,710.0
	minimum	1.0	1.6	14.0
1974	Total-cfs	307.0	108.5	274.2
	mean	9.9	3.62	8.85
	maximum	16.0	7.40	42.0
	minimum	6.2	1.3	1.30
1973	Total-cfs	311.3	931.0	248.8
	mean	10.0	31.0	8.03
	maximum	16.0	354.0	14.0
	minimum	5.8	2.6	2.20
1972	Total-cfs	28,425.0	754.0	1,134.2
	mean	917.0	25.1	36.6
	maximum	6,300.0	52.0	230.0
	minimum	0.0	12.0	8.1
1971	Total-cfs	21,726.0	1,984.0	389.9
	mean	701.0	66.1	12.6
	maximum	3,690.0	223.0	24.0
	minimum	160.0	25.0	7.4

APPENDIX I: Fort Peck Reservoir Elevations
Yearly Maximum and Minimum Stages
(Information provided by U.S. Corps of Engineers.)

Year	Maximum Elevation	Date	Minimum Elevation	Date
1937	2065.80	25 Dec.		
1938	2136.51	20 Jul.	2059.85	24 Mar.
1939	2099.98	27 Mar.	2069.10	29 Sep.
1940	2128.43	29 Jun.	2079.30	1 Jan.
1941	2131.21	31 Dec.	2109.02	1 Jan.
1942	2183.81	24 Jul.	2131.21	1 Jan.
1943	2222.73	8 Aug.	2173.52	1 Jan.
1944	2225.75	22 Jul.	2203.20	4 Feb.
1945	2226.38	31 Jul.	2209.30	27 Jan.
1946	2232.25	21 & 29 Jul.	2217.80	1 Jan.
1947	2242.58	13 Jul.	2223.92	28 Dec.
1948	2244.80	15 Jul.	2222.81	31 Dec.
1949	2231.79	30 Jun.	2214.21	31 Dec.
1950	2234.18	21 Jul.	2214.16	14 to 20 Jan.
1951	2237.53	26 Jul.	2217.17	31 Dec.
1952	2237.75	21 Jul.	2215.75	9 Feb.
1953	2239.99	12 Jul.	2218.90	29 Dec.
1954	2226.80	15 Jul.	2202.96	11 Nov.
1955	2206.00	21 Jun.	2167.60	31 Dec.
1956	2180.87	30 Jun.	2157.36	25-26 Jan.
1957	2186.62	30 Dec.	2173.86	7 to 9 Feb.
1958	2198.53	21-22 Jul.	2186.58	3 to 6 Jan.
1959	2210.01	20 Jul.	2195.59	26-28 Feb.
1960	2217.67	28 Jun.	2208.73	17 Mar.
1961	2212.20	1-3 Jan.	2195.40	31 Dec.
1962	2205.10	16-19 Nov.		
1963	2216.00	16-22 Nov.	2202.00	4 Feb.
1964	2235.90	23-28 Nov.	2212.20	1-2 Mar.
1965	2245.90	22-23 Jul.	2232.70	17-18 Feb.
1966	2242.20	2 Jan.	2235.60	30-31 Dec.
1967	2245.70	21 Jul.	2233.70	18-20 Mar.
1968	2244.70	16-20 Jul.	2236.20	21-25 Feb.
1969	2246.80	21 Jul.	2235.60	17 Mar.
1970	2247.3	9-14 Jul.	2236.5	8 Mar.
1971	2244.2	14-17 Jul.	2237.3	10-14 Feb.
1972	2244.0	9-14 Jul.	2237.3	4-8 Mar.
1973	2241.7	1 Jan.	2236.2	28 Sept. -11 Oct.
1974	2245.5	17 Jul.	2235.3	15 Jan.
1975	2251.6	16 Jul.	2236.1	15 Mar.
1976	2249.0	12 Jul.	2240.5	31 Dec. 1976
1977	2237.5	25 May	2231.0	30 Dec. 1977
1978	2249.6	21 Jul.	2227.7	12 Mar. 1978
1979	2247.3	5 Jun.		

APPENDIX J. Estimate of Delta Growth in Fort Peck Reservoir.



Note: Graph assumes delta growth occurring in form of a wedge, beginning at upstream end of reservoir near Rock Creek or about 10 miles downstream of Highway 191.

Source: U. S. Army Corps of Engineers
Omaha District
May 1979

APPENDIX K: Wild and Scenic River Classification of the Missouri River.

While not directly a concern of the CM Russell Refuge, that section of the Missouri River above Fort Peck Reservoir to Fort Benton is now protected from future development through the Wild and Scenic Rivers Act. This section of the Missouri was included in a bill signed by President Ford on October 12, 1976. Administrative responsibility was delegated to the U. S. Bureau of Land Management. Recreationally, use of the wild and scenic section blends into that of the Refuge. The following classification is from Sec. 2(b) of S. 1009 (93rd Congress):

(1) Wild river areas - those rivers or sections of rivers free of impoundments and generally inaccessible except by trail; with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

(2) Scenic river areas - those rivers or sections of rivers that are free of impoundments with shorelines or whatersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

(3) Recreational river areas - those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along the shoreline and that may have undergone some impoundment or diversion in the past.

The Missouri River from Fort Benton to Fort Peck Reservoir is described as follows:

Fort Benton to Ebersole Bottom	52 mi. - Recreational
Ebersole Bottom to Deadman Rapids	33 mi. - Wild
Deadman Rapids to Holmes Rapids	7 mi. - Recreational
Holmes Rapids to Leslie Point	7 mi. - Wild
Leslie Point to Magdall Homestead	25 mi. - Scenic
Magdall Holmstead to Cow Island	24 mi. - Wild
Cow Island to Fred Robinson Bridge	21 mi. - Scenic
	149 miles