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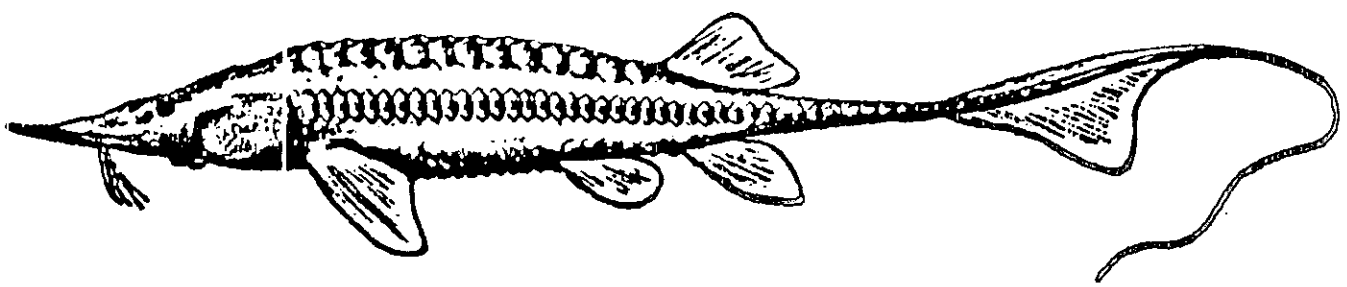
MISSOURI RIVER ENDEMIC FISH DRAFT PLAN



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Missouri River Endemic Fish Plan

I. Introduction

This plan for work on the endemic fish species of the Missouri River was drafted by the Valentine Fishery Assistance Office of the Fish and Wildlife Service. It is intended only as a starting point in this very complex and lengthy process.

The waters of the Missouri River have been highly modified by dams and reservoirs, not only on the main channel but also on many of the tributaries. Water withdrawals for various uses also contribute to the complexity, particularly during low water years.

There is very little recent information on the fish species of concern, and historical information is either lacking or of little value. Therefore, work on the life histories, habitat requirements and the impact of habitat modifications on the life strategies will be starting at the very beginning.

Of the several candidate endemic fish species considered for inclusion in this plan, four were selected. The basis for selection are as follows:

Pallid sturgeon Scaphirhynchus albus. Although this fish was probably more common in the Missouri River than indicated in the literature, it certainly was never as numerous as some of the other species. The reasons for its rapid decline after construction of main stem dams can be attributed to several factors, not the least of

which was intensive commercial fishing in the new reservoirs. No recruitment has been documented in more than 20 years. The species is currently considered to be on the brink of extinction.

Paddlefish Polydon spathula. This species was included because it is extirpated from several of the river reaches. This fish also has a higher visibility due to the snag fisheries and the potential to be exploited in the illegal caviar trade.

Blue sucker Clycleptus elongatus. This species was considered to be one of the more common species in the time period shortly after completion of the main stem dams. In recent survey work on paddlefish and sturgeon, very few blue suckers are captured and they are all large, old fish. No work has been done on this species and virtually nothing is known about its life history or habitat requirements.

Shovelnose sturgeon Scaphirhynchus platorynchus. While still considered common throughout most of its range in the Missouri River, there is some preliminary indications of poor to nonexistent recruitment in several river reaches. While conducting operations for other species included in this plan, there will be opportunities to collect additional data on the shovelnose sturgeon.

Sturgeon chub Hybopsis gelida, Sicklefin chub Hybopsis meeki. These two species were not included at this time because there is some indication that the primary habitat and location is more associated with tributaries rather than the Missouri River. If there is evidence at a later date that they should be included, they can be added to the list of species of concern.

II. Purpose

This document provides the framework which will direct an intensive research and management effort designed to provide important information necessary to the management of native, main stem Missouri River fishes. The pallid sturgeon will soon be listed as Endangered under the Endangered Species Act (Act) and the paddlefish is being considered for listing as Threatened. Several other native fishes are considered category 2 under the Act. The U. S. Fish and Wildlife Service (Service), through the Secretary of the Interior, is responsible for the protection and recovery of endangered species (Endangered Species Act, 16 U. S. C. 1531 et seq). The states of Montana, North Dakota, South Dakota, Nebraska, Kansas, Iowa, and Missouri (each of which contains portions of the main stem Missouri River) are responsible for the protection and management of fish and wildlife within their borders. The Army Corps of Engineers (Corps) and other public and private organizations are

responsible for water management within the Missouri River Basin.

There is considerable interest in the welfare of pallid sturgeon and paddlefish. The Service and several states within the Missouri River basin have begun investigations designed to aid the recovery and management of these two species. However, these investigations have been poorly funded and generally disjunct from one another. The Service, because of its primary responsibility for endangered species, has the lead role in directing activities that may affect these species. Therefore, this document outlines procedures to: 1. assess all information known about these two species, 2. identify important gaps in the information, 3. identify research programs designed to acquire the missing information, 4. identify a source of funds and outline procedures for the allocation of those funds, and 5. design a system to assure close coordination among the organizations responsible for resource management in the Missouri River Basin.

III. History

Since abandonment of the north central reservoir investigations in 1975 by the U. S. Fish and Wildlife Service, work on Missouri River endemic fish species has only been sporadic and relatively cursory. In recent years, work has been on only a few of the species and has been, more or less, on the initiative of the individual biologists of the state and federal agencies. There has been no concerted effort to identify the

most critical information needs and to mount an organized effort to obtain the necessary data.

Starting in 1985, Gavins Point NFH and Valentine FAO cooperated in a venture to improve and refine paddlefish capture, spawning, and culture methods. In 1988, this project was expanded to include pallid sturgeon. At this point in time, the capture and culture of paddlefish is a routine operation and probably the same will be true for Missouri River sturgeon in the short term. However, there is almost a total lack of biological evidence concerning the most important aspects of assuring the continuance of the species in these waters.

IV. Description of the Project Area

As with any substantial undertaking, it is necessary to establish some practical limits or boundaries. With regard to this plan, since it already covers a vast area, it was deemed advisable not to include the tributaries unless a connection could be made with a main stem problem. The Yellowstone River from the confluence with the Missouri River upstream to Intake, MT was of course included since that river reach appears to be the most critical for two or more of the endemic species included in the plan. The project area, including the lower reach of the Yellowstone River, is from Ft. Peck Dam downstream to the point the Iowa state line intersects the Missouri River south of Omaha, Nebraska.

The project area is divided into segments, (river reaches)

identified by numbers for convenience in data collection and storage. The river reaches are based largely on the barriers (dams) to fish movement.

River Reach 1. The Yellowstone River from Intake, Montana to the confluence with the Missouri River at Ft. Buford, North Dakota.

River Reach 2. The Missouri River from Ft. Peck Dam to the confluence with the Yellowstone River.

River Reach 3. From the confluence at Ft. Buford to the Garrison Dam.

River Reach 4. From Garrison Dam to Oahe Dam.

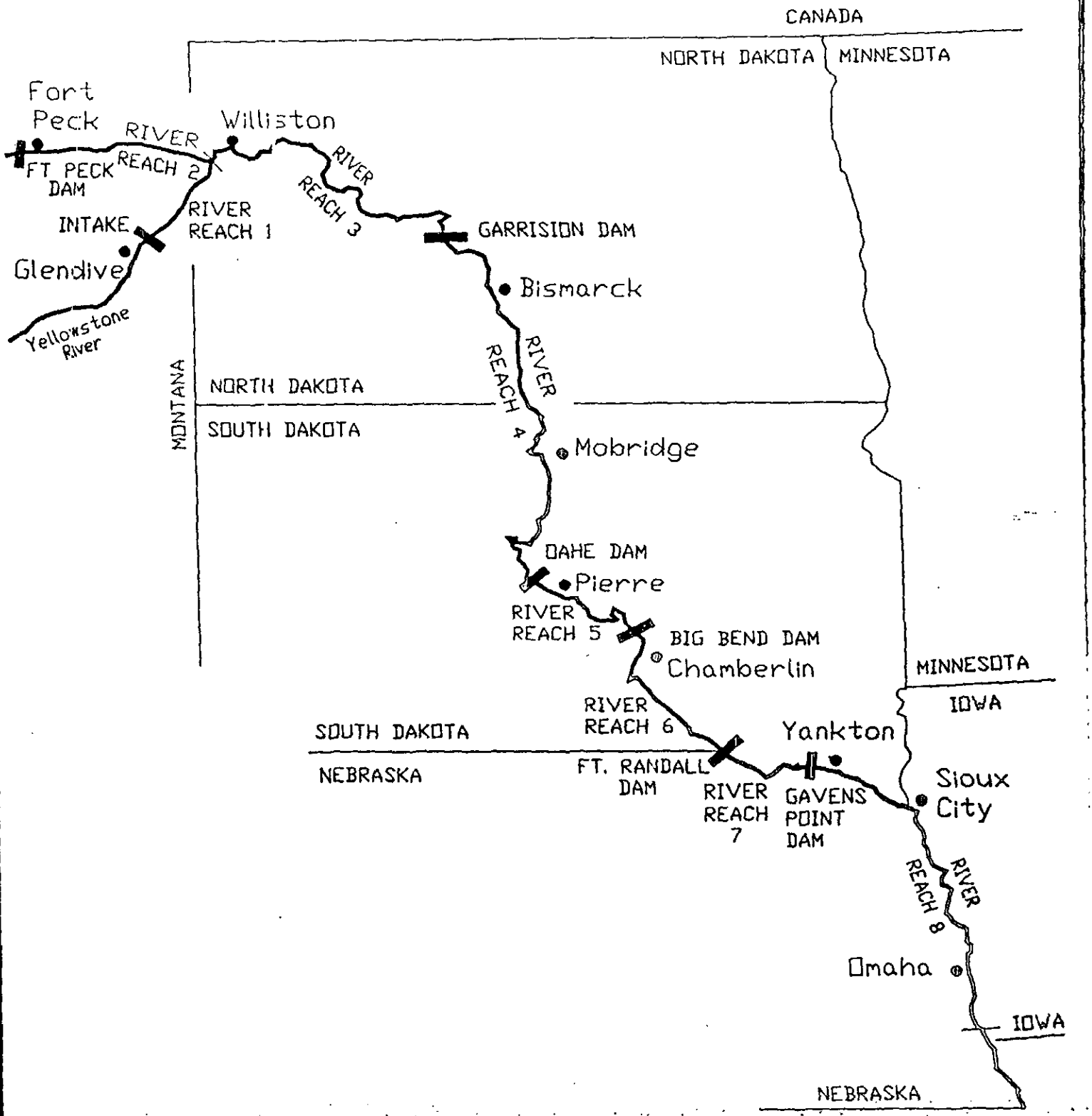
River Reach 5. From Oahe Dam to Big Bend Dam.

River Reach 6. From Big Bend Dam to Ft. Randall Dam.

River Reach 7. From Ft. Randall Dam to Gavins Point Dam.

River Reach 8. From Gavins Point Dam to the intersection of the Missouri River and the Iowa state line south of Omaha, Nebraska.

MISSOURI RIVER REACHES



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V. Strategies and Assumptions

With nearly a total lack of information pertaining to the life strategies of the endemic fish species of the Missouri River prior to the construction of the first main stem dam in the late 1930's, a great deal of assumptions have to made in any restoration program. There is no doubt that some of the fish species were highly mobile and that this mobility was an important factor in life strategies that enabled at least the sturgeons and the paddlefish to survive dramatic changes in the approximately 50 million years of their existence. Whether these species have a highly developed homing instinct or whether they opportunistically utilized suitable flows and temperatures as they were encountered is not known. There is some evidence to support either assumption. Based on the behavior of the remnant population, there is certainly reason to believe that at least some of the fish utilized tributaries for spawning. Most of the tributaries are no longer available for spawning areas either because flows are controlled by water development projects or because they are now embayments on the massive reservoirs and the fish would not be able to find them. The two remaining reproducing populations of paddlefish utilize main stem spawning sites, however that is the only suitable spawning habitat available to the fish. The only population of shovelnose sturgeon with evidence of significant recruitment apparently utilizes a tributary, the Platte River.

There is considerable urgency in initiating a recovery

program for the pallid sturgeon. The remnant population has declined to a point that very few fish are observed in extensive field operations. The more common and closely related shovelnose sturgeon will be utilized in any efforts to obtain the necessary information if the operation will place a pallid sturgeon at risk. Since two or considerably more years are required between spawning periods for mature pallids, it will be most difficult to locate fish with mature sexual products. In addition to continuing to develop spawning and culture methods utilizing shovelnose sturgeon, the priority information needs are whether the pallid sturgeon population in River Reach 3 reproduces, at what location and what factors contribute to the apparent total lack of recruitment. There is no doubt that a fish culture program will be essential in any recovery effort. The pallid sturgeon population in River Reach 5 serves no biological purpose since there are no suitable tributaries in that reach and the flows and water temperature regime are highly altered. That population is the best prospect as a future broodstock source.

The paddlefish population in River Reach 1 and 3 is considered to be stable or possibly increasing. There are several thousand adult spawning fish removed by anglers from this population each year. Information needs pertain to the size of the population, rate of recruitment, spawning and nursery areas, and the amount of illegal harvest, if any. There is some information on the spawning location, the first 20 river miles below Intake, MT, but it is based on speculation. There is

almost no data on the rest of the information needs.

In River Reaches 4, 5, and 6, the fish are either extirpated or the population consists of a few old, large fish. There is potential for restoration of paddlefish in River Reach 7 and work is currently under way to determine if the population can be augmented by hatchery produced fish. There is reproduction of paddlefish in Reach 7 but apparently there is no recruitment because the young-of-year fish move downstream and pass through Gavins Point Dam. The strategy is to stock the hatchery fish with coded wire tags in early fall and perhaps, bypass the instinct to move downstream. The source of eggs needs to be changed to the population that exists in this river reach. The information needs are the location of the spawning area and to what degree are the hatchery produced fish recruiting to the population in Reach 7. The paddlefish in River Reach 8 are an unknown quantity. They are thought to be a mix of fish from Reach 7, downstream tributaries including hatchery fish from Missouri and perhaps fish from as far downstream as the Mississippi River. Information needs relate to a suitable external mark that can be used to identify fish originating from several locations to determine the impact of fish removed by the snag fishery at Gavins Point Dam.

It appears at this time that River Reaches 4, 5, and 6 are unsuitable for paddlefish restoration. Reach 6 may have some potential if the management of the reservoir were changed to preclude late summer and fall draw downs.

Blue suckers were reported to be one of the most common species in the river in the time period immediately after completion of the dams. It is unknown how abundant they were prior to the dams. It is presumed that they were a mid to lower reach fish that moved upstream to utilize the various tributaries as spawning areas. In recent survey work on the river, only a few specimens have been captured. They were all large fish near the maximum size for the species. During work on other species, there will be opportunities to begin assembling a data base on blue suckers for future reference. There may also be sources of information that will reveal more on the status of the species. Information needs relate to current abundance, recruitment, and spawning areas.

While shovelnose sturgeon are still considered common throughout their range, there are preliminary indications of future declines. These problems relate to very poor growth in most river reaches which impacts reproduction. There is also evidence of a total lack of recruitment in several river reaches. It is anticipated that much of the data obtained from investigations on this fish can be transferred to the recovery program for pallid sturgeon. Information needs are identifying spawning habitat, annual movement patterns, and age and growth data.

One of the most important aspects of this plan is to assure that all objectives and tasks fit together to begin building a data base on the priority information needs. With the very

limited resources anticipated, all projects irregardless of funding source should be directed at the most critical factors affecting Missouri River endemic fishes.

BLUE SUCKER

RIVER REACH	HISTORIC STATUS	PRESENT STATUS	CURRENT TREND	LIMITING FACTORS	INFORMATION NEEDS
1	PROBABLY ABUNDANT	RARE, ALL LARGE INDIVIDUALS	UNKNOWN, PROBABLY RAPIDLY DECLINING	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT	1. ADULT MOVEMENT PATTERNS 2. ADULT WINTERING HABITAT 3. REASONS FOR NO RECRUITMENT A. IS SPAWNING ATTEMPTED? B. WHAT HABITAT IS REQUIRED? C. WHERE IS THE HABITAT LOCATED? D. WHAT HABITAT IS REQUIRED FOR LARVAE, AGE-0 FISH, JUVENILES E. IS THAT HABITAT STILL AVAILABLE WHERE? F. IS PREDATION ON YOUNG FISH A PROBLEM? G. WHAT ARE FOOD REQUIREMENTS OF YOUNG FISH? IS IT STILL AVAILABLE
2	PROBABLY ABUNDANT	UNKNOWN	UNKNOWN	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT	
3	PROBABLY ABUNDANT	RARE, ALL LARGE INDIVIDUALS	UNKNOWN, MAY BE DECLINING	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT	
4	PROBABLY ABUNDANT	UNKNOWN, PERHAPS EXTIRPATED	UNKNOWN	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT	
5	PROBABLY ABUNDANT	UNKNOWN, PERHAPS EXTIRPATED	UNKNOWN	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT	
6	PROBABLY ABUNDANT	UNKNOWN, PERHAPS EXTIRPATED	UNKNOWN	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT	
7	PROBABLY ABUNDANT	UNKNOWN, PERHAPS EXTIRPATED	UNKNOWN	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT	
8	PROBABLY ABUNDANT	UNCOMMON, ALL LARGE INDIVIDUALS	UNKNOWN PROBABLY DECLINING	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT	

SHOVELNOSE STURGEON

RIVER REACH	HISTORIC STATUS	PRESENT STATUS	CURRENT TREND	LIMITING FACTORS	INFORMATION NEEDS
1	PROBABLY ABUNDANT	COMMON, MOSTLY LARGE FISH. SOME RECRUITMENT.	PROBABLY DECLINING	UNKNOWN FACTORS. POSSIBLE LOW REPRODUCTIVE SUCCESS OR POOR SURVIVAL AND GROWTH OF YOUNG FISH.	A. ADULT MOVEMENT PATTERNS AND HABITAT USE. B. ADULT WINTERING HABITAT
2	PROBABLY ABUNDANT	COMMON, MOSTLY LARGE FISH. SOME RECRUITMENT.	PROBABLY DECLINING	UNKNOWN FACTORS. POSSIBLE LOW REPRODUCTIVE SUCCESS OR POOR SURVIVAL AND GROWTH OF YOUNG FISH.	C. SPAWNING REQUIREMENTS 1. HABITAT 2. TEMPERATURE
3	PROBABLY ABUNDANT	COMMON, MOSTLY LARGE FISH. SOME RECRUITMENT.	PROBABLY DECLINING	UNKNOWN FACTORS. POSSIBLE LOW REPRODUCTIVE SUCCESS OR POOR SURVIVAL AND GROWTH OF YOUNG FISH.	D. HABITAT REQUIREMENTS OF SMALL FISH. 1. NURSERY AREAS.
4	PROBABLY ABUNDANT	COMMON, MOSTLY LARGE FISH. PROBABLY NO RECRUITMENT.	UNKNOWN	UNKNOWN FACTORS. POSSIBLE NO REPRODUCTIVE SUCCESS OR SURVIVAL OF YOUNG FISH. LOW WATER TEMPERATURE. NO TRIBUTARIES.	2. FOOD 3. AFFECT OF PREDATION E. ADULT FOOD HABITS AND FOOD SUPPLY.
5	PROBABLY ABUNDANT	UNCOMMON. MOSTLY LARGE FISH. NO RECRUITMENT.	PROBABLY DECLINING	UNKNOWN FACTORS. POSSIBLE LOW REPRODUCTIVE SUCCESS OR POOR SURVIVAL AND GROWTH OF YOUNG FISH.	
6	PROBABLY ABUNDANT	UNCOMMON, MOSTLY LARGE FISH. NO RECRUITMENT.	PROBABLY DECLINING	UNKNOWN FACTORS. POSSIBLE LOW REPRODUCTIVE SUCCESS OR POOR SURVIVAL AND GROWTH OF YOUNG FISH.	
7	PROBABLY ABUNDANT	UNKNOWN. RARE.	PROBABLY RAPIDLY DECLINING	UNKNOWN FACTORS. POSSIBLE LOW REPRODUCTIVE SUCCESS OR POOR SURVIVAL AND GROWTH OF YOUNG FISH.	
8	PROBABLY ABUNDANT	ABUNDANT. MOSTLY SMALL FISH. SOME RECRUITMENT. SLOW GROWTH.	POSSIBLY STABLE	APPARENT LACK OF SUFFICIENT FOOD FOR ADEQUATE GROWTH.	

RIVER REACH	HISTORIC STATUS	PRESENT STATUS	CURRENT TREND	LIMITING FACTORS	INFORMATION NEEDS
1	PRESENT	PRESENT, NO RECRUITMENT	RAPIDLY DECLINING	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT.	A. ADULT MOVEMENT PATTERNS AND HABITAT USE.
2	PRESENT	PRESENT, AT LEAST 5 SEEN IN WINTER OF 1988-1989. NO RECRUITMENT.	RAPIDLY DECLINING	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT.	B. ADULT WINTERING HABITAT C. SPAWNING HABITAT
3	PRESENT, 33 OBSERVATIONS IN 33 YR.	PRESENT, NO RECRUITMENT. 7 OBSERVATIONS IN RECENT PAST.	RAPIDLY DECLINING	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT.	D. IS SPAWNING OCCURING? E. LARVAE AND YOUNG FISH SURVIVAL, HABITAT USE, FOOD HABITS.
4	'REASONABLY GOOD POPULATION' >200 OBSERVATIONS FROM 1957 TO 1974.	NEARLY EXTIRPATED. 1 OBSERVATION SINCE 1974 (1985).	NEARING EXTIRPATION	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT. NO RIVERINE HABITAT.	F. PREDATION.
5	PRESENT, ABOUT 60 OBSERVATIONS	PRESENT, NO RECRUITMENT. 9 OBSERVATIONS SINCE 1980.	RAPIDLY DECLINING	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT. NO RIVERINE HABITAT.	G. CAN POPULATION BE MAINTAINED WITH STOCKING. H. STOCKING RATES AND SIZE OF FISH TO STOCK.
6	GOOD NUMBERS. ABOUT 300 OBSERVATIONS.	EXTIRPATED. NO OBSERVATIONS SINCE 1969 RECENT PAST.	EXTIRPATED	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT.	
7	PRESENT	ESSENTIALLY EXTIRPATED.	EXTIRPATED	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT.	
8	PRESENT	PRESENT IN LOW NUMBERS. 3 OBSERVATIONS SINCE 1980	RAPIDLY DECLINING	UNKNOWN FACTORS LEADING TO LACK OF RECRUITMENT.	

PADDLEFISH

RIVER REACH	HISTORIC STATUS	PRESENT STATUS	CURRENT TREND	LIMITING FACTORS	INFORMATION NEEDS
1	ABUNDANT	LARGE POPULATION SOME RECRUITMENT, BUT MAY NOT BE SELF SUSTAINING.	STABLE	UNKNOWN	HARVEST LEVELS THAT NATURAL REPRODUCTION WILL SUPPORT.
2	ABUNDANT	LARGE POPULATION SOME RECRUITMENT, BUT MAY NOT BE SELF SUSTAINING.	UNKNOWN	LOW WATER TEMPS. DURING SPAWNING	SPAWNING AREAS. SPAWNING REQUIREMENTS. SPAWNING SUCCESS
3	ABUNDANT	LARGE POPULATION SOME RECRUITMENT, BUT MAY NOT BE SELF SUSTAINING.	STABLE	PREDATION NURSERY HABITAT	NURSERY AREAS, LOCATION AND HABITAT TYPE. FOOD SUPPLY; ADULTS AND YOUNG.
4	ABUNDANT	PROBABLY EXTIRPATED	PROBABLY EXTIRPATED	NO RECRUITMENT.	STOCKING RATES NUMBERS, SIZE.
5	ABUNDANT	EXTIRPATED	EXTIRPATED	NO RECRUITMENT.	
6	ABUNDANT	NEARLY EXTIRPATED. NO RECRUITMENT.	DECLINING	NO RECRUITMENT. NO RIVERINE HABITAT.	
7	ABUNDANT	SMALL POPULATION. APPARENT REPRODUCTION BUT NO RECRUITMENT	DECLINING	NO RECRUITMENT OUT MIGRATION OF YOUNG-OF-YEAR	
8	ABUNDANT	LARGE POPULATION OF SLOW GROWING FISH. NO REPRODUCTION, BUT APPARENT RECRUITMENT FROM REACH 7 OR DOWNSTREAM.	PROBABLY DECLINING	NO SPAWNING HABITAT LIMITED FOOD SUPPLY. NO NURSERY AREAS.	

VII. Specific Objectives

Objectives and associated tasks are listed by year, time frame, and priority. Personnel time costs other than salaries are included for only U. S. Fish and Wildlife Service operations. Since the exact cost of personnel time is impossible to estimate at this time, it is not included.

1990

1. Objective: To refine and further develop cultural methods for shovelnose sturgeon in preparation for future propagation of pallid sturgeon.

   A. **Task:** (River Reach 1) Capture 10 to 15 shovelnose sturgeon that appear to have mature eggs/testes.
   Time Period: April 15 to May 1.
   Participants: Valentine, Gavins Point, Bozeman. 4 persons, 2 boats, 5 days.
   Equipment: Marginal but adequate.
   Cost Estimate: $1300
   Products: Track and document maturation process in hatchery environment. Develop field procedure for determining maturity of males (Bozeman FTC).

   B. **Task:** (River Reach 1) Capture 30 to 40 shovelnose sturgeon that appear to have potential for spawning.
   Time Period: June 5 to 15.
   Participants: Valentine, Gavins Point, Bozeman. 4 persons, 2 boats, 10 days.
   Equipment: Marginal but adequate.
   Cost Estimate: $2600
   Products: Test efficacy and results of alternative hormones. Test results of alternative injection regimes of LHRH. Alter egg taking procedures to determine results. Work on fish handling procedures. Run diet trials for shovelnose sturgeon fingerlings. (Bozeman FTC & Gavins Point NFH)

2. Objective: To obtain additional population information on pallid sturgeon in Lake Sharpe as a candidate brood stock for future propagation efforts.

   A. **Task:** (River Reach 5) Conduct netting and electronic surveys in various areas of Lake Sharpe.
   Time Period: Periodically; June 20 to July 15.
   Participants: SDGFP and Valentine FAO, 2 persons, 1 boat, 10 days.
   Equipment: Require Humminbird Color 1 or Lowrance equivalent ($1200), boat trailer for Boston Whaler ($1800).

Cost Estimate: $1400
Products: Improve estimate of number of pallid sturgeon in River Reach 5. Implant sonic transmitters to enable collection of additional habitat preference and movement data. Obtain information on sexual maturity of pallid sturgeon.

B. Task: (River Reach 5) Continue surveillance on movement of pallid sturgeon with sonic tag implants.
Time Period: Ice free season.
Participants: SDGFP.
Equipment: In place.
Cost Estimate: $0
Product: Add to data base on movement and habitat preference for pallid sturgeon in River Reach 5.

3. Objective: To determine best method for monitoring movement and habitat preference of sturgeon in River Reaches 1, 2, and 3.

A. Task: (River Reach 3) Capture several large, mature appearing shovelnose sturgeon. Implant different fish with sonic and internal radio tags and affix external radio tags.
Time Period: May 15 to September 1.
Participants: MTFWP has most of the necessary equipment.
Cost Estimate: $1600
Products: Evaluation of transmitter type tags in upper Missouri River habitats. Data on shovelnose sturgeon movement and habitat preference in River Reaches 1, 2, and 3.

4. Objective: To produce 25,000 eight inch paddlefish for continuation of study on recruitment and movement of young-of-year paddlefish in Lewis and Clark Reservoir.

A. Task: (River Reach 6) Capture adult paddlefish at mouth of White River for spawning at American Creek Station. Eggs to be transported to and reared at Gavins Point NFH. 25,000 eight inch paddlefish to be released in the tail-waters of Ft. Randall Dam.
Time Period: May 15 for spawning and September 1 for release.
Participants: SDGFP, NEGPC, Gavins Point NFH; 2 persons, 1 boat, 5 days.
Equipment: Available.
Cost Estimate: $900

Products: Increase data base on movement, area of recruitment, and contribution of hatchery reared fish to the population in Lewis and Clark Reservoir (River Reach 7) and the river below Gavins Point Dam (River Reach 8).

1991

1. Objective: Locate current/potential spawning areas for pallid sturgeon, shovelnose sturgeon, paddlefish and blue suckers. Establish movement patterns of adult fish.

   A. Task: (River Reaches 1, 2, and 3) Conduct systematic surveys of riverine areas during time period when adult fish are expected to move to spawning areas. Type of electronic tags would depend on outcome of 1990 studies. Utilizing fish/depth finder to locate the fish, netting operations will be conducted to capture several large shovelnose sturgeon and as many pallid sturgeon as possible. They would be fitted with electronic tags of the type selected. Movement would be monitored at a minimum of two times each week by aircraft and boat.
   Time Period: May 1 to September 30.
   Participants: MTFWP, Missouri River Fishery Office.
   Equipment: Require jet boat, electronic tags and monitoring equipment, aircraft time.
   Products: Begin establishing data base on possible spawning areas and habitat utilized during other seasons.

   B. Task: (River Reaches 1, 2, and 3) Conduct surveys with nets, fish finders, ect. to begin establishing catch per unit effort data, relative abundance data and relative weight data. Conduct surveys of tributaries to determine utilization during spawning and other periods.
   Time Period: May 1 to September 30.
   Participants: MTFWP, Missouri River Fishery Office.
   Equipment: Large inventory of nets and equipment required in Task 1.A.
   Products: Establish data base on CPUE and relative abundance of species included in the plan. Initial information on importance of tributaries.

   C. Task: (River Reach 7) Locate specific spawning sites for paddlefish. Conduct systematic surveys with nets and fish finders of logical spawning sites.
   Time Period: May 10 to May 30.
   Participants: NEGPC, Gavins Point NFH.
   Equipment: Available.
   Products: Determine spawning site so source of paddlefish eggs for rearing program at Gavins Point can be changed to River Reach 7.

D. Task: (River Reach 5) Continue to monitor movement of pallid sturgeon with sonic tags. Capture several pallids to determine maturity of sexual products. If mature male/female pallids are captured, spawn using surgical methods. Rear and retain progeny at Gavins Point NFH. Send egg/tissue samples in for genetic evaluation. Send samples of fry/fingerlings to larval fish lab.
Time Period: May 15 to indefinite.
Participants: SDGFP, Gavins Point NFH, Missouri River Fishery Office.
Equipment: Rearing and holding tanks at Gavins Point.
Products: Spawning and rearing methods for pallid sturgeon. Establish captive population of pallids. Genetic evaluation of pallids in River Reach 5. Establish reference samples of larval to fingerling pallids.

2. **Objective:** Determine fry drift and nursery area data for species of concern. Establish fry CPUE data as it would relate to a recruitment index.

A. **Task:** (River Reaches 1 and 3) Conduct systematic sampling for age-0 sturgeon and paddlefish. Establish stationary drift net stations in areas where drifting eggs and larvae are expected to occur. Systematic hand-seine collections will be conducted at designated sites in designated time frames. Mid-water trawls utilizing mesh size suitable for larvae and very small fish will be conducted in a standardized pattern.
Time Period: May 15 to June 30.
Participants: MTFWP, Missouri River Fishery Office.
Equipment: Need drift nets, hand seines, fry trawl.
Products: Begin establishing data base on CPUE using various types of gear and at designated locations. Develop identification factors for larval size fish of the various species.

B. **Task:** (River Reach 3) Conduct small-mesh gill netting operations in upper end of Garrison Reservoir.
Time Period: July 1 to September 30.
Participants: Missouri River Fishery Office.
Equipment: Need small-mesh gill nets.
Products: Location of nursery areas and data base on recruitment.

3. Objective: To produce 25,000 eight inch paddlefish for continuation of study on recruitment and movement of young-of-year paddlefish in Lewis and Clark Reservoir.

A. Task: (River Reach 6, 7, and 8) Capture adult paddlefish at either the mouth of the White River or in upper end of Reach 7 for spawning. Rearing program to be carried out by Gavins Point. 25,000 eight inch paddlefish, all with coded wire tags, to be released in the tail-waters of Ft. Randall Dam. Collection and evaluation of data to be a joint venture of NEGPC and SDGFP.
Time Period: May 15 for spawning and September 1 for release.
Participants: SDGFP, NEGPC, Gavins Point NFH.
Equipment: Need large tanks for holding adult paddlefish at Gavins Point.
Products: Increase data base on movement, area of recruitment, and contribution of hatchery reared fish to the population in Lewis and Clark Reservoir (Reach 7) and the river below Gavins Point Dam (Reach 8).

B. Task: (River Reach 8) Evaluate several types of external marking systems for paddlefish for study of movement and point of origin in Reach 8.
Time Period: June 1 continuing for 1 year.
Participants: Gavins Point NFH.
Equipment: Need various types of marking and tagging equipment.
Products: If an effective external mark can be identified, will enable long term study on movement and point of origin of paddlefish in Reach 8.

1992

1. Objective: Conduct a major re-evaluation of the plan, objectives, and tasks to determine what can be accomplished and if the highest priority information needs can be met. The evaluation of work accomplished and proposed future projects will be conducted by the Missouri River Endemic Fish Team.

2. Objective: Evaluate potential reintroduction sites for pallid sturgeon. Produce at Gavins Point NFH, large numbers of shovelnose sturgeon (25,000 for each site) for stocking in selected areas.

   A. **Task:** (River Reach 1) Capture sufficient number of shovelnose sturgeon in spawning condition to produce a minimum of 50,000 fingerlings. Fingerlings to be stocked in potential reintroduction sites for pallid sturgeon.
   Time Period: June 1 for one year.
   Participants: Missouri River Fishery Office, Gavins Point NFH.
   Equipment: Available if purchased for other objectives/tasks.
   Products: Provide information on marking large numbers of small sturgeon. Develop methodology on evaluation of reintroduction sites for pallid sturgeon.

3. Objective: Continue studies on the location of spawning areas for pallid sturgeon, paddlefish, blue suckers, and shovelnose sturgeon. Establish movement patterns of adult fish.

   A. **Task:** (River Reaches 1, 2, and 3) Expand study of 1991 Objective 1, Task A to include up to 10 each of blue suckers and paddlefish with electronic tags.
   Time Period: May 1 to September 30.
   Equipment: Require additional electronic tags.
   Products: Expand data base on seasonal use of various habitats and spawning areas.

   B. **Task:** (River Reaches 1 and 3) Continue operations under 1991 Objective 2, Tasks A and B. No significant changes in specifications, gear type, or sampling intensity of the previous year are anticipated. Some adjustment of sampling sites, depending on data collected, would be likely.

4. Objective: Locate populations of pallid sturgeon with potential for propagation effort to be conducted at Gavins Point NFH.

A. Task: (River Reach 8) Capture as many pallid sturgeon as possible with drift nets and/or hook and line to examine for sexual maturity. If fish with mature sexual products are captured, spawn using standard surgical methods. Conduct genetic evaluation using eggs/tissue samples. Rear and hold progeny at Gavins Point.
Time Period: April 15 to indefinite.
Participants: Gavins Point NFH, NEGPC, and Missouri River Fishery Office.
Equipment: Available if purchased for 1991 pallid sturgeon rearing project.
Products: Additional year class of pallid sturgeon from another source to add to genetic inventory.

5. Objective: Establish data base on relative abundance of fish species included in plan and habitat parameters for River Reach 7.

A. Task: (River Reach 7) Conduct fish population surveys for species of concern utilizing standardized survey methods.
Time Period: May 1 to October 15.
Participants: NEGPC, Missouri River Fishery Office, SDGFP.
Equipment: Require boat, motor, nets, and electronic locator equipment.
Products: Initial data base on CPUE on species of concern.

B. Task: (River Reach 7) Obtain flow/temperature data from Corps of Engineers. Obtain recruitment data from NEGPC and SDGFP. Conduct surveys of spawning substrate with variable flows. Conduct surveys of potential nursery areas with the variable reservoir levels.
Time Period: May 1 to October 15.
Equipment: Available from Objective 5, Task A.
Products: Establish suitability of Reach 7 as a oduction site.

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1. Objective: Based on prior years data, results, and numbers of pallid sturgeon available at Gavins Point NFH, stock fish at least 12 inches in length in a selected site in either Reach 3 or 7. Reach 7 is preferred if a suitable site can be located.

2. Objective: From prior years work on relative abundance and spawning site locations for blue suckers, conduct spawning operation, with the fish to be reared at Gavins Point. Target reintroduction site is the Niobrara River in Reach 7.

3. Objective: Continue studies on location of spawning and nursery areas, movement of adult fish and recruitment in Reaches 1 and 3.

4. Objective: Depending on the results of work on a suitable external mark for paddlefish, establish a marking program for hatchery-reared fish and wild fish to determine movement patterns and composition of catch in the snag fishery at Gavins Point Dam.

5. Objective: Initiate study of tributaries in all reaches to determine their value as reintroduction sites and what impediments, such as water diversions, exist to the use of the tributaries.