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Ecosystem Management of the Missouri River from Gavins Point Dam to Ponca State Park, Nebraska

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Missouri National Recreational River

January, 2001

Background

- Authorized by a 1978 amendment to the National Parks and Recreation Act (PL 95-625) which amended the Wild and Scenic Rivers Act of 1968 (PL 90-542)
- Corps is authorized to construct recreational development, bank stabilization, and other recreational river features as necessary to support the values for which the river was designated
- Life-of-project funding ceiling of \$21 million; approximately \$3.2 million spent to date
- The Corps and National Park Service signed a 1980 Cooperative Agreement outlining each agency's responsibilities
- The General Management Plan has recently been updated (1999) with an environmental emphasis

Construction Projects

- Recreational construction (50-50 cost share) to date is as follows:
 - Riverside Park river access, park, and picnic area (1991 - \$1,280,000 total cost)
 - Myron Grove river access and picnic area (1987 - \$60,000 total cost)
 - *Ponca Research and Education Center (in progress - \$5 million total estimated)*
- Bank stabilization projects to date are as follows:
 - Ponca breakwater structures (1999 - \$200,000)
 - Eagle nest bank protection (2000 - \$20,000)
 - *Stabilization of habitat sites – demonstration timber structures (just beginning)*
- Environmental construction projects to date are as follows:
 - Tern and plover island construction / protection (1991 - 1995)
 - *Ponca backwater / wetland construction project (FY 03)*

Environmental Studies

- Ponca backwater / wetland restoration study PRP (2000)
- Habitat erosion protection analysis (2000)
- Freshwater mussel survey (1999)
- Eagle nest survey (1999)
- Benthic (bottom-dwelling) fish study (1996 - 2000)
- Tern and plover studies (1988 - 1990)
- Aquatic habitat mapping (1981)

Future / Potential Projects

- Purchase of recreational easements from willing landowners
- Purchase of habitat conservation easements from willing landowners
- Canoe trail pull-out areas / primitive campsites
- Construct additional boat access areas (need cost-share sponsor)
- Construct a bike trail from Ponca to Ponca State Park (need cost-share sponsor)

ECOSYSTEM MANAGEMENT OF THE MISSOURI RIVER
FROM GAVINS POINT DAM TO PONCA STATE PARK, NEBRASKA

by Robert S. Nebel
for 812M Problems in Ecosystem Management
University of Nebraska at Omaha
May 1980

DESCRIPTION OF THE ECOSYSTEM

The portion of the Missouri River under study is located in the eastern portion of the States of Nebraska and South Dakota. The river length in the study area is 94 kilometers and includes the area from immediately below Gavins Point Dam downstream to Ponca State Park, Nebraska. The ecosystem width, for the purposes of this study, is 1 kilometer on either side of the existing river banks.

The river channel in this area is free from any impoundments and other structures which might impede flow; however, the river flow is regulated through the Gavins Point Dam. Flows during years of normal water supply vary seasonably between 35,000 cubic feet per second (cfs) during the spring, summer, and fall months and 15,000 cfs or less during winter. River banks vary from relatively flat sandy beach areas to vertical faces 3 to 4.5 meters high where active erosion is taking place.

The land adjacent to the river ranges from a relatively level flood plain to steep tree-covered bluffs on the Nebraska side and relatively level flood plain on the South Dakota side.

The major use of land adjacent to the river is for agricultural purposes, for both irrigated and non-irrigated crops and pasture. Also, this section of the Missouri River is a major recreational resource because of its nearness to major population centers and its availability for year round recreational use. Public access to the river and developed facilities for

recreational use, however, are limited.

Natural vegetation along the study segment is composed primarily of two plant communities. These are the flood plain forest of willow and cottonwood and the elm, oak woodland typical of the bluffs that border the flood plain in Nebraska.

Varying stages of flood plain vegetative succession are evident throughout the segment. On the sand bars and newly deposited accretion lands adjacent to the river banks are the dominant pioneer species of flood plain succession: peach-leaved willow, sandbar willow, and eastern cottonwood seedlings. Farther back and higher above the water table larger willow and cottonwood trees dominate until finally a flood plain forest consisting mainly of cottonwoods and an understory of red-osier dogwood, Virginia creeper, and poison ivy comprise the dominant vegetation on the highest banks and two large islands.

In contrast to mixed flood plain forest and agricultural use on the flood plain are the hardwood forests of the adjoining bluffs in Nebraska. There are several places in the river segment where the river flows at the base of the bluffs. Here, the bluffs and their hardwood forest dominate the scene. The slopes are predominantly north facing and support a dense growth of oak, ash, mulberry, and walnut. Burr oak is by far the predominant species. Where grazing has been limited, a good understory shrub layer is present as in the flood plain forest. Dog wood and sumac are typical understory plants.

Wildlife in the study segment is fairly abundant. The

presence of 48 species of mammals has been documented. Small mammals, including mice, voles, bats, moles, rats, and ground squirrels, make up almost 60 percent of these species, and furbearers contribute another 20 percent. White-tailed deer is the only large mammal in the study segment; however, an occasional mule deer moves into the uplands adjoining the river from the west. Coyote, red fox, and badger are also common.

An abundance of fish species is also found within the study corridor. Although the main stem dam system has altered the Missouri River's traditional pattern of flow and significantly reduced the sediment load in this river reach, most of the native fish species are still present. The changed river condition has, however, modified the dominance and abundance of species in the fish community, and there have been a few species introduced into the river. Table 1 lists the principal fish species found in this river reach today. Of these species, sauger, carp, channel catfish, goldeye, white bass, and fresh water drum are the most abundant.

Table 1. Principal species of the fish community.

Shovelnose sturgeon	Gizzard Shad	Smallmouth Buffalo
River Carpsucker	Goldeye	Bigmouth Buffalo
Channel Catfish	Sauger	Shorthead Redhorse
Paddlefish	Walleye	Flathead Catfish
Shortnose Gar	Blue Sucker	Freshwater Drum
Longnose Gar	Red Shiner	Emerald Shiner
White Bass	Sand Shiner	

The natural vegetation of the river corridor also provides a year-round home for 25 bird species. Fifty-eight species commonly nest in the area in addition to the year-round residents, while 15 additional species are common winter residents. Over 115 species regularly use the corridor on their spring migration, and 110 return through the area during their fall migration. This number of species represents about one-third of the bird species that are present in the Missouri River Basin either as regular residents, common visitors, or as occasional visitors. Except for a few introduced species and a couple of recently extinct species, there is very little change in the bird community from the historic past. The migration of waterfowl and shorebirds along the river corridor remains one of the most important ornithological occurrences in the area. This is particularly true of their spring migration. The interior least tern, a rare shorebird that nests on sandbars, is being considered for inclusion on the Federal endangered species list. The bald eagle, a bird already on the endangered species list, uses the forested area for winter roost sites and trees overhanging the flowing water areas as feeding perches.

DESCRIPTION OF THE ECOSYSTEM PRIOR TO SETTLEMENT BY MAN

Prior to settlement and development by man, the river width in the study area would have been much, much wider. Flows, unregulated by man, would have meandered from bluff to bluff. The width of the ecosystem would have been six times what it is today. The lands between the high banks (the bluffs) would have been ribboned with many side channels and oxbows.

Vegetation would have been somewhat similar to the species composition of today, but nowhere similar to the species relative abundance of today. A wide, free-meandering, uncontrolled, flooding river would have provided a much greater abundance of habitat for a much greater number of both plant and animal species. Also, uncontrolled natural fires would have added diversity to the ecosystem that is not present today.

Wildlife in the study segment would not be tremendously different in the species composition of today, with the exception of large herbivores and the grizzly bear. Abundance of wildlife, however, would be tremendously greater in presettlement times than today.

Fish, like the vegetation and the terrestrial wildlife would also be similar to the species composition of today; but again, the dominance and abundance of fish species in the community would be quite different.

WHY PRESETTLEMENT CONDITIONS CANNOT BE
APPROXIMATED BY ANY MANAGEMENT PLAN

The best management plan could not even come close to approximating the presettlement conditions of this Missouri River ecosystem mainly because any realistic plan must allow man to remain in the ecosystem. The only plan that could approximate presettlement conditions is the plan which would predominantly prescribe (1) the removal of man from the flood plain, and (2) the relinquishment of man's control of the flood stages of the entire upper Missouri River system. Such a plan would be highly unrealistic.

PLAN OF DEVELOPMENT
OF AN ECOSYSTEM MANAGEMENT PLAN

As a matter of fact, an ecosystem mangement plan is currently being developed for this ecosystem by the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the South Dakota Department of Game, Fish, and Parks, and the Nebraska Game and Parks Commission. An ecosystem management plan is being developed because this river reach has recently been designated the Missouri National Recreational River under the Wild and Scenic Rivers Act. This Act specifically requires the development of a fish and wildlife management plan for any river reach designated.

The plan of development manager and eventual principal writer of ^{the} plan is myself. I am currently employed by the U.S. Army Corps of Engineers as an Environmental Resources Specialist. I have recently outlined a one and one-half year plan of development for the management plan which has been fully coordinated with the other three agencies. This actual plan of development is presented on the following four pages. The following paragraphs explain why the tasks of the plan of development were selected.

The literature inventory was deemed necessary to enable all agencies involved in developing the plan to better understand the ecology of the 94 kilometer-long ecosystem. Such understanding will enable better management decisions to be made.

MISSOURI NATIONAL RECREATIONAL RIVER
FISH AND WILDLIFE MANAGEMENT PLAN
PLAN OF DEVELOPMENT

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TIME	TASK	WHO
1980 MAR APR MAY JUN	<u>INVENTORY LITERATURE</u> - Compile a bibliography, with abstracts (if available) of all ecological literature published, unpublished, and currently underway. Appropriate Federal and State agencies and State Universities will be contacted for input.	CORPS - Coordinate and prepare complete bibliography.
APR MAY JUN	<u>INVENTORY SEVEN CRITICAL EROSION SITES</u> - FWS will inventory sites and prepare a narrative which prioritizes which lands and/or land-use rights should be negotiated for prior to bank stabilization and why. FWS will circulate narrative to NGPC, SDDGFP, and COE for comment.	FWS - Inventory sites; prepare narrative. NGPC - Review narrative. SDDGFP - Review narrative.
APR MAY JUN	<u>INVENTORY AQUATIC HABITAT</u> - This task consists of the following: 1 - Scope tasks for a contract with Dr. James Schmulback, University of South Dakota - Vermillion to inventory aquatic habitat by field investigation. Write and secure contract. 2 - Inventory of aquatic habitat by Dr. James Schmulback. (1 June 1980 - 1 July 1981)	FWS/SDDGFP/NGPC - Scope contract tasks. CORPS - Write and award contract.

MISSOURI NATIONAL RECREATIONAL RIVER
FISH AND WILDLIFE MANAGEMENT PLAN
PLAN OF DEVELOPMENT

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TIME	TASK	WHO
1980 MAY THRU OCT	<u>FIELD INVESTIGATIONS</u> - Observe habitat conditions and write field notes when in the corridor for any reason.	FWS - Observations NGPC - Observation SDDGFP - Observati
JUL AUG SEP	<u>UPDATE TERRESTRIAL HABITAT INVENTORY</u> - Secure a purchase order contract by this time (July) to obtain color-infrared imagery of the river reach. Contract specifications will be 1:12,000 scale; 30,000-35,000 cfs releases from Gavins Point Dam; and imagery shall be cloudless and not taken within 3 days following a rainstorm. (Such specifications will allow a comparison of aerial imagery observed aquatic habitat to aquatic habitat mapped by Dr. Schmulback). Three sets of prints, with 30% overlap, will be obtained: one for COE, one for NGPC, and one for FWS and SDDGFP.	
SEP OCT NOV	<u>MAP TERRESTRIAL HABITAT</u> - Map terrestrial habitat from the color-infrared imagery. Reproduce and distribute maps to NGPC, SDDGFP, and NNRC.	FWS - Prepare maps CORPS - Reproduce distribute maps.

MISSOURI NATIONAL RECREATIONAL RIVER
FISH AND WILDLIFE MANAGEMENT PLAN
PLAN OF DEVELOPMENT

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TIME		TASK	WHO
1980	NOV	<u>ASSESS INVENTORY</u> - Identify habitat areas which should be preserved (i.e., marshes, roost sites, spawning areas), restored (i.e., overgrazed woodlands) and enhanced (i.e., marshes). Once identified, areas within each group (preserved, restored, and enhanced) will be prioritized as to its importance toward maintaining the diversity of species in the corridor. Trends occurring within the corridor will also be identified and a projection of their continuation over the next 5 years will also be made.	CORPS - Coordinate
	DEC		FWS - Coordinate NGPC - Identification and prioritization SDDGFP - Identification & prioritization.
1981	JAN	<u>ESTABLISH MANAGEMENT OBJECTIVES - MEETING</u> - Begin with those in the HCRS Management Plan and compile a list of specific and realistic objectives.	CORPS/FWS - Conduct meeting.
		<u>PREPARE DRAFT DETAILED MANAGEMENT PLAN</u> - This task consists of the following:	
	FEB	1 - COE will consult NGPC, SDDGFP, and FWS to determine each agency's management capabilities and restraints.	
	MAR		
	FEB	2 - COE will consult NGPC, SDDGFP, and FWS to obtain agreement on corridor units to be managed.	
	MAR		
	APR	3 - COE will consult NGPC, SDDGFP, and FWS to obtain agreement on form and context of a 5-year management plan.	
	MAY		
	JUN	4 - COE will prepare a draft plan.	

MISSOURI NATIONAL RECREATIONAL RIVER
FISH AND WILDLIFE MANAGEMENT PLAN
PLAN OF DEVELOPMENT

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TIME	TASK	WHO
1981 JUL	<u>REVIEW OF DRAFT PLAN BY ALL AGENCIES</u>	
AUG	<u>REWRITE OF DRAFT PLAN AND SECOND REVIEW</u>	
SEP	<u>WRITING OF FINAL PLAN</u>	

This task is currently underway and six pages of references have already been identified. Appendix A contains these pages of references..

The narrative planned for in the task entitled "Inventory Seven Critical Erosion Sites" will put down in writing, for all agencies to review, that existing habitat within the area of seven critical erosion sites that should be preserved or enhanced to maintain the integrity of the ecosystem. These seven sites, and others, have been authorized for stabilization under the Act. In those areas that are stabilized, the Federal government will purchase land-use rights for habitat preservation or enhancement. In some instances, when there are willing sellers, land will be purchased. Land-use rights will be secured by easement. Therefore, the narrative planned for in this task will be used as a basis for determining the "fish and wildlife" component of the easements.

The aquatic habitat inventory was deemed necessary mainly because such an inventory has never been undertaken on the subject river reach. The main product of this inventory will be a determination of the total surface areas of the eight aquatic habitat types in this river reach: main channel, main channel border, pool, sandbar, chute, marsh, backwater, and isolated pool or oxbow. This inventory will quantify the base in the river reach today that is responsible for the populations of fish and other aquatic organisms that are in the river reach today. Therefore, changes to this base can be monitored and

thereby allow better management decisions to be made.

The field observations will enable the planning team to better assess the inventory (see next paragraphs also) and document critical habitat which must be preserved and protected. A serious problem in this river reach that has not been previously identified in this paper, and one that must be reckoned with by the planning team is that land owners are clearing trees for crop production at a very rapid rate (an estimated 300 acres per year). Therefore, it is easily understood why critical habitat is in desperate need of identification.

The Color-infrared imagery was deemed necessary to obtain the most accurate map of the terrestrial habitat. The color-infrared imagery will permit (1) a more confident and accurate interpretation than black and white or color imagery, (2) not only quantification, but also qualification of vegetation, and (3) qualitative analysis of flow, depth, sediment transport-deposition, erosion, and bed form characteristics of the river system and its backwaters. Therefore, this imagery can be used by both the biologists and the hydrologists of the agencies. This imagery will also be a historical record of the ecosystem.

The terrestrial habitat mapping will enable quantification of the habitat in the river reach today that supports the wildlife populations of the river reach today. And, as with the aquatic habitat base, this terrestrial habitat base can be monitored, and thereby allow better management decisions to be made. Also, this mapping will allow management units to be planned.

The inventory assessment is the step needed to combine past research, recent field observations, and the projection of trends. This task is the defining of the ecosystem problems and needs. It is the foundation upon which the next task - the establishment of management objectives - is based.

The remaining tasks of the plan of development are believed to be self-explanatory.

INFORMATION LACKING WITH RESPECT
TO MAKING MANAGEMENT DECISIONS

Habitat needs of the many organisms in the corridor whose habitat needs have not been researched - such information is needed to insure management decisions do not significantly affect a species adversely.

Population counts of every species in the corridor - such base information is needed to enable the best monitoring of the effects of the management plan, and thereby allow the best future revisions of the management plan.