

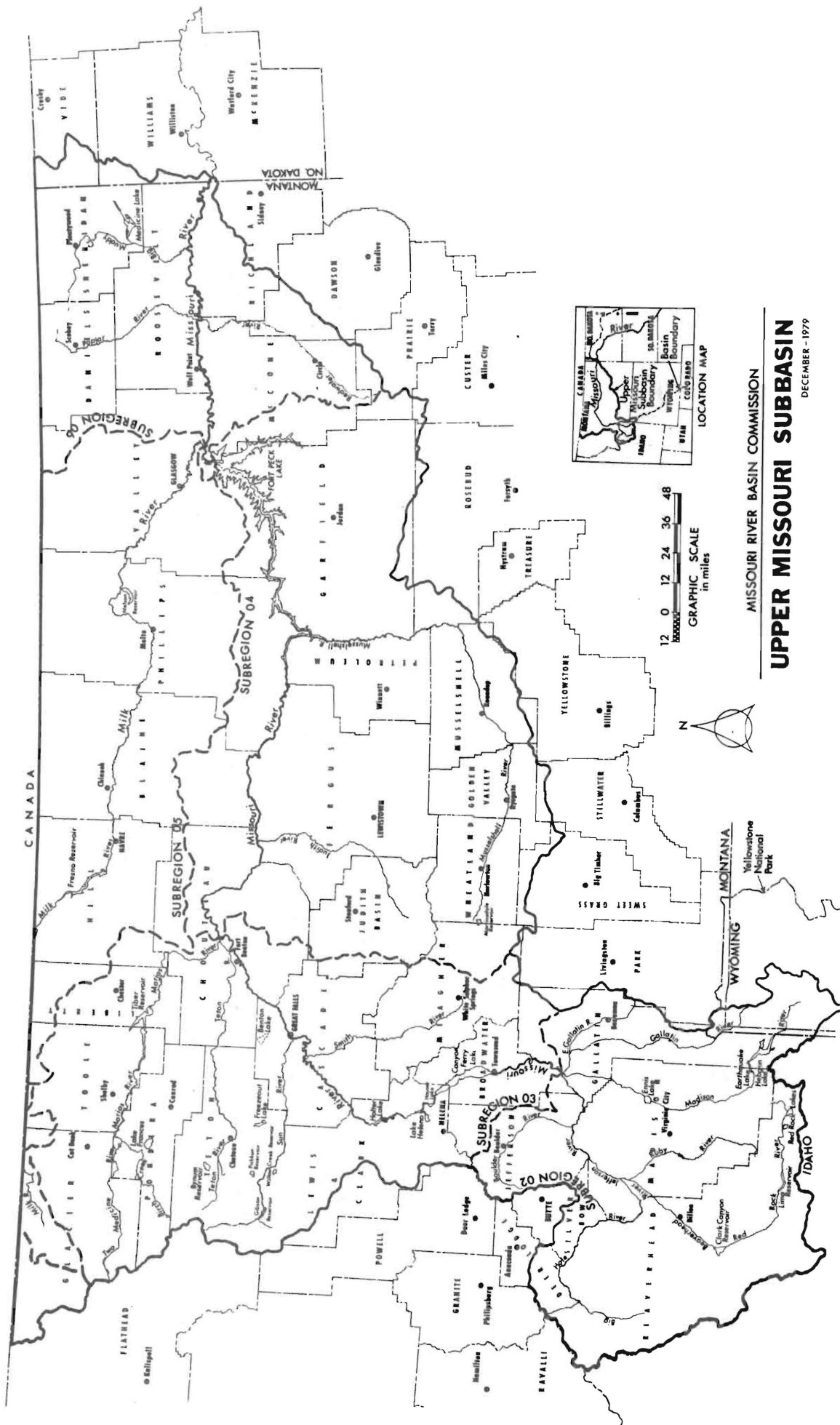
CHAPTER 3 - UPPER MISSOURI SUBBASIN

SUBBASIN DESCRIPTION

The Upper Missouri Subbasin is a 57.7 million acre area in the northwest part of the Missouri River Basin. As illustrated in figure 3-1, it includes the land drained by the Missouri River and its tributaries upstream from its confluence with the Yellowstone River at the western edge of North Dakota. The principal tributaries of the Missouri River include the Jefferson, Madison, Gallatin, Sun, Marias, Musselshell, and Milk Rivers. These rivers generally originate in mountainous areas and flow through level to gently rolling plains. Most of the subbasin lies in Montana with a portion in southern Canada and small areas in North Dakota and Wyoming. The subbasin extends 500 miles east to west, and has a north-south extent of 350 miles.

The topography is of two types: a series of intermontane valleys descending from the Rocky Mountains in the west; and a large tableland prairie, broken by deeply entrenched, narrow, meandering streams in the northern and eastern portions. Elevations range from 1,860 feet to 11,293 feet.

Grassland ecosystems are extensive on the plains. There are expansive areas of the mixed-grass, short-grass, or sagebrush grasslands as well as ribbons of flood plain forests and woodlands along major streams. Ponderosa pine or juniper woodlands are extensive in the upper Fort Peck and Musselshell drainage areas. Areas of croplands, usually under crop fallow systems, are dispersed throughout this subbasin. In the Fort Peck area, there are extensive antelope populations. Populations of prairie grouse, gray and chukar partridge, Merriam's turkey, and other native prairie species are relatively stable. Mule deer numbers have dropped slightly throughout the plains area, while the populations of bighorn sheep and elk have flourished within the Charles M. Russell National Game Range. The endangered black-footed ferret,



MISSOURI RIVER BASIN COMMISSION
UPPER MISSOURI SUBBASIN
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Figure 3-1 - Upper Missouri Subbasin

American peregrine falcon, and northern swift fox are believed to occur in several different regions of the subbasin.

In the mountain areas, vegetation is more diverse. Grasslands occur in the valleys while forests occur at higher altitudes. Alpine meadows occur at the highest elevations in most mountain ranges. Forests of aspen and lodgepole pine are found over a broad range of altitude but especially on lands having a history of fires or logging. Elk, bighorn sheep, and mountain goat inhabit several mountain areas with black bear, mule deer, and mountain grouse being more widespread. Rare predators include the mountain lion, fisher, pine martin, wolverine, and the Canadian lynx. Croplands found in intermontane areas and valleys are important for wildlife having moderate tolerance to human intrusion, especially deer and various exotics such as ring-necked pheasant and Hungarian partridge.

This subbasin also has a wide diversity of aquatic ecosystems including cold- and warm-water streams, alpine lakes, prairie-pothole complexes, many reservoirs, and thousands of stock ponds. Fishery resources of reservoirs and warm-water streams are generally of good quality. Important species include northern pike, walleye, channel catfish, yellow perch, and several species of centrarchids. Natural wetlands are found across extensive plains areas north of the Missouri River.

The population of the subbasin, estimated in 1975 to be 323,000, is expected to reach 500,000 by the year 2000. In 1975, the people living in urban areas constituted the majority of the population. The Great Falls Standard Metropolitan Statistical Area contained over one-fourth of the subbasin's population. However, the rural population is expected to increase by the year 2000. Presently about 1 out of every 5 persons employed is engaged in agriculture, and by the year 2000 it is estimated that this ratio will

decrease to only 1 person out of 10.

Production of small grains and livestock is the predominant source of income in the subbasin. Energy fuels, some mining, tourism and forestry also contribute to the economy. Small manufacturing and the service industry are rapidly growing sectors.

Almost all surface water in this subbasin originates as snow which falls on the Rocky Mountains. This snowmelt accounts for about 20 inches of runoff, while vast areas of the Montana plains contribute less than 1 inch of runoff in an average year. Many uncontrolled stream reaches pass 75 percent of their annual volume during the May and June thaw. This pattern presents problems for instream flow and offstream uses of water.

The subbasin contains the only international waters in the Missouri Basin. The Milk River originates in the United States, flows into Canada, and returns to empty into the Missouri River below Fort Peck Reservoir. An international treaty allows about 136,000 acre-feet of water to be imported from the St. Mary's River into the Milk each year.

In general, ground water is not as important a source of water as surface water in this subbasin. Limited quantities are obtained from small alluvial aquifers near streams. This supply is generally sufficient for domestic use. Extensive alluvial deposits which yield greater quantities of water are found along the Milk River. The most important high yield consolidated rock aquifer is the Madison Limestone where large quantities of water can be obtained especially in the east central part of the subbasin. The quality of the alluvial aquifers generally reflects the water quality of the supplying stream. The greatest contamination is due to salt intrusion from saline seep areas. High concentrations of sodium and chlorides limit use for industry and irrigation in the eastern part of the subbasin.

Instream use of water for the preservation of fish habitat and related recreational flows is important to the character and economy of the subbasin. Montana law permits reservation of water for instream flow purposes.

Maintenance of flows for hydroelectric power generation is another major instream use. Currently installed hydroelectric production capacity is 430 megawatts. Water releases are managed to sustain the highest power output consistent with existing functions. Additional proposed plants may require revising water releases.

The major off-stream water use is irrigation. Surface water is used for valley irrigation, which is common throughout the subbasin. Irrigation practices include meadow flooding during high spring flows and supplemental crop irrigation throughout the growing season. Irrigation water use is projected to increase by the year 2000. In addition, industrial water use for energy is expected to grow significantly. The availability of ground and surface water is judged to be adequate for most consumptive purposes in the future.

The waters in the State of Montana are considered to be public waters. An individual has the right to use water so long as he does not infringe on any rights of prior appropriation. In 1973, the Montana legislature adopted the Montana Water Use Act which established a uniform centralized system for the acquisition, administration, and determination of water rights. The basic concept of the doctrine of prior appropriations has been preserved, that is, the rule of "first in time, first in right." The permit system applies to all types of water appropriation including surface water, ground water reservoirs, and geothermal water. Beneficial use as defined by statute is one of the key criteria to determination of the entitlement of water use. The list of beneficial uses includes water for agricultural (including stockwater),

domestic, fish and wildlife, industrial, irrigation, mining, municipal, power, and recreational purposes. The use of surface water for slurry to export coal from the State is considered a beneficial use and not allowed in Montana.

PROBLEMS AND OPPORTUNITIES

The major problems in the Upper Missouri Subbasin include rural flooding, water shortages for irrigation, destruction of fishery habitat, upland soil erosion, limited access to water-oriented recreation areas and nonpoint source pollution. Other problems include flooding at a number of locations especially during spring runoff, additional sources of water supply needed for many communities, and developments that impair the natural and aesthetic value of many streams throughout the subbasin.

Rural flooding is common along the Milk, Judith, Musselshell, Sun, Upper Marias and Cut Bank Creek tributaries, and tributaries to the Gallatin, Jefferson, and Madison Rivers. This flooding causes streambank erosion and often adversely affects irrigation pumps, roads, bridges, and fences, and removes land from crop production.

The amount of irrigated acreage is steadily increasing in this subbasin especially along the Milk River. With limited supplies, the competition for water is intense. Many older surface irrigation systems need rehabilitation to increase efficiency of water use. Water users are often unable to finance the improvements needed. Throughout the subbasin, late season irrigation water shortages are common, especially along the Big Hole, Milk, and Musselshell Rivers.

High quality fisheries along Grasshopper Creek and Wise River are threatened by mine drainage from abandoned copper, lead, gold, and silver mines in the area. Thermal pollution on the Madison River below Ennis Lake has degraded the quality of that river's fishery. Other problems common throughout

the subbasin affecting fisheries include irrigation return flows, erosion due to improper land-use practices, municipal outflows, and dewatering of many streams. The lake level fluctuations at Fort Peck and Canyon Ferry Reservoirs have affected fish propagation.

Riparian habitat destruction is a major problem on many streams in this subbasin. Reasons for this loss of habitat are crop cultivation too close to the edge of the stream, livestock pasturing in the riparian zone, and highway and railroad development. While concern for habitat loss has greatly increased recently, no comprehensive inventory has been made to identify specific lands that have been damaged.

Excess water application, improper tillage practices, and overgrazing contribute to wind and water erosion and sedimentation problems. In 10 years up to 15,000,000 acres will be in need of land conservation treatment, due to these factors.

Tourism is a major industry in the subbasin and one which requires sound planning and management. The activities with the greatest need for additional facilities, access, or lands are hunting, developed camping, boating, and swimming. The locations expecting the greatest increase in recreation demand are lands adjacent to Yellowstone Park and the Missouri River segment from Townsend to Cascade, Montana. Natural resources must be protected to ensure continued attraction.

Spring runoff causes urban flooding at many locations. Some of the more severe problems appear at Great Falls on the Sun River, Roundup on the Musselshell River, and Glasgow and Nashua on the Milk River.

There are 10 communities in the subbasin with populations over 3,000, and all will need some type of improvement for water supply within the next 20 years. In addition, there are 132 communities that currently have or

anticipate having problems of water supply or quality before year 2000. The problems these communities face include construction of storage, treatment, and distribution facilities which they cannot afford.

This subbasin has exceptional natural and esthetic resources. Features include wooded river valleys or canyons containing free-flowing waters, badlands areas, rugged mountain ranges and forested landscapes, and many historical and cultural sites. A 149-mile reach of the upper Missouri River has been designated as a component of the national wild and scenic river system, and a segment of the Madison River between Earthquake Lake and Ennis has been identified as having outstanding wild and scenic values. Development often conflicts with the natural values of streams, especially streams suggested for designation in the national system of wild and scenic rivers. Water quality degradation, decreased flows, and stream-bank structures all contribute to impairment of the natural condition. The potential exists for development of cultural and historical resources at Fort Union National Historic Site along the Lewis and Clark National Historic Trail and on other Indian, national resource, and national forest lands.

Agricultural runoff is the principal nonpoint source pollutant; with contributions from mining and milling generations. Although these have virtually stopped, many years will be required for the streams to completely recover. Point source discharges are expected to remain a minor problem. Most of the municipal discharges are in the process of being corrected.

Most point source discharges are from municipal wastewater treatment facilities, specifically waste water lagoons. While this is an economically suitable treatment method for small Montana communities, a number have developed discharge problems.

Throughout the subbasin there are many Indian and Federal lands with

undefined water rights requiring definition in order to plan for effective water management.

The 1973 Montana Water Use Act identified instream flows as a beneficial water use. For this reason, Montana has an opportunity unique among Missouri River Basin States to reserve water for instream purposes. Currently, the Montana Fish, Wildlife and Parks Department is collecting data on several streams. Eventually these data will be the foundation for instream reservation applications in the subbasin.

National demands for more power may require assessment of new operating criteria and the possibility of installing additional capacity at hydropower dams throughout this subbasin.

PLANNING OBJECTIVES

Montana has a goal to have a comprehensive water resources management plan prepared by 1982. Montana recognizes the need to integrate its planning process with regional planning activities and to insure that its planning proposals provide for the efficient use of water resources while maintaining overall environmental quality.

Montana stresses the need to minimize flood damage, but places the initiative for flood plain regulation at the local level supported by State action.

Montana strongly endorses maintenance and enhancement of fish and wildlife habitat. To this end, the State permits the protection of instream flows.

Montana generally supports continued irrigation development where feasible. Montana also emphasizes the need to rehabilitate older systems in order to conserve water.

Protection of the productivity of soils, control of erosion, and reduction of sediment loading in streams and lakes are important objectives in Montana.

Incentives are encouraged to implement nonpoint source pollution control programs, including land treatment, bank stabilization, and other management practices.

Hydropower development is encouraged, provided there is State involvement. Montana is concerned about impoundments and their effects on the environment and the possible loss of good croplands. Montana law prevents the use of water for coal slurry pipelines and large water users may not change water use from agricultural to industrial purposes.

PLAN OVERVIEW

The plan for the Upper Missouri Subbasin includes the programs recommended in this chapter and the recommended basinwide, and statewide programs for Montana and North Dakota in chapter 2. Conclusions and additional recommendations for the subbasin follow the recommended programs in this chapter.

A large number of Soil Conservation Service small watershed programs are recommended in this subbasin, generally to resolve rural flooding problems. Structural flood control alternatives such as dams, levees, and large-scale channelization in some instances are not feasible. Nonstructural flood damage reduction measures such as decreasing use of the flood plain for cropland may be needed. Alternatives that might help to minimize the problem are a continuing program of channel clearing and snag removal, and a program to prevent sediment deposition in stream channels; but adequate funding for these programs is not readily available.

Irrigation development can serve a dual role, by both increasing agricultural production and stimulating the subbasin's economy. The importance of irrigation in the area is illustrated by the large number of irrigation programs recommended in the Upper Missouri Subbasin. Among those are programs

of the Montana Department of Natural Resources and Conservation to assist in irrigation development in small watersheds and to study the possibility of providing irrigation water storage and instream flows in the Big Hole Basin. The plan contains these Soil Conservation Service watershed projects in the subbasin emphasizing irrigation: the Beaver Creek, Boulder River, and Lower Birch Creek watersheds. Another recommended Soil Conservation Service program involves investigating the feasibility of irrigating additional acreage in the subbasin as well as studying the need to rehabilitate some of the older irrigation systems. On a statewide basis the Soil Conservation Service is determining the affects of timber harvest on water yield and sedimentation. The plan also recommends that the Water and Power Resources Service review possible rehabilitation and betterment of two older irrigation systems, Greenfields and West Bench.

A number of recommended multipurpose programs, underway or proposed, address upland soil erosion. Among these are several Bureau of Indian Affairs ongoing programs dealing with land conservation related to Indian reservations. They include the Bureau's Agricultural Resources Program, Forest Management Program, and the Range Stock Water Development Program.

A cooperative study being completed by the Soil Conservation Service is determining the effects of timber harvest on water yield and sedimentation.

Several programs recommended to control erosion, acid mine drainage, improper grazing and logging, and irrigation return flows are being conducted by the Montana Department of Health and Environmental Sciences through its Pollution Discharge Elimination System Program. Another important recommended program dealing primarily with point source pollution reduction and elimination throughout the subbasin includes the Farmers Home Administration's Water and Waste Disposal Grant and Loan Program.

Recommended efforts in the subbasin directed toward correcting urban flooding problems include the Army Corps of Engineers program to provide a flood control structure on the left bank of the Sun River to protect Great Falls, Montana. Other urban flooding problems remain unaddressed.

Needs for supplies of high quality water for small communities in the subbasin are being addressed by a number of recommended programs. The Water and Power Resources Service through its Water Management Study Upstream of Gavins Point, and the Water Planning Program of the Montana Department of Natural Resources and Conservation are examples. These efforts complement the programs of by the Farmers Home Administration referred to above. The National Park Service has an important program to correct water supply and quality problems at Glacier National Park.

RECOMMENDED PROGRAMS - UPPER MISSOURI

NAME, LEAD AGENCY, AND FUNCTIONS ADDRESSED DESCRIPTION

COMPREHENSIVE PLANNING AND SUPPORT ACTIVITIES

- 1-WATER MANAGEMENT STUDY UPSTREAM OF GAVINS POINT
 DOI/Water and Power Resources Service
 Comprehensive
 Also in Yellowstone, W. & E. Dakotas Subbasins

 Ongoing special study of water supply and use; scheduled to be completed in FY 81; total cost of \$871,000, \$136,000 of which is programmed to be spent in FY 81.
- 2-SNOW SURVEY
 USDA/Soil Conservation Service
 Comprehensive
 Also in Yellowstone & Platte-Niobrara Subbasins

 Ongoing data collection of hydrometeorological snow data to provide advance information on seasonal water supplies for regulation and management; FY 81 cost \$328,000.
- 3-HEADWATERS RC&D, MONTANA
 USDA/Soil Conservation Service
 Comprehensive

 Ongoing special study to provide local groups with assistance in conserving and developing natural resources; part in Pacific NWRB. total cost \$822,000.

FLOODING

- 4-SUN RIVER, GREAT FALLS
 Army Corps of Engineers
 Flooding

 Ongoing program implementation of flood control structure on left bank of Sun River that includes a levee and drainage conduit.
 Total cost \$8.5 million, FY 81 cost \$2.6 million.
- 5-FAIRVIEW WATERSHED PROJECT, MONTANA
 USDA/Soil Conservation Service
 Flooding

 Approved flood prevention project scheduled to begin in FY 81; Richland County, MT. and McKenzie County, ND; cost \$100,000.

6-FORT BENTON WATERSHED PROJECT, MONTANA
 USDA/Soil Conservation Service
 Flooding

 Approved flood prevention project scheduled for
 FY 82; Chouteau County, MT;
 cost \$150,000.

7-WOLF CREEK WATERSHED PROJECT, MONTANA
 USDA/Soil Conservation Service
 Flooding

 Approved flood prevention project scheduled to
 begin in FY 80; Judith Basin, Fergus County, MT;
 cost \$750,000.

8-TEN MILE CREEK WATERSHED PROJECT, MONTANA
 USDA/Soil Conservation Service
 Flooding

 Approved flood prevention project scheduled for
 FY 81; Lewis & Clark County, MT;
 cost \$1.5 million.

9-BOZEMAN CREEK WATERSHED PROJECT, MONTANA
 USDA/Soil Conservation Service
 Flooding

 Planning underway for flood prevention protect
 scheduled for FY 81; Gallatin County, MT;
 cost \$300,000.

10-CITY OF BROWNING WATERSHED PROJECT, MONTANA
 USDA/Soil Conservation Service
 Flooding

 Under construction flood prevention project
 scheduled for FY 82; Glacier County, MT;
 cost \$1.3 million.

11-BIG SPRING WATERSHED PROJECT, MONTANA
 USDA/Soil Conservation Service
 Flooding, Rec.

 Under construction flood prevention and recreation
 project; Fergus County, MT;
 cost \$7.8 million.

FISH AND WILDLIFE

IRRIGATION

12-UPPER MISSOURI BASIN COOPERATIVE SPECIAL STUDY
 USDA/Soil Conservation Service
 Irrigation, Land Cons. & Mgt.

 Ongoing special study to determine irrigation
 potential on projects of 1,000 acres or more
 scheduled through FY 81;
 total cost \$499,000, FY 81 cost \$48,000.

13-REHABILITATION OF EXISTING IRRIG. SYSTEMS COOP SP STUDIES MT
 USDA/Soil Conservation Service
 Irrigation, Land Cons. & Mgt.
 Also in Yellowstone and W. Dakotas Subbasins

 New start special study to develop inventory of
 problems and to identify costs and benefits to
 rehabilitate irrigation systems;
 FY 81 cost \$122,000.

14-BIG HOLE STUDY
 Montana Dept. of Natural Resources and Conservation
 Irrigation, Rec., & Instr. Flows

 New start special study of reservoir sites
 off stream for late season irrigation and
 benefits;
 total cost \$86,500 scheduled through FY 81.

15-GREENFIELDS REHABILITATION AND BETTERMENT PROGRAM
 DOI/Water and Power Resources Service
 Irrigation

 Ongoing program implementation that includes con-
 struction rehabilitation of an existing irrigation
 system.
 Total cost \$8.3 million scheduled through FY 81.

16-WEST BENCH PROJECT
 DOI/Water and Power Resources Service
 Irrigation

 Ongoing program implementation that includes con-
 struction rehabilitation of an existing 5,700 acre
 irrigation system;
 total cost \$3.8 million.

17-LOWER BIRCH CREEK WATERSHED, MONTANA
 USDA/Soil Conservation Service
 Irrigation

 Planning underway for an agricultural water
 management project for irrigation scheduled for
 FY 84; Pondera County, MT;
 total cost \$10 million.

18-BEAVER CREEK WATERSHED, MONTANA
 USDA/Soil Conservation Service
 Irrigation, Flood, Rec., and F&W

 Under construction irrigation, flood prevention,
 recreation, fish & wildlife project;
 Hill County, MT;
 total cost \$2.2 million.

19-BOULDER RIVER WATERSHED, MONTANA
 USDA/Soil Conservation Service
 Irrigation, Rec., and F&W

 Under construction irrigation, recreation, fish &
 wildlife project; Jefferson County, MT;
 total cost \$11.6 million.

LAND CONSERVATION AND MANAGEMENT

- 20-AGRICULTURAL RESOURCES PROGRAM, INDIAN RESERVATIONS
Ongoing implementation of program providing water and land resources management assistance; funded through FY 85.
DOI/Bureau of Indian Affairs
Land Conservation & Management, Water Quality
Also in Yellowstone Subbasin
- 21-Forest Management, Indian Reservations
Ongoing implementation of program providing forest management assistance; funded through FY 85.
DOI/Bureau of Indian Affairs
Land Conservation & Management, Flood, F&W, Rec., Water Quality
Also in Yellowstone Subbasin
- 22-RANGE STOCKWATER DEVELOPMENT ON INDIAN RESERVATIONS
Ongoing implementation of program to construct range water facilities on Indian lands; cost FY 81 \$40,000.
DOI/Bureau of Indian Affairs
Land Cons. & Mgt., Flood, F&W, M&I Rural Supply, Water Qual
Also in Yellowstone Subbasin
- 23-MONTANA TIMBER WATER FEDERAL-STATE COOPERATIVE SPECIAL STUDY
New start special study with SCS, ESCS, FS, and Montana DNR to determine effects of timber harvest on water yield and sedimentation; cost FY 80 \$115,000; FY 81 \$120,000; FY 82 \$145,000.
USDA & Montana Dept. of Natural Resources
Land Conservation & Management, Water Quality
Also in Yellowstone & W. Dakotas Subbasins
- 24-GLACIER NATIONAL PARK WATER SUPPLY
New start implementation of program to improve the drinking water facilities throughout the park; cost FY 81 \$2.5 million.
DOI/National Park Service
Municipal, Industrial, and Rural Domestic Water Supply

MUNICIPAL, INDUSTRIAL, AND RURAL DOMESTIC WATER SUPPLY

NATURAL, HISTORIC, AND CULTURAL RESOURCES

25-UPPER MISSOURI RIVER WILD AND SCENIC RIVER MGT. PLAN
DOI/Bureau of Land Management
Natural, Historic, & Cultural Resources

Ongoing implementation of program to develop and administer the Upper Missouri River as a part of the wild and scenic river system.
Annual cost \$200,000 through FY 85.

26-FORT UNION TRADING POST NAT'L HISTORIC SITE, MT & ND
DOI/National Park Service
Nat Hist & Cult, F&W, Rec, Water Qual, Legal & Inst,
Instr Flows

Ongoing program of implementation of a general management plan for a historic site.
Cost FY 81 \$50,000, FY 82 \$50,000, FY 83 \$20,000
FY 84 \$264,000, FY 85 \$1.1 million.

POWER AND ENERGY

27-FORT BENTON REFORMULATION, MONTANA
DOI/Water and Power Resources Service
Power and Energy, Flood, F&W, Rec.

Resumption of implementation study of a multi-purpose project in North-Central Montana.
Total cost \$402,000.

WATER-ASSOCIATED OUTDOOR RECREATION

TRANSPORTATION

WATER QUALITY

LEGAL AND INSTITUTIONAL

INSTREAM FLOWS

28-INSTREAM STUDY FOR THE MISSOURI RIVER WILD & SCENIC CORRIDOR
DOI/Bureau of Land Management
Instream Flows, F&W, Nat. Hist. & Cult.

New start research program to determine flow requirements for fish and other aquatic organisms in part of Missouri River above Ft. Peck Reservoir.
Total cost \$150,000, to begin in FY 80.

WEATHER MODIFICATION

CONCLUSIONS AND ADDITIONAL RECOMMENDATIONS

- A. Several problems and opportunities which are not being duly addressed by ongoing or programmed studies by State or Federal agencies have been identified in the Upper Missouri Subbasin. "The Upper Missouri River Basin Level B Study," to be completed in 1980, will address these problems, so they have not been fully addressed to the full extent possible during the course of the update.
- B. An appraisal level study by the Water and Power Resources Service for installing additional hydroelectric power facilities at Canyon Ferry, Tiber, and Gibson Dams will be updated in FY 1980. It is recommended that the Service conduct feasibility level studies for these projects beginning in FY 1981.
- C. The Army Corps of Engineers "Missouri River Review Report" recommended installing additional hydroelectric facilities in this subbasin at Fort Peck Dam. It is recommended that the Army Corps of Engineers receive authorization to proceed with advance planning for these facilities beginning in FY 1981.
- D. The State of Montana has applied to the Federal Energy Regulatory Commission for a permit to generate and market hydroelectric power from Broadwater Toston Dam. It is recommended that the permit be granted and construction be pursued to include modification of the existing structure and installation of six tube turbines and associated power facilities. Normal capacity would be 10 megawatts.
- E. The State of Montana has submitted a proposal to study irrigation water conservation in Montana. The study being considered by the U.S. Water Resources Council would: (1) assess the water use efficiency of several types of irrigation systems, both public and private, throughout Montana;

(2) identify the economic, legal, and institutional factors affecting irrigation water conservation; and (3) recommend an implementable program for enhancing incentives and removing disincentives to irrigation water conservation. It is recommended that this study be funded by the Water Resources Council.