# MONTANA'S WATER PLANNING PROGRAM

a report to the forty-ninth session of the montana legislature

JANUARY 1985

# MONTANA'S WATER PLANNING PROGRAM

A REPORT TO THE 49th SESSION OF THE MONTANA LEGISLATURE

by the

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January 1985

ACKNOWLEDGMENTS

Susan Higgins, Gerhard Knudsen, and Richard Moy were responsible for preparation of this publication. Gary Fritz and Jack Acord provided policy guidance and review. Other DNRC staff who provided technical assistance and critical review include Caralee Cheney, Richard Brasch, Carole Massman, Peggy Todd, and Sharleen Pendergrass.

Typing was accomplished by Julie Frickel and Sylvia Banschbach. Graphics were prepared by Don Howard. The cover photo was provided by the Montana Travel Promotion Bureau.

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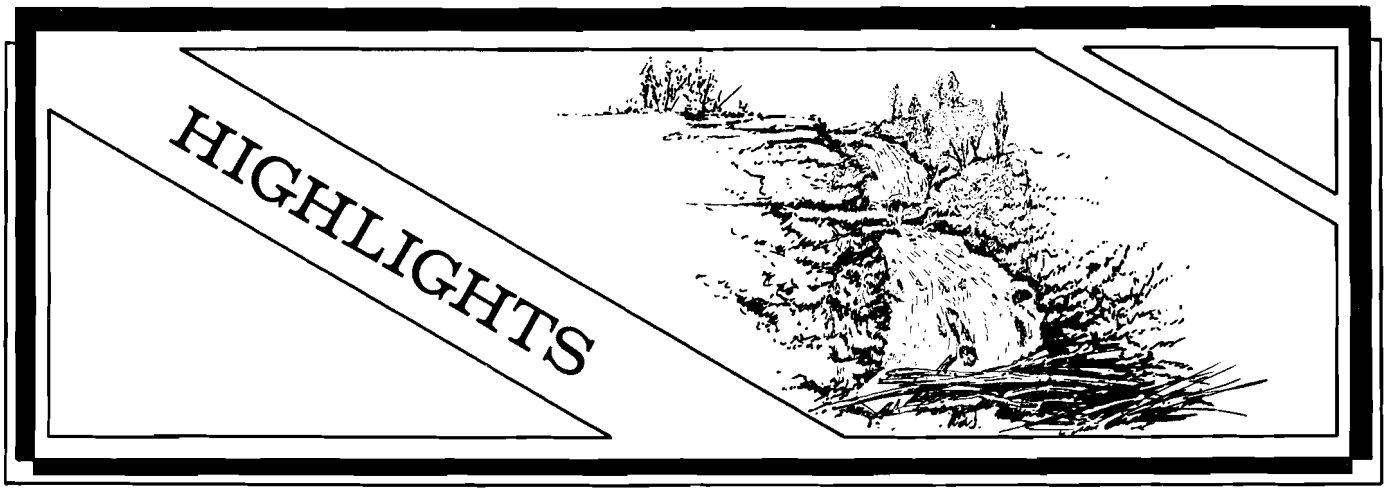



Purpose of this report.

This report responds to the requirement for biennial legislative review of the state water plan. Because prior planning reports prepared by the Department of Natural Resources and Conservation focus on water planning between 1967 and 1973, this document reviews progress made in the development of the plan from 1973 to 1984.

What is the state water plan?

As a result of the 1967 Water Resources Act, the development of a state water plan for Montana was set in motion. As required by law, a series of management plans were prepared for major river basins of the state. Collectively, these comprehensive basin plans are the foundation for the state water plan. In keeping with the spirit of the statute and basin plan guidelines, a number of problem-specific planning studies have been conducted to provide further refinement to the state water plan. It is clear that the state water plan cannot be a single, definitive "document," but rather an ongoing "process" that addresses key water allocation, quantification, and management issues. This dynamic process, bounded by statutory policies and guidelines, allows innovative study of a variety of specific, water-related problems. Although a great deal of effort has gone into the preparation of the state water plan, much work remains. Chapter IV of this report describes the important studies that should be continued or initiated to carry on Montana's water planning program.

What has been accomplished?

Formal water planning began in Montana with the establishment of the State Water Conservation Board in 1934. Today, water planning is directed by the Montana Department of Natural Resources and Conservation through its Water Resources Division, in concert with a number of other state and federal agencies. Water planning has become multi-objective and has shifted from a once

federally funded planning agenda to an effort funded and developed principally by the state. To date, a general statewide inventory of surface water resources has been achieved, and a more detailed analysis of current water uses is underway through a progressive water rights permit and adjudication program. A comprehensive ground water review also has been initiated. In addition, a framework of reconnaissance-level river basin plans has been prepared for Montana's major basins: the Clark Fork, Yellowstone, and Missouri. Examples of recent studies or programs that update the state water plan are described in Chapter III and include:

* Water Reservation Planning
* A Water Protection Strategy for the Missouri River Basin
* Transboundary Water Apportionment
* Water Development Planning and Implementation
* Ground Water Planning
* Hydropower Planning
* Irrigation Potential in the Missouri Basin

What lies ahead?

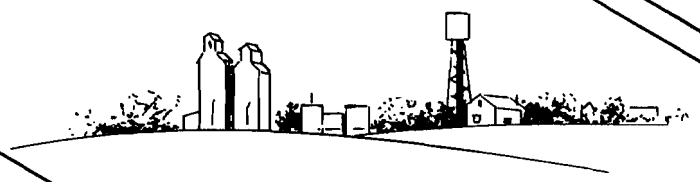
Looking ahead, the department intends to

--undertake the critical water planning analyses listed in Chapter IV of this report,

--continue the development and modification of the state water plan, and assure that the specific planning studies and recommendations prepared by the department are presented to and reviewed by the Board of Natural Resources and Conservation, and

--continue to inform and solicit opinion from the general public. This involves the establishment of basin-specific advisory committees, increased public involvement in planning activities, and the development of newsletters, films, and surveys.

# I INTRODUCTION



## FOCUS

In passing the 1967 Water Resources Act, the 40th Montana Legislature assigned water planning authority to what is today the Water Resources Division of the Montana Department of Natural Resources and Conservation (department). The act not only laid out general policies for the state to manage, conserve, use, and protect its water resources, but also required the development of a state water plan. Under direction of the department, this comprehensive water plan is to be formulated in sections corresponding to hydrologic divisions of the state, and then adopted by the Board of Natural Resources and Conservation (board). The department is also required to submit new sections of the state water plan to each general session of the legislature. In accordance with the directive, this progress report focuses on the status and achievements of the state water plan.

## WHAT IS WATER PLANNING?

Simply stated, water planning is the process of developing strategies and options to assure wise management of the water resource. Its goal is to establish various guideline water resource studies or plans. The most general are broad assessments called Level A plans or "Framework" studies. They focus on determinations of statewide or regional water availability, demand projections, water quality and quantity problems, and assessments of water policy and law. A framework study was partially completed in 1976 for the State of Montana. It defines the capabilities of the statewide resource as well as the general problems requiring further study.

Level B plans, or Type IV studies, are regional river basin plans which accomplish the same objectives as Level A plans, but are more detailed and go a step further to develop general action plans for solving long-range water resource problems. It is not uncommon for a Level B study to address the needs of a variety of water users, and the basic steps that can be taken in a region to manage the resource. In association with federal agencies and river basin commissions, the department has prepared Level B

plans for Montana's major river basins. They serve as a resource base and guideline for the planning undertaken in Montana today to solve critical problems.

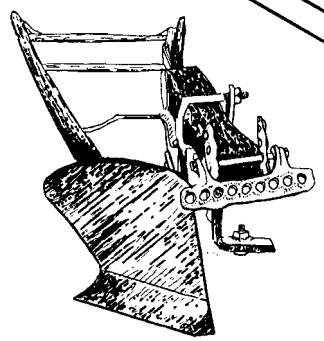
Undoubtedly the most effective planning is accomplished through the Basin Management Implementation Study, or Level C plan. A logical offshoot of a Level B plan, the implementation study is specific to each sub-basin or problem. It responds to public and agency support for solving a particular water-related problem. The Milk River water supply plan being prepared by the department, the U.S. Bureau of Reclamation, and the local Milk River irrigation districts is an example of an implementation plan. Based on findings from Level B and other studies, this is a plan for the development of specific means to overcome present and projected water shortages in the basin.

## THE CHANGING ROLE OF THE STATES

Clearly, Level A and Level B plans are broad, long-term approaches for examining the regional situation. Implementation plans, on the other hand, constitute an "adaptive" planning approach whereby special analyses are coordinated in response to shifts in economic and social events. This more flexible approach characterizes water planning in Montana today. However, during the 1930s, most water planning examined the large-scale, long-term regional needs. It began at the federal level, spurred by a need for interstate development of large multi-purpose water projects. The states took little part in this planning. Today, with the advent of increased federal/state cost-sharing and the termination of federal planning grants once provided under Title III of the 1965 Water Resources Planning Act, the states are taking the lead in planning for the wise management and use of their water resources.

As the states take the lead, the emphasis has diverged from the classic basin planning approach to problem-specific planning. Using Level B plans as a foundation, it has changed from long-range federal project development to an examination of distinct water management needs within the state. This trend holds for such states as Idaho, California, Nebraska, South Dakota, and Illinois where the interest in preparing rigid state water plans has changed in favor of dynamic program review and policy development. Such an approach leads, in turn, to workable decisions designed to resolve water problems and issues. Similarly in Montana, the state water plan is formed through the regular development of specific, realistic, and timely water management studies that are guided by the basin plans required by statute.

# A HISTORY OF WATER PLANNING IN MONTANA



II

## FEDERAL INVOLVEMENT

Involvement by the federal government in water resources planning and development began with a provision in the U.S. Constitution authorizing Congress to regulate commerce and navigation among the states. However, federal water planning did not begin to unfold in Montana until 1884 when Congress established the Missouri Basin Commission to oversee regional planning of federal flood control and navigation projects. Near the turn of the century, the U.S. Army Corps of Engineers became active in western flood control activities, and the Bureau of Reclamation was formed to promote irrigation development.

With the expansion of railroad transportation to the West, families from eastern states began moving into previously undeveloped areas of Montana. Many of these areas lacked sufficient water to support agriculture, so homesteaders petitioned Congress for aid in obtaining irrigation projects for their lands. Washington responded by passing the Carey Land Act in 1894 which granted one million acres to each of the western states on the condition that the states develop the granted lands. It was not until the 1930's depression that national programs such as the Tennessee Valley Authority were organized to ensure, in part, the comprehensive development of an entire drainage basin while providing an economic boost to the area. Before this time, the federal agencies dealt with development of single-purpose projects.

The concept of regional multi-purpose basin planning became a reality in Montana when Congress passed the 1944 Flood Control Act. This act authorized a system of six mainstem Missouri flood control dams, including the Fort Peck Dam in Montana, and required that their operation for navigation could not interfere with upper basin water development. Other regional planning was completed between 1946 and 1967 by the Columbia Basin Interagency Commission, comprised of representatives from several western states. This commission set guidelines for the study of water development and conservation needs in the Columbia River Basin; the resulting publication was titled the Columbia-North Pacific Comprehensive Framework Study.

Another plan, called "Westside," was initiated under the direction of the Bureau of Reclamation as authorized by the 1968 Colorado River Basin Project Act. This plan was to present the projected water needs of western states to Congress for use in studying future national water problems. In addition to identifying Montana's pressing water-related problems, the act also established a moratorium on diversions from other basins into the Colorado River Basin until 1978.

With the passage of the Water Resources Planning Act in 1965, federal river basin planning gained momentum. River basin commissions were established throughout the United States under Title II of the act to oversee interstate basin-wide water resources planning. Montana was a member of the Missouri River Basin Commission and the Pacific Northwest River Basins Commission, both of which were active in developing Level B plans in those basins.

The act also authorized the allocation of Title III planning funds to the states. For sixteen years Title III funds were available annually to the department for a variety of water planning projects. They were administered by the U.S. Water Resources Council, which developed national water policy and coordinated water and related land resources planning among the states. Although many of its provisions have not been reauthorized, the act laid the groundwork for the development of a continuous water planning program in Montana. The river basin commissions were terminated in 1981, although today the Missouri Basin States Association carries on many of the coordination activities of the former Missouri commission. Clearly, the Water Resources Planning Act served to promote formal water planning in Montana.

Another important action during this formative period was the development of the "Principles and Standards" in 1973 by the Water Resources Council. The report outlined methods for achieving national economic development and environmental goals in federally assisted water plans and programs. This effort to standardize water planning was later criticized because of the cost and time required to complete a full analysis. The standards were replaced by the "Principles and Guidelines," used today to examine how development of federally assisted water projects contributes to national economic development.

Federal planning activities have been exceptionally valuable in shaping Montana's water planning program; much of our water planning could not have been accomplished without the contributions of federal agencies and the availability of federal funds. Under current national water policy, however, federal water planning funds are not available, and state-level involvement and cost-sharing in water planning are receiving more emphasis. Montana is, therefore, continuing to develop its own sound water planning program.

## STATE ACTIONS

Montana's first attempt at water planning followed federal passage of the federal Carey Land Act. The 1895 Montana Legislature created an Arid Land Commission, which became the Carey Land Act Board in 1903. This board, directed by the Governor, Secretary of State, and Attorney General, surveyed and later constructed a number of irrigation projects on

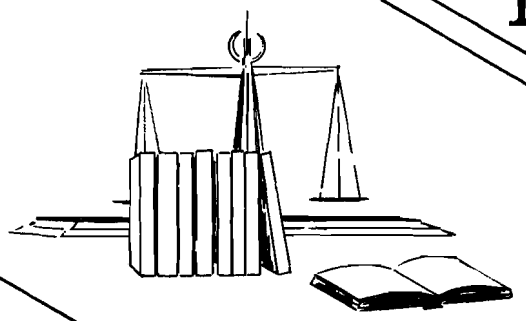
the federal lands which had been granted under the act.

During this same period, in 1902, a second state water management agency was created--the State Engineer's Office. It was concerned with surface water and ground water rights, the Well Drillers' Examining Board, and water agreements between Montana and other states. The State Engineer inaugurated the Water Resources Survey, a valuable series of reports prepared for almost every county in Montana between 1942 and 1977. These surveys contain an examination of water rights, water uses, and irrigation development, and today, continue to provide basic information for many planning activities. In 1965, the Montana Legislature abolished the office of the State Engineer and the Carey Land Act Board and transferred both functions to the Water Conservation Board.

The Montana Irrigation Commission had the responsibility, from 1919 to 1921, of producing extensive county plans for irrigation development. Later, the nationwide depression of 1933 coincided with severe drought conditions in the central plains, threatening to destroy Montana's farming and livestock industries. That year, a special session of the Montana Legislature passed House Bill 39, which was amended in 1935 by the State Water Conservation Board Act. The act required the construction of a system of works, through state or federal funding, for the conservation, development, storage, distribution, and utilization of water. Nearly all water storage or distribution projects currently administered by the department were constructed during the 33-year tenure of the Water Conservation Board. Approximately 180 projects were developed, and are managed today for recreation, flood control, irrigation, municipal supply, and potentially, for hydropower generation. Most of the projects are now managed by local water-users associations.

In 1967, the Montana Legislature took significant action to coordinate development of the state's water resources. Under directives of the Water Resources Act, the Water Conservation Board was abolished, and its powers and duties were transferred to the Water Resources Board. In addition, the act designated the Water Resources Board as the agency responsible for preparing a water resources inventory and a comprehensive, coordinated, multiple-use state water plan. In 1971, under the Executive Reorganization Act, the Montana Water Resources Board became the Water Resources Division of the Montana Department of Natural Resources and Conservation.

# III MONTANA'S WATER PLANNING PROGRAM



WHAT IS THE STATE WATER PLAN?

The Montana Water Resources Act of 1967 is the legal basis for a statewide comprehensive water planning effort. It directs the department to prepare a water resources inventory and formulate a comprehensive state water plan (see Appendix A). The Act also sets forth broad new policies to guide this planning mandate. In short, the state is required to:

- optimize beneficial water use and avoid wasteful practices
- help secure economic and social prosperity through wise water use
- coordinate water development
- protect existing water uses and make assurances for future needs
- protect supplies for recreational, fishery, and wildlife needs
- construct diversion and storage works for the benefit of Montana citizens
- coordinate federal, state, and local water management activities
- coordinate the development of water with the development of all other natural resources in the state
- restrict ground water speculation

These policy objectives clearly point to a need for thoughtful planning and management of Montana's water resources. The final objective states that

> to achieve these objectives and to protect the waters of Montana from diversion to other areas of the nation, it is essential that a comprehensive coordinated multiple-use water resource plan be progressively formulated, to be known as the "state water plan." (Section 85-1-101, MCA)

Given this directive, the state water plan has become a series of

Level B basin plans upon which specific water resources studies and plans are founded. Level B plans have been prepared for the major basins in Montana, but they alone cannot constitute the state water plan; new legislation, unanticipated issues or problems, and shifts in environmental values lead to plan obsolescence. Nor do Level B plans contain the detail needed to address water management problems in detail. Therefore, new efforts are being directed to Level C planning activities which address present water-related problems. Because of this, the state water plan, although founded on a solid inventory base and a framework of comprehensive Level B basin studies, is not intended to be a finished product.

In keeping with the mandate of the 1967 Water Resources Act, the department coordinated the development of a state water plan to correspond to major river basins within the state (figure 1). The planning process has evolved into three phases--resource inventory, plan formulation, and implementation--each of which is described more fully in the following sections.

Inventory

The water planning statute is explicit in its mandate requiring the department to

> gather from any source reliable information relating to Montana's water resources and prepare therefrom a continuing comprehensive inventory of the water resources of the state. In preparing this inventory, the department may conduct studies; adopt studies made by other competent water resource groups, including federal, regional, state, or private agencies; perform research or employ other competent agencies to perform research on a contract basis; and hold public hearings in affected areas at which all interested parties shall be given an opportunity to appear. (Section 85-1-203(1), MCA)

The inventory has been developed in several phases which are discussed below.

1. Water Resources Surveys. The Water Resources Surveys, conducted between 1942 and 1977, serve as the foundation for this inventory. These county-specific reports contain information on water rights, irrigated and irrigable lands, and general water uses. Of Montana's 56 counties, only the Beaverhead County survey has not been completed, and the surveys of Daniels, Fergus, Garfield, Petroleum, Roosevelt, and Sheridan counties are available, but not published. All other surveys have been published and are used by a number of agencies and individuals.

2. Inventory Series. The department has also completed an extensive Inventory Series, a compilation of information ranging from water law to potential storage projects. The publications comprising the Inventory Series are listed in Appendix B.

3. Water Data Collection. Although the Inventory Series is comprehensive, considerable time has been devoted to collecting additional, updated water resource data. For example, new information has been compiled on present water uses in Montana. In a report to be published as part of the U.S.

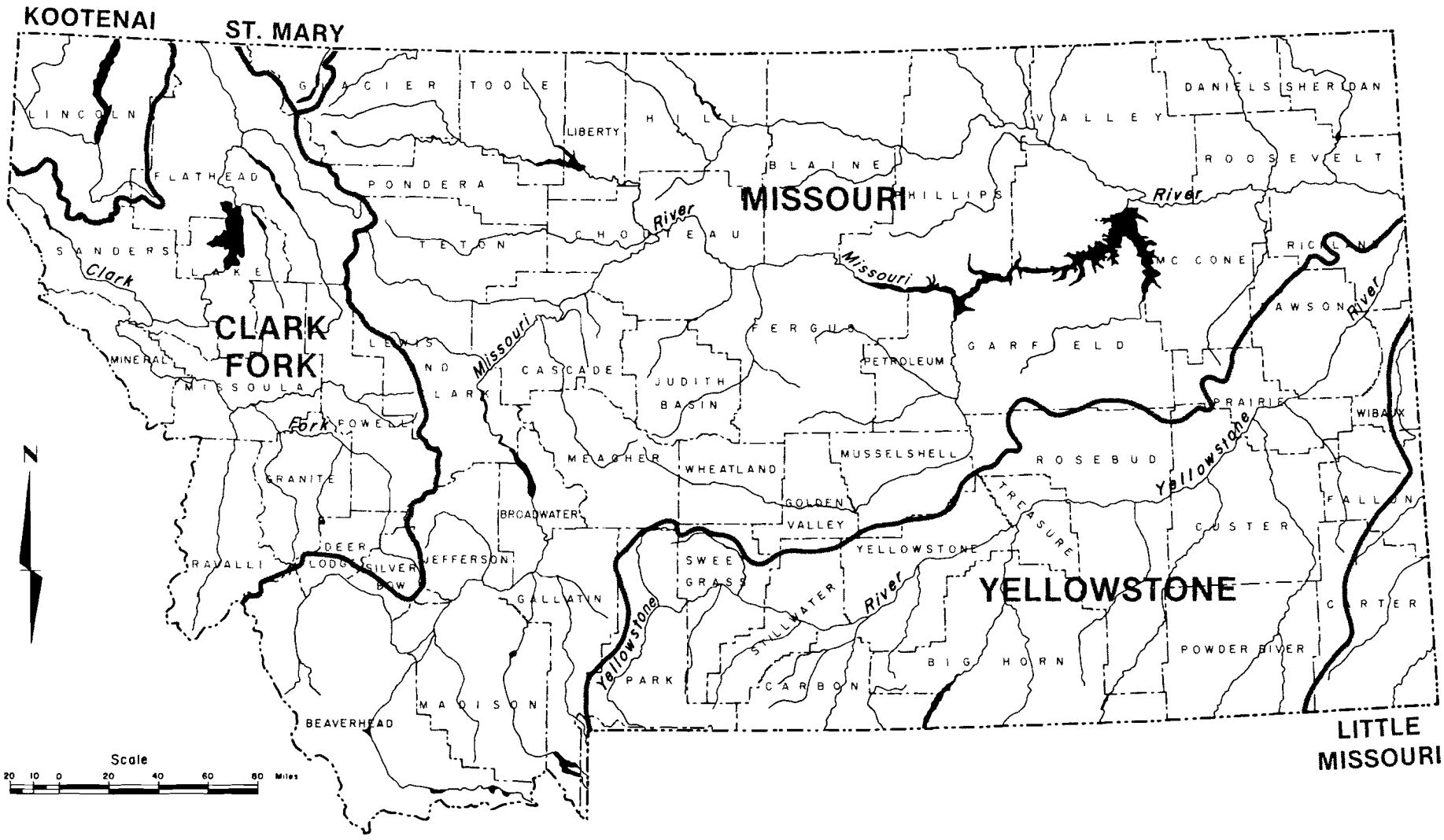



FIGURE 1. MAJOR RIVER BASINS IN MONTANA

Geological Survey (USGS) National Water Use Data System, information will be presented on 1981 water use by basin, county, and type of use. Also in cooperation with the USGS, an ongoing statewide stream gaging program provides valuable water supply data. This program is modified yearly to assure that data are collected on critical streams. A similar program, in concert with the Montana Bureau of Mines and Geology, involves collection of ground water data through a statewide well monitoring program.

In addition to data collection, the department continues to improve its water resource data base. For many areas in Montana, computer models have been developed which estimate surface water availability and simulate ground water flows. Another aid is the Soil Conservation Service IRRSYS model (Computer Program for Irrigation Delivery System Analysis), used to design and price irrigation systems. The department's linear measuring system (LMS), linked with a computer, has made it possible to efficiently determine existing irrigated acreages.

4. Water Rights Adjudication and Permit Programs. Perhaps the most progressive elements of the water resources inventory are Montana's water rights permit and adjudication programs. These programs, authorized by the 1973 Water Use Act, are the cornerstones of state water planning and management. They provide an accurate inventory of existing water rights and thus are valuable tools for protecting current water users, negotiating water compacts, planning for future development, and resolving water allocation conflicts. The permit program assures that every water use established since 1973 has been reviewed by the department, and that a record of authorized permits is maintained in a computerized data system. The adjudication program was spurred by passage of Senate Bill 76 in 1979 and required those who appropriated water before 1973 to file a claim which would later be adjudicated, or legally defined, by the Montana Water Courts. As of January, 1985, 25 preliminary or final decrees that list the quantified rights had been issued. Sixty basins must be adjudicated to complete the program.

5. Data for Reserved Water Rights Negotiation. Along with verifying pre-1973 water claims, a goal of the adjudication program has been to quantify the Indian and non-Indian reserved water rights protected for tribes and federal agencies under federal law. The department, as staff to the Reserved Water Rights Compact Commission, has been charged with obtaining technical information for quantifying the reserved rights of the tribes. Its tasks include the identification of irrigable lands within Montana's seven Indian reservations, and the determination of water availability, instream flow needs, and existing uses on federal and tribal lands. The U.S. Departments of Agriculture, Defense, and the Interior are in the process of negotiating federal reserved rights for uses on Indian reservations, national parks, national forests, wildlife refuges, and military reserves.

## Plan Formulation

After establishment of a water resources inventory, plan formulation is the logical second phase of the state water planning process. This phase includes an identification of study needs and the development of plans that focus on effectively managing the water resource for long-term benefits.

These studies cover many areas, ranging from small watersheds to an entire river basin. Some have statewide implications. The formulation of a specific plan consists of the following basic steps.

1. Water Policy Consideration. A progressive water planning program must reflect the statutory water policies for the benefit of all Montanans. The legislature initiates specific directives based on these guidelines, often as a result of department recommendations or requests from the public.

For example, a study initiated by the department in 1979 examined current water policies in detail and recommended modifications needed to resolve changing resource management issues. As part of this review, the governor appointed a 17-member Water Policy Review Advisory Council to work with the department. Issue papers involving dam safety, water quality-quantity integration, flood plain management, data collection and management, allocation of water in highly appropriated basins, and water development were prepared by the planning staff. The council then adopted a position on each issue. A report summarizing these water policy approaches was completed in 1981. Each summary statement presents a revised policy, its need, and any funding or legal changes required for implementation. The publication is designed for public, legislative, and state agency reference as water-related programs are developed.

Several other committees, boards, and councils provide valuable assistance in developing the department's water planning policies. The department is assisted foremost by the Board of Natural Resources and Conservation, a quasi-judicial, decision-making body. Its members are appointed by the governor and provide direction on planning activities brought before them. The Water Development Advisory Committee also assists the department in making recommendations to the legislature regarding water development project funding. Permanent and interim legislative entities provide other relevant guidance. The groups include the Environmental Quality Council, the Select Committee on Indian Affairs, and the Select Committee on Water Marketing. Collectively, these committees assist the department as it monitors water resources legislation and prepares comments for congressional or gubernatorial consideration.

Direction from regional planning organizations is vital to development of interstate and federal water policy. The department maintains an active membership to the Missouri Basin States Association and the Western States Water Council; its representative has served as president and chairman of these organizations. Both interstate groups are influential means through which Montana can join other western states in designing resolutions to guide federal policy. The department is also an active member of the Interstate Conference on Water Problems, a national water resources policy development forum.

2. Public Involvement. Knowledge of public sentiment toward water issues is integral to development of a planning study. Many problems are identified in public meetings and hearings. Such meetings were crucial during the preparation of Level B plans. Public hearings are also an important component of water rights proceedings, especially in cases of water use conflicts. Many productive hearings and meetings were conducted,

for example, for reviewing the Yellowstone reservation process (1976-78), the Tongue River Dam rehabilitation project (1983), and the Milk River Basin Water Supply Study (1984). The department has also relied on public response to surveys, like surveys of irrigators in the Clark Fork and Milk River Basins to determine irrigation needs, and of water users throughout the state to compile 1981 water use figures.

Public and special interest groups also help determine the focus of a planning study. Examples of these groups include the Clark Fork Coalition, the Montana Environmental Information Center, and the Montana Association of Conservation Districts. Also of note, between 1981 and 1984 the department co-sponsored a number of conferences on ground water and water issues in Montana, all of which solicited ideas from and disseminated information to the public.

3. Plan and Study Development. Water policy directives and public participation guide a plan development process that uses a team of water resource planners, hydrologists, geohydrologists, soil scientists, and economists. Depending upon the nature of study, the planning team will seek advice and assistance from federal agencies such as the USGS, the Bureau of Reclamation, and the Corps of Engineers, and from state agencies including the Department of Fish, Wildlife and Parks, and the Department of Health and Environmental Sciences. Most planning studies require the team to consider constraints on the available water supply; conjunctive surface and ground water uses, trade-offs between water quality and water quantity, economics, and other aspects are considered. Using information from the water resource inventory and current water use data, the team is then able to quantify the resource. In turn, these results are used to assess legal issues and determine available water supplies for future uses. Within the past five years, comprehensive water availability studies have been prepared for the Milk River Basin, the Big Hole River Basin, portions of the Missouri River drainage, the Yellowstone Basin, and for areas upstream of large hydroelectric facilities in the Clark Fork Basin. They are the guiding documents for future action.

A final element of the detailed planning study involves the initiation of water research needed to supplement available information. Montana's Water Resource Research Center, located in Bozeman, promotes applied research. Examples of recent assistance provided by the Center include development of a strategy to finalize the international Poplar River water apportionment and a study to examine the effects of hydropower on fisheries. A department planning function involves participation on an advisory council that ranks research proposals, thereby focusing research on important problems.

## Implementation

Implementation of study recommendations is the logical culmination of the water planning process. Although implementation is not mandated by statute, it is frequently an end product of the process. Certain plans require legislative action as a precedent to their implementation. Others deal with area-specific problems and require action by local organizations. A department goal is to recommend actions that assist plan implementation. Many of these plans have been carried out.

Examples include implementation of the department's water development program and of water reservations in the Yellowstone Basin following extensive efforts to quantify future water resource needs.

## PROGRESS MADE IN STATE WATER PLAN DEVELOPMENT

In developing the state water plan, the most logical approach has been preparation of reconnaissance-level basin plans, followed by a refinement of the plans, as needed, through detailed investigations.

### Basin Plans

Reconnaissance-level plans--broad statewide and region-wide planning studies--have been prepared for most regions of the state. They include framework studies and Level B (or Type IV) basin plans. In 1976, the department prepared the Framework Report. Serving as a transition between the inventory and plan formulation phases, the Framework Report presents an overview of Montana's water and related land resources. Representing several years of work in the water planning field, it discusses the legal authority for river basin planning in Montana, the state water planning methodology, and the extent of Montana's water and related land resources.

The Montana Level B plans predict demands within 15 to 30 years and offer recommendations to be pursued by federal, state, and local entities. They investigate selected areas where problems are so complex that an intermediate planning step is needed between Framework (Level A) and implementation (Level C) studies. The statute requires the department to

> formulate and, with the approval of the board, adopt and from time to time amend, extend, or add to a coordinated multiple-use water resources plan known as the "state water plan". The state water plan may be formulated and adopted in sections. These sections corresponding with hydrologic divisions of the state.... Before adoption of the state water plan or any section thereof, the department shall hold public hearings in the state or in an area of the state encompassed by a section thereof if adoption of a section is proposed. (Section 82-1-203(1),(2), MCA)

To date, Level B basin studies have been prepared for all of Montana's major river basins, except for the Kootenai Basin. These studies are summarized below.

1. Clark Fork of the Columbia River Basin. This study was completed in 1977 by the U.S. Soil Conservation Service in cooperation with the department. The basin encompasses portions of ten western Montana counties, the entire Flathead Indian Reservation, and over half of Glacier National Park. A sub-basin of the Columbia River Basin, the 13-million-acre Clark Fork is primarily mountainous, forested, and water-rich. The study examined the basin economy, the status of the mineral and forest industries, and potential agricultural, recreational, and environmental opportunities. The preferred basin management plan promoted a mix of national economic development and environmental quality protection to be accomplished by the year 1990. Recom-

mendations included (1) storing 28,000 acre-feet of excess spring runoff in three reservoirs and two lakes for the late-season irrigation of presently irrigated land; (2) improving the municipal water systems of 20 towns through the upgrading of water quality, supply, and distribution systems; and (3) reserving minimum streamflows to maintain the fishery.

2. Flathead River Basin. The Flathead River Basin is a sub-basin of the Clark Fork River Basin, located west of the Continental Divide and comprised of over five-million acres of scenic mountains, canyons, and broad valleys. The basin is water abundant, yet characterized by conflicts between exceptional environmental qualities and continued industrial activity. Because of this conflict, the Flathead Level B Study was completed in 1976 following three years of planning by an interagency study team directed by the department and the former Pacific Northwest River Basin Commission. Through a public survey, the study identified water-related problems and needs, provided information to lawmakers, and assigned future planning tasks to appropriate agencies. The selected alternative would attempt to balance the economic and environmental requirements of the Flathead Basin through the year 2000. Some of its recommendations called for (1) improving Ashley Creek water quality; (2) establishing minimum stream flows and lake levels; and (3) assuring supplemental water supplies to 127,000 acres of irrigated land. The Flathead Level B study has been adopted formally by the board as a component of the state water plan.

3. Yellowstone River Basin. A comprehensive interagency study of the 123,000-square-mile Yellowstone Basin in Montana and Wyoming began in 1976. It was spurred by threats of coal development resulting indirectly from the 1973 mideast oil embargo. Through direction by the former Missouri River Basin Commission and financial and professional assistance from state and federal agencies, The Yellowstone River Basin and Adjacent Coal Area Level B Study was completed in 1978. Four of its volumes examined regions of the Yellowstone Basin situated in Montana: the Upper Yellowstone, the Clark Fork-Bighorn, the Tongue-Powder, and the Lower Yellowstone. The preferred plan identified irrigation potential, land conservation needs, fishery requirements, and storage potentials that could be accomplished within the 1975-2000 time frame.

Another critical basin study was completed by the department in 1976. The Yellowstone Impact Study commenced not only in response to foreseen agricultural and industrial conflicts, but principally because of an action taken by the 1974 Legislature which placed a moratorium on major water appropriations in the basin for four years. During this time, the department studied basin water availability and future water needs in an effort to guide the allocation of a limited water resource. The information was used by the board before its 1978 order allocating the resource through a basin-wide reservation proceeding. The research culminated in a summary and eleven technical reports that identify three possible levels of future agricultural, industrial, and municipal development and their associated streamflow depletions. The effects of these levels of depletion on river morphology, water quality, migratory birds, resident mammals, recreation, and existing water users were analyzed.

4. Missouri River Basin. The Upper Missouri Basin Level B Study resulted in a 20-year plan to coordinate water and related land resource management in Montana's largest river basin. Organized by the Missouri River Basin Commission, the final report was produced in 1981 by study teams representing federal, state, local, and private entities. It is the final Level B plan of a series that addresses water problems and needs throughout the state. Consisting of fifteen technical studies and a summary report, the Missouri Plan investigated potential water resource uses, ranging from agriculture to water quality. The recommended plan identified actions needed to reduce flood damages by 23 percent by the year 2000, to improve water quality by means of streamflow reservations, and to protect wildlife through habitat preservation.

Detailed Planning Studies

Plan refinement is a key phase in the formulation of the state water plan. Because basin plans are broad and do not address specific problems and issues in detail, the department combines basin plan findings with other technical studies to create an information base for detailed investigations. The publications listed in Appendix C provide an indication of the types of specific investigations that have merited attention since 1973. Recent examples of important detailed planning studies are discussed below.

1. Water Reservations. In the last decade, the need to quantify future water uses has been the thesis of many department planning efforts. The reason for this is quite evident--the threat of inequitable, and perhaps inefficient, water use due to the demands of downstream states, or from potential large-scale, in-state developments. It is apparent the department must sustain the planning effort needed to define and protect Montana's future water use options.

A monumental planning tool, embodied in the 1973 Water Use Act, allows public entities to reserve and legally protect water for instream and future uses. To date, the Yellowstone River Basin is the only area of the state where water has been reserved for instream needs and future consumptive demands. The process was launched in 1974 with enactment of the Yellowstone Moratorium, a legislative suspension for four years of all large water use permit applications. The moratorium afforded the time needed to determine water availability in the basin and plan future basin-wide water requirements. Following review of 38 reservation applications made by 28 public entities, the board adopted its final order in 1978, taking into account hearings testimony and an environmental impact statement prepared by the department. The order set the following priorities:

1. Municipal 60,913 acre-feet
2. Instream flows upstream of Billings 3,679,968 acre-feet as measured at Billings
3. Irrigation 655,324 acre-feet
4. Instream flows downstream of Billings 5,429,310 acre-feet as measured at Sidney
5. Multi-purpose storage 1,111,000 acre-feet

At this time, the department and applicants are proceeding to put the reserved water to beneficial use. To assist this process, the department completed a study in 1982 which was designed to determine (1) the amount of water

currently available for appropriation, taking into account existing uses, water reservations, and estimated future depletions by Wyoming and Indian tribes; and (2) whether there will be enough water available to fully satisfy the irrigation reservations upstream and downstream of Billings, Montana.

In addition to implementation of the Yellowstone reservations, the department is working with parties interested in developing water reservation plans in the Clark Fork and Missouri basins. The entities include the Department of Fish, Wildlife and Parks, which is seeking a reservation for protection of the Upper Clark Fork Basin fishery, a number of conservation districts interested in agricultural reservations, and the City of Lewistown which expects to reserve water for future municipal needs.

2. A Water Protection Strategy for the Missouri River Basin. A strategy for protecting supplies and allocating water among competing users in the Missouri River Basin was the subject of an important planning study by the department and Wright Water Engineers, Inc., titled A Water Protection Strategy for Montana-Missouri River Basin. Completed in 1983, the study points out that Montana is in a favorable legal position regarding the availability of water in the Missouri River Basin. Nonetheless, the lower basin states' concern for stable navigation flows will lead to actions aimed at frustrating further water development by the upper basin states. As a result, it is probable that Montana will be drawn into a challenge on the river. Therefore, the report recommends the following six-point strategy for protecting Montana's water development interests in the Missouri River Basin.

a. Montana should not initiate new Missouri River Basin allocation process but should rely upon the 1944 Flood Control Act for protection.

b. Montana should monitor activities of the other basin states and Congress that might threaten the 1944 Flood Control Act and the O'Mahoney-Milliken Amendment. The state should be prepared to respond to those threats. Such responses would probably be in the form of congressional legislation or a lawsuit.

c. Montana should monitor water development in other states, and congressional activity that might threaten future in-state use of water. The state should be prepared to respond to those actions.

d. Montana should encourage a negotiated resolution of the Missouri Basin conflict and discourage any confrontational approaches.

e. Montana should prepare for the eventuality of a new allocation among all the Missouri basin states and establish the strongest position possible to achieve an allocation that protects Montana's current uses and provides for future water needs.

f. Montana should take steps to encourage the wise use and development of its water resources.

3. Transboundary Water Apportionment. Since 1973, significant progress has been made in water management across political boundaries. The Boundary Waters Treaty between Canada and the United States, the Yellowstone River Compact between Wyoming and Montana, and a recommended U.S.-Canadian Poplar River apportionment constitute important agreements because they allocate flows in an efficient and equitable manner between different political entities.

A number of planning studies have supported the administration of these agreements. In 1980, the Yellowstone River Basin was identified as the fastest developing sub-basin in the Missouri River System. Spurred by a $600-million Wyoming water development program, the department assigned a staff member to work closely with the Wyoming State Engineer's Office to develop a methodology for administering the Yellowstone Compact between Montana and Wyoming. Subsequent planning studies have supported administration of the compact. One study, authorized in 1983 through House Bill 914, focused on developing storage on the Clarks Fork River in Wyoming for downstream irrigation development. The department surveyed all agricultural water users in the basin and found that shortages occur in roughly 2 out of every 10 years. Through the survey it was determined that although shortages exist, development of the proposed storage was not merited. Another planning effort is studying the effect of water quality in the Powder River Basin on irrigation and crop yields in Montana.

The Poplar River Basin is located in a semi-arid region of southern Saskatchewan and northern Montana. In March 1972, the Saskatchewan Power Corporation (SPC) applied for Canadian water rights for a 1,200-megawatt thermal electric power plant on the East Fork of the river. Numerous studies, investigations, and International Joint Commission (IJC) recommendations resulted from the initial planning for the SPC Poplar project. The purpose of these studies was to establish an equitable apportionment of Poplar River flows as well as criteria for water quality protection. In 1978, the IJC formally recommended an apportionment. While the recommendations never progressed to a formal treaty, both the department and its Canadian counterpart, Saskatchewan Environment, have informally complied with the terms of the suggested apportionment. In addition, a comprehensive bilateral monitoring arrangement was adopted in 1980, and hydrologic data have been exchanged on a quarterly basis since then. The arrangement and recommended apportionment, however, have no force of law. A 1984 planning study completed by the department and the 49th Parallel Institute, a transboundary relations study group, analyzed the options available to Montana regarding Poplar River issues. The department is working with the governor's office to consider the study recommendations.

4. Water Development Planning. Because of the foreseen need and the statutory directive to promote sound water development in Montana, the governor proposed legislation in 1981 to create a water development program. The department administers this program and, through use of coal severance taxes and bond sales, funds a number of water-related projects.

These range from stream stabilization, to the rehabilitation of state-owned dams, to irrigation development. The department receives grant and loan requests from private entities and divisions of government which are then reviewed, ranked, and eventually approved on the basis of their immediate need and contribution to the public welfare. The department also takes an active role in the development of projects for which technology and solutions are uncertain. For instance, it has assisted the U.S. Soil Conservation Service in surveying lands eligible for gravity sprinkler irrigation. It has also studied the potential for consolidating the development of rural water systems. In this planning function, the department will develop guidelines to assist project sponsors with financial planning, dam and hydropower planning, and project implementation.

Aside from the Water Development Program, the department exercises its planning function through interagency project planning studies. From the time a water management problem is identified to the time it is solved, the department is an active participant. For example, since 1981, the department, the U.S. Bureau of Reclamation, and the Milk River Irrigation districts have been studying means to overcome present and projected water shortages in the Milk Basin. After closure by the department of the Milk River Basin to new appropriations, current work has involved development of alternative plans to supply irrigators in the basin. Also, in cooperation with the federal government and the Northern Cheyenne Tribe, the department has undertaken a similar planning study on the rehabilitation of the Tongue River Dam. In southwestern Montana, the feasibility of constructing Pattengail Dam in Beaverhead County to reduce shortages is another water project planning study.

5. Ground Water Planning. At present, ground water comprises a relatively small percentage of the total consumptive water use in Montana. A statewide annual ground water withdrawal rate of 293,000 acre-feet has been estimated which accounts for only about two percent of the total water withdrawn in Montana for non-hydropower purposes. However, the number of people reliant upon ground water continues to increase. Since 1974--the first complete year for which accurate water use permit information is available--over 84 percent of all water permits issued were for ground water development. An average of 3,800 ground water use permits have been issued annually by DNRC since 1974. Most have involved withdrawals of less than 100 gallons per minute for domestic and stock watering purposes. Still, permit information suggests that 14 percent of the irrigated land developed since 1973 is supplied by ground water, and surveys conducted in 1980 indicate that as much as 52 percent of the water used by self-supplied industry and 39 percent of the water used for public water supply is ground water. Finally, almost all rural domestic water needs are supplied by ground water.

Despite the importance of ground water, Montanans have exhibited a complacency toward this resource when compared with their interest in surface water. This complacency is fostered by the fact that Montana has not yet experienced large-scale aquifer depletion problems (as in Arizona, Texas, and California) or contamination problems (as in New York, Rhode Island, New Jersey, and North Carolina). Although Montana's laws governing

the use and protection of ground water are progressive, there is a lack of emphasis on ground water problems and development potential.

Prompted by the Montana Ground Water Conference held in April 1982, an extensive planning effort was undertaken by professionals throughout the state to prepare a comprehensive ground water status report. Coordinated by the department, the report includes major aspects of ground water management: important policy considerations, government and university roles, a description of the resource, and a detailed discussion of ground water issues such as saline seep, coal mining, conjunctive uses, oil and gas exploration, and well drillers' qualifications. In 1983, Governor Schwinden appointed a Ground Water Advisory Council, comprised of legislators, administrators, and technical staff, to address specific issues outlined in the 1982 status report. The Council's four subcommittees addressed the issues of integrated management strategies, agency coordination, water quality, and ground water data and information collection. The Council has prepared a strategy report that will recommend key steps for legislative action in 1985. Overall, the strategy is expected to be instrumental in promoting sound management and planning of Montana's ground water resource.

6. Hydropower Planning. The passage of the Public Utilities Regulatory Policy Act in 1978 and the Crude Oil Windfall Profits Tax Act in 1980 gave hydropower development in Montana an attractive option for growth. The financial incentives and tax credits provided under these acts resulted in a surge of interest in small-scale hydropower development in most mountain headwaters. To assure that hydropower regulation by the Federal Energy Regulatory Commission (FERC) was in accord with Montana's water use permit system, the department concentrated on a planning effort to coordinate administration of the two processes. A hydropower planning strategy is being developed to examine the federal and state agency responsibilities and regulatory conflicts in order to coordinate state action on hydropower development in Montana. Coordination with the Montana Departments of Fish, Wildlife and Parks, and Health and Environmental Sciences is an important aspect of the strategy.

With regard to large-scale projects, the department has intervened in the future operations of selected hydroelectric projects. Specifically, it has prepared planning studies of potential agricultural and municipal uses that could be precluded by the Tiber and Thompson Falls projects. These studies have been submitted to FERC as documentation of other water uses that should be recognized in the final licenses for these projects.

A final aspect of the strategy recommends monitoring actions of the Pacific Northwest Power Planning Council. As hydropower development is coordinated in the Northwest, careful attention must be paid to its potential impacts on the fishery and future consumptive water uses in Montana's Clark Fork Basin. The department continues to review planning studies prepared by the Council and to work with its staff.

7. Upper Missouri River Basin Cooperative Special Study. Consideration of future water use options is a fundamental aspect of water planning work. This comprehensive planning study was the beginning of

an ongoing effort to better define irrigation potential in the Missouri River Basin. In 1979, the department requested assistance from the U.S. Soil Conservation Service in a study to delineate economically feasible irrigation potential in the basin. The study evaluated project-sized development (i.e., greater than 1,000 acres of new irrigation or 4,000 acre-feet of water storage). A total of 215 projects involving 2.4 million acres in 31 counties was investigated during the study, and it was concluded that 21 projects totalling 279,500 acres could be developed in the 52.9-million-acre basin. To supplement this important study of irrigable lands in the Missouri Basin, the department is now identifying all other areas that can be developed.

During the last decade steps have been taken to develop the state water plan and a sound water planning program. Accomplishments of the program have provided the impetus for progressive new efforts to manage the water resources of Montana. Actions that further develop and refine a water plan for Montana must now focus on resolving a number of critical water resource issues. Certain of these issues have statewide significance. Others are particular to specific sub-basins or regions of the state. In the following discussion, each of the statewide or river basin issues demanding attention is highlighted and the needed planning agenda is broadly outlined. It should be noted that this list is not exhaustive. Other issues may be identified by the legislature or through the public hearing process.

## STATEWIDE ISSUES

### Current Water Use

A knowledge of existing water uses and associated legal rights is fundamental to sound water resource management and planning. This knowledge underlies proper administration of existing rights, particularly during water shortages. It also serves as formal documentation that will be needed to protect current uses in Montana against claims by downstream states.

In 1973, Montana established a water right permitting system for legally defining all new water uses in the state. Also recognizing the crucial need to define and protect all pre-1973 rights, the 1979 legislature formed a program to expedite the general stream adjudication program. In view of the need for the adjudication, Montana must remain fully committed to completing the program. This will include the quantification of exercised and unexercised federal reserved rights. Consequently, efforts of the Reserved Water Rights Compact Commission to describe those rights must be sustained and supported.

### Future Water Needs

River basin plans that underlie the state water plan contain important information on future water needs in Montana. To date, these water use projections have been

used in several specific planning studies. However, the projections should be updated in order to better substantiate future water needs. This is vital in those basins where downstream states may seek to limit Montana's capacity to develop currently unappropriated flows.

Studies needed to refine future development options should carefully document all future water needs, including municipal, industrial, agricultural, and other beneficial consumptive uses. In order to better understand the tradeoffs between consumptive development and instream uses, there should also be an examination of flows needed to preserve water quality and aquatic values. Present and projected water availability should be defined through the development of comprehensive, computer-based water accounting models. In those areas where the water supply is limited, studies should examine water storage as a means to meet future needs.

Ground Water

During the past several years, considerable national attention has been directed toward ground water contamination and depletion problems. Similarly in Montana, there is growing concern over these problems and the general management of the state's ground water resources. The results of a ground water conference held in 1982 led to the creation of a governor-appointed Ground Water Advisory Council. Building on a status report prepared by ground water experts which identified important issues, the council looked more closely at the means to resolve these issues. Work of the council resulted in a report that recommends actions needed to better manage the state's ground water resources. These include the creation of a state funding source to finance systematic data collection and management, implementation of a mechanism to readily access data on specific problems, and the development of more effective integrated ground water management programs and protection regulations. Although some of these efforts will be handled initially through cooperative state-federal efforts, it is clear that the final responsibility for ground water management will lie with state and local governments.

Conservation

Montana, as a mountainous headwater state, is often viewed as being water rich. If one examines the large volume of water that leaves the state each year, this might be considered a valid speculation. Closer scrutiny, however, reveals that portions of Montana are water-deficient and frequently the supply will not meet demand. If Montana wishes to maintain present-level uses during times of shortage or expand the level of development in certain areas, available supplies must be used more efficiently.

Throughout the state, steps are being taken to conserve limited supplies and put water to more efficient use. On the other hand, there are many areas where conservation practices could expand the use of available supplies or reduce the cost of putting water to use. Consideration should therefore be given to developing water conservation guidelines for Montana. Such a study would examine all water use sectors and define where conservation opportunities may exist. It also would review means to inform Montana water users of various water conservation measures. These measures should address conserva-

tion needs in specific problem areas or sub-basins.

Water Development Program

The integrity of Montana's economy relies on the wise development and use of the state's water resources. Indeed, actual development of water is perhaps the strongest legal means to establish a formal water claim. This has particular significance in interstate water allocation proceedings. Recognizing this, Montana has placed an emphasis on statewide water development activity. The state Water Development Program is strong evidence of this commitment and an effort that must be maintained, if not expanded in scope.

Other means of promoting the conservation and development of the state's waters should be carefully evaluated. Among the actions that should be considered are special tax incentives that encourage further development, technical assistance to groups or individuals preparing water development plans, and the potential for use of federal planning and construction assistance.

Hydropower Development

Montana is somewhat unique because the state owns a number of water development projects. Constructed over a thirty-year period beginning in the 1930s, these projects have offered important benefits to the citizens of the state. If the benefits are to continue, funding to maintain the projects must be available. The department is studying the feasibility of hydropower development at certain projects as a means of generating revenue. If this source of revenue is to be developed, the department must continue to plan for these projects and seek required federal authorization. Along with development at state-owned water projects, Montana should also explore cooperative hydropower development at certain federal projects.

Flood Plain Management and Dam Safety

While the department creates new water use plans, management of the water resource for public safety must continue. When the Montana Flood Plain and Floodway Management Act was passed in 1971, the Board of Natural Resources and Conservation was given authority to delineate and restrict development on flood plains. Since then, fifty-three Montana communities have elected to comply with the state flood plain standards to help reduce drastic losses and assure protection of its citizens. However, fifty-three other communities are situated in flood-prone areas. It is apparent that planning efforts should continue to inform and assist communities that could suffer from flood impacts. Coupled with benefits of the National Flood Insurance Program, the department should continue to plan for the safe management of high-risk floodways.

Several dams in Montana regulate flood flows; all of them store water for various important water uses, including stock water, municipal, irrigation, and recreation. Many of these are small projects used by a single landowner. Others are much larger and serve a variety of users. In spite of their value to the state, many projects need repair and pose a potential risk to downstream residents. For this reason, the department must continue to cooperate with the U.S. Army Corps of Engineers and conduct safety inspections of dams over 20 feet high with a storage capacity

of 50 acre-feet or more. At least 3,500 dams in Montana meet this size criteria, and 35 have been determined unsafe; only one has been rehabilitated.

Public Information

Water issues facing Montana must be understood by the public. Consequently, a state water planning program should provide Montana citizens with information necessary to respond effectively to current water planning and management issues; information on department water planning activities must be widely disseminated. This is the single most important element in the formulation of the state water plan. In continuing this effort, the department must (1) hold public information meetings on the many specific project planning efforts undertaken throughout the state; (2) periodically hold hearings or conduct surveys to develop a better understanding of public interests and concerns; (3) consider the formation of basin-specific advisory committees; and (4) develop a newsletter and films on water management activities and issues in Montana.

## MISSOURI RIVER BASIN ISSUES

Protection of Water Use Options

A fundamental and overriding concern in the Missouri Basin is that of interstate water allocation. More specifically, present and potential claims by lower Missouri Basin states may seriously limit Montana's ability to use flows of the river and its tributaries. During 1982, the department prepared a comprehensive report on this issue that outlined a six-part strategy for establishing a claim to water needed for future development in Montana. Further, in 1984, a model was developed to assess water availability under various water right constraints and demand conditions.

Other studies must be undertaken to better define Montana's future water needs in the basin, both consumptive and non-consumptive. Subsequent work must be focused on preparing site-specific water development plans and, in time, placing a legal claim to the needed flows through a basin-wide reservation process. There should also be a study on the potential role of water storage at existing federal reservoirs in meeting future Montana uses.

Water Shortages

Over the years, water shortages have resulted in severe hardships to water users along major tributaries to the Missouri River--examples of these problems occur in the Big Hole, Milk, and Musselshell river basins. In the Big Hole Basin, irrigators experience annual water shortages that also affect the river's blue-ribbon fishery. Irrigators along the Milk River suffer periodic shortages that will increase substantially if Canada puts its share of the river's flow to use. Current water needs in the Musselshell Basin cannot be satisfied without a new supplemental water supply.

Irrigated agriculture in these three basins is an important contributor to the economy of Montana. Steps must be taken to uphold the integrity of this industry. In the Big Hole Basin, studies should be initiated that carefully examine (1) potential new water storage facilities; (2) water management and conservation; and (3) the possible role of basin-wide conjunctive surface/ground water development. Studies aimed

at supplementing existing supplies by diverting flows from the Missouri River into the Milk River should be completed. The department should also examine other means to overcome present-level shortages in the Milk River Basin, including: (1) increasing the volume of water imported from the St. Mary's Basin; (2) improving water conservation and management; and (3) a joint water storage project along the Milk River mainstem in Canada. Problems in the Musselshell Basin should be addressed through a study that considers water conservation and storage opportunities.

Upper Missouri Wild and Scenic River

Water needed to protect the qualities of the Upper Missouri Wild and Scenic River has not been defined or recognized by a formal water right. However, studies recommending instream flow requirements have been completed. If these recommended flows are protected under a legal right, they could significantly limit the currently available water supply. Because of this, the potential for consumptive development upstream of the Wild and Scenic River reach should be determined and the results used to assess the impact of these depletions on the proposed Wild and Scenic River flows. These analyses will provide a basis for quantifying and protecting the Wild and Scenic River flows, while at the same time establishing a specific amount of water needed for future consumptive uses.

Poplar River

Canadian coal development along the Poplar River near the United States border was a matter of considerable controversy and concern during the 1970s. A central issue was the allocation of Poplar River flows between Canadian energy facilities and downstream agricultural uses in Montana. Since waters in the Poplar River had not been apportioned between the two nations, the International Joint Commission developed a recommended apportionment. Although not legally binding, Canada has been diligent in following the terms of the apportionment. Nonetheless, the agreement should be finalized and the apportionment made firm. This would require further negotiation with the Province of Saskatchewan and the Canadian federal government, as well as planning studies that assess the effects of proposed agreements on water use in the United States.

## YELLOWSTONE RIVER BASIN ISSUES

Implementation of Water Reservations

When water reservations were granted in 1978 throughout the Yellowstone Basin, steps to implement a basin water plan were set in motion. These water rights were granted by the board for a variety of planned future water uses, determined only after careful study of potential basin-wide water requirements. An important phase of the reservation process has not been completed--in order for reservations to withstand the test of claims by downstream states, their strength must be demonstrated by actual beneficial use. Therefore, the department must continue to assist reservants in developing implementation plans and putting their reserved water to beneficial use by the year 2007. The importance of the water reservation implementation phase cannot be overstated, especially at a time when equitable water allocation among Missouri basin states is becoming such a predominant issue.

Tongue River Dam Rehabilitation

The department has been studying alternative means to rehabilitate the state-owned Tongue River Dam. At present, the structure of the dam poses a risk to downstream inhabitants. To alleviate this problem, the department, with technical assistance from the Bureau of Reclamation, has developed alternatives that examine the spillway passage of various flood flows. Along with evaluating the most favorable alternative, options for funding are under study. Through an associated planning effort, the water rights of the Northern Cheyenne Tribe, situated downstream of the dam, must be taken into account in the planning studies for an enlarged dam. In short, the planning required to address the complex issues at Tongue River Dam must continue.

Yellowstone River Compact

Administration of the 1950 Yellowstone River Compact, which allocates water between Wyoming and Montana, is taking new direction. An administrative water model with capabilities of predicting and allotting monthly flows has been developed by the department and is under review by the Yellowstone River Compact Commission. This is a significant step because full implementation of the compact will provide a more complete picture of the water available for future development in both Montana and Wyoming. The department must continue to assist administration of the compact. The ultimate result of this and associated planning efforts will be the quantification and protection of Montana's claims to Yellowstone River tributary flows.

Powder River Water Quality

In 1982, the Wyoming legislature appropriated $600 million in an unprecedented effort to promote water development. Several projects that may result from this program have the capacity to affect the quality and quantity of water that reaches Montana. One of these projects, the proposed Middle Fork Reservoir, may harm Montana irrigators along the Powder River. In particular, the project may tend to store the high-quality water and pass lower-quality water downstream to Montana. This could have a detrimental effect on Montana's water users, because water quality in the river is already marginal. Much of the current Powder River water quality problem may be traced to oil well drillers in Wyoming who are releasing brackish water into the river. About 27 percent of the total dissolved solids in the river's mainstem may be attributed to these oil drilling activities.

In view of this problem, Montana must continue to monitor the project planning activities in Wyoming. Studies should be directed at assessing the effects of the proposed projects on Montana water users. Specifically, the effects of poor water quality on shortand long-term crop yields should be studied. Using results of these studies, Montana should assert that water quality is an indispensable component of the water rights that are guaranteed this state by provisions of the Yellowstone River Compact.

Little Bighorn Negotiations

In the late 1970s, Wyoming initiated full-scale water development planning for the headwaters of the Little Bighorn River Basin. Montana's concern over the proposed project evolved because of complex

issues involving the Yellowstone Compact, Indian reserved water rights, and the effect that development in Wyoming could have on existing and future water uses in Montana. Since flows of the Little Bighorn River are not directly apportioned under Article V of the Yellowstone River Compact guidelines, the department began studies to examine the implications of Wyoming water development plans. Montana must continue to define its future water use options in the Little Bighorn Basin during the course of continued negotiations with the Crow Tribe and the State of Wyoming.

## CLARK FORK RIVER BASIN ISSUES

### Hydropower Planning

High flows and a mountainous topography have made the Clark Fork Basin exceptionally suited for hydroelectric production. Not only have a number of large-scale federal and private projects been developed in the basin but the Public Utilities Regulatory Policy Act and other federal laws have made small-scale development exceptionally attractive as well. Without question, hydropower is an indispensable use of Montana's water resource. Nevertheless, the department must study two problems that have emerged as a result of its development. One problem involves the effects of large-scale projects, such as Noxon Rapids, Thompson Falls, and Kerr Dams, on future water development upstream of these projects. These projects place a major claim on the river's flow and thereby seriously limit the potential for further consumptive water development in the basin. The department must continue to take steps to assure that the Federal Energy Regulatory Commission will recognize in its hydropower authorizations future consumptive needs. Equally important, the department should examine means to overcome effects of large-scale hydropower development in the basin.

A second hydropower development problem centers on small-scale projects. The recent surge of proposals for small-scale hydroelectric development has demonstrated the need for state and federal agency cooperation in regulating hydropower development. The department must continue to pursue a hydropower planning strategy that will guarantee recognition of state water management goals in the federal hydropower licensing process.

### Northwest Power Planning Council

Through passage of a 1978 federal act to coordinate energy development in the northwest, the Northwest Power Planning Council has been charged, in part, with mitigating the effects of hydroelectric development on migrating and resident fisheries in Montana, Idaho, Washington, and Oregon. Many positive actions have been taken by the state to help study and temper these impacts. However, through its planning efforts, the department must continue to assure that instream fishery flows recommended by the Northwest Power Planning Council at large dams and river reaches are given protection under state law. At the same time, impacts of these large instream flows on the potential for future consumptive uses in Montana should be examined.

### Clark Fork Water Reservations

Along the upper Clark Fork River significant water quality and dewatering problems have occurred as a result of long-term mining operations and over-appropriation.

To prevent the problem from worsening, the Department of Fish, Wildlife, and Parks plans to reserve instream flows needed to maintain the fishery in the river and key tributaries. Through preparation of an environmental impact statement and related planning studies, the department will assess the various impacts of the proposed reservation, including its effects on future water development. These planning studies will assist the board in making its final decisions on the allocation of flows in the Upper Clark Fork Basin.

Cabin Creek Coal Development

Sage Creek Coal, Ltd., proposes to mine up to two million tons of coal annually at sites located in British Columbia, about ten miles north of Glacier Park and the Montana border. This development would occur in the Cabin Creek drainage, a tributary of the North Fork of the Flathead River. Montana and British Columbia should explore methods for reducing the potential water supply impacts in Montana. Planning studies should be undertaken to assist the state in assessing the potential impacts of this development in Montana.

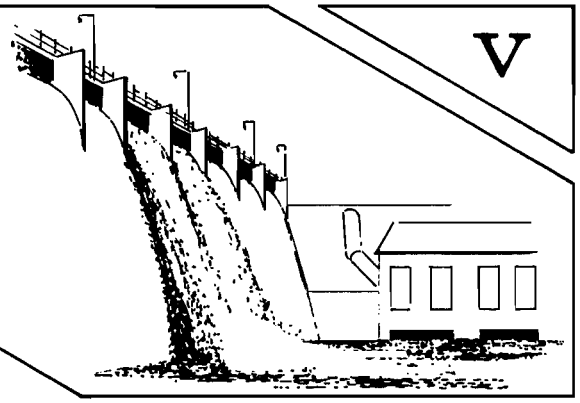
Wild and Scenic River Water Needs

In the Wild and Scenic Rivers Act, Congress declared that certain rivers should be protected for the benefit and enjoyment of present and future generations. In a cooperative federal-state planning effort, some designated rivers in Montana are now under study for determination of required instream flows. Headwaters of the North and South Fork of the Flathead River are included in this designation. Special studies between the USDA Forest Service and the department must continue not only to define the needed flows, but also to assure they are legally protected.

Bitterroot River

The Bitterroot River, located in southwestern Montana, is a major tributary of the Clark Fork River. Because of the braided nature of its channel, new sub-channels are constantly created, making it difficult to maintain irrigation diversion structures. Moreover, sedimentation and related increases in water temperature are detrimental to the fishery. A department study prepared for the Bitterroot Conservation District recommended that structural measures may not solve the problem and are prohibitively expensive. Rather, the Conservation District should concentrate on excluding any further development in the flood plain and improving riparian habitat management. To fully control the problem, the department should work with the district to explore these recommendations, as well as options for water conservation and conjunctive surface and ground water management.

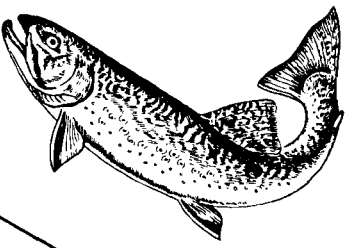
# V CONCLUSIONS



In preparing this report the department has sought to fulfill two objectives. The first was to inform the legislature of progress being made in the development of the state water plan. The state water plan is not a single, definitive document, but rather an ongoing process that addresses key water allocation, quantification, and management issues. The process is founded on the water use inventory and general basin plans that have been developed in accordance with the water planning statute. This process and its statutory guidelines allows for innovative study of a variety of specific water-related problems. These planning accomplishments have been reviewed in Chapter III.

The second objective was to identify some of the major tasks that state water planning should accomplish in the following decade. These important water planning and management needs are listed in Chapter IV, and their fulfillment is vital to the future sound management of Montana's water resources. It must be recognized, however, that the state's ability to undertake these planning efforts is affected by the lack of funds formerly available through the Federal Title III Program. Consequently, increased legislative and public direction and support will be required in order to realize the suggested planning agenda. Finally, the state planning statute is explicit in its requirement for the board to adopt a state water plan. Therefore, following legislative review of the planning program discussed in this report, and after a series of statewide public hearings, the department proposes the submittal of this report and future Level C studies to the Board of Natural Resources and Conservation for adoption.

# APPENDICES



A. The State Water Planning Statute

B. Listing of Inventory Series Publications

C. Water Resources Publications by the Montana Department of Natural Resources and Conservation, 1973-1985

## APPENDIX A. THE STATE WATER PLANNING STATUTE

85-1-203. State Water Plan. (1) The department shall gather from any source reliable information relating to Montana's water resources and prepare therefrom a continuing comprehensive inventory of the water resources of the state. In preparing this inventory, the department may conduct studies; adopt studies made by other competent water resource groups, including federal, regional, state, or private agencies; perform research or employ other competent agencies to perform research on a contract basis; and hold public hearings in affected areas at which all interested parties shall be given an opportunity to appear.

(2) The department shall formulate and, with the approval of the board, adopt and from time to time amend, extend, or add to a comprehensive, coordinated multiple-use water resources plan known as the "state water plan". The state water plan may be formulated and adopted in sections, these sections corresponding with hydrologic divisions of the state. The state water plan shall set out a progressive program for the conservation, development, and utilization of the state's water resources and propose the most effective means by which these water resources may be applied for the benefit of the people, with due consideration of alternative uses and combinations of uses. Before adoption of the state water plan or any section thereof, the department shall hold public hearings in the state or in an area of the state emcompassed by a section thereof if adoption of a section is proposed. Notice of the hearing or hearings shall be published for 2 consecutive weeks in a newspaper of general county circulation in each county encompassed by the proposed plan or section thereof at least 30 days prior to the hearing.

(3) The department shall submit to each general session of the legislature the state water plan or any section thereof or amendments, additions, or revisions thereto which the department has formulated and adopted.

(4) The department shall prepare a continuing inventory of the ground-water resources of the state. The ground-water inventory shall be included in the comprehensive water resources inventory described in subsection (1) above but shall be a separate component thereof.

(5) The department shall publish the comprehensive inventory, the state water plan, the ground-water inventory, or any part of each, and the department may assess and collect a reasonable charge for these publications.

History: En. Sec. 5, Ch. 158, L.1967; and Sec. 138, Ch. 253, L.1974; R.C.M. 1947, 89-132.1(1)

## APPENDIX B. LISTING OF INVENTORY SERIES PUBLICATIONS

No.1 Directory of State of Montana, Federal Agencies and Private Groups Active in the General Field of Water Resources (1968 and 1971)
No.2 Water Resources Programs Conducted by Government Agencies in Montana (1969)
No.3 Montana Register of Dams (1968)
No.4 Water Resources and Planning (1968)
No.5 Montana's Water Laws: A Resume (1968)
No.6 Catalog of Stream Gaging Stations in Montana (1968 and 1972)
No.9 Summary of Potential Projects in Montana (1969)
No.10 Bibliography of Montana Water Resources and Related Publications (1969)
No.11 An Atlas of Water Resources by Hydrologic Basin (1970)
No.12 Montana's State Water Plan: A Program Report (1970)
No.13 An Inventory of Water Use in Montana (1973)
No.16 A Ground Water Report of Montana (1969)

Uncompleted reports in the series include:

No.7 Economic Aspects of Water Use
No.8 Patterns of Management and Administration
No.14 An Inventory of Related Land Resources
No.15 A History of Water Development in Montana

## APPENDIX C. WATER RESOURCES PUBLICATIONS BY THE MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION, 1973-1985

ANALYSIS OF WATER AVAILABILITY ON THE MISSOURI RIVER ABOVE CANYON FERRY RESERVOIR. January 1981. 21 pp. (out of print)

APPENDIX TO WATER STORAGE IN THE BIG HOLE: A RECOMMENDATION. March 1982. 164 pp. (out of print)

APPROPRIATION OF WATER IN MONTANA. Brochure. January 1981. 8 pp.

BIBLIOGRAPHY OF LITERATURE RELATED TO FLOODPLAIN MANAGEMENT IN MONTANA. August 1982. 32 pp.

BROADWATER DAM VERTICAL TURBINE-SPILLWAY COMBINE. Final Report on Potential Hydroelectric Power. April 1979. 120 pp.

BROADWATER POWER PROJECT. May 1982. Application for License; Major Project-Existing Dam. Before the Federal Energy Regulatory Commission. 140 pp.

CONCEPTUAL PLAN FOR MONTANA WATER RESOURCES PROJECTS. March 1978. 48 pp. (out of print)

COTTONWOOD DAM: SPILLWAY INVESTIGATION AND REPAIR PROGRAM. October 1982. 58 pp.

ECOLOGICAL EFFECTS OF RAINSHOWERS ON EASTERN MONTANA RANGELAND: Progress report, 1977. March 1978. 112 pp. (out of print)

EXISTING AND PROPOSED WATER STORAGE ON THE TONGUE RIVER IN MONTANA. August 1976. 44 pp. (out of print)

FEASIBILITY OF SILVER-LEAD MINE WASTE MANIPULATION FOR MINE DRAINAGE CONTROL. November 1977. 98 pp. (out of print)

FLATHEAD RIVER BASIN. The Level B Study of Water and Related Land Resources. In cooperation with the Pacific Northwest River Basins Commission. September 1976. 133 pp. (out of print)

FLOODPLAIN MANAGEMENT: GUIDEBOOK FOR LOCAL ADMINISTRATORS. August 1982. 226 pp.

THE FRAMEWORK REPORT. October 1976. 101 pp.

THE FUTURE OF THE YELLOWSTONE RIVER...? January 1977. 107 pp. (out of print)

HIGH WATER. Pamphlet. 1982-1984. Vols. 1 17. 1 p.

ISSUES IN WATER MANAGEMENT. An Evaluation of Montana's Water Policy. January 1981. 36 pp.

LIQUID ASSETS. A report to the 46th Legislature. March 1979. 69 pp. (out of print)

THE MADISON RIVER BASIN: A Resource Review. 1974. 61 pp.

MANAGING MONTANA'S FLOOD PLAINS. Brochure. July 1981. 1 p.

MARTINSDALE RESERVOIR: SEEPAGE MONITORING PROGRAM AND SUITABILITY ANALYSIS. December 1982. 93 pp.

MONTANA SURFACE RECORDS.
Clark Fork Basin. 1961-76. September 1977. 106 pp.
Missouri River Basin. 1961-76. September 1977. 242 pp.
Yellowstone River Basin. 1961-76. September 1977. 83 pp.

MONTANA WATER DEVELOPMENT PROGRAM. Brochure. 1982. 1 p.

MONTANA WATER DEVELOPMENT PROGRAM. Pamphlet. 1984

MONTANA WATER USE ACT--DRAFT EIS. 1982. 32 pp.

OFFSTREAM HYDROPOWER POTENTIAL IN THE YELLOWSTONE RIVER BASIN. February 1983. 45 pp.

PAINTED ROCKS DAM EMERGENCY PLAN. May 1983. 95 pp. Maps.

PAINTED ROCKS HYDROELECTRIC PROJECT. Application For Exemption. February 1982. 117 pp.

PAINTED ROCKS HYDROELECTRIC PROJECT. Feasibility Report. September 1982. 130 pp.

PETROLIA DAM, PETROLEUM COUNTY, MONTANA. Investigation of Foundation Seepage and Spillway Conditions with Recommendations for Repair. January 1983. 120 pp.

POTENTIAL INCREASE IN IRRIGATED ACREAGE IN MONTANA DUE TO INCREASED RED MEAT PRODUCTION. November 1976. 24 pp.

POTENTIAL OFFSTREAM RESERVOIR SITES IN THE BIG HOLE RIVER BASIN. January 1979. 49 pp.

PRE-FLOOD HAZARD MITIGATION PLAN (FOR MISSOULA, KALISPELL, LAUREL, GREAT FALLS). August 1984.

PREFEASIBILITY REPORT FOR THE PATTENGAIL DAM, BEAVERHEAD COUNTY, MONTANA. Legislative summary presented to the 48th Legislature. January 1983. 96 pp.

PROGRESS REPORT: PROJECT CRITIQUES. January 1973. 70 pp. (out of print)

PROGRESS REPORT: PROJECT CRITIQUES. Supplement "A". January 1973. 135 pp. (out of print)

REHABILITATION OF COONEY DAM SPILLWAYS IN COOPERATION WITH ROCK CREEK WATER USERS' ASSOCIATION. 1978. 70 pp.

RENEWABLE RESOURCE DEVELOPMENT PROGRAM: 1981 GRANT EVALUATION AND RECOMMENDATIONS. January 1982. 78 pp. (out of print)

RENEWABLE RESOURCE DEVELOPMENT PROGRAM: 1982 PROJECT EVALUATION AND RECOMMENDATIONS. January 1983. 136 pp.

RESOURCE BIBLIOGRAPHY FOR FLOODPLAIN MANAGEMENT IN MONTANA. August 1982. 31 pp.

RIVER MILE INDEX OF THE MISSOURI RIVER. January 1979. 142 pp.

RIVER MILE INDEX OF THE YELLOWSTONE RIVER BASIN. September 1976. 61 pp.

RUBY DAM EMERGENCY PLAN. July 1982. 60 pp.

SEEPAGE INVESTIGATIONS IN DEADMAN'S BASIN. October 1973. 36 pp. (out of print)

SPECIAL FLOOD HAZARD INFORMATION, CLARK FORK. August 1973. 12 pp. (out of print)

STATE OF MONTANA ACTIVITIES IN THE HIGH PLAINS COOPERATIVE PROGRAM: 1975-1981. Final Report. April 1981. 287 pp.

STATE WATER CONSERVATION PROJECTS. March 1977. 187 pp. (out of print)

STATUS REPORT OF THE SOUTH PINE CONTROLLED GROUND WATER AREA. January 1981. 31 pp. (out of print)

STILLWATER RIVER AND ROSEBUD CREEK FLOOD HAZARD ANALYSES, STILLWATER COUNTY, MONTANA. May 1974. 132 pp. (out of print)

SUPPLEMENTAL WATER FOR THE MILK RIVER. February 1977. 146 pp. (out of print)

TECHNICAL ASSISTANCE PROGRAM (TAP) PREFEASIBILITY REPORTS. (out of print)
Big Coulee Area, Proposed Rural Domestic Water System. November 1978. 16 pp.
Glen Lake Irrigation District Gravity Irrigation System. November 1978. 6 pp.
Madison Conservation District Dry Lake Project. November 1978. 6 pp.
Musselshell River Water Development Association. Proposed offstream storage reservoir. November 1978. 13 pp.
Teton Cooperative Canal Company Eureka Reservoir Project. January 1979. 43 pp.

TONGUE RIVER DAM PROJECT: SUMMARY REPORT. December 1980. 9 pp. (out of print)

TONGUE RIVER PROJECT. Modification Feasibility Study. October 1976. 34 pp. (out of print)

TONGUE RIVER PROJECT: Modification Feasibility Study Summary (Contract). April 1977. 13 pp. (out of print)

TONGUE RIVER REHABILITATION PROJECT. October 1981. 91 pp.

UPPER FLATHEAD RIVER BASIN STUDY. January 1977. 136 pp. (out of print)

WATER DEVELOPMENT AND RENEWABLE RESOURCE PROGRAMS: APPLICATION GUIDELINES FOR GRANTS AND LOANS. 1984. 103 pp.

WATER DEVELOPMENT IN THE TONGUE AND POWDER RIVER BASINS. January 1979. 55 pp.

WATER DEVELOPMENT PROGRAM. Status report on 1982-83 biennium. Project evaluation and recommendations for 1984-85 biennium. January 1983. 152 pp.

WATER PROTECTION STRATEGY FOR MONTANA: MISSOURI RIVER BASIN. September 1982. 333 pp.

WATER PROTECTION STRATEGY FOR MONTANA: MISSOURI RIVER BASIN. Summary report. September 1982. 41 pp.

WATER RESERVATIONS AND WATER AVAILABILITY IN THE YELLOWSTONE RIVER BASIN. May 1982. 118 pp.

WATER RESERVATION APPLICATIONS: YELLOWSTONE RIVER BASIN. ENVIRONMENTAL IMPACT STATEMENT.
Draft Vol. I and II. December 1976. 413 pp.
Final. February 1977. 194 pp.
Draft Addendum. June 1977. 67 pp.

WATER RESERVATIONS ASSESSMENT PROJECT. December 1978. Reissue August 1981. 72 pp.

WATER STORAGE IN THE BIG HOLE: A RECOMMENDATION. Brochure. January 1981. 7 pp. (out of print)

WATER STORAGE IN THE BIG HOLE: A RECOMMENDATION. September 1982. 52 pp.

WATER USE IN MONTANA. Vol. 13. April 1975. 26 pp.

YELLOW WATER DAM, PETROLEUM COUNTY, MONTANA. Outlet Conduit Investigation with Recommendations for Repair. February 1983. 38 pp.

WEATHER MODIFICATION IN MONTANA: INFORMATION ABOUT ATMOSPHERIC WATER RESOURCE MANAGEMENT AND DEVELOPMENT: (Newsletter) Vol I-V. 1977-1981. (out of print)

WILD AND SCENIC RIVER STUDY REPORT. Flathead River, Flathead National Forest. July 1973. 195 pp.

WOULD RENEWABLE RESOURCE DEVELOPMENT FUNDS HELP YOUR CITY, COUNTY, CONSERVATION DISTRICT, IRRIGATION DISTRICT, DRAINAGE DISTRICT? 1981. Pamphlet 4 pp.

YELLOWSTONE IMPACT STUDY. July 1977.
Tech. Rept. 1. Future Development Projections and Hydrologic Modeling in the Yellowstone River Basin, Montana. 141 pp.
Tech. Rept. 2. The Effect of Altered Streamflow on the Hydrology and Geomorphology of the Yellowstone River Basin, Montana. 163 pp.
Tech. Rept. 3. The Effect of Altered Streamflow on the Water Quality of the Yellowstone River Basin, Montana. 393 pp.
Tech. Rept. 4. The Adequacy of Montana's Regulatory Framework for Water Quality Control. 79 pp.
Tech. Rept. 5. The Effect of Altered Streamflow on Aquatic Invertebrates of the Yellowstone River Basin, Montana. 109 pp.
Tech. Rept. 6. The Effect of Altered Streamflow on Furbearing Mammals of the Yellowstone River Basin, Montana. 79 pp.
Tech. Rept. 7. The Effect of Altered Streamflow on Migratory Birds of the Yellowstone River Basin, Montana. 107 pp.

Tech. Rept. 8. The Effect of Altered Streamflow on Fish of the Yellowstone and Tongue Rivers, Montana. 180 pp.
Tech. Rept. 9. The Effect of Altered Streamflow on Existing Municipal and Agricultural Users of the Yellowstone River Basin, Montana. 64 pp.
Tech. Rept. 10. The Effect of Altered Streamflow on Water-Based Recreation in the Yellowstone River Basin, Montana. 125 pp.
Tech. Rept. 11. The Economics of Altered Streamflow on the Yellowstone River Basin, Montana. 81 pp.

YELLOWSTONE IMPACT STUDY. Final Report. How the River Runs: A Study of Potential Changes in the Yellowstone River Basin. 1981. 45 pp.