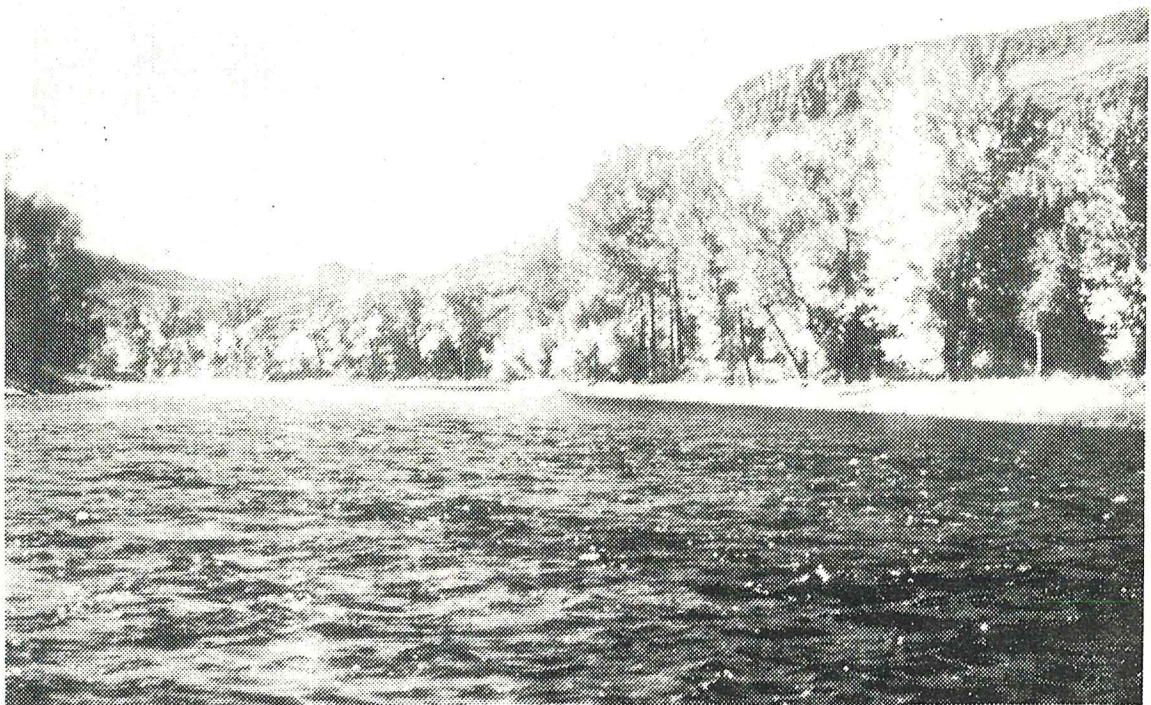


# **BIG HOLE RIVER**

## **FISHERIES MANAGEMENT PLAN**



**SEPTEMBER 1989 – SEPTEMBER 1994**



***Montana Department of  
Fish, Wildlife & Parks***

**BIG HOLE RIVER FISHERIES MANAGEMENT PLAN**  
**FOR THE PERIOD**  
**SEPTEMBER 1989 TO SEPTEMBER 1994**

**ADOPTED BY THE**  
**MONTANA FISH AND GAME COMMISSION**  
**ON NOVEMBER 9, 1989**

**PREPARED BY**  
**MONTANA DEPARTMENT OF FISH, WILDLIFE & PARKS**  
**REGION 3**

**with assistance from**  
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## BIG HOLE FISHERIES MANAGEMENT PLAN

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## I. SUMMARY OF MANAGEMENT PLAN

The major elements of this five year Fisheries Management Plan are summarized under the following headings:

FISHERIES MANAGEMENT - The Department has divided the Big Hole into four management reaches. The management statement for each reach is presented below:

Reach 1 - Mouth of the river near Twin Bridges to the Glen Bridges. The Department will continue it's management emphasis on brown trout in Reach 1 and no changes in fishing regulations will be proposed at the present time.

Reach 2 - Glen Bridges to Divide. The Department will not propose any alternatives to the present management of Reach 2 at this time. Strong public support coupled with fisheries data which demonstrates that the goal of providing an abundant large trout fishery is being achieved supports continuation of the special regulations from Divide to Melrose. If, in the future, more special regulations areas are desired by anglers on the Big Hole, the Department will give consideration to extending this special regulation area further downstream. The brown trout population in the special regulation section will be watched closely to determine if the numbers of large fish stabilize or if they will continue to cycle as recent population data seems to suggest.

Reach 3 - Divide to Dickie Bridge. The Department will maintain the present special regulations for another 2-year regulation setting period. These regulations limit harvest to three fish under 13 inches and one over 22 inches for rainbow, brown and cutthroat trout, catch and release fishing only for grayling. This will give the Department an opportunity to complete it's evaluation of the effects of the special regulations on the trout population. At that time, the results of the evaluation will be presented to the public along with a set of alternatives for future management of this reach. Recommendations based on public input received will then be made to the Fish and Game Commission for adoption.

Reach 4 - Dickie Bridge to the upper river near Jackson. The native stream dwelling population of Big Hole grayling is the last of its kind in the lower 48 states and has been listed as a "Species of Special Concern" in Montana. The public has previously supported the protection and enhancement of the grayling population as the management emphasis for Reach 4. Population studies of the grayling show their numbers are very low, the reasons for which the Department does not fully understand at the present time. Data seems to suggest that grayling are short lived, have spawning and rearing problems, and do not compete well with other fish. The hatchery rainbow plant at Sportsmen's Park is felt to be detrimental to the grayling and also to wild rainbow populations and probably should be

eliminated. The brook trout is the most abundant species in Reach 4 and is a popular fish with anglers. Due to questions regarding competition between brookies and grayling the Department has taken a conservative approach and encouraged a high harvest rate of brookies through a 20 fish or 10 pounds limit. An added benefit to this management is better growth and larger than average size of brookies.

The Department will continue present management which places the highest priority on preserving, protecting, and enhancing grayling populations. Brook trout management will continue to encourage high harvest rates and the hatchery plant of rainbows at Sportsmen's Park will be discontinued. Future research work by the Department will improve the understanding of the needs of the grayling and will allow a reevaluation of management of Reach 4 and perhaps result in a change in management emphasis. It is presently anticipated that the results of this research work will be completed and available to assist in the development of the next 5-year Management Plan (1994-99).

FISHERIES HABITAT - The Department will monitor activities within the Big Hole drainage which have the potential to impact the fisheries habitat and will work to solve present habitat problems. Specifically the Department will:

1. Protect water quality by:
  - participating in interdisciplinary team activities with the Forest Service and the Bureau of Land Management,
  - being involved in the planning process for mining, timber sales, grazing allotments, etc.,
  - working closely with individual land owners and Conservation Districts on water quality concerns,
  - working closely with the Water Quality Bureau (DHES) to insure that water quality standards are maintained and enforced and that Best Management Practices are utilized, and,
  - striving to see that water quality monitoring is accomplished to determine the results of these efforts.
2. Work toward enhancement of summer and fall water flows in the river by:
  - encouraging conservation of water and consideration for the fishery by the Big Hole irrigators,
  - continuing to explore the feasibility of water leasing to carry the fishery through low flows, and,
  - further exploring the feasibility of offstream or tributary storage.
3. Protect the stream banks and bed by:
  - working closely with the Bureau of Land Management to see that their Recreation Area Management Plans are accomplished where they deal with protection of the streambed and riparian zones,
  - insuring that the provisions of the Stream Protection Act are enforced, and,

-insuring that the provisions of the Natural Streambed and Land Preservation Act ("310") are enforced.

ANGLER USE - The Department anticipates that public use of the Big Hole will increase in the future, particularly if ways can be found to improve flow conditions during the summer and fall. The Department must develop a better understanding of the numbers of users and the interactions between the various user groups and their effects on the resource. To do so a method must be developed to survey users of the river. This can be accomplished in several ways:

1. Operation of census/interview station(s).
2. Periodic spot surveys.
3. A survey conducted by mail.
4. Voluntary completion of user census forms at unmanned self dispensing stations at access locations.

The Department will evaluate these various methods and review the associated costs in order to develop a census program that will be utilized during either the summer of 1991 or 1992.

Should be census reveal that the Department needs to get involved with management of the floating use, the Department feels that its present authority to limit fishing from boats is sufficient. Additional authority may be needed in the future and this authority will have to be sought from the Legislature. However, this action will be the subject of future Management Plans and is not a part of this Plan.

The Department will initiate action immediately to develop a cooperative program with the Bureau of Land Management to work on:

1. Development of additional angler access locations.
2. Development of a map/brochure for use by visitors which contains information on access, recreation facilities, public lands, user education, hazards, and floating etiquette.

CORRIDOR MANAGEMENT - The Department intends to take an active role in the review, discussion, and permitting (where required) of land use activities within the Big Hole River stream corridor to insure that they do not negatively affect the fishery, the fisheries habitat, and opportunities and experiences available to the recreation user. The Department will also work closely with the Bureau of Land Management to assist in the accomplishment of the objectives as set forth in their Recreation Area Management Plans for the Big Hole.

AGENCY MANAGEMENT - The Department has worked in the past with all agencies who have management responsibilities within the Big Hole drainage and the Department will continue to work with these agencies in the future. The Department, as the recreation

management agency for the State of Montana, will represent the interests of recreationalists in all development proposals, public or private.

## II. INTRODUCTION

In 1805, Captain William Clark described the Wisdom River as being rich in beaver, otter, and muskrat - important commodities of the day. A modern day Captain Clark might well use similar words to describe the stream, now known as the Big Hole River, not only for it's abundant wildlife, but in terms of the wealth of it's fishery and outdoor recreation resources. No one in Clark's day and it is doubtful that anglers fishing the Big Hole even thirty years ago ever envisioned the magnitude of the demand that would be placed on the river today. The Big Hole has been designated as a Class I or "Blue Ribbon" fishery by the Department and is one of the heaviest used fishing streams in the State. In addition, the upper Big Hole contains the last stream dwelling population of grayling in the lower 48 states.

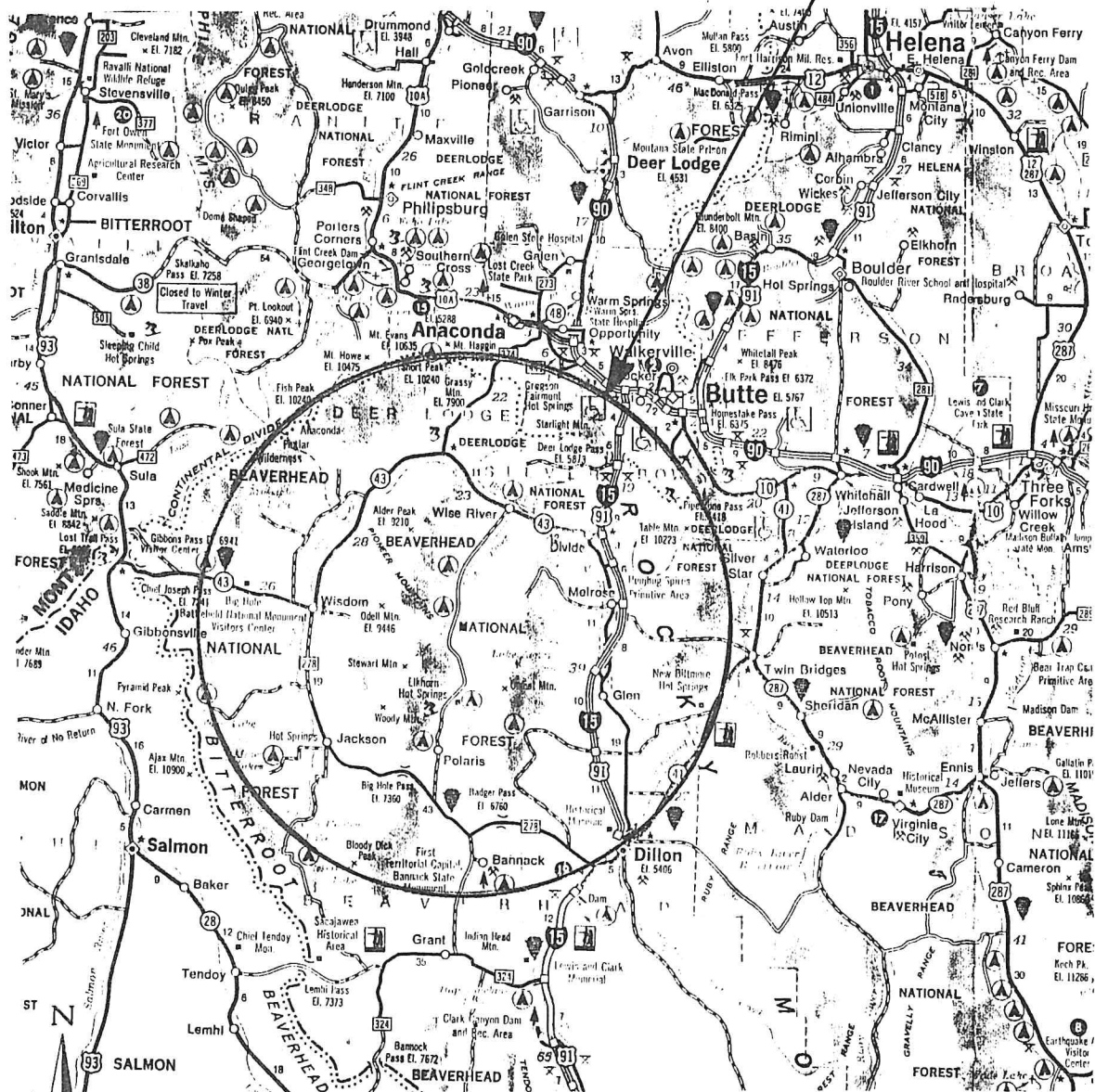
An ever increasing influx of anglers are discovering the fantastic fishing opportunities that the river provides. Recent surveys conducted by the Department show that the Big Hole supports in excess of 50,000 angler days per year. Much of this use is disproportionate with certain reaches sustaining more than 500 angler days per river mile per year. This tremendous public interest and use in the Big Hole is the basis for the formulation of this Management Plan by the Department which will be used to carry out the Department's responsibilities as the recreation management agency for the State.

The Big Hole River originates at the outlet of Skinner Lake at an elevation of 7340 in the Beaverhead Mountains of southwest Montana. From its modest beginnings, the river gathers volume and velocity due to numerous tributaries along its 115 mile course until its confluence with the Beaverhead River near Twin Bridges at an elevation of 4600. (See Vicinity Map on page 6.) The Big Hole drainage basin encompasses approximately 2,476 square miles with the majority of its tributaries originating in the Beaverhead and Pintlar Mountains, the Dickie Hills, and the west and north slopes of the Pioneer Mountains. Tributaries originating on the east slope of the Pioneer and west slope of the Highland Mountains also contribute water, although not as significantly. The annual average discharge of the Big Hole recorded near Melrose is 1,174 cubic feet per second or 848,400 acre feet per year. The river remains unimpounded, although the feasibility of mainstem and tributary impoundments have been discussed and investigated in recent years.

Early explorers and settlers were drawn by the sheer size, beauty and richness of the high elevation valley or "hole" as the trappers called it, but were often frustrated by the severity of the winters they encountered. The fur trade had a very limited history in the Big Hole due to distance from the highly navigable Missouri and Yellowstone Rivers. During the 1860's placer gold



# BIG HOLE RIVER PLANNING AREA



VICINITY MAP

was discovered in several tributaries and one author reported that more than 1,000 miners worked placers in the Big Hole between 1865 and 1867. In August of 1877 the Big Hole received national attention as Colonel John Gibbon engaged the Nez Perce in the "Battle of the Big Hole". By the 1880's, permanent settlers were lured by the valley's lush native grasses and abundant water as small homesteads were established to raise livestock. The 1880's also saw the first commercial timber harvest in the Big Hole as timber cut near Wisdom was floated downriver to Divide and Melrose for railroad ties. As Montana entered the twentieth century small homesteads in the Big Hole gave way to large ranches. The combined harsh winters and need for larger acreages of pasture and hay ground made small operations in the high valley impractical.

Change has come slowly to the Big Hole valley and today it largely remains the "valley of 10,000 haystacks". The area is still dominated by large ranches which harvest hay to winter cow/calf production herds. Forested mountain slopes rise from the valley floor to merge with snowcapped peaks in a panorama unique to the Big Hole, and yet the valley still remains sparsely populated. There is, however, another population in the Big Hole which vastly outnumbers its permanent residents. This increasing seasonal population of outdoor recreationalist represents the most notable change in the Big Hole since the arrival of permanent settlers over a century ago.

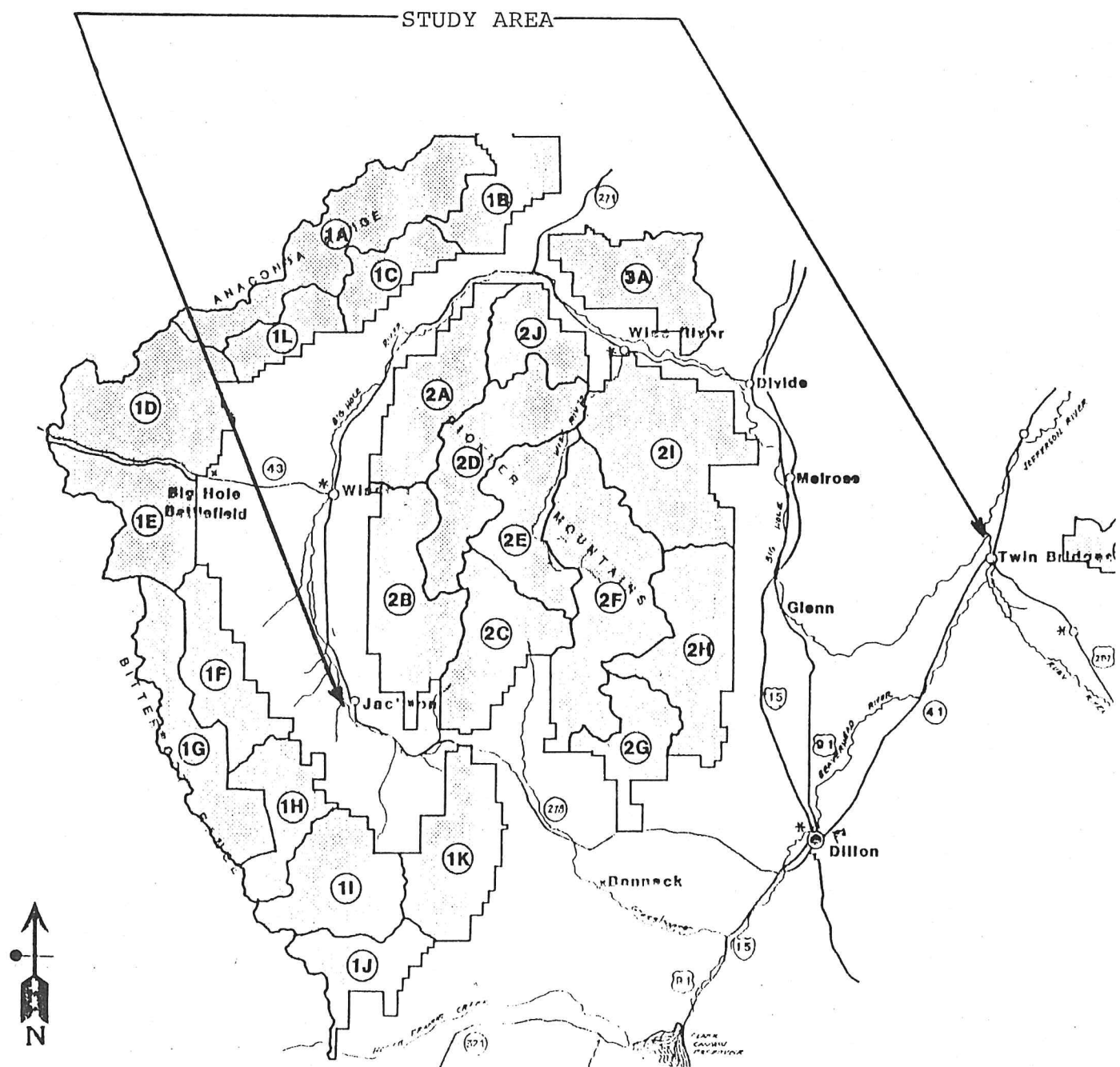
The other major land use in the Big Hole basin besides agriculture and recreation is timber production. Most of the mountain lands are in the Beaverhead National Forest and are managed for multiple use, particularly timber harvest and recreation. Fishing, hunting, camping, hiking, and other outdoor activities are enjoyed by both Montana residents and out-of-state visitors.

In recent years there has been a great deal of interest in preserving and protecting the Big Hole River and its drainage basin. Many special groups have been formed and they along with existing conservation organizations, agencies and individuals have worked very hard to achieve recognition for the unique values present within the drainage. Many of these groups were created to review and in some cases challenge the Beaverhead National Forest Plan which was adopted in 1986.

Montana's outstanding outdoor recreation opportunities have long been treasured by residents of the State. They have also been increasingly used by nonresidents to where tourism and recreation has become Montana's number two industry. Fishing of our "Blue Ribbon" trout streams is a major element in this industry. Statistics compiled by the Department indicate that nonresident use of the Big Hole was 30% of all fisherman in 1986.

In 1987 the Department released a study entitled "The Net Economic Value of Fishing in Montana" which was authored by John Duffield of the University of Montana, John Loomis of the University of California, Davis, and Rob Brooks of the Department. Results of this study show that the state average net economic value (net willingness to pay) for stream fishing is \$113 per trip. However, the study showed that trips on the Big Hole were among the highest valued with a value of \$164 per trip. Total recreational value for the Big Hole was estimated to be \$5.2 million per year. The study also concludes that the annual aggregate value of Montana's stream and lake fishing is \$122 million and \$93 million, respectively. Angler expenditure data indicates a typical resident angler spent \$48 per trip and a typical nonresident angler spent \$360 per trip in Montana.

The principal area of the Big Hole being addressed by this Management Plan is from the Miner Lake Road bridge over the Big Hole located between Jackson and Wisdom to the juncture with the Beaverhead River near Twin Bridges. (See Management Plan area map on Page 9.)



MANAGEMENT PLAN AREA MAP

### III. BACKGROUND

In the last several years the Department has recognized that the public is in general much more knowledgeable on resource issues and wants to be more involved in decision making regarding the management of fish and wildlife resources. The Department feels that it must get the public involved early in the planning process to help in selecting a management program rather than simply approving one after the fact. A major goal of the process is to give the public ownership in the management of the resource. As a result the Fisheries Division has prepared guideline documents to assist Regional Fisheries Managers in development of Management Plans. The Department has also identified the top ten fisheries in the State and has initiated a program to develop five year Fisheries Management Plans for these fisheries. The Big Hole falls into this category.

The planning process utilized by the Department involves several stages. The first of these is an in-house scoping phase to preliminarily identify the issues of concern. The next stage is the public scoping phase which results in a refined statement of issues. In the case of the Big Hole, an Ad Hoc Advisory Committee was established to work closely with the Department and the public at large was informed of the planning program and advised of the various means of inputting the process by means of the media. The public also participated in informational meetings. The next stage is the draft phase and involves the distribution to the public of a draft of the Management Plan and a series of public meetings for both informational and input purposes. The last stage is the publication of the final Management Plan. The Management Plan may require action by the Fish and Game Commission and in some cases may call for the drafting of special legislation to be presented to the Legislature.

An extremely important element in the planning process is the involvement of other public land management agencies which have an interest in the stream. In the case of the Big Hole, the Beaverhead National Forest manages a significant percentage of the lands within the drainage as does the Bureau of Land Management through their Dillon and Headwaters Resource Area offices. Representatives of these agencies have been involved in all stages of development of this Management Plan.



#### IV. U. S. FOREST SERVICE

The Beaverhead National Forest Plan, which was adopted in 1986, devotes an entire Chapter to a summary of the Forest's land management plans within the Big Hole River drainage. There are approximately 989,700 acres of National Forest lands within the Big Hole drainage which represents about 62% of the total drainage area of the river. The Forest Plan includes a Chapter on the Big Hole "because of the high level of public interest in the area and because in its entirety the Big Hole River encompasses portions of three Ranger Districts and three distinct blocks of National Forest lands (the Pioneers, the Fleecer area, and the south, west and north Big Hole)".

The Forest Plan includes a Table which summarizes the major resource potential and planned resource uses within the Big Hole drainage. This Table shows that 288,717 acres of the 654,672 acres of biologically suitable timberland will be managed for timber production. Timberland which will not be managed for timber includes existing wilderness (72,614 acres), Forest Service proposed wilderness (121,201 acres), and timberland which cannot be managed economically. The Forest plans to harvest 95.7 million board feet of timber in 37 separate timber sales over the ten year period 1986-1996. National Forest rangelands which are managed for livestock include 143,944 acres in 61 allotments.

The Forest Plan concludes with a summary of management direction which reads in part as follows: "In summary, the Forest is providing a mix of resource uses that responds to public concern for the values of the Big Hole drainage. Water quality and fisheries are of utmost importance, and scheduling, implementation, and monitoring of activities will be responsive to protection of those values. Critical wildlife areas have been identified and standards will be applied to ensure maintenance and protection of these critical habitats. Timber harvest has been reduced throughout the drainage in response to concern for other important resource values. However, there are areas in the Big Hole drainage that can benefit from timber management and where a positive cash flow from timber harvest can be expected. These lands remain in the suitable timber base and will be scheduled for harvest sometime in the planning horizon. In areas where timber harvest is scheduled, Forestwide and Management Area standards will be applied to protect other values while ensuring efficient use of the timber resource. Livestock grazing will continue on existing allotments with management designed to protect riparian and winter range values."

The Department and the Beaverhead National Forest have entered into a Cooperative Agreement to assist in achieving the objectives of each agency. Under the terms of this agreement a Cooperative Fisheries Biologist has been assigned to the Forest Supervisor's Office since August of 1985. The Department

provides salary and the Forest provides operations and field help. The Biologist collects fish abundance and fish habitat data on and off Forest lands. These data are summarized each year and presented to both agencies. The Biologist also acts as liason between the two agencies.

## V. BUREAU OF LAND MANAGEMENT

The Bureau of Land Management is responsible for management of a significant amount of public lands within the Big Hole River drainage. These lands fall under the jurisdiction of the Butte District office of BLM. Jurisdiction is further divided with the Headwaters Resource Area being responsible for lands upstream from Divide while the Dillon Resource Area handles the area downstream from Divide.

Within the last three years each of these Resource Areas have developed Recreation Area Management Plans for portions of the Big Hole River. The Headwaters Resource Area Upper Big Hole River Recreation Area Management Plan deals with the lands within one mile of the river from Pintlar Creek to Divide, a distance of approximately 40 river miles. BLM lands within this Management Plan are 15,170 acres which represents approximately 31% of the total lands and over 25% of the river front lands. The Dillon Resource Area Lower Big Hole River Recreation Area Management Plan addresses lands within one mile of the river from Divide to the Beaverhead/Madison County Line near Twin Bridges, a distance of approximately 38 river miles. BLM lands within this Management Plan are 12,980 acres which represents approximately 31% of the total lands within the corridor and approximately 19% of the river front lands.

These Management Plans had as objectives the continuation of present levels of recreation use with some provisions for anticipated increases in recreation demand and the maintenance of the natural setting of the public lands to enhance recreation and scenic values. The Lower Big Hole Plan was prepared in cooperation with the East Pioneer Stewardship Committee for the reason that the large amount of private lands will strongly influence the quality of recreation throughout the river corridor. This Committee is made up of a wide array of federal, state, local and private interests. The Department is one of the members of this Committee. The Lower Big Hole Plan also utilized BLM's Visual Resource Management Program to analyze scenic values and visual qualities and ultimately led to all river front lands being recognized under a Recreation Opportunity Spectrum Classification.

Some of the important Management Plan actions in these BLM plans are summarized as follows:

### A. Compatibility of Land Use

- Elimination or prohibiting of grazing in some areas, limitations on grazing in other areas, and identification of criteria to determine when an unacceptable level of conflict exists between grazing and recreation.

- Evaluation and limitation for both present and future oil and gas leases.

- Maintenance of a scenic buffer strip along the river as applied to resource activities such as timber harvesting and road building.

- Vehicle travel restrictions in developed recreation sites.

#### B. Land Tenure Adjustments

- Retention of BLM lands which are important to recreation within a one mile corridor on each side of the river.

- Acquiring of lands through exchange, purchase, or easement acquisition as opportunities occur to provide increased recreational opportunities or to protect visual resources.

In some cases certain specific parcels were identified.

- Acquisition of rights of way where a need is demonstrated.

#### C. Visitor Use

- Implement visitor use monitoring and supervision.

- Prepare an information, interpretation and signing plan.

- Develop a map/brochure that lists facilities and public lands, interprets natural phenomena, and educates the public on resource and recreation use problems. The Plans specifically state that this should be developed in conjunction with the Department.

- Physically identify appropriate parcels of public land to accomodate public use.

#### D. Site Development

- In the Upper River Plan specific sites were discussed for improvements. These included Divide Bridge, Dickie Bridge, Squaw Creek, and Sawlog.

- In the Lower River Plan several specific improvements were mentioned including a long term agreement with the Stauffer Chemical Company concerning their bridge at Maiden Rock.

Other action items dealt with noxious weeds, maintenance plans, manpower needs, and budget matters.

## VI. AD HOC ADVISORY COMMITTEE

In the in-house scoping meetings at the start of the planning study for the Big Hole, the Department began the process of identification of the special interest groups and members of the public who could bring a balanced perspective to the Ad Hoc Advisory Committee. This Committee would serve during the formulation of the Management Plan and would be a source of new ideas and would critically review issues, management alternatives and draft reports. Invitations to serve on the Committee were extended and the first meetings of the Committee were held in November of 1988 to begin the issues identification process. Members of the Committee and their affiliation, if any, are as follows:

Clayton Huntley, Big Hole Ranchers Association  
Tim Magness, Anaconda Sportsmen  
Bill Cain, Trout Unlimited, Butte  
Pat Dwyer, American Fisheries Society  
Brad Rixford, Bureau of Land Management, Butte  
Department of State Lands  
Dennis Havig, USFS, Wisdom  
Ed Levert, USFS, Wise River  
Ray Tilman, Butte Water Company  
Al Lubeck, Big Hole Watershed Coalition  
Tony Schoonen, Skyline Sportsmen  
Skip Mathewson, Wise River Sportsmen  
Bob Pavlovich, Legislator  
Bruce Botsford, Bureau of Land Management, Dillon  
Ray Gross, Trout Unlimited, Dillon  
David Browning, USFS, Dillon  
Jack Hutchison, Fishing & Floating Outfitters of Montana  
Loren Bahl, Water Quality Bureau, DHES  
Siv Seidensticker, Rancher  
Charles Hahnkamp, East Pioneer Stewardship Committee  
David Lehwalder, Madison County Planning Board  
E. Maynard Smith, Rancher  
Meg Smith, Beaverhead Conservation District  
Fritz Daily, Legislator  
Byron Bayers, Madison County Commission  
John Eliel, Beaverhead County Commission  
Frank Pickett, Montana Power Company  
Jerry Manley, Coalition for Stream Access  
John Anderson Jr., Ruby Valley Conservation District  
Beaverhead County Planning Board  
Harry Murnin, Fisherman  
Dick Vincent, Regional Fisheries Manager for the Department  
Dick Oswald, Big Hole Biologist for the Department  
Joel Shouse, Planning Consultant for the Department



## VII. ISSUES

The Department initially identified possible issues in the in-house scoping sessions. The Department was able to do this because of their frequent contact and communication with the public concerning the Big Hole. Recent examples include attendance at sportsmen's clubs and organizations meetings and periodic public meetings scheduled to allow anglers to express their feelings.

The issues identified through the in-house scoping sessions were then transmitted to the Ad Hoc Committee for their review and then were thoroughly discussed in meetings of the Committee held in November of 1988 and April of 1989. From this process the following refined statement of issues was identified:

### Refined Statement of Issues

1. Fisheries Management (by reach)
  - a) Fish Populations
  - b) Trends
  - c) Goals
  - d) Regulations
2. Fish Habitat (by reach)
  - a) Water Quality
  - b) Water Quantity
  - c) Off Stream Storage
  - d) Streambed Alterations
  - e) Diversions
  - f) Bank Cover
  - g) Channel Stability
3. Angler Use (by reach)
  - a) Access
  - b) Hazards (obstructions & diversions)
  - c) Numbers of Fishermen
  - d) Float Fisherman
  - e) Outfitter Use
  - f) User Education
  - g) Recreation Facilities
4. Corridor Management (by reach)
  - a) Preservation of Existing Riparian Values
  - b) Land Development
  - c) Aesthetics
  - d) Livestock
  - e) Coordination with Other Agencies

5. Agency Management

- a) Who
- b) What
- c) Where
- d) When

#### VIII. PUBLIC INFORMATION AND INVOLVEMENT PROCESS

The Department utilized two different means of informing and involving the public in the development of a Management Plan for the Big Hole. The first was through the use of an Ad Hoc Advisory Committee which has been previously described. Meetings of the Committee were held as follows:

Divide, Montana, November 1, 1988  
Butte, Montana, November 9, 1988  
Divide, Montana, April 27, 1989  
Butte, Montana, July 24, 1989

Secondly, the general public was involved both prior to and throughout the course of drafting the Management Plan. As discussed previously, the public was given a number of opportunities to provide input on the issues which enabled the Department to initially scope out the Plan. A number of press releases were made to announce the study, to provide periodic updates, to announce public informational meetings, and to detail means of providing input to the Plan.

The Draft Management Plan was announced to the public through the media in early August 1989 and copies were made available on request. Copies were also sent to members of the Ad Hoc Advisory Committee. Public meetings on the draft were held on August 30th in Butte and August 31st in Dillon.

The Final Management Plan was adopted by the Montana Fish and Game Commission on November 9, 1989, and copies are available through the Region 3 Headquarters Office in Bozeman. Copies of the Plan were also sent to all members of the Ad Hoc Advisory Committee.

## IX. FISHERIES MANAGEMENT

The Big Hole fishery was severely impacted by the extreme low water conditions of the summer and fall of 1988. Preliminary conclusions from fish population studies done in the spring of 1989 showed that a significant portion (50-60%) of the one and two year old fish were eliminated from the population. In addition, a significant percentage of the surviving rainbow population exhibited a great deal of physical stress. Hopefully these drought conditions will not occur again in the immediate future and that the Department will develop means of increasing flows in the river during future drought occurrences. This subject is discussed elsewhere in this Management Plan. For purposes of discussion of the Department's fishery management the fish populations studies through 1988 will be utilized as being reflective of the capabilities of the Big Hole fishery resources.

Prior to 1974, the Big Hole received annual plants of catchable size hatchery rainbows as did most of the region's rivers and streams. Research by the Department on the Madison River and O'Dell Creek in the early 70's demonstrated that these hatchery plants actually depressed trout numbers and that rivers could support higher trout populations based on a wild trout fishery without hatchery support. In 1974 the stocking of hatchery trout was virtually eliminated in the Big Hole in favor of wild trout management. The results of that action are depicted in Figure 1 which shows the response of wild brown and rainbow trout in the Melrose Study Section. From this graph it can be seen that both brown and rainbow numbers increased markedly since stocking was eliminated. Modern day numbers of brown trout average more than double what they were in the days of hatchery plants while rainbow numbers have about tripled. This was an important management decision since fishing pressure on the Big Hole has increased from about 40,000 angler days per year in the 60's to around 60,000 in the 80's.

The Department has divided the Big Hole into four management reaches. Reach 1 extends from the mouth of the river near Twin Bridges to the Glen Bridges, Reach 2 from the Glen Bridges to the dam at Divide, Reach 3 from Divide to Dickie Bridge, and Reach 4 from Dickey Bridge to the upper river near Jackson (See Figure 2). Trout populations vary among the four reaches both in terms of species composition and numbers of a particular species that the reach will support. Another important difference among the reaches exists due to differences in productivity or how many pounds of trout the reach can support. The populations of the four reaches are determined therefore by a combination of many factors including natural chemical nutrients, amount and type of habitat available, food supply, length of growing season, spawning and rearing habitat (reproduction), and competition among the species that occupy the reach.

# WILD TROUT POPULATIONS and STOCKING OF HATCHERY TROUT

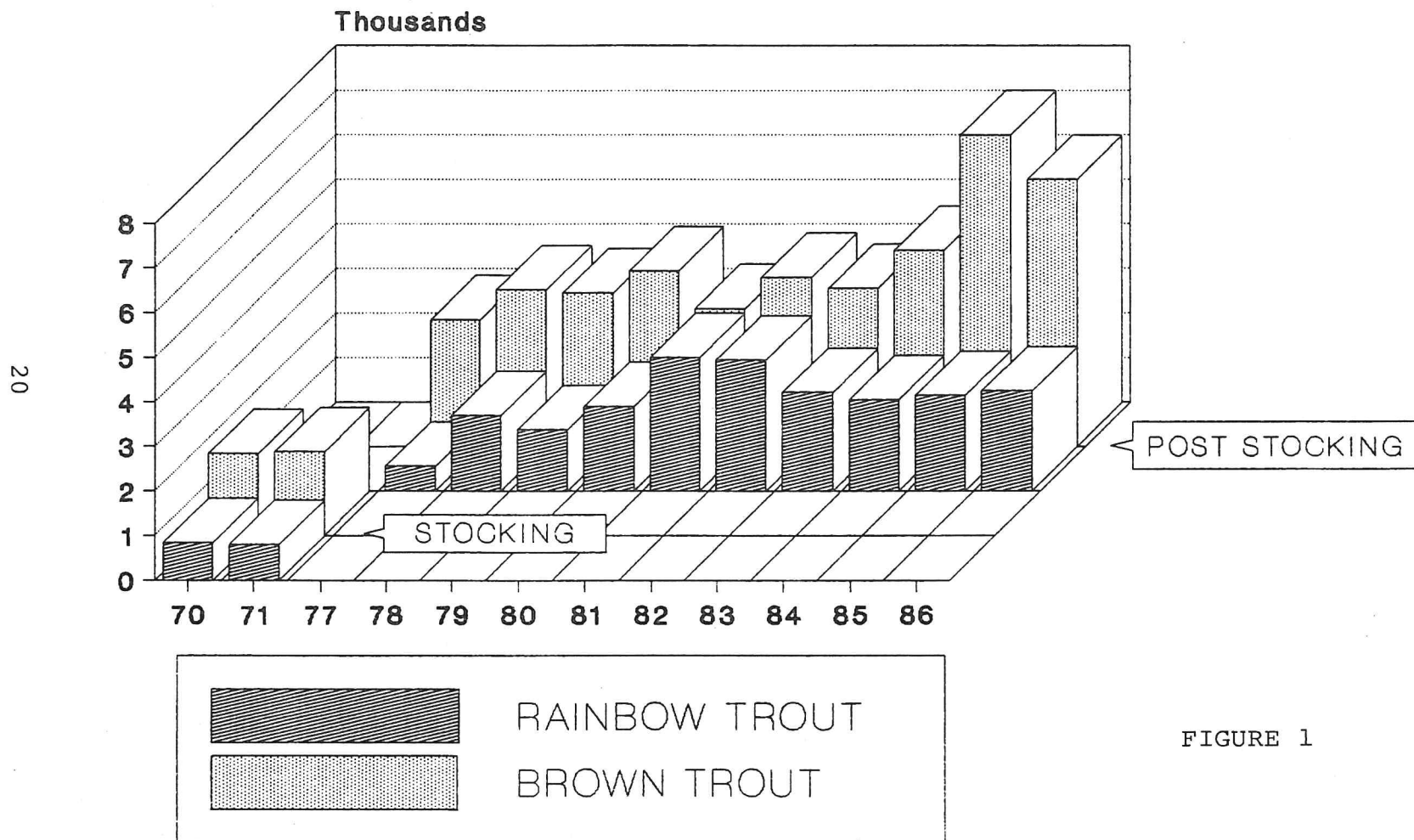
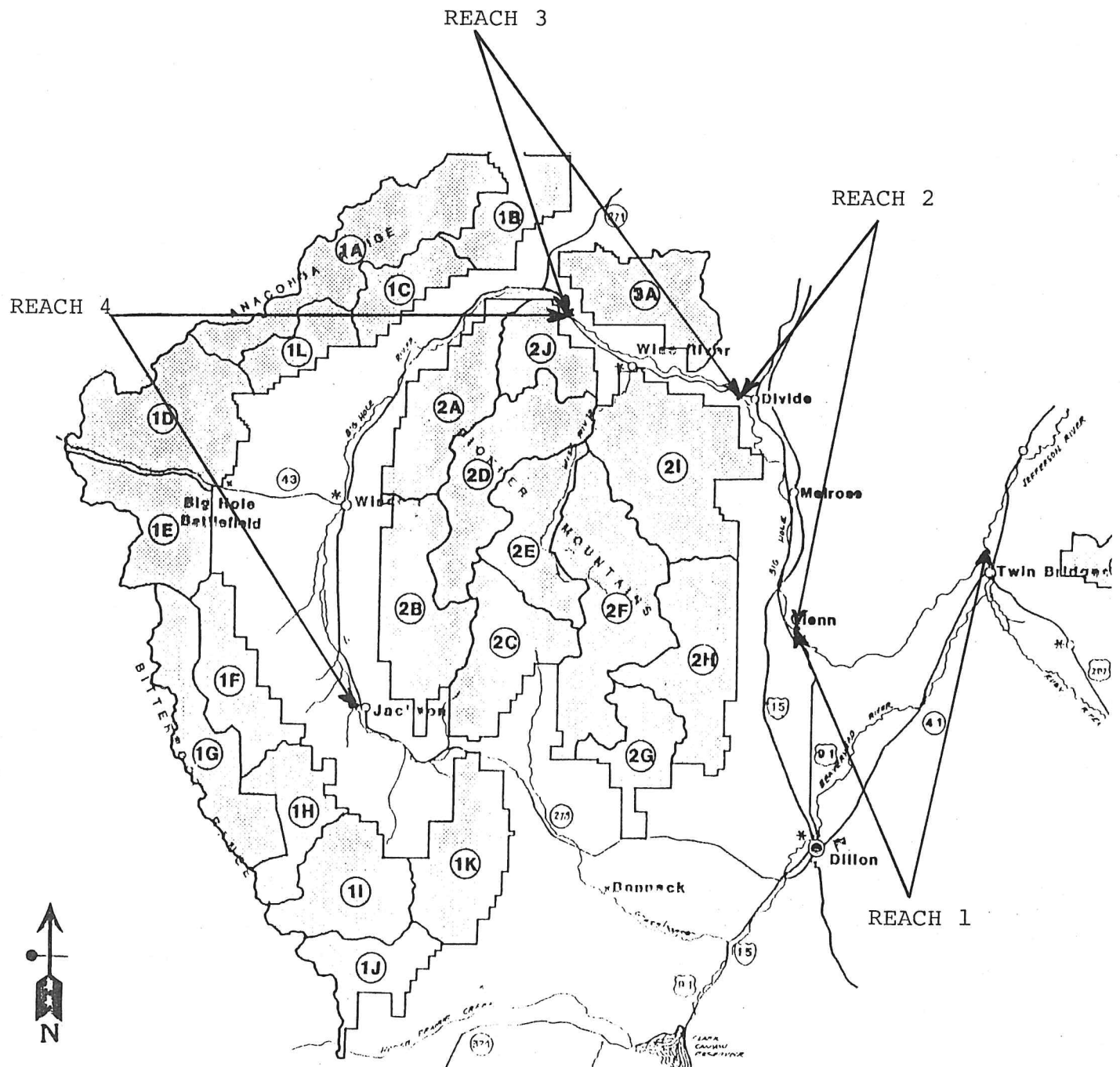


FIGURE 1





FISHERIES MANAGEMENT REACHES

FIGURE 2

# TROUT POPULATIONS COMPOSITIONS OF FOUR REACHES OF THE BIG HOLE RIVER

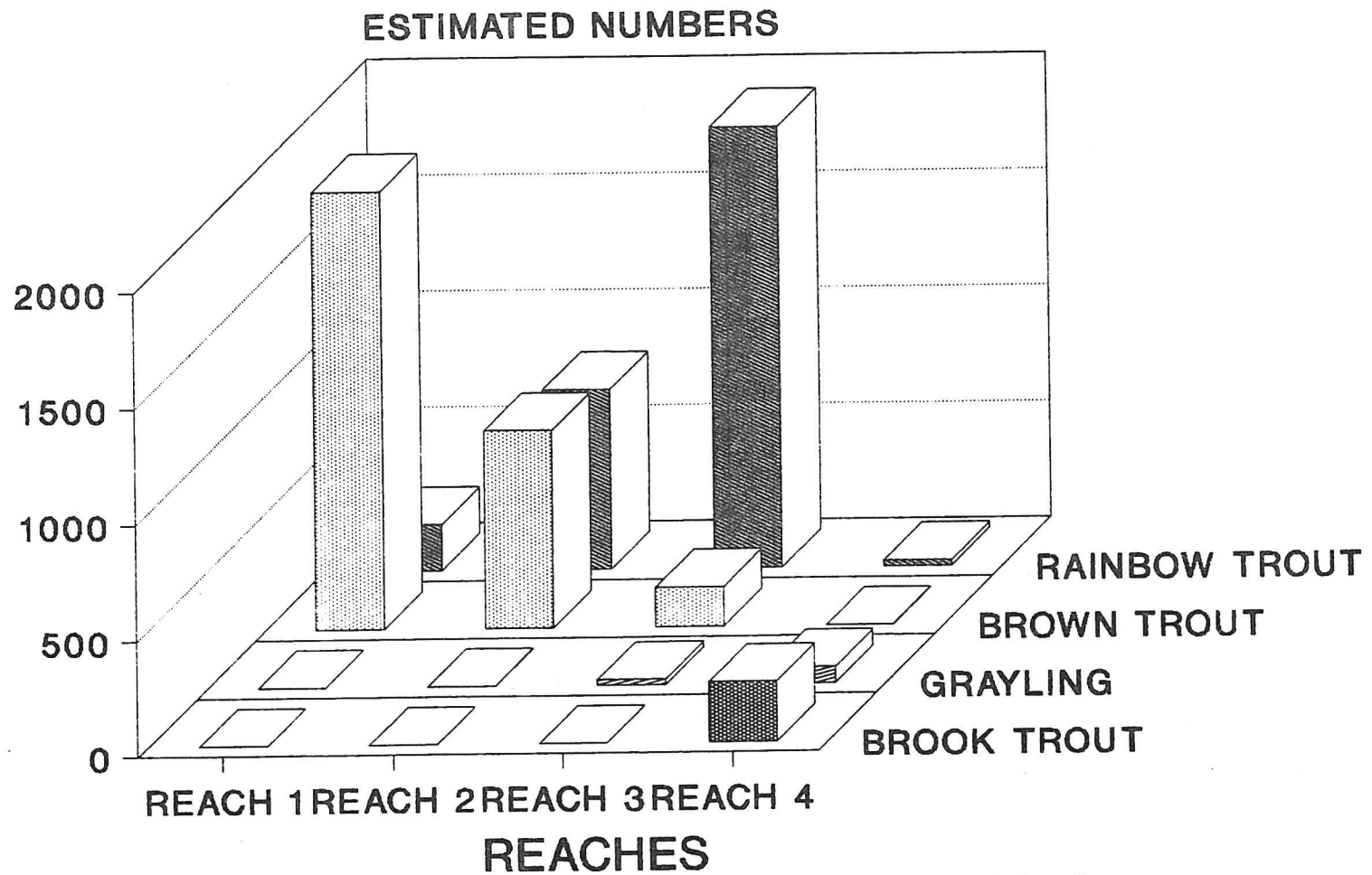


FIGURE 3

These natural factors may of course be altered by man's affects on the trout populations. Harvest will keep the standing crop below the limits set by the productivity or natural reproductive rate of the reach. Heavy angler harvest may severely reduce numbers or dramatically alter the age structure of a population as anglers concentrate their harvest on older larger fish. Man's activities may also reduce or alter populations through activities that degrade habitat such as the sedimentation of spawning habitat, erosion of streambanks, and summer dewatering of the stream channel.

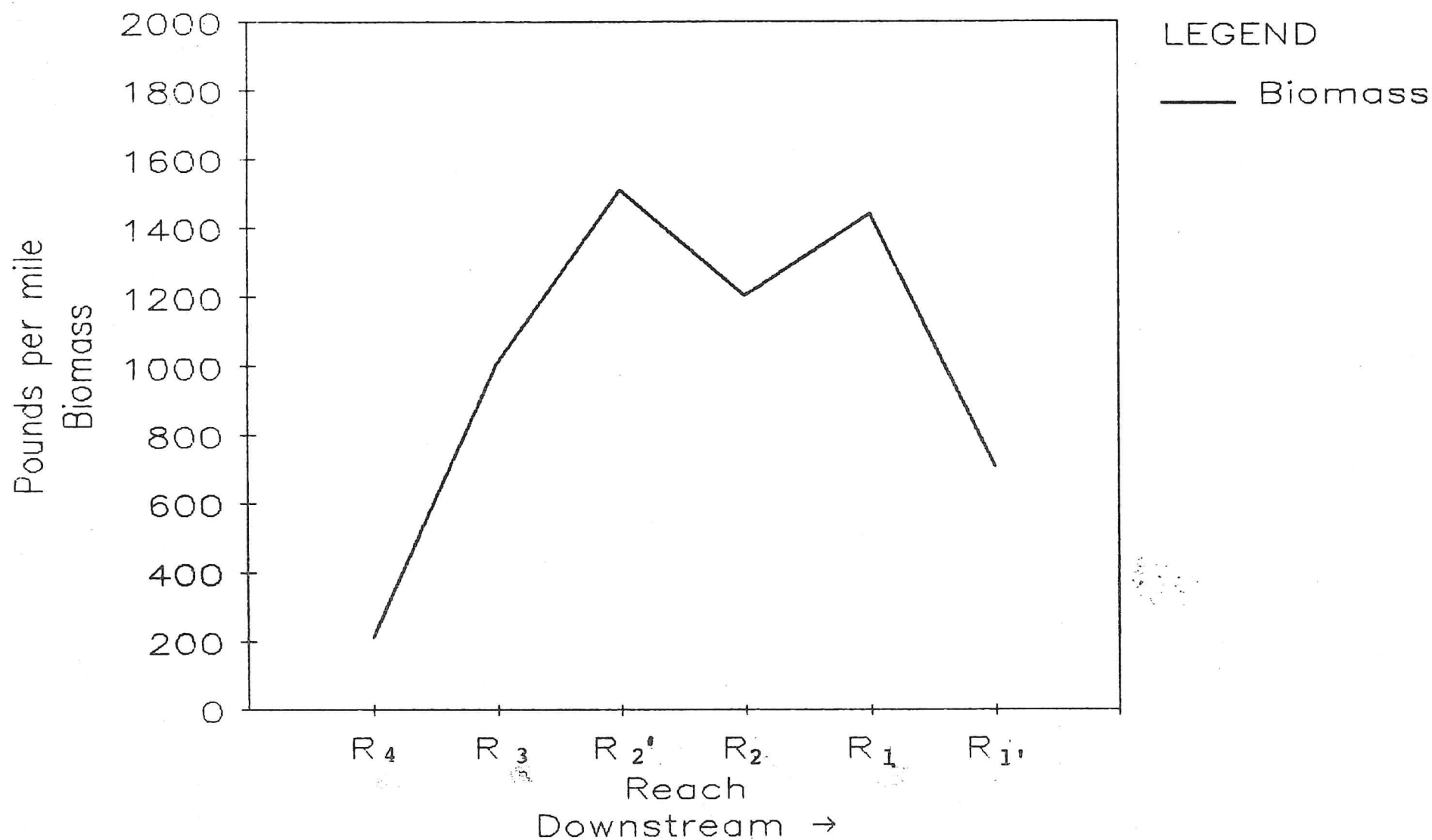
Trout population data collected in recent years from the various study sections was used to calculate average densities and species composition of the populations of two year and older fish of the four management reaches. This data is shown in Figure 3.

The numbers presented in Figure 3 are averages which tend to flatten out high and low population shifts. These numbers were compiled from the various study sections which the Department samples each year and therefore do not represent densities throughout the entire length of each reach. For example, while brown trout numbers are reported as 850 per mile for Reach 2, densities would be considerably higher near Glen at the lower end, and considerably lower near Divide at the uppermost end of the reach.

Several things are quite obvious from Figure 3. First, there is a gradation in species composition and abundance as one proceeds from the lower river upstream. Second, some species, like the brook and particularly the grayling, are limited to the upper river and are present in low numbers compared to the brown and rainbow, thereby requiring special management direction. Third, the native cutthroat are currently present at such low levels as to preclude any management whatsoever.

A different perspective of the trout populations of the four reaches is given in Figure 4. This graph shows a downstream gradation of the standing crops or biomass of trout that each reach supports. As explained above, this is an index of the productivity of each section as modified by habitat and angler harvest. Generally each stream reach supports a greater biomass of trout as one proceeds downstream. The section identified as R2', the Maiden Rock Section, is under special fishing regulations and it can be seen that it supports the highest observed trout biomass in the river. To some extent this demonstrates that trout populations are maintained below the carrying capacity of the river due to angler harvest. The section identified as R1' is the Heron Section and is the extreme downstream portion of the river near it's mouth. It shows a serious downturn in biomass as this reach of the river suffers from habitat deterioration due to chronic dewatering and habitat alteration.

Mean standing crop (Biomass) of all salmonids represented as pounds per mile of river from selected study sections in the four management reaches of the Big Hole River.



Whitefish are very abundant in all of the Big Hole River reaches with a catch limit of 100 fish. Several years ago several groups of anglers expressed concerns about a whitefish season which occurred during the general trout fishing season closure. These concerns centered around anglers really fishing for trout during this season. The Department responded to these concerns by making a number of changes in the fishing regulations. An extended whitefish season and catch and release fishing for trout opens on December 1st to the third Saturday in May with maggots and/or artificial lures only except for the special regulation section from Divide Dam to Melrose which remains closed to all fishing from December 1st through the third Saturday in May.

Each of the management reaches are briefly discussed in the following paragraphs.

#### Reach 1. (Mouth to Glen Bridges)

The fishery of Reach 1 represents an abundant mid-sized brown trout fishery in a relatively isolated setting. Long reaches of the cottonwood river bottom are located away from established roads or dwellings. Access is limited and angling pressure is much lighter than in other more accessible or popular reaches. The most abundant gamefish in the reach are the mountain whitefish and the brown trout. Low populations of rainbow trout are probably due to a scarcity of spawning tributaries. Fish populations are severely impacted by low summer stream flows, high summer water temperatures, and significant habitat alteration.

Since 1978, the entire length of Reach 1 has been included in the standard limit for trout, 5 fish per day, one of which may exceed 18 inches. An extended whitefish season and catch and release fishing for trout is open from December 1st to the third Saturday in May with maggots and/or artificial lures only. No special regulations have been proposed or are currently being considered for Reach 1. Because of the extreme dominance of brown trout, the management emphasis for Reach 1 must be placed on this species.

Public Input The public expressed no concerns with the Department's fisheries management of this Reach. Comments were directed at lack of access and ways of increasing low flows.

Management Statement for Reach 1 The Department will continue it's management emphasis for brown trout in Reach 1 and no changes in fishing regulations will be proposed at the present time.

#### Reach 2. (Glen Bridges to Divide Dam)

The fishery of Reach 2 represents an excellent sport fishery for both brown and rainbow trout and is the most heavily fished area.

of the river. One biologist describes this reach as the "meat and potatoes portion of the river". Brown trout predominate in the lower or downstream segment of the reach below Melrose, and conversely, rainbows are most abundant in the upstream segment near Divide.

In 1981 the segment of this reach between Divide and Melrose was placed under a special restrictive angler regulation. It was felt that harvest of larger trout was adversely affecting this segment of the population and anglers were expressing a desire to manage the segment for larger trout. The special regulation included a "slot limit" which required the release of all fish between 13 and 22 inches. The daily bag limit was 3 fish under 13 inches and one fish over 22 inches. The special regulation section was open to fishing during the standard fishing season from the third Saturday in May through November 30th. Fishing gear was also restricted to the use of artificial lures and flies. The remainder of Reach 2, Melrose to Glen Bridges, remains under the standard limit of 5 fish, one of which can be over 18 inches, with no restrictions on gear. An extended whitefish season and catch and release fishing for trout is open from December 1st to the third Saturday in May with maggots and/or artificial lures only.

The effects of the special "slot limit" regulation on the brown trout population of Reach 2 have been monitored since the regulation was put into effect in 1981. The data suggest that the special regulation has had the effect of markedly increasing numbers of older larger brown trout to the point at which they dominated, and to some degree may have depressed, the overall population. Accelerated mortality among these older large brown trout has caused a decline in their number but the data indicates that a new group of smaller fish will soon replace the large fish that were lost. Whether the population will tend to stabilize at some level or whether it will cycle within the type of fluctuation described remains to be seen and should be revealed by future sampling.

The effects of the special regulation on the rainbow trout is in contrast to that of the brown trout. In the case of the rainbows there has been a marked increase in the number of all rainbow trout as well as in the numbers of rainbows in excess of 13 inches in length. The density of the species has resulted in a slight decline in growth which may be limiting the number of large rainbow produced in the section. The number of rainbow in excess of 16 inches in length has increased under the regulation, but not to the extent seen for the browns and is probably a product of overall rainbow density.

Public Input Public input was very much in support of the Department's fisheries management of Reach 2. Support was strongly and enthusiastically voiced for the special regulations section of Reach 2, Divide to Melrose, with some individuals stating that "they would give up their life before they would



give up these regulations".

Management Statement for Reach 2 The Department will not propose any alternatives to the present management of Reach 2 at this time. Strong public support coupled with fisheries data which demonstrates that the goal of providing an abundant large trout fishery is being achieved supports the continuation of the special regulations from Divide to Melrose. If, in the future, more special regulation areas are desired by anglers on the Big Hole, the Department will give consideration to extending this special regulation area further downstream. The brown trout population in the special regulations section will be watched closely to determine if the numbers of large fish stabilize or if they will continue to cycle as recent population data seems to suggest.

### Reach 3 (Divide to Dickie Bridge)

The fishery of Reach 3 represents a diverse angling opportunity centered around the abundant rainbow trout. Mountain whitefish are also plentiful along with a modest population of large brown trout and limited numbers of arctic grayling and eastern brook trout. The two most popular species with anglers are the rainbow and browns.

Prior to 1986 no fish sampling was conducted in Reach 3 so no long term population data is available. In 1988 the entire length of Reach 3 was added to the existing special regulation management section (Divide to Melrose) of the river. Limits allow the harvest of three fish under 13 inches and one over 22 inches for rainbow, brown and cutthroat trout during the standard fishing season from the third Saturday in May through November 30th. An extended whitefish season and catch and release fishing for trout is open from December 1st to the third Saturday in May with maggots and/or artificial lures only. The regulation for grayling is catch and release for the entire Big Hole River. Angling method is restricted to the use of artificial lures and flies. The extension of the special regulations upstream to Dickie Bridge was sponsored by local sportsmen's groups rather than by the Department. Future fish sampling will include an evaluation of the effects of the special regulations on the trout populations of Reach 3.

Rainbow trout populations for Reach 3 are the highest observed for any reach of the Big Hole River. However, the vast majority of the rainbow fishery is provided from fish under 13 inches in length which are estimated to make up 70-85% of the population. This is not to suggest that ample numbers of larger rainbows are not found in Reach 3 as densities of these fish compare quite favorably with those observed in the special regulation section of Reach 2. This reach also demonstrates a unique feature for the Big Hole River; the ability to produce "trophy" sized rainbows in the 5 to 7 pound range. As the dominant game species in Reach 3, the primary fisheries management direction within the

reach should be placed on the rainbow trout.

Brown trout make up a small percentage (7-13%) of the trout population of the reach. However, the brown trout population is dominated by older, larger fish with the vast majority being over 15 inches in size. The low densities contribute to high growth rates. This is indicative of a situation where reproduction and recruitment are severely limited. Fish sampling has revealed a higher incidence of 5 pound and larger brown trout per mile than is seen in any other reach of the river which makes the brown trout population of Reach 3 a true trophy fishery.

Reach 3 supports a small but commonly encountered population of arctic grayling. These fish are a "Species of Special Concern" and represent the last population of its kind in the lower 48 states. Tagging of grayling has shown that they move between Reaches 3 and 4 and they will be discussed more thoroughly under Reach 4.

Brook trout are common residents of Reach 3 but are present in numbers too low to estimate.

Public Input There is a segment of the public who feel that the sportsmen sponsored special regulations for Reach 3 went too far. The special regulations which were applied to the entire reach, Divide to Dickie Bridge, in 1988 perhaps should have only covered the lower portion of the reach, from Divide to Jerry Creek Bridge or Wise River. It has also been pointed out that the lower portions of the reach has a significant rainbow population and due to its accessibility was an area that was heavily used by families prior to the special regulations. However, the public acknowledged that the Department's fish population studies of this reach have not progressed to the point of being able to draw any definitive conclusions on the effects of the special regulations and that perhaps these regulations should be continued for another 2-year regulation setting period.

Management Statement for Reach 3 The Department will maintain the present special regulations for another 2-year regulation setting period. These regulations limit harvest to three fish under 13 inches and one over 22 inches for rainbow, brown and cutthroat trout, catch and release fishing only for grayling. This will give the Department an opportunity to complete it's evaluation of the effects of the special regulations on the trout population. At that time, the results of the evaluation will be presented to the public along with a set of alternatives for future management of this reach. Recommendations based on public input received will then be made to the Fish and Game Commission for adoption.

Reach 4 (Dickie Bridge to Upper River near Jackson)

The fishery of Reach 4 is the least productive but in many ways the most unique of the four management reaches of the Big Hole

River. Mountain whitefish and eastern brook trout are the two most abundant species present. The reach also supports the highest densities of the native stream dwelling arctic grayling in the system as well as a small population of wild rainbow trout.

The three most popular or most sought after species in Reach 4 are the grayling, brookies, and rainbow. Meaningful population studies began in 1978 out of concern for grayling population status. The Department established the Wisdom study section in 1983 and the McDowell study section in 1985 to expand research work on the grayling. In addition to these study sections, virtually the entire reach has been sampled to monitor grayling migrations and investigate grayling habitat requirements. Population trends for grayling, brookies and rainbows are shown in Figure 5.

The native stream dwelling population of Big Hole grayling is unique in that it represents the last population of its kind in the lower 48 states. The species was widely distributed in the upper Missouri River system but its range has since been reduced to the upper Big Hole. The grayling is listed as a "Species of Special Concern" in Montana and the potential exists for the species to be classified as threatened or endangered under federal law. Recent research has found the Big Hole grayling to be genetically different from other forms of Montana grayling and to exhibit genetically linked behavioral differences with other Montana grayling. For these reasons as well as concern of landowners and anglers expressed at public meetings, the premier management emphasis on Reach 4 should be placed on the protection and enhancement of the grayling population.

The recent population status of the grayling is low with numbers ranging from 35 to 110 per mile. Reasons for the low numbers are not fully understood at this time. Data collected would seem to indicate that few grayling live beyond age 5. The data further suggests that low densities and population fluctuations are directly tied to inadequate recruitment of juvenile fish into the population. This problem may be associated with spawning or rearing or both. Research suggests that the grayling population of the upper Big Hole is essentially one population that uses a large expanse of river and a specific range of habitats over the course of a year. This segment of the river covers most of Reach 4 and probably extends into the upper portions of Reach 3. Competition from introduced species is perhaps another reason for reductions in grayling numbers. Brook trout were introduced into the upper Big Hole in the 30's and wild rainbow trout numbers appear to be increasing. A small plant of hatchery rainbows (about 3,000 per year) is made at Sportsman's Park and given the Department's present knowledge that stocking depresses wild fish populations, it is possible that this plant may have detrimental effects on the grayling. In 1988 fishing regulations for grayling were changed to catch and release fishing only. Future research work by the Department is being directed at better

# ESTIMATED POPULATIONS OF GRAYLING, BROOK TROUT AND RAINBOW TROUT IN THE WISDOM (Wis) AND McDOWELL (Mc) STUDY SECTIONS OF REACH 4 OF THE BIG HOLE RIVER 1978-1986

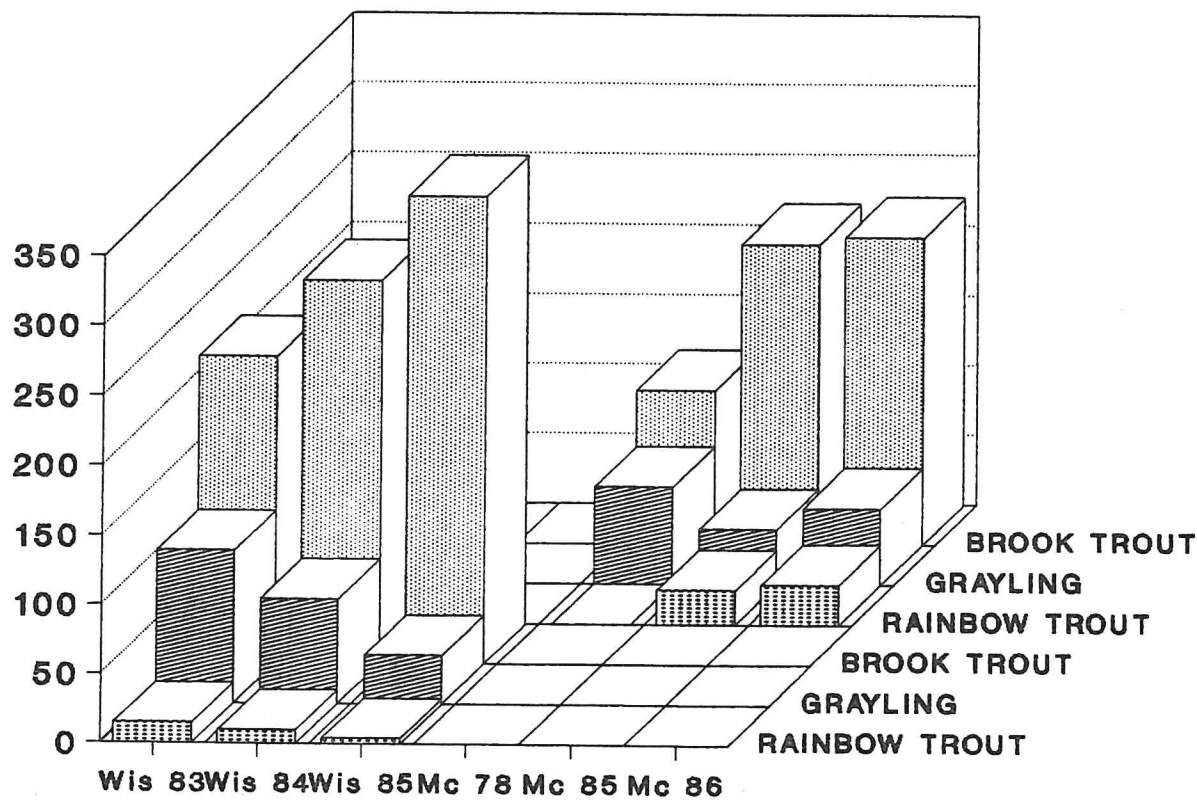


FIGURE 5

understanding of the needs of grayling and at management to enhance the population.

The brook trout is the most abundant trout species in Reach 4 and composes the majority of the angler catch within the reach. It is also the dominant species in all of the tributary streams to Reach 4. While the brook trout fishery represents a popular fishery with a segment of the angling public, the importance of the grayling population, particularly in its current status, must take precedence over the brook trout. Questions over competition between the brookies and grayling are a cause of concern for grayling management. At this time, it is probably a conservative approach to maintain a high harvest rate on the brook trout to help limit their abundance. This is being done currently through a 20 fish or 10 pound limit. An added benefit of this management, at least at current harvest rates, is better growth and larger than average fish for this fertile species.

While the rainbow trout is not abundant in Reach 4, the fact that any population estimate can be calculated at all represents an expansion of wild rainbow into the area. It is believed that this invasion represents a response of wild rainbow populations to the cessation of hatchery plants in 1974. These populations will continue to be monitored to ascertain to what level the population may increase. As with brook trout, the possibility of competition between rainbows and grayling must be considered. Due to their low densities, growth and condition of the rainbow within the reach is superior, resulting in large, heavy 17 to 20 inch fish. The small annual plant of catchable hatchery rainbow trout (about 3,000 per year) at Sportsman's Park has been maintained at the request of the Anaconda Sportsman's Club which owns the facility. It was believed that the plant was necessary because of the high number of anglers who camp at the park. With modern day knowledge of the superiority of wild trout management over hatchery plants and the knowledge that a substantial number of grayling winter at Sportsman's Park, this plant should probably be abandoned.

The standard fishing season from the third Saturday in May through November 30th applies to Reach 4. However, an extended whitefish season and catch and release fishing for trout is open from December 1st to the third Saturday in May with maggots and/or artificial lures only.

Public Input Initial public input as regards fisheries management for Reach 4 saw several groups strongly urging the Management Plan to place emphasis on brook and rainbow trout rather than the grayling. Many questions were raised as to why there are not the brookies and grayling that there used to be in this reach. The Department explained at length the results of the fish population sampling, interpreted this data, explained what the Department thinks is happening, and the rationale for the resulting management program. Members of the public who heard this explanation reversed their position to one of support



for the present Department management.

Management Statement for Reach 4 The native stream dwelling population of Big Hole grayling is the last of its kind in the lower 48 states and has been listed as a "Species of Special Concern" in Montana. The public has previously supported the protection and enhancement of the grayling population as the management emphasis for Reach 4. Population studies of the grayling show that their numbers are very low, the reasons for which the Department does not fully understand at the present time. Data seems to suggest that grayling are short lived, have spawning and rearing problems, and do not compete well with other fish. The hatchery rainbow plant at Sportsmen's Park is felt to be detrimental to the grayling and also to wild rainbow populations and probably should be eliminated. The brook trout is the most abundant species in Reach 4 and is a popular fish with anglers. Due to questions regarding competition between brookies and grayling the Department has taken a conservative approach and encouraged a high harvest rate of brookies through a 20 fish or 10 pounds limit. An added benefit to this management is better growth and larger than average size of brookies.

The Department will continue present management which places the highest priority on preserving, protecting, and enhancing grayling populations. Brook trout management will continue to encourage high harvest rates and the hatchery plant of rainbows at Sportsmen's Park will be discontinued. Future research work by the Department will improve the understanding of the needs of the grayling and will allow a reevaluation of management of Reach 4 and perhaps result in a change in management emphasis. It is presently anticipated that the results of this research work will be completed and available to assist in the development of the next 5-year Management Plan (1994-99).



## X. FISHERIES HABITAT

The elements which make up fisheries habitat include the water of the stream (specifically it's quality and quantity), the stream bed, and the stream banks. The quality of a fishery can be directly related to the quality of the habitat. In the case of the Big Hole, the fishery was in very good condition until the summer of 1988. Extreme low flows and high water temperatures in the summer and fall of 1988 severely damaged the fishery. The river below Melrose and above Divide suffers to some degree during most summers from low flows and high water temperatures and the fishery is to some extent limited by these conditions.

Limited water quality data is available for the Big Hole. The U. S. Geological Survey (USGS) has done some sampling at their gaging station located between Melrose and Glen. Information on temperature and conductance is available for one year in the 50's, four years in the 60's, and from 1977 to the present. Some sediment data was gathered in the 50's and 60's. The Water Quality Bureau of the Montana Department of Health and Environmental Sciences has a limited amount of information which was mostly gathered in the 70's. Because water is taken from the river at Divide by the Butte Water Company for use as water supply for the City of Butte, the river above Divide has been classified as A-1 by the Water Quality Bureau. This is the highest classification utilized by the State.

Analysis of the water quality data would seem to indicate that quality is in general good. Sediment levels are higher during periods of runoff and are probably related to land use activities and disturbances such as grazing and logging. Temperatures levels can be quite high and are generally related to very low water flow conditions resulting from irrigation diversions during the hotter summer months.

Water quantity data for the Big Hole is available from the USGS gaging station mentioned above between Melrose and Glen. A continuous record has been maintained since 1923. Historically the maximum flow measured was 23,000 cfs but was related to a dam failure in 1927. Next highest was 14,300 cfs in June of 1972. Lowest flow of record was 49 cfs measured in August of 1931. For 1988 the maximum flow was 3,480 cfs on June 2nd and the lowest was 51 cfs on September 12th. The average discharge of the Big Hole at this location over 64 years of record was 1,162 cfs or 841,900 acre feet per year.

The fisheries habitat of the Big Hole River is quite obviously limited by insufficient water quantities during the summer and early fall of most years. This problem is caused or worsened by water diversions for irrigation. In a severe drought year such as 1988 the river can literally be totally dewatered in an effort to satisfy the present water rights. There are few, if any, options available to the Department to deal with this problem. Water conservation might be assisted by irrigators through the

use of practices which achieve irrigation efficiency. Some improvement might also be expected when the water rights on the Big Hole are eventually adjudicated.

The possibility of water storage in the Big Hole was investigated by the Montana Department of Natural Resources and Conservation (DNRC) at the request of the State Legislature. Studies were initiated in 1977 and a final report issued in January of 1981. The study concluded that there were water shortages for agricultural use in the upper basin of the Big Hole and for agricultural and instream use in the lower basin. These shortages in an average year were estimated to total 113,644 acre-feet to provide a maintenance-level fish habit and 308,708 acre-feet for an ideal habitat. The study also concluded that water storage on the mainstem was not recommended and looked at eight tributary storage sites. The study recommended that a dam be built on Pattengail Creek approximately 12 miles south of Wise River. The dam would provide a 10,000 acre-foot annual yield at a then cost of \$36/acre-foot. DNRC estimated that the firm annual yield would be sufficient to irrigate 4,352 acres and add 170 cfs for one month to instream flows.

The DNRC study also suggested that if some laws were changed that instream flows could be increased by renting water rights from irrigators. In the 1989 Legislative session a Bill was introduced to allow the leasing of water rights for this purpose. Although the Bill was not passed by the Legislature in this form the Legislature did approve a test Bill which gives the Department the ability to lease water on several test streams to see if this can be a workable solution to augment stream flows. The results of these tests will be monitored very closely for applicability to the Big Hole.

Irrigation practices can have significant impacts on fisheries habitat. Perhaps the most significant are streambed alterations associated with irrigation diversions which require instream work on an annual basis. Proper management of irrigation diversion shutdown can also minimize fish losses in irrigation canals and ditches. Rather than a total shutdown of a diversion, it should first be cut in half to allow fish to return to the river.

The stream banks of the Big Hole have seen significant disturbance in some areas. Vegetation (willows) have been removed from the banks in areas in the upper basin which directly impacts fisheries habitat. Major areas of encroachment on the riparian zone and the stream banks by roads, railroads, and bridges has occurred in the past, but these activities are now fully monitored through the Stream Protection Act and the Natural Streambed and Land Preservation Act ("310"). Some degree of meandering and braiding of the stream channel has occurred, particularly in the middle and lower reaches. Immediately above the community of Melrose the Big Hole splits into two channels. In recent years the major flow has been switching from the east to the west channel which has caused major problems for

irrigators on the east channel and threatens land and structures on the west channel. This problem was the subject of a Water Development Grants Program Application submitted to DNRC by the Mile High and Beaverhead Conservation Districts in 1988. The project proposes to divide the flow between the two channels in a stable near permanent condition through the construction of drop and sill structures. Funding for this project was approved by the Legislature and construction is planned in the spring of 1990.

Public Input The input received by the Department on fisheries habitat throughout the course of development of this Management Plan has generally supported the conclusion that the major habitat problem of the Big Hole River is low water flows and resulting high water temperatures. The public also has concerns about land use activities within the Big Hole drainage which increase soil erosion and result in higher sediment loads in the river.

Management Statement The Department will monitor activities within the Big Hole drainage which have the potential to impact the fisheries habitat and will work to solve present habitat problems. Specifically the Department will:

1. Protect water quality by:

- participating in interdisciplinary team activities with the Forest Service and the Bureau of Land Management,
- being involved in the planning process for mining, timber sales, grazing allotments, etc.,
- working closely with individual land owners and Conservation Districts on water quality concerns,
- working closely with the Water Quality Bureau (DHES) to insure that water quality standards are maintained and enforced and that Best Management Practices are utilized, and,
- striving to see that water quality monitoring is accomplished to determine the results these efforts.

2. Work toward enhancement of summer and fall water flows in the river by:

- encouraging conservation of water and consideration for the fishery by the Big Hole irrigators,
- continuing to explore the feasibility of water leasing to carry the fishery through low flows, and,
- further exploring the feasibility of offstream or tributary storage.

3. Protect the stream banks and bed by:

- working closely with the Bureau of Land Management to see that their Recreation Area Management Plans are accomplished where they deal with protection of the streambed and riparian zones,
- insuring that the provisions of the Stream Protection Act are enforced, and,
- insuring that the provisions of the Natural Streambed and Land Preservation Act ("310") are enforced.

## XI. ANGLER USE

It has been previously pointed out in the study entitled "The Net Economic Value of Fishing in Montana" that the Big Hole River was found to be one of the highest valued streams in Montana. In a companion study entitled "Angler Preference Survey" the Department learned a great deal about the anglers who fished the Big Hole in the summer and fall of 1986.

A total of 185 residents and non-residents were mailed questionnaires and 158 were returned for a rate of response of 85%. Approximately 70% were residents and 30% were non-residents. The majority, about 71%, fished from the shore with the balance, 29%, in part using a boat. A little over 5% used a guide or outfitter. Only 11% indicated that bait was their preferred method of fishing. About 17% reported that they saw more anglers than they expected to see. However, 83% said that their fishing was unaffected by other anglers. Of those that were affected, 29% said the reason was competition for holes with the next highest answer of 18% saying it was floating related. In another question concerning perceived problems or concerns, the most commonly checked concern was "too many boats" and the second most common was "water levels". Over 65% reported that the Big Hole was either their favorite or one of their favorite streams in Montana. On questions relating to management preference, the vast majority preferred habitat protection and special regulations. With regard to limits, most preferred a slot limit or reduction in the total limit. On how to increase the numbers of trout, the favored responses were limit number, gear restrictions, and limit size kept.

From the study one might conclude that the typical Big Hole angler is a fly fisherman who fishes the Big Hole frequently, is not interested in large catch limits, and is somewhat knowledgeable concerning fish habitat and fish management problems of the river. This general conclusion perhaps presents a distorted view on angler use as each reach experiences differences. Reach 1, Mouth to Glen Bridges, is probably the lightest used due to access limitations and to low water conditions in most years. Reach 2, Glen Bridges to Divide, probably experiences the heaviest total use during the year with the majority of this use occurring during the Salmon Fly hatch in early June. Anglers from all over the State as well as non-residents travel to the Big Hole for the hatch and most will fish this reach. Creel census clerks at Melrose during the hatch have counted over 100 boats a day on numerous occasions. Access is good for both wade anglers and floaters in this reach. Reach 3, Divide to Dickie Bridge, would rank second in terms of use. Use of the lower end of the reach is similar to Reach 2 with very heavy use during the Salmon Fly hatch. Use of the upper portion of the reach is probably more uniform throughout the season and experiences more family type fishing associated with both day and camping uses. Reach 4, Dickie Bridge to the Upper River, likewise experiences more uniform use throughout the season by



more diverse types of fisherman. Access is somewhat limited in the upper portions of this reach which also affects the amount of use.

User conflicts on the river are noted during busy times, such as the Salmon Fly hatch. The most common are conflicts between bank or wade fisherman and floaters and occur in Reaches 2 and 3. However, in the Preference Survey only 17% of anglers indicated that they were interfered with by other anglers and only 18% of the interfered anglers indicated that it was due to floating. The Department feels that the situation has not reached a level which calls for management action at the present time but also recognizes that it does not have sufficient census information to clearly delineate the seriousness of the conflict.

Outfitter use of the river is also a topic of debate among users. Most outfitter use involves floating and occurs during and near the Salmon Fly hatch. Outfitters from throughout the State are found on the river at this time. The Preference Survey revealed that only 5% of respondents had utilized an outfitter but this figure represents the entire season whereas the outfitter use is felt to be much higher during the hatch. Once again the Department simply does not presently have sufficient census data to evaluate this concern.

Angler access and facilities are relatively numerous throughout the Management Plan area, but there are areas which need improvement. A listing of what is presently available follows beginning with Reach 1 and working upstream.

#### Reach 1 - Mouth to Glen Bridges

1. High Road Fishing Access Site (FAS), Department provided, boat ramp and parking.
2. Pennington Bridges, Department provided, no improvements.
3. Notch bottom at Hogback, Department provided, boat ramp, parking and toilets.
4. Glen Bridges FAS, Department provided, campsites, boat ramp, parking, toilets, tables.
5. Various locations where public lands (mostly BLM) adjoin the river.

#### Reach 2 - Glen Bridges to Divide

1. Grogan's at Glen, private, crude ramp, parking, toilet.
2. Brown's Bridge FAS, Department provided, campsites, boat ramp, parking, toilets.
3. Salmon Fly FAS (Melrose), Department provided, campsites, boat ramp, parking, toilets, tables.
4. White Gate, Private, boat launch, parking.
5. Maiden Rock FAS, Department provided, campsites, toilets, tables.
6. Maiden Rock Day Use/Fishing Access, BLM provided.
7. Maiden Rock Boat Launch, BLM provided, boat ramp, parking, toilets.
8. Divide FAS, BLM provided, campsites, boat ramp, parking,

toilets, tables.

9. Various park and walk access through ranches, private.
10. Various locations where State and County roads cross or abut river.
11. Various locations where public lands (mostly BLM) adjoin the river.

#### Reach 3 - Divide to Dickie Bridge

1. Unofficial at bridge above Divide Dam, private, crude ramp, 38 acres at this location have been offered for sale to the Department.
2. Unofficial below Dewey FAS, private, crude ramp.
3. Dewey FAS, Department provided, boat ramp, parking.
4. Jerry Creek Bridge, BLM provided, boat ramp, parking.
5. Dickey Bridge, BLM provided, campsites, toilets, tables.
6. Various areas where State or County Roads cross or abut river.
7. Various locations where public lands (mostly BLM) adjoin the river.

#### Reach 4 - Dickie Bridge to Upper River

1. Bryant Creek Road, BLM provided, campsites, toilets, tables.
2. East Bank Recreation Area, BLM provided, (new).
3. Sportsmen's Park, Anaconda Sportsmen, campsites, toilets, tables.
4. Fish Trap Creek FAS, Department provided, campsites, toilets, tables.
5. Squaw Creek Bridge, BLM provided.
6. Doolittle Creek, BLM provided.
7. Various areas where State or County Roads cross or abut river.
8. Various locations where public lands (mostly BLM) adjoin the river.

It has been previously pointed out that access needs do exist, particularly in Reach 1 and to some extent in Reach 4. BLM has recently completed their Recreation Area Management Plans for the Big Hole wherein they identify their plans for increased access and facilities on their present lands and their intent to seek land exchanges which might also provide additional sites. The Department will work closely with BLM to jointly resolve access and facility needs on the Big Hole.

Various hazards exist for users of the Big Hole, in particular to floaters. Most of these relate to irrigation diversion facilities located within the river itself and other man caused obstructions. During high spring flows certain areas of the river can be quite dangerous, particularly to small boats. The mining operation and the private bridge at Maiden Rock as well as the railroad tracks adjacent to the river from Divide to near Melrose also created hazards to users. The Department needs to develop a method of informing the public of these hazards.

Some of the conflicts between users of the river could be



resolved through user education. This is particularly true in situation where a floater encounters a bank or wade fisherman. The Department needs to find a means to set forth fishing and floating etiquette so individuals know how to deal with specific situations.

BLM discussed the development of a map/brochure for use by Big Hole visitors in their Recreation Area Management Plans. They also stated that it should be developed in conjunction with the Department. This would appear to be an ideal method of communicating with anglers on items such as access and recreation facility locations, public lands, user education, hazard locations, floater etiquette, etc.

Public Input The public has expressed to the Department their concerns about the amount of public use, the conflicts occurring between users, and their concerns about growing commercial (outfitter) use of the river. They have also asked for additional public access to the river in Reach 1 and to some extent in Reach 4.

Management Statement The Department anticipates that public use of the Big Hole will increase in the future, particularly if ways can be found to improve flow conditions during the summer and fall. The Department must develop a better understanding of the numbers of users and the interactions between the various user groups and their effects on the resource. To do so a method must be developed to survey users of the river. This can be accomplished in several ways:

1. Operation of census/interview station(s).
2. Periodic spot surveys.
3. A survey conducted by mail.
4. Voluntary completion of user census forms at unmanned self dispensing stations at access locations.

The Department will evaluate these various methods and review the associated costs in order to develop a census program that will be utilized during either the summer of 1991 or 1992.

Should the census reveal that the Department needs to get involved with management of the floating use, the Department feels that its present authority to limit fishing from boats is sufficient. Additional authority may be needed in the future and this authority will have to be sought from the Legislature. However, this action will be the subject of future Management Plans and is not a part of this Plan.

The Department will initiate action immediately to develop a cooperative program with BLM to work on:

1. Development of additional angler access locations.
2. Development of a map/brochure for use by visitors which contains information on access, recreation facilities, public lands, user education, hazards, and floating etiquette.

## XII. CORRIDOR MANAGEMENT

Land uses within the Big Hole drainage play an important role in influencing the quality of the fishery, the fishery habitat, and opportunities and experiences available to the recreation user. This is even more true as it pertains to land uses in the areas immediately adjacent to the stream, or as it is known, the stream corridor.

Water quality is probably the most obvious element of fish habitat to be affected by land use, with sediment normally being the parameter most affected. Activities which (1) remove vegetation (logging, concentration of livestock, etc.), (2) alter the natural landscape (road construction, farming, etc.), and/or (3) concentrate runoff (culverts, etc.), can increase erosion and result in deposition of sediments in waterways which over time are transported to the river itself. Sediment has the negative effects of reducing the fishing opportunities (fish cannot see the fly), reducing the overall aesthetics of the stream (muddy water is not as pleasing to look at as clear), and most importantly, it can severely impact fish reproduction. Sediment clogs spawning gravels and cuts off the oxygen supply to eggs which have been deposited in the gravels.

A number of other water quality parameters can be impacted by land use. Water chemistry is influenced by leachates from mine waste. Water temperatures can be increased by removal of vegetation which furnishes shade to water. Nutrients and bacteria levels can be increased by livestock and human wastes.

Water yield from a drainage basin is also influenced by land uses within the basin. An area covered with trees produces an entirely different yield than an area covered with grass. Likewise, the timing of the runoff can be similarly impacted. An area with heavy tree cover will generally produce a longer sustained runoff during the spring melt, whereas an area with little vegetation will have earlier and higher flows but of shorter duration.

There are many ramifications of land uses within the stream corridor. Vegetation removal on the banks can affect shelter and shade for fish, cause stable stream banks to become unstable, and affect the general aesthetics of the riparian zone. Heavy livestock concentrations along streams normally results in vegetation removal, the breaking down of stream banks, and a widening and flattening of the stream channel itself. Typically this eliminates holding water for trout. Roadways alongside streams can have some of these same results. Irrigation diversion structures, bridges, and culverts that are located within the stream also can impact water quality and the fishery.

In the case of the Big Hole the stream corridor is a very important part of the recreation setting and the Department is very much concerned that it be preserved and protected. The Department's goals in this regard are very much the same as the Bureau of Land Management. Previous discussion about the Bureau's Recreation Area Management Plans set forth the fact that in the Headwaters Resource Area Plan (above Divide) 31% of the lands within one mile of the river are public lands managed by BLM as is 25% of the river frontage. In the Dillon Resource Area Plan these numbers are 31% and 19% respectively.

The Dillon Area utilized a planning process called the Recreation Opportunity Spectrum (ROS) to establish their management objectives. In this process the physical, social, and management setting component criteria were applied from the perspective of a recreationist located in a corridor which included the river, and 150 feet to each side of the river. In other words, the criteria were used only to the extent that a user within the immediate "river corridor" would be affected by sights and sounds emanating from the wider Management Area corridor. Topography and vegetation along the "river corridor" are the major ingredients in screening out noise and visual intrusions. The social setting still depended, to a large extent, on the degree of human activity within the river corridor.

The basis for this approach is that most river-oriented recreation occurs on the river or within 150 feet to each side of the river. This classification resulted in the breakdown of 15 different river segments into one of the four following classifications:

- Developed
- Rural
- Roaded Natural
- Semi-primitive Motorized

The Bureau's management objectives included (1) management to retain the present level of recreation opportunities as defined by these classifications, and (2) the maintenance of visual quality to enhance recreation as well as scenic values.

The Department fully concurs with the management objectives and the Management Plan actions as set forth in the BLM Recreation Area Management Plans and will work with BLM to see that these plans are accomplished for public lands within the stream corridor. The Department will also work closely with BLM as regards their acquisition or exchanging of lands to increase the amount of public lands within the corridor.

For private lands within the stream corridor, the Department will work with the Planning Boards for the respective counties, Beaverhead, Silver Bow, and Madison Counties. This will hopefully result in subdivisions and other land use proposals, which come under review by means of the county subdivision

regulations or Comprehensive Plan provisions, being compatible with the recreation goals of the stream corridor. Madison County has adopted as a part of their County Comprehensive Plan a 500 foot setback for structures along the upper Madison River. The Department would like to see this type of setback contained in the Comprehensive Plans of all three counties for the Big Hole.

The Department will work with the local Conservation Districts to assist in seeing that conservation is practiced on private lands within the stream corridor. The State Highway Department and County Road Offices will likewise be contacted regarding construction and maintenance within the corridor.

Public Input The public input received by the Department throughout the development of this Management Plan has been very supportive of protection and preservation of the stream corridor.

Management Statement The Department intends to take an active role in the review, discussion, and permitting (where required) of land use activities within the Big Hole River stream corridor to insure that they do not negatively affect the fishery, the fishery habitat, and opportunities and experiences available to the recreation user. The Department will also work closely with the Bureau of Land Management to assist in the accomplishment of the objectives as set forth in their Recreation Area Management Plans for the Big Hole.

### XIII. AGENCY MANAGEMENT

A variety of agencies have management responsibilities in the Big Hole drainage. The Department, as the recreation management agency for the State of Montana and as trustee for the water which flows in the Big Hole River on behalf of the citizens of the State of Montana, must play a key role in future management of the river. This includes the fishery, the fish habitat, the angler use, and the stream corridor.

The Beaverhead National Forest manages 62% of the drainage basin of the Big Hole and must play a major role in future management of the water quality of the river. The management direction expressed in the Forest Plan states that water quality and fisheries are of utmost importance and that the Forest activities will be responsive to protection of these values. The Department and the Forest have entered into a cooperative agreement which has placed a Department Fisheries Biologist in the Forest Supervisors Office to monitor Forest activities and to act as a liaison between the two agencies.

The Bureau of Land Management manages a significant amount of public lands within the river corridor. The Bureau has developed Recreation Area Management Plans for these lands whose principal emphasis is on recreation. In addition, the plans call for acquisition and exchanges to increase public lands within the river corridor. The Department has worked closely with BLM in the past and intends to get more involved in the future in the areas of access, recreation facilities, and user assistance.

The Montana Department of State Lands has certain responsibilities as regards the evaluation and permitting of mining in the Big Hole drainage and is involved in various issues relating to the streambed ownership due to the Big Hole being considered a navigable stream.

The Montana Department of Health and Environmental Sciences, Water Quality Bureau, enforces water quality regulations of the State. They have pointed out that they are particularly concerned not only because the Big Hole River is used as a municipal water supply but also because it supports a world-class "blue ribbon" fishery. The State Surface Water Quality Standards and Water Quality Bureau are established to protect all beneficial uses of water. They also administer Montana's Nonpoint Source Pollution Control Program which will establish minimum acceptable management practices (BMP's) for agriculture and forestry for all lands in the Big Hole drainage.

The Montana Department of Natural Resources is involved in the water rights on the river and has also done studies relating to the development of tributary storage within the drainage basin.

The Montana Department of Highways operates and maintains state highways within the Big Hole drainage.

Beaverhead, Silver Bow, and Madison Counties operate and maintain county roads within their respective jurisdictions and control subdivisional development within the drainage.

The Beaverhead, Silver Bow, and Ruby Valley Conservation Districts administer the Natural Streambed and Land Preservation Act ("310") with assistance from the Department in their respective jurisdictions. This law relates to construction work on private property within the high water limits of perennial streams.

Public Input Input received by the Department throughout the development of this Management Plan has been very supportive of the Department's involvement with the various agencies who have management responsibilities within the Big Hole drainage to insure the protection and preservation of the river and its fishery.

Management Statement The Department has worked in the past with all agencies who have management responsibilities within the Big Hole drainage and the Department will continue to work with these agencies in the future. The Department, as the recreation management agency for the State of Montana, will represent the interests of recreationist in all development proposals, public or private.