FISHERIES DIVISION DROUGHT

CONTINGENCY PLAN

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TABLE OF CONTENTS

	Page
Introduction	1
Objective I. Protect our existing instream rights	1
A. Summary of existing rights to be protected	1
B. Protection Procedures	1
Water supply forecasts	1
List of junior water users	1
Initial notification letter	2
Streamflow monitoring	2
2nd notification letter	2
Enforcement actions	3
Additional considerations	4
Objective II. Supplement streamflows through purchase of stored water	4
A. Bitterroot River - Painted Rocks Reservoir	5
B. Smith River - Newlan Creek Reservoir	5
Objective III. Obtain reservoir operations which minimize impacts to fish, wildlife and recreation	5
A. Canyon Ferry Reservoir	5
B. Tiber Reservoir	6
C. Libby Reservoir	6
D. Fort Peck Reservoir	6
E. Yellowtail Reservoir	7
F. Hungry Horse Reservoir	7
G. State owned reservoirs	7
Objective IV. Monitor fishing use and harvest to ensure carry-over of wild stream fisheries while maintaining reasonable opportunity for harvest in all streams and lakes. Implement emergency regulations on streams and lakes as needed	8
A. Lakes and reservoirs	8
B. Rivers and streams	8

Objective V. Develop and implement an information and education program which informs the public and maintains consistency in the department's programs..... 8

Objective VI. Coordinate an updated department drought summary for presentation to the Drought Task Force and/or Disaster Advisory Council and the Fish and Game Commission as required..... 8

Objective VII. Develop and implement conservation practices in the agency to conserve water..... 9

LIST OF FIGURES

Figure 1 - Implementation schedule for protecting instream rights and reservations..... 1(a)

Page

APPENDICES..... 10

Appendix A - DFWP Annex to the Montana Drought Contingency Plan

Appendix B - Instream water rights and reservations held by the Department of Fish, Wildlife and Parks

Appendix C - Notification letters sent to junior water users in 1988

Appendix D - Stream gages currently used to monitor DFWP instream water rights and reservations

Appendix E - Position statement on modification of Yellowstone River instream reservation at Billings to benefit upper river conservation districts

Appendix F - Reservoir operation guidelines and water purchase contracts and agreements

Appendix G - Members of Upper Missouri River Advisory Committee - 1988

Appendix H - State owned reservoirs which influence downstream fisheries

Appendix I - Trigger flows and related circumstances which initiate implementation of emergency fishing regulations

Appendix J - Guidelines for reducing fish losses in irrigation ditches

Front only

December, 1988

FI)UGHT CONTINGENCY PLAN

INTRODUCTION:

The Fisheries Division Drought Contingency Plan is intended to complement the State of Montana's Drought Contingency Plan prepared by the Montana Disaster and Emergency Service Division of the Department of Military Affairs. The FW&P Annex in the state plan presents the options available to DFWP in responding to drought as it affects the Fisheries, Wildlife and Parks Divisions. (See Appendix A) This Fisheries Division plan expands that concept by defining specific objectives and outlining specific actions the division can take in response to drought.

OBJECTIVE I. PROTECT OUR EXISTING INSTREAM RIGHTS.

A. Summary of existing rights to be protected

The instream rights to be protected are summarized in Appendix B. These include Murphy Rights on 12 streams; reservations on 66 Yellowstone basin streams; Ashley Creek; Young Creek and Tobacco River.

B. Protection Procedures.
The schedule of decision points for protecting instream rights is shown in Figure 1.

Procedures Narrative

Water Supply Forecasts (SCS)[1]

Montana's yearly water supply outlook is developed by the SCS and its cooperators. Current snowpack and forecasts of runoff are issued each month from January through May. From these forecasts, it is possible to estimate streamflow conditions during the summer, enabling us to determine if we will need to notify junior water users about our instream rights and the possibility they may have to cease their diversions upon request.

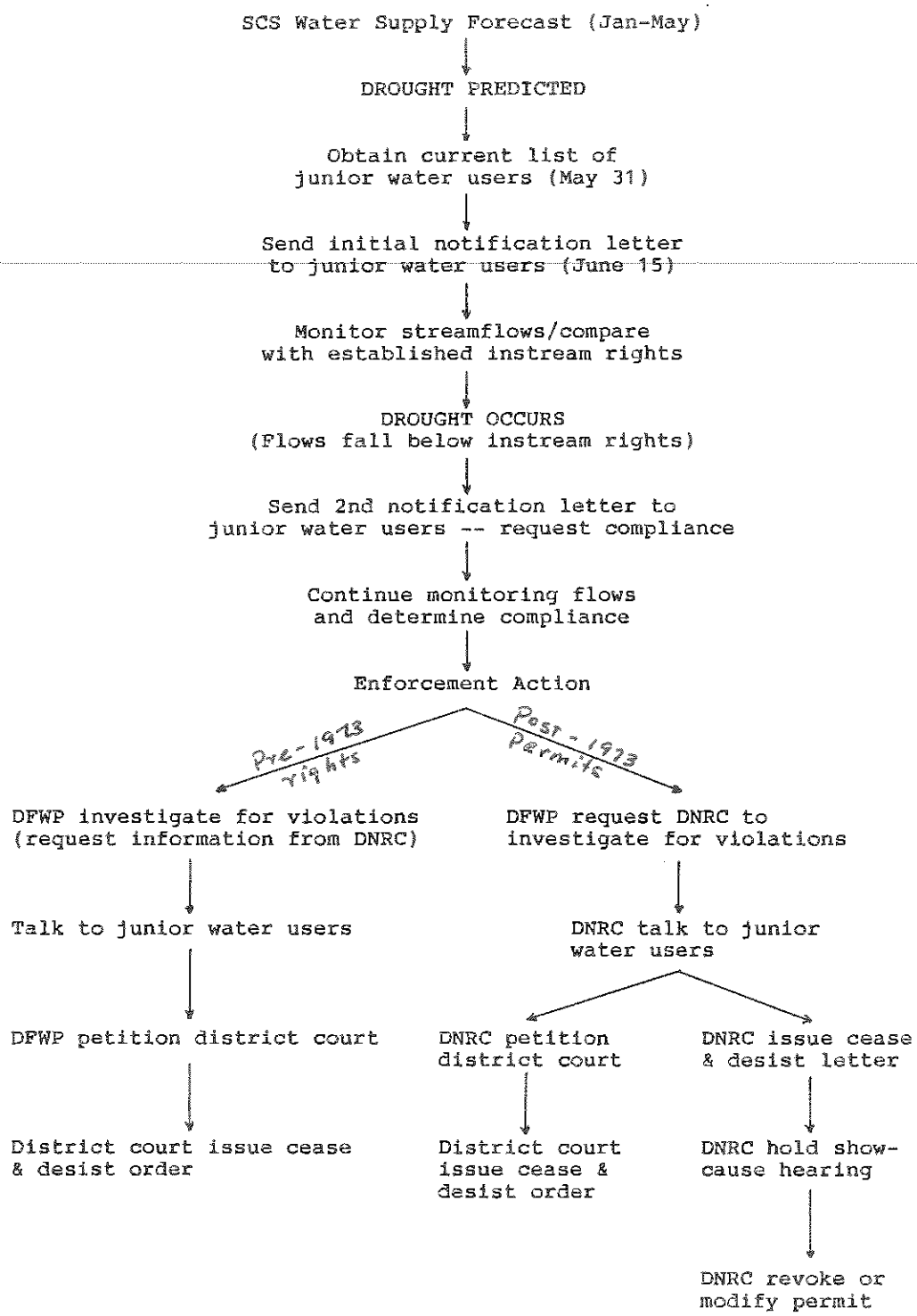
List of Junior Water Users (Helena)

A current list of all junior water users is obtained from the Helena Water Rights office of DNRC by May 31.

1 Items in parenthesis identify responsible parties

Figure 1

IMPLEMENTATION SCHEDULE
FOR PROTECTING INSTREAM RIGHTS
AND RESERVATIONS



Initial Notification Letter (Helena)

If the water supply outlook is poor, an initial letter is sent to each water user whose water use priority date is junior to the priority date established for each of our instream water rights.

The initial letter simply informs those junior users of FWP's prior right(s) in their source(s) of supply and indicate that we may, if unsuitable flow conditions actually materialize, notify them at a later time to cease their diversion(s). This letter is signed by the Department Director and is sent by regular mail. The letter should be sent by June 15 to allow junior users to develop alternatives to the use of their junior water.

Streamflow Monitoring (Helena/USGS)

Streamflows are monitored at established USGS gaging stations. Flow levels are obtained from the USGS's Helena office on a regular schedule, usually twice per week. These flows are compared to the respective instream water rights and the flow trend is monitored.

Monitoring of flows depends on having stream flow data available upon request at appropriate stream sites. These data can be obtained from staff gages read daily by an observer or from continuous recording gages which automatically transfer data to a receiving station. Currently, all streams where we have instream rights do not have gages installed on them. Where gages are not available on a particular stream, we use the closest downstream gage which will record that stream's flow.

2nd Notification Letter (Helena)

When the actual flow at any gaging station drops to the level of the established instream flow for that time of year, a second notification letter is sent to those junior users monitored by that gage. The letter requests the users to cease their diversion(s), presents gaging information and lists phone numbers they can call to keep track of the flows so they will know if they can again begin diverting water. This letter is our "call" for the water. The letter is also signed by the Department Director and is currently sent by regular mail. There is no established date on which to send this second letter; timing depends on flow conditions in a given year.

There are some exceptions to whom we send the second letter. The intent of notification is to improve streamflows. If there are no junior users on a stream, or if the total junior use is too small to significantly affect streamflows if they cease diverting, the second notification letter is not sent to those users. Accordingly, a decision must be made on each stream, depending on the amount of the water right and the junior users who can affect it. Examples of notification letters currently used are given in Appendix C. The flows, by month, which trigger the second notification letter are the same as the instream rights shown in Appendix B. The USGS and DFWP stream gages currently used to monitor those flows are presented in Appendix D.

Enforcement Actions (Helena)

At the present time, DFWP enforcement procedures rely largely upon voluntary compliance by junior water users. We do not have the time, personnel or expertise to monitor all junior users who are asked to cease their diversions unless an obvious violation is observed and reported.

The notification letters enable FWP to maintain contact with junior users so they are aware of our rights, and they are therefore, primarily an informational tool -- a precursor to being able to better administer those rights through a water commissioner. Ultimately, court-appointed water commissioners on decreed streams are the only effective means of administering instream rights and solving immediate dewatering problems.

Until 1988, we asked junior users to cease diverting in two (1977 and 1985) of the three previous drought years (1977, 1985, 1987) we have experienced since we obtained instream water rights. The 1977 experience concerned only Murphy Rights because the Yellowstone reservations were not granted until 1978 and we had not yet obtained the Ashley Creek, Young Creek and Tobacco River rights. In 1985, we sent the second notification letter to junior users on only three streams in the Yellowstone basin plus Ashley Creek. In 1987, the second letter was not sent to any junior user.

DNRC will not enforce instream rights having priority dates prior to July 1, 1973 unless requested by the water court. However, they will assist in obtaining information regarding a violation if requested to do so. DNRC will enforce instream rights against violations on permits issued after July 1, 1973 upon receiving a written complaint from a senior water user adversely affected. The sequence of these events is as follows:

1) Formal complaint by FWP to DNRC
2) Field investigation by DNRC
3) Cease & desist order to permittee
4) Show cause hearing (if permittee objects to cease & desist order)
5) District court action (if water user is dissatisfied and appeals results of the hearing)

This procedure is not effective in solving an immediate dewatering problem.

Regarding pre-1973 junior water rights, DNRC has told DFWP that we have the same enforcement options as they do, i.e., we can get a court order to enforce our rights against junior users who do not comply with our "call" for the water if we have sufficient facts for a case.

Additional Considerations

Current policy is to not enforce instream flow rights during the high flow period (approximately May 1 - July 15). The only real possibility of altering the existing spring runoff hydrograph (important for fish passage and spawning and maintaining channel configuration) on most streams is a large main stem impoundment. Should this future situation occur, the instream rights for the high flow period may have to be enforced.

Also, in 1980, FWP agreed, through the Board of Natural Resources and Conservation, to relinquish a portion of our Yellowstone reservation for August and September and to not enforce our mainstem reservations between May 1 and July 10 above the Bighorn River. This was to satisfy the upper river conservation districts' concern over their 3rd priority to that water (municipalities have 1st and FWP has 2nd priority). This agreement allows those CD agricultural water users to produce one hay crop in all years even if water is restricted during August and September in drought years when flows fall below the instream reservations. (See our Position Statement in Appendix E, page 3)

Instream flow enforcement continues as long as streamflows are below FWP rights or until the end of the irrigation season, after which irrigators have little or no effect on streamflows.

OBJECTIVE II. SUPPLEMENT STREAMFLOWS THROUGH PURCHASE OF STORED WATER

Documents pertaining to all actions described in this section are included as Appendix F.

A. Bitterroot River - Painted Rocks Reservoir

- ~~Finalize water purchase contract with DNRC (R-2, Helena)~~
- Develop annual stored water release plan (R-2)
- Contact agricultural interests who divert from Bitterroot River and obtain their concurrence to use a water commissioner (R-2)
- Petition District Court for water commissioner (R-2 & Helena Legal Unit)
- Implement planned releases from Painted Rocks Reservoir (R-2)
- Monitor streamflows at Bell Crossing gauge (R-2)

B. Smith River - Newlan Creek Reservoir

- Negotiate water purchase contract with Newlan Creek Water Users Association (R-4 and Helena)
- Develop water release schedule (R-4).
- Call for delivery when Ft. Logan gage reads 25 cfs (R-4).
- Monitor affects of releases (R-4)

OBJECTIVE III. OBTAIN RESERVOIR OPERATIONS WHICH MINIMIZE IMPACTS TO FISH, WILDLIFE AND RECREATION.

A. Canyon Ferry Reservoir

- Determine potential for drought conditions at annual meeting of Upper Missouri River Advisory Committee (DFWP chairs committee. See list of members in Appendix G.)
- Monitor runoff and precipitation conditions through SCS, DNRC, Bureau of Reclamation (BOR) (Helena)
- Hold additional advisory committee meetings as necessary if critical water supply conditions develop (Helena)
- Recommend appropriate adjustments in reservoir operations according to Upper Missouri River Reservoir Operating Guidelines for fish, wildlife and recreation (Committee action)

- Monitor streamflow conditions and reservoir levels and revise recommendations as necessary for the duration of the drought period (Helena via contact with BOR & committee members)

B. Tiber Reservoir

- Determine potential for drought conditions by April 15 (Helena through SCS, BOR, DNRC)

- Monitor snowpack, precipitation and runoff (Helena via USGS, SCS, BOR, DNRC)

- Implement recommended fish, wildlife and recreation operating guidelines through Tiber Reservoir Advisory Committee (Helena, R-4 via BOR)

- Make additional recommendations, as necessary, if critical water supply conditions develop (Helena via advisory committee)

C. Libby Reservoir

- Contact COE in January to determine expected runoff conditions and projected reservoir operations (R-1)

- Determine probability of achieving desired minimum streamflows as per 3-tiered flow agreement with COE. Also determine subsequent effect on reservoir levels

- If necessary, recommend alternative reservoir operation (R-1, Helena)

- Monitor effects of altered operation as needed (R-1)

D. Fort Peck Reservoir

- Meet with COE in March at annual reservoir operation meeting and discuss expected runoff conditions and reservoir operations (Helena, R-6)

- If drought conditions appear likely, develop recommendations for reservoir water levels and downstream flow releases (Helena, R-6)

- Monitor effects of implemented reservoir operations as needed (R-6)

E. Yellowtail Reservoir

- ~~Meet with BOR during April to determine expected runoff~~ conditions and projected reservoir operation (R-5, Helena)

- Determine probability of achieving agreed upon streamflows given in current Upper Bighorn River Fisheries Management Plan and subsequent effect on reservoir levels (R-5, Helena)

- If necessary, recommend alternative reservoir operations (R-5, Helena)

F. Hungry Horse Reservoir

- Meet with BOR in January to determine expected runoff conditions and projected reservoir operation (R-1, Helena)

- Determine probability of achieving desired releases for kokanee spawning in south fork and main Flathead Rivers (Adjust desired releases according to expected numbers of spawning kokanee) (R-1)

- If necessary, recommend alternative reservoir operation (R-1)

- Monitor effects of releases and/or altered reservoir operation (R-1)

G. State-Owned Reservoirs

- Determine which state-owned reservoirs affect important downstream fisheries (Regions, Helena) (See list in Appendix H)

- Determine amount of any unallocated water in the reservoirs and identify operational and structural (safety) constraints at each dam (Helena)

- Determine significance of reservoir fisheries. Compare tradeoffs of maintaining lake levels as opposed to releasing water for downstream fisheries.

- Monitor streamflows during drought conditions to determine if additional releases are necessary (Regions)

- Work with DNRC to obtain releases from state-owned reservoirs where the fishery and flow conditions warrant (Helena, Regions)

OBJECTIVE IV. MONITOR FISHING USE AND HARVEST TO ENSURE CARRY-OVER OF WILD STREAM FISHERIES WHILE MAINTAINING REASONABLE OPPORTUNITY FOR HARVEST IN ALL STREAMS AND LAKES. IMPLEMENT EMERGENCY REGULATIONS ON STREAMS AND LAKES AS NEEDED.

A. Lakes and Reservoirs (Helena, regions)

- These waters are usually stocked with hatchery fish. If low water levels or high water temperatures would jeopardize survival of the population, regulations would likely be liberalized to allow maximum harvest of fish. Some waters may be deleted from planting schedule in the drought years. Action will be taken on a case by case basis.

B. Rivers and streams (Helena, regions)

- These waters are supporting wild populations of fish. As flows decline, more restrictive or voluntary catch-and-release regulations may be recommended. Trigger flows and other circumstances which may initiate restrictive regulations are given in Appendix I.

OBJECTIVE V. DEVELOP AND IMPLEMENT AN INFORMATION AND EDUCATION PROGRAM WHICH INFORMS THE PUBLIC AND MAINTAINS CONSISTENCY IN THE DEPARTMENT'S PROGRAMS.

- Disseminate information on gradual shutdown of irrigation ditches to agricultural organizations and their news media (Helena, regions, via pamphlets & news releases) (See example in Appendix J)

- Prepare weekly drought update by region describing effects of drought on lake and stream water supplies and fisheries (Helena, Regions)

- Compile, via USGS, twice weekly streamflow summaries on streams where DFWP holds instream water rights and distribute to FWP regions and DNRC water rights field offices (Helena via USGS)

- Prepare PSA's, news releases, and Montana Outdoors columns on effects of drought on fish and wildlife (Helena fish and Con Ed staffs)

OBJECTIVE VI. COORDINATE AN UPDATED DEPARTMENT DROUGHT SUMMARY FOR PRESENTATION TO THE DROUGHT TASK FORCE AND/OR DISASTER ADVISORY COUNCIL AND THE FISH AND GAME COMMISSION AS REQUIRED. (Helena)

- Keep abreast of drought effects on fisheries

- Attend Drought Task Force meetings as requested by Director

- Provide information to task force on effects of drought on fish and wildlife as requested by task force chairman

- Provide to Director, as requested, the results of task force actions

- Attend Disaster Advisory Council meetings as requested by Director

- Provide drought updates and FWP responses to drought conditions to Fish and Game Commission as requested.

OBJECTIVE VII. DEVELOP AND IMPLEMENT CONSERVATION PRACTICES IN THE AGENCY TO CONSERVE WATER. (Helena, regions)

- Determine best means to conserve water at fisheries installations, hatcheries, and developed fishing access sites

- Implement suitable water conservation measures as needed and monitor effects

Approved: James W. Flynn

James W. Flynn
Director

12-23-88

Date

For next
only
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paper other
than blue

APPENDICES

Appendix A

DFWP Annex to the Montana Drought Contingency Plan

DEPARTMENT OF FISH, WILDLIFE AND PARKS ANNEX TO THE MONTANA DROUGHT CONTINGENCY PLAN

FISHERIES DIVISION

(Revised July 1988)

Reduced stream flows can have many significant impacts on fish populations. We are particularly vulnerable to the stress and mortality of fish caused by dewatering streams because we manage the waters for wild or natural fish populations. The department has water rights in sections of 12 "**blue ribbon**" trout streams and an instream flow reservation in the Yellowstone River Basin. The purpose of these instream rights is to reduce the probability of adversely low stream flows occurring.

As in the past, we notify junior water right holders when stream flows are approaching our instream flow right. At that time, they are requested to reduce or curtail their use of water during the drought period. Water rights in the "**blue ribbon**" streams have a 1970 or 1971 priority date and are presently in various stages of the water adjudication process. The Yellowstone Basin has a 1978 priority date.

In streams where we have no instream flow rights we are not in a position to affect streamflows nor are we guaranteed adequate stream flows where we have water rights. Irrigators and other senior water right holders may have the rights to all remaining water. In these situations we can only appeal to water right holders to leave sufficient water to flow between holes in these rivers in hopes of sustaining fish life.

As necessary, requests are made of the Commission to grant to the Director the authority to restrict or liberalize fishing regulations depending

on the conditions, with the concurrence of the Commissioner from the area involved (or, in his absence, the Commission Chairman). In streams managed for wild or natural fish populations, we may recommend closing the fishing season when it appears conditions are becoming stressful to fish because of higher temperatures, crowding, vulnerabi-lity or similar factors. The objective would be to avoid added stress to the population in the hope that conditions may be relieved and the population can be maintained.

In waters managed with hatchery trout, which would mostly be smaller reservoirs. we, we may recommend more liberal regulations if it becomes apparent that the fish will die. Waters stocked with hatchery fish can be replenished the following year and will begin to produce a fishery a year later. However, wild fish populations must be given every opportunity to survive the drought.

There are several streams which routinely go dry in the state because they are over appropriated for water use. It is unlikely that we will propose any special regulations for these streams because the value of the aquatic resources in these streams is often very low.

Low water creates other problems as well. Irrigators often find it necessary to get into the stream channel to divert the remaining water into their ditches, creating dikes in the river channel. these impacts are more long lasting than might be apparent. They destabilize the streambed creating poor conditions for fish food organisms and successful fish spawning.

Irrigators have the right to make these changes under the emergency provisions of the streambank law. However, we encourage water users to anticipate low water conditions and obtain the necessary permits before entering the stream channels.

The Department of Agriculture will be asked to advise persons applying herbicides and pesticides near surface water to be extremely careful to avoid contamination of lakes and streams during drought years. Very small amounts of chemicals are likely to trigger mortalities in fish populations already stressed by abnormally low flows and high temperature.

Press releases will be prepared to explain the impacts of low water on fish, the purpose of proposed regulation changes, efforts the department has made to protect instream water rights and encouraging judicious use of water. The department will also continue to work with other state and federal agencies to maintain the best stream flows possible below reservoirs.

PARKS DIVISION

In the event of serious drought causing fire danger to all or portions of Montana, water-based parks, especially near population centers and along all main tourism routes, would be kept open. This will provide concentrated places for people to recreate and camp in manageable areas where the fire danger can be minimized and fire can more readily be controlled. Additional personnel and equipment could be stationed at such sites or be available, on call nearby, if necessary.

In sites where fire danger is considered high, open fires can be prohibited. The department has a supply of signs available for that purpose. Coleman-type stoves and lanterns could still be permitted.

In areas of extreme fire danger, land-bases sites or sites which receive only limited use or supervisory control could be closed to public use. Other

intensely managed land-based sites, such as Lewis and Clark Caverns State Park, would remain open. Open fires would be prohibited and fire fighting equipment and personnel would be ready on-site for immediate use if necessary.

WILDLIFE DIVISION

Since wildlife and vegetation evolved because of weather patterns, including drought, there is little that can be done directly for wildlife during a drought period.

Therefore, efforts of the Montana Department of Fish, Wildlife and Parks to minimize effects of a drought would be directed toward activities of hunters. Hunting seasons could readily be shortened, deferred, or canceled to reduce physical damage to drought-affected livestock forage supplies. Wildlife damage to livestock forage supplies (haystacks or otherwise) or to crops suffering from drought may be lessened by implementation of specially conducted hunting seasons. Trapping and removing wildlife from problem areas may not be realistic because there would probably not be any areas without similar problems in which to put them.

Information transmitted via news media to hunters and other recreationists could call attention to specific problems, and suggested solutions. This information could, for example, instruct persons afield where to report fires and how to assist with fire suppression.

Utilizing shortened, deferred, or canceled hunting seasons, along with reduced bag limits, may alleviate the drought associated stress on these wildlife populations. Feeding wildlife to alleviate drought-related stress is not advised.

Department Drought Contacts are:

Fisheries

Pat Graham, 444-2449

Wildlife

Arnold Olson or Don Childress, 444-2612

Parks

Don Hyyppa, 444-3750

Appendix B

Instream water rights and reservations held by Department of Fish, Wildlife and Parks

Montana Department of Fish, Wildlife and Parks

Summary of Murphy Right Claims Filed Under S.B. 76

Stream/Reach / Priority Date	Period	Flow (cfs)	Volume (acre-ft)
1) Big Spring Creek (31 miles total)			
Mouth-State Fish Hatchery (31 miles) 12/21/70	1/1 -12/31	110	79,617
2) Blackfoot River (52 miles total)			
Mouth-Clearwater River (34 miles) 1/6/71	9/1 - 3/31	650	273,257
	4/1 - 4/15	700	20,822
	4/16- 4/30	1,130	33,612
	5/1 - 6/30	2,000	241,926
	7/1 - 7/15	1,523	45,302
	7/16- 8/31	700	65,241
Clearwater R-NF of Blackfoot (18 miles) 1/7/71	9/1 - 3/31	360	151,343
	4/1 - 4/30	500	29,745
	5/1 - 5/15	837	24,897
	5/16- 6/15	1,750	107,578
	6/16- 6/30	1,423	42,327
	7/1 - 7/15	848	25,224
	7/16- 8/31	500	46,601
3) Flathead River (56 miles total)			
Flathead Lake-South Fork (46 miles) 12/22/70	8/1 - 4/15	3,500	1,790,649
	4/16- 4/30	6,650	197,804
	5/1 - 7/15	8,125	1,224,502
	7/16- 7/31	5,402	171,395
South Fork-Middle Fork (10 miles) 12/22/70	10/1 - 3/31	1,950	703,767
	4/1 - 4/15	2,100	62,465
	4/16- 4/30	3,597	106,993
	5/1 - 7/15	5,000	753,540
	7/16- 7/31	3,945	125,167
	8/1 - 9/30	2,100	254,022
4) Gallatin River (67 miles total)			
Mouth-E. Gallatin River (12 miles) 12/21/70	9/1 - 4/30	800	383,909
	5/1 - 5/15	947	28,169
	5/16- 5/31	1,278	40,548
	6/1 - 6/15	1,500	44,618
	6/16- 6/30	1,176	34,980
	7/1 - 8/31	850	104,504

Stream/Reach	Period	Flow (cfs	Volume (acre-ft)
Beck and Border Ditch-YNP	7/16- 5/15	400	241,133
(55 miles) 12/21/70	5/16- 7/15	800	96,770
5) Madison River (99 miles total)			
Mouth-Ennis Dam (40 miles)	1/1 - 5/31	1,200	359,320
12/28/70	6/1 - 6/30	1,500	89,235
	7/1 - 7/15	1,423	42,327
	7/16-12/31	1,300	435,665
Ennis Reservoir-West Fork	1/1 - 5/31	900	269,490
(44 miles) 12/28/70	6/1 - 7/15	1,400	124,929
	7/16-12/31	1,050	351,883
West Fork-Quake Lake (12 miles)	1/1 -12/31	500	361,902
12/21/70			
Quake Lake-Hebgen Dam (3 miles)	8/1 - 3/31	500	240,935
12/21/70	4/1 - 7/31	500	12,096
6) Middle Fork of Flathead River (77 miles total)			
Mouth-Bear Creek (44 miles)	8/1 - 4/15	850	434,872
12/22/70	4/16- 4/30	1,831	54,463
	5/1 - 7/15	2,325	350,396
	7/16- 7/31	1,904	60,410
Bear Creek-Cox Creek (33 miles)	10/1 - 3/31	75	27,068
12/22/70	4/1 - 9/30	180	65,320
7) Missouri River (83 miles total)			
Smith River-Holter Dam (62 miles)	1/1 -12/31	3,000	2,171,385
12/17/70			
Canyon Ferry Reservoir-Toston Dam	9/15-12/31	3,000	642,492
(21 miles) 12/17/70 +	1/1 - 1/31	1,500	92,210
12/22/70	2/1 - 5/15	3,000	618,696
	5/16- 6/30	4,000	364,872
	7/1 - 7/15	3,816	113,507
	7/16- 9/14	1,500	181,445

Stream/Reach	Period	Flow (cfs	Volume (acre-ft)
8) North Fork of Flathead River (59 miles total)			
Middle Fork-Bowman Creek (34 miles) 12/22/70	10/1 - 3/31	987.5	356,395
	4/1 - 4/15	1,400	41,643
	4/16- 4/30	1,766	52,530
	5/1 - 7/15	2,625	395,609
	7/16- 7/31	2,041	64,757
	8/1 - 9/30	1,400	169,348
Bowman Creek-Border (25 miles) 12/22/70	10/1 - 3/31	625	225,566
	4/1 - 4/15	750	22,309
	4/16- 4/30	1,100	32,720
	5/1 - 7/15	1,500	226,062
	7/16- 7/31	1,279	40,580
	8/1 - 9/30	750	90,722
9) Rock Creek (56 miles total)			
Mouth-Ranch Creek (14 miles) 1/6/71	7/16- 4/30	250	143,272
	5/1 - 5/15	454	13,504
	5/16- 5/31	975	30,935
	6/1 - 6/15	926	27,544
	6/16- 6/30	766	22,785
	7/1 - 7/15	382	11,363
Ranch Creek-Headwaters (42 miles) 1/7/71	7/16- 4/30	150	85,963
	5/1 - 5/15	454	13,504
	5/16- 5/31	975	30,935
	6/1 - 6/15	926	27,544
	6/16- 6/30	766	22,785
	7/1 - 7/15	382	11,363
10) Smith River (72 miles total)			
Hound Creek-Cascade County Line (33 miles) 12/17/70	7/1 - 4/30	150	90,425
	5/1 - 5/15	372	11,065
	5/16- 6/15	400	24,589
	6/16- 6/30	398	11,839
Cascade County Line-Sheep Creek (24 miles) 12/22/70	9/1 - 3/31	125	52,550
	4/1 - 4/30	140	8,329
	5/1 - 6/30	150	18,144
	7/1 - 8/31	140	17,212
Sheep Creek-Ft. Logan Bridge (15 miles) 12/22/70	7/1 - 4/30	90	54,255
	5/1 - 6/30	150	18,144

Stream/Reach	Period	Flow (cfs	Volume (acre-ft)
11) South Fork of Flathead River (59 miles total)			
Hungry Horse Reservoir-Powell/ Flathead County Line (43 miles)	10/1 - 3/31	600	216,544
	4/1 - 4/15	700	20,822
	4/16- 4/30	1,180	35,099
	5/1 - 7/15	1,750	263,739
	7/16- 7/31	943	29,920
	8/1 - 9/30	700	84,674
Powell/Flathead County Line- Headwaters (16 miles) 1/7/70	4/1 - 9/30	270	97,980
	10/1 - 3/31	100	36,091
12) Yellowstone River (155 miles total)			
Carbon/Stillwater County Line- Stillwater River (10 miles)	4/16-10/31	2,600	1,026,005
	11/1 - 4/15	1,500	493,769
Stillwater River-Boulder River (43 miles) 12/14/70	11/1 - 4/15	1,300	427,932
	4/16- 4/30	1,800	53,541
	5/1 - 7/31	2,200	401,360
	8/1 -10/31	1,800	328,384
Boulder River-Tom Miner Creek (85 miles) 12/14/70 + 12/23/70	11/1 - 4/15	1,200	395,014
	4/16-10/31	2,000	789,234
Tom Miner Creek-YNP (17 miles) 12/23/70	1/1 -12/31	800	579,033

TOTAL CLAIMS = 106

Ashley Lake

ABSTRACT OF WATER RIGHT

The Department of Fish, Wildlife and Parks has purchased the Ashley Irrigation District, henceforth referred to as AID, (a corporation) stored water right in Ashley Lake, No. 14,607-ss76LJ. The application for Sever and Sell was made August 31, 1977 and approved by the Department of Natural Resources and Conservation after appropriate hearings on 3 March 1981 (Exhibit 1).

The said water is and has been impounded and stored in Ashley Lake, located in Sections 9, 8, 7, 6, 5 and 4, Township 28 North, Range 25 West and Sections 1, 2, 10, 11, 12, 14, 15, 22 and 23 in Township 28 North, Range 24 West (Exhibit 2, map of lake). The stored water is discharged from an earth and concrete dam with steel and wood headgate and splash boards. The concrete structure is part of an earth fill dam as much as 15 feet high and a couple hundred feet long. The headgate holds back water 6.25 feet above the concrete sill (floor) and causes storage of an estimated 17,173 acre feet of water. There are an estimated 11,448 acre feet of useable storage without reexcavating a ditch from the low water shoreline to the dam and outlet. Ashley Lake has been planimetered at 2,862.3 surface acres at a time when there was about three feet of water above the dam sill.

The AID purchased both the Ashley Lake stored rights and the instream flow rights from the Ashley Lake Irrigating Company, a corporation, henceforth referred to as ALIC, by Warranty Deed dated July 1, 1910. The purchase from ALIC (Exhibit 3, copy of Warranty Deed) included "all those water rights, dams, flumes, headgates and reservoirs and all appurtenances of every kind and character in connection therewith...."

The ALIC had filed for 20,000 MI (500 cfs) "....from Ashley Creek and the same that flows from upper Ashley Lake by means of a dam forcing said water back into said lake and creating a reservoir therein and then reclaiming the same by means of a headgate and flume..." The ALIC water right was filed March 25, 1897, Book 16, page 312, Flathead County Book of Records (Exhibit 4A and 4B).

Being uncertain of the implications of Montana Water Laws passed in 1907 (Chapter 146, Session of Laws of the Eleventh Legislative Assembly, State of Montana and previous Water Acts), the AID again filed for 125 cfs (5,000 MI) of waters of Ashley Creek (Book 75, page 425, Exhibit 5A) and for 500 cfs (20,000 MI) (Exhibit 5B) from water impounded in Ashley Lake by a six foot high dam six feet wide with headgates (Book 71, page 42).

It is believed by the Montana Department of Fish, Wildlife and Parks, reviewer of the records, that the original filing by ALIC and the later filing by the AID are and were for the same water stored and diverted from the same lakes and streams. Furthermore, the sale of the ALIC to the AID was for the purchase of "....all those water rights, dams...." etc, held and owned by the ALIC which were filed for by Walter D. Jaquette

and others on April 9, 1897. Reference Book of Deeds (Book 5, page 280 of the Clerk of Court and Recorder of Flathead County) (Exhibit No. 6).

ABSTRACT OF SALE AGREEMENT

The Montana Department of Fish, Wildlife and Parks, acting with individual ranchers, corporations and other governmental entities, agreed to purchase the entire AID's Water Rights (No. 14,607-ss76LJ) and the Department to purchase the dam and headgate on Ashley Lake in the NW¼NE¼ Section 23, Township 28 North, Range 24 West, including easement rights for repair, service and replacement or maintenance of the said dam and headgate.

The Montana Department of Fish, Wildlife and Parks Sales Agreement proposed to release up to 11,447 acre feet per year at a rate described in Appendix A of the "Preliminary Environmental Review for Ashley Creek Watershed, Kalispell, Montana", published June 1979 (Exhibit No. 7). The said review was prepared for the Water Rights Bureau, Water Resources Division, Department of Natural Resources and Conservation by the Technical Services Bureau of that department. The management agreement was amended in March, 1980 prior to sale approval. The proposal was to discharge from Ashley Lake a varying flow pattern to simulate a near-natural unregulated flow in the creek at the gauging station near Kalispell, and modified for annual irrigation needs. Discharge rates maybe altered at need by the Department of Fish, Wildlife and Parks to provide for storage and to insure safety of the dam, but will be operated to produce a reasonably normal seasonal hydrograph to be expected for an unregulated stream. Water level recording gauges have been installed by the Department of Fish, Wildlife and Parks below the Ashley Lake dam and south of Kalispell on the City Sewage Treatment Plant.

The Purchase Agreement also provided that in years of low precipitation and inadequate storage, all concomitant purchases of the AID water right would share proportionally among the purchasers any reduction in available water based on the percent their original purchase made of the total.

The Montana Department of Fish, Wildlife and Parks purchased the 11,447 acre feet of stored water for the purpose of instream use by fish and wildlife and is to be carried by the natural channel of Ashley Creek from the Ashley Lake headgate (NW¼NW¼NE¼ Section 23, Township 28 North, Range 24 West) to the mouth of Ashley Creek at its confluence with the Flathead River in SE¼NE¼SW¼ Section 25, Township 28 North, Range 21 West.

CHANGE IN POINT OF DIVERSION AND USE

Previous use of all Ashley Lake water stored and released was diverted from Ashley Lake by existing dam (now owned by Montana Department of Fish, Wildlife and Parks in NW¼NW¼NE¼ Section 23, Township 28 North, Range 24 West) to be carried by Ashley Creek in its natural channel to a headgate in NW¼NW¼ Section 21, Township 28 North, Range 22 West where it was diverted into a canal for purposes of agricultural irrigation and stock watering.

According to the approved Sales Agreement, the stored water purchased by Fish, Wildlife and Parks will be diverted from Ashley Lake Dam, described above, and will be carried in the natural creek channel to the mouth of Ashley Creek and its confluence with the Flathead River, described above. The water purchased by the Department of Fish, Wildlife and Parks will be used as an instream right, and 9,540 acre feet per year will be used to support fish and wildlife in and adjacent to Ashley Creek from January 1 through December 31 of each year. In addition, 1,908 acre feet will be used instream for sewage dilution and improved water quality and will also be used coincidentally by fish and wildlife from January 1 through December 31 of each year.

Robert E. Schumacher

Robert E. Schumacher

Subscribed and sworn before me, this 8th day of October, 1981.

Nadine M Sand

Notary Public for the State of Montana
Residing at Kalispell, Montana
My Commission expires March 7, 1984

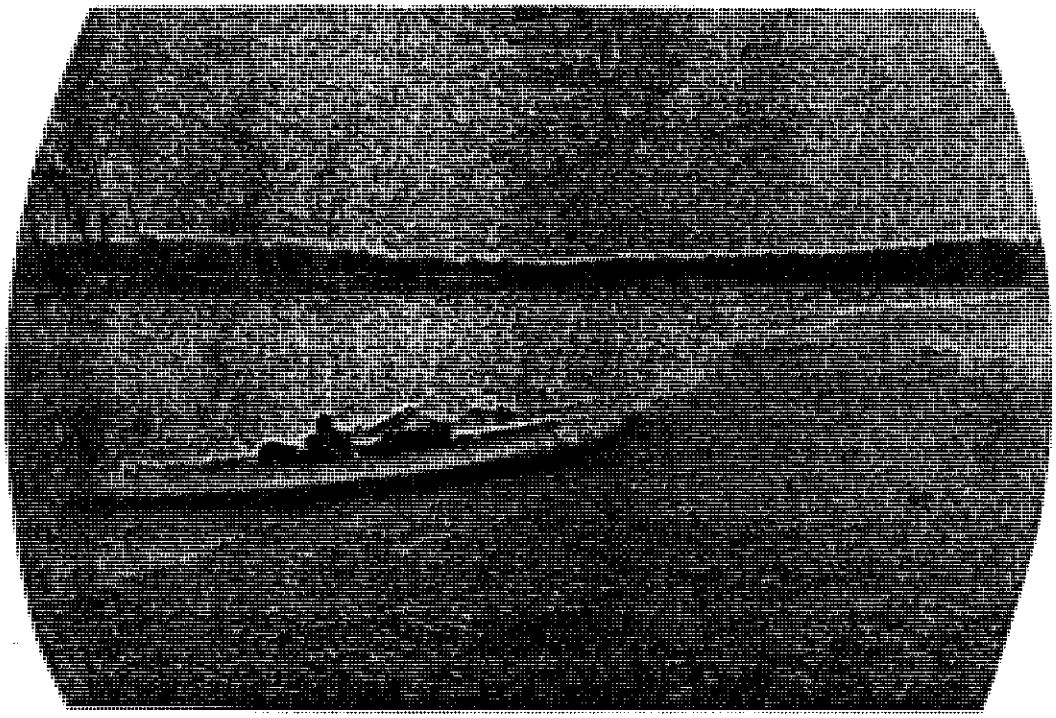
YOUNG CREEK CLAIMED RIGHTS

July 1 - April 30	5 cfs	(Priority Date March 19, 1968)
May 1 - June 30	25 cfs	

TOBACCO RIVER CLAIMED RIGHTS

		(Priority date February 24, 1965)
June 1 - 15	703 cfs	
June 1 - 15	1263 cfs	for 1 day in this period
June 15 - 30	433 cfs	
July 1 - 15	282 cfs	
July 16 - April 15	100 cfs	
April 16 - 30	171 cfs	
May 1 - 15	409 cfs	
May 16 - 31	692 cfs	

The Yellowstone River Instream Reservation



Final Instream Flow Quantifications

Yellowstone Reservations

ALPHABETICAL INDEX TO STREAMS

Stream	Page
Armstrong Spring Creek	2
Bear Creek	3
Big Creek	4
Bighorn River at its mouth	53
Big Timber Creek at its mouth	31
Billman Creek	5
Bluewater Creek	34
Boulder River at Contact	32
Boulder River at Big Timber	33
Brackett Creek	6,7,8
Bridger Creek	34
Butcher Creek	35
Castle Creek	36
Cedar Creek	9
Cinnabar Creek	9,10
Clarks Fork Yellowstone River	36,37
Clear Creek	37
Coke (Miner) Creek	10
Cottonwood Creek	11
Dry Creek	38
East Boulder River at its mouth	39
East Fishtail Creek	38
East Rosebud Creek	40
Eightmile Creek	12
Emigrant Spring Creek	13
Fishtail Creek	40
Flathead Creek	13,14
Fleshman Creek	15
Fridley Creek	15,16
Hanging Woman Creek	54
Little Mission Creek	16
Little Rocky Creek	41
Lower Deer Creek	41
McDonald Spring Creek	17
Middle Fork Brackett Creek	17
Mill Creek	18
Mission Creek	18
Mol Heron Creek	19
Nelson Spring Creek	20
North Fork Brackett Creek	20
Otter Creek	54
Powder River at its mouth	55
Pumpkin Creek	56
Picket Pin Creek	42
Red Lodge Creek	42
Rock Creek (Clarks Fork Drainage)	43
Rock Creek (Shields Drainage)	21
Rock Creek (Yellowstone Drainage)	21

Rosebud Creek..... 56
Sage Creek..... 43
Shields River near Wilsall..... 22
Shields River near Clyde Park..... 23
Shields River at its mouth..... 24
Sixmile Creek..... 25
Smith Creek..... 25
South Fork Brackett Creek..... 26
Stillwater River at its mouth..... 44
Suce Creek..... 27
Sweet Grass Creek..... 45
Tom Miner Creek..... 27,28
Tongue River at inlet to reservoir..... 57
Tongue River at the Yellowstone..... 58
Trail Creek..... 28
Upper Deer Creek..... 45
West Boulder River at its mouth..... 46
West Fishtail Creek..... 47
West Fork Stillwater River..... 47,48
West Rosebud Creek..... 49
Willow Creek..... 50
Yellowstone River at Livingston..... 29
Yellowstone River at Billings..... 51
Yellowstone River at Miles City..... 59
Yellowstone River at Sidney..... 60

UPPER YELLOWSTONE BASIN

(Gardiner to Mouth of Boulder River)

ARMSTRONG SPRING CREEK
Mouth to Origin

50th Percentile May-Sep.
10th Percentile Oct.-Apr.

	Cfs	AF
Jan.	102.0	6,272
Feb.	102.0	5,665
Mar.	102.0	6,272
Apr.	118.0	7,021
May	135.0	8,301
Jun.	151.0	8,985
Jul.	133.0	8,178
Aug.	120.0	7,378
Sep.	116.0	6,902
Oct.	110.0	6,764
Nov.	109.0	6,486
Dec.	105.0	6,456
		84,680 AF/year

BEAR CREEK
Mouth to North Fork (USGS Site No. 2)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	10.1	621
Feb.	9.58	532
Mar.	10.8	664
Apr.	32.2	1,916
May	90.8	5,583
Jun.	322.0	19,160
Jul.	135.0	8,301
Aug.	46.7	2,871
Sep.	38.8	2,309
Oct.	18.1	1,113
Nov.	16.5	982
Dec.	12.4	762
		44,814 AF/year

BEAR CREEK
North Fork to Fish Lake (USGS Site No. 1)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	5.68	349
Feb.	5.35	297
Mar.	6.15	378
Apr.	19.9	1,184
May	56.2	3,456
Jun.	186.0	11,068
Jul.	71.9	4,421
Aug.	24.3	1,494
Sep.	21.1	1,255
Oct.	10.3	633
Nov.	9.48	564
Dec.	7.11	437
		25,536 AF/year

BIG CREEK
Mouth to Millfork Creek (Gage No. 06191800)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	25.0	1,537
Feb.	23.0	1,277
Mar.	26.0	1,599
Apr.	57.0	3,392
May	117.0	7,194
Jun.	240.0	14,281
Jul.	97.0	5,964
Aug.	35.0	2,152
Sep.	33.0	1,964
Oct.	36.0	2,214
Nov.	34.0	2,023
Dec.	29.0	1,783
		45,380 AF/year

BIG CREEK
Millfork Creek to Bark Cabin Creek

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	9.0	553
Feb.	8.0	444
Mar.	9.0	553
Apr.	19.0	1,130
May	41.0	2,521
Jun.	84.0	4,998
Jul.	33.0	2,029
Aug.	12.0	738
Sep.	11.0	654
Oct.	13.0	799
Nov.	12.0	714
Dec.	10.0	615
		15,748 AF/year

BILLMAN CREEK
Mouth to Coke (Miner) Creek (USGS Site No. 20)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	9.66	594
Feb.	9.18	510
Mar.	10.4	640
Apr.	31.0	1,845
May	87.7	5,393
Jun.	27.8	1,654
Jul.	8.11	499
Aug.	2.53	156
Sep.	2.58	154
Oct.	17.4	1,070
Nov.	15.8	940
Dec.	11.9	732
		14,187 AF/year

BILLMAN CREEK
Coke (Miner) Creek to Fork South of NE Corner Sec. 20
(USGS Site No. 18)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	5.25	323
Feb.	4.94	274
Mar.	5.70	350
Apr.	18.6	1,107
May	52.6	3,234
Jun	21.6	1,285
Jul.	6.10	375
Aug.	1.88	116
Sep.	1.96	117
Oct.	9.50	584
Nov.	8.78	522
Dec.	6.59	405
		8,692 AF/year

BRACKETT CREEK
Mouth to Sheep Creek (USGS Gage No. 06194000)

50th Percentile Jan.-Dec.[1]

	Cfs	AF
Jan.	7.0	430
Feb.	7.0	389
Mar.	9.0	553
Apr.	42.0	2,499
May	93.0	5,718
Jun.	79.0	4,701
Jul.	27.0	1,660
Aug.	10.0	615
Sep.	11.0	654
Oct.	11.0	676
Nov.	9.0	536
Dec.	7.0	430
		18,861 AF/year

[1]Derived from the actual gage records of the Brackett Creek gage (#06194000). These cfs figures differ from those in Table 8 of the USGS report, which are estimates based on the Riggs' Method. (See Appendix A, pages 16-19)

BRACKETT CREEK
Sheep Creek to Skunk Creek (USGS Site No. 32)

50th Percentile Jan.-Dec.

	Cfs	AF
Jan.	5.77	355
Feb.	5.77	320
Mar.	7.55	464
Apr.	40.4	2,404
May	89.6	5,509
Jun.	75.6	4,498
Jul.	29.6	1,820
Aug.	11.1	682
Sep.	11.9	708
Oct.	9.08	558
Nov.	7.31	435
Dec.	5.79	356
		18,109 AF/year

[1]These cfs figures differ from those in Table 8 of the USGS report, which are estimates based on the Riggs' Method. Those estimates were adjusted to account for the difference between the estimates derived from regression equations using the Riggs' Method, and the values determined from the gage record (No. 06194000). See explanation in Appendix A, Pages 16-19.

BRACKETT CREEK
Skunk Creek to Confluence of North, Middle and South Forks[1]
(USGS Site No. 31)

50th Percentile Jan.-Dec.[2]

	Cfs	AF
Jan.	3.20	197
Feb.	3.20	178
Mar.	4.26	262
Apr.	29.2	1,738
May	63.2	3,886
Jun.	49.0	2,916
Jul.	21.3	1,310
Aug.	7.98	491
Sep.	8.79	523
Oct.	5.01	308
Nov.	4.00	238
Dec.	3.17	195
		12,242 AF/year

[1]Shown in reservation application (page 32), and Order of the Board as "Brackett Creek-Skunk Creek to one mile up North, Middle, and South Forks."

[2]These cfs figures differ from those shown in Table 8 of the USGS report, which are estimates based on the Riggs' Method. Those estimates were adjusted to account for the difference between the estimates derived from regression equations using the Riggs' Method, and the values determined from the gage record (No. 06194000). See explanation in Appendix A, Pages 16-19.

CEDAR CREEK
Mouth to Second Fork (USGS Site No. 7)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	3.02	186
Feb.	2.81	156
Mar.	3.30	203
Apr.	11.7	696
May	33.0	2,029
Jun.	28.7	1,708
Jul.	8.43	518
Aug.	2.63	162
Sep.	2.68	159
Oct.	5.48	337
Nov.	5.15	306
Dec.	3.84	236
		6,696 AF/year

CINNABAR CREEK
Mouth to Cottonwood Creek (USGS Site No. 5)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	4.29	264
Feb.	4.21	234
Mar.	4.88	300
Apr.	16.3	970
May	46.1	2,835
Jun.	38.8	2,309
Jul.	11.9	732
Aug.	3.76	231
Sep.	3.73	222
Oct.	8.13	500
Nov.	7.54	449
Dec.	5.65	347
		9,393 AF/year

CINNABAR CREEK
Cottonwood Creek to FS Boundary in T8S, R7E and Sec. 32
(USGS Site No. 4)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	3.35	206
Feb.	3.13	174
Mar.	3.67	226
Apr.	12.8	761
May	36.1	2,220
Jun.	35.7	2,124
Jul.	10.8	664
Aug.	3.41	210
Sep.	3.41	203
Oct.	6.09	374
Nov.	5.70	339
Dec.	4.26	262
		7,763 AF/year

COKE (MINER) CREEK
Mouth to Miner (Eldridge) Creek (USGS Site No. 19)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	4.02	247
Feb.	3.77	209
Mar.	4.38	269
Apr.	14.9	887
May	42.0	2,582
Jun.	13.2	785
Jul.	3.46	213
Aug.	1.05	65
Sep.	1.14	68
Oct.	7.30	449
Nov.	6.79	404
Dec.	5.08	312
		6,490 AF/year

COTTONWOOD CREEK
Mouth to Little Cottonwood Creek (USGS Site No. 27)

50th Percentile Jan.-Dec.

	Cfs	AF
Jan.	7.98	491
Feb.	7.98	443
Mar.	8.34	513
Apr.	20.9	1,244
May	79.8	4,907
Jun.	105.0	6,248
Jul.	33.3	2,048
Aug.	11.0	676
Sep.	10.1	601
Oct.	13.8	848
Nov.	11.9	708
Dec.	9.43	580
		19,307 AF/year

COTTONWOOD CREEK
Little Cottonwood Creek to Trespass Creek (USGS Site No. 26)

50th Percentile Jan.-Dec.

	Cfs	AF
Jan.	5.44	334
Feb.	5.44	302
Mar.	5.69	350
Apr.	15.1	898
May	74.8	4,599
Jun.	105.0	6,248
Jul.	41.4	2,546
Aug.	13.7	842
Sep.	12.4	738
Oct.	9.40	578
Nov.	8.18	487
Dec.	6.43	395
		18,317 AF/year

EIGHTMILE CREEK
Mouth to Big Draw (USGS Site No. 14)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	10.5	646
Feb.	9.99	555
Mar.	11.2	689
Apr.	33.3	1,981
May	93.9	5,774
Jun.	63.2	3,761
Jul.	20.8	1,279
Aug.	6.72	413
Sep.	6.40	381
Oct.	18.9	1,162
Nov.	17.1	1,017
Dec.	12.9	793
		18,451 AF/year

EMIGRANT SPRING CREEK
Mouth to Origin

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	5.2	320
Feb.	5.2	289
Mar.	5.2	320
Apr.	9.0	536
May	12.5	768
Jun.	16.6	988
Jul.	12.5	768
Aug.	9.2	566
Sep.	7.4	440
Oct.	6.2	381
Nov.	5.8	345
Dec.	5.4	332
		6,053 AF/year

FLATHEAD CREEK
Mouth to Muddy Creek (USGS Site No. 25)

50th Percentile Jan.-Dec.

	Cfs	AF
Jan.	18.8	1,156
Feb.	18.8	1,044
Mar.	22.4	1,377
Apr.	33.6	1,999
May	123.0	7,563
Jun.	119.0	7,081
Jul.	25.7	1,580
Aug.	9.71	597
Sep.	8.51	506
Oct.	30.6	1,882
Nov.	26.7	1,589
Dec.	22.4	1,377
		27,751 AF/year

FLATHEAD CREEK
Muddy Creek to Cache Creek (USGS Site No. 24)

50th Percentile Jan.-Dec.

	Cfs	AF
Jan.	13.4	824
Feb.	13.4	744
Mar.	16.1	990
Apr.	31.1	1,851
May	112.0	6,887
Jun.	107.0	6,367
Jul.	35.2	2,164
Aug.	13.3	818
Sep.	11.4	678
Oct.	21.7	1,334
Nov.	18.8	1,119
Dec.	15.8	972
		24,748 AF/year

FLATHEAD CREEK
Cache Creek to S.F. Flathead Creek (USGS Site No. 23)

50th Percentile Jan.-Dec.

	Cfs	AF
Jan.	4.20	258
Feb.	4.20	233
Mar.	5.24	322
Apr.	12.9	768
May	43.8	2,693
Jun.	33.1	1,970
Jul.	13.4	824
Aug.	5.07	312
Sep.	4.61	274
Oct.	6.74	414
Nov.	5.69	339
Dec.	4.86	299
		8,706 AF/year

FLESHMAN CREEK
Mouth to Perkins Creek (USGS Site No. 21)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	2.72	167
Feb.	2.53	140
Mar.	2.99	184
Apr.	10.7	637
May	30.3	1,863
Jun.	6.57	391
Jul.	1.55	95
Aug.	0.46	28
Sep.	0.52	31
Oct.	4.95	304
Nov.	4.66	277
Dec.	3.48	214
		4,331 AF/year

FRIDLEY CREEK
Mouth to Miller Creek (USGS Site No. 13)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	1.58	97
Feb.	1.46	81
Mar.	1.76	108
Apr.	6.81	405
May	19.2	1,181
Jun.	29.7	1,767
Jul.	8.76	539
Aug.	2.74	168
Sep.	2.78	165
Oct.	2.90	178
Nov.	2.77	165
Dec.	2.05	126
		4,980 AF/year

FRIDLEY CREEK
Miller Creek to Needle Creek (USGS Site No. 12)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	6.12	376
Feb.	5.77	320
Mar.	6.62	407
Apr.	21.2	1,261
May	59.8	3,677
Jun.	69.6	4,141
Jul.	23.3	1,433
Aug.	7.55	464
Sep.	7.13	424
Oct.	11.1	682
Nov.	10.2	607
Dec.	7.64	470
		14,262 AF/year

LITTLE MISSION CREEK
Mouth to Little Mission Forks (USGS Site No. 36)

90th Percentile May-Sep.
50th Percentile Oct.-Apr.

	Cfs	AF
Jan.	2.00	123
Feb.	2.00	111
Mar.	2.55	157
Apr.	9.66	575
May	38.1	2,343
Jun.	31.9	1,898
Jul.	5.60	344
Aug.	1.72	106
Sep.	1.65	98
Oct.	3.19	196
Nov.	2.65	158
Dec.	2.28	140
		6,249 AF/year

MCDONALD SPRING CREEK
Mouth to northern boundary of Sec. 22

50th Percentile May-Sep
10th Percentile Oct-Apr

	Cfs	AF
Jan.	7.2	443
Feb.	7.2	400
Mar.	7.2	443
Apr.	12.1	720
May	16.8	1,033
Jun.	21.3	1,267
Jul.	16.8	1,033
Aug.	12.7	781
Sep.	10.4	619
Oct.	8.6	529
Nov.	10.2	607
Dec.	9.5	584
		8,459 AF/year

MIDDLE FORK BRACKETT CREEK
Mouth to One Mile Upstream[1] (USGS Site No. 29)

50th Percentile Jan.-Dec.

	Cfs	AF
Jan.	1.28	79
Feb.	1.28	71
Mar.	1.66	102
Apr.	10.5	625
May	35.3	2,170
Jun.	25.3	1,505
Jul.	4.61	283
Aug.	1.74	107
Sep.	1.69	101
Oct.	2.04	125
Nov.	1.68	100
Dec.	1.45	89
		5,357 AF/year

[1]Shown in reservation application (page 32), and Order of the Board as "Brackett Creek-Skunk Creek to one mile up North, Middle, and South forks."

MILL CREEK
Mouth to East Fork (USGS Gage No. 06192000)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	33.0	2,029
Feb.	34.0	1,888
Mar.	33.0	2,029
Apr.	80.0	4,760
May	388.0	23,857
Jun.	757.0	45,045
Jul.	323.0[1]	19,860
Aug.	115.0[1]	7,071
Sep.	89.7[1]	5,338
Oct.	51.0	3,136
Nov.	58.0	3,451
Dec.	47.0	2,890
		121,354 AF/year

[1]Values for these three months are estimates derived for USGS Site No. 15 using the Riggs' Method.

MISSION CREEK
Mouth to Little Bear Draw (USGS Site No. 37)

90th Percentile May-Sep.
50th Percentile Oct.-Apr.

	Cfs	AF
Jan.	6.79	418
Feb.	6.79	377
Mar.	8.36	514
Apr.	24.6	1,464
May	122.0	7,502
Jun.	94.6	5,629
Jul.	27.4	1,685
Aug.	9.68	595
Sep.	8.05	479
Oct.	11.0	676
Nov.	9.35	556
Dec.	7.93	488
		20,383 AF/year

MOL HERON CREEK
Mouth to Cinnabar Creek (USGS Site No. 6)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	9.93	611
Feb.	9.45	525
Mar.	10.6	652
Apr.	31.8	1,892
May	89.7	5,515
Jun.	125.0	7,438
Jul.	45.6	2,804
Aug.	15.1	928
Sep.	13.6	809
Oct.	17.9	1,101
Nov.	16.2	964
Dec.	12.3	756
		23,995 AF/year

MOL HERON CREEK
Cinnabar Creek to Yellowstone Park Boundary (USGS Site No. 3)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	6.91	425
Feb.	6.53	363
Mar.	7.46	459
Apr.	23.4	1,392
May	66.2	4,070
Jun.	92.7	5,516
Jul.	32.4	1,992
Aug.	10.6	652
Sep.	9.78	582
Oct.	12.5	769
Nov.	11.4	678
Dec.	8.60	529
		17,427 AF/year

NELSON SPRING CREEK
Mouth to Origin

50th Percentile May-Sep.
10th Percentile Oct.-Apr.

	Cfs	AF
Jan.	61	3,751
Feb.	61	3,387
Mar.	61	3,751
Apr.	61	3,630
May	33	2,029
Jun.	33	1,964
Jul.	33	2,029
Aug.	33	2,029
Sep.	33	1,964
Oct.	61	3,751
Nov.	61	3,630
Dec.	61	3,751
		35,666 AF/year

NORTH FORK BRACKETT CREEK
Mouth to One Mile Upstream[1] (USGS Site No. 28)

50th Percentile Jan.-Dec.

	Cfs	AF
Jan.	2.08	128
Feb.	2.08	116
Mar.	2.66	164
Apr.	11.9	708
May	40.4	2,484
Jun.	29.9	1,779
Jul.	11.3	695
Aug.	4.26	262
Sep.	3.92	233
Oct.	3.32	204
Nov.	2.77	165
Dec.	2.38	146
		7,084 AF/year

[1]Shown in reservation application (page 32), and Order of the Board as "Brackett Creek-Skunk Creek to one mile up North, Middle, and South forks."

ROCK CREEK (SHIELDS DRAINAGE)
Mouth to Forest Service West Boundary Sec. 8 (USGS Site No. 34)

50th Percentile Jan.-Dec.

	Cfs	AF
Jan.	5.77	355
Feb.	5.77	320
Mar.	6.03	371
Apr.	15.9	946
May	68.0	4,181
Jun.	132.0	7,854
Jul.	48.6	2,988
Aug.	16.2	996
Sep.	14.5	863
Oct.	9.96	612
Nov.	8.66	515
Dec.	6.81	419
		20,420 AF/year

ROCK CREEK (YELLOWSTONE DRAINAGE)
Mouth to Steele Creek (USGS Site No. 10)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	4.36	268
Feb.	4.09	227
Mar.	4.74	291
Apr.	15.9	946
May	45.0	2,767
Jun.	109.0	6,486
Jul.	39.1	2,404
Aug.	12.9	793
Sep.	11.8	702
Oct.	7.90	486
Nov.	7.34	437
Dec.	5.50	338
		16,145 AF/year

Shields River near Wilsall
(Approximately 90% Flows, as per USGS Gauging Station at Wilsall)

Month	CFS	AF/Y
January	7	430
February	7	389
March	9	553
April	24	1,430
May	111	6,824
June	119	7,079
July	27	1,660
August	12	737
September	11	655
October	12	737
November	11	655
December	10	615
Total Reservation	(Av. 30 cfs)	21,764 af/y

Shields River near Clyde Park
(Approximately 90%ile Flows as per USGS Gauging Station at Clyde Park)

Month	CFS	AF/Y
January	26	1,598
February	29	1,610
March	44	2,704
April (1-15)	93	2,766
April (16-30)	39	1,160
May (1-10)	83	1,645
May (11-20)	137	2,716
May (21-31)	184	4,012
June (1-10)	189	3,747
June (11-20)	157	3,113
June (21-30)	105	2,082
July	22	1,352
August	13	800
September	13	773
October	30	1,845
November	27	1,606
December	31	1,905
Total Reservation	(Av. 49 cfs)	35,434 af/y

SHIELDS RIVER AT ITS MOUTH

90th Percentile January - December

	cfs	AF
January	86.2	5,300
February	87.3	4,848
March	106	6,518
April	131	7,795
May	460	28,284
June	945	56,231
July	99.0	6,087
August	85.6	5,263
September	87.5	5,207
October	132	8,116
November	125	7,438
December	107	6,579
		147,666 AF/Yr.

SIXMILE CREEK
Mouth to North Fork (USGS Site No. 11)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	6.60	406
Feb.	6.23	346
Mar.	7.13	438
Apr.	22.6	1,345
May	63.7	3,917
Jun.	157.0	9,342
Jul.	59.1	3,634
Aug.	19.8	1,217
Sep.	17.5	1,041
Oct.	11.9	732
Nov.	10.9	649
Dec.	8.23	506
		23,573 AF/year

SMITH CREEK
Mouth to Bitter Creek (USGS Site No. 22)

50th Percentile Jan.-Dec.

	Cfs	AF
Jan.	2.61	160
Feb.	2.61	145
Mar.	3.31	204
Apr.	23.9	1,422
May	85.1	5,233
Jun.	75.5	4,493
Jul.	13.6	836
Aug.	5.14	316
Sep.	4.67	278
Oct.	4.17	256
Nov.	3.49	208
Dec.	2.99	184
		13,735 AF/year

SOUTH FORK BRACKETT CREEK
Mouth to One Mile Upstream[1] (USGS Site No. 30)

50th Percentile Jan.-Dec.

	Cfs	AF
Jan.	0.97	60
Feb.	0.97	54
Mar.	1.27	78
Apr.	8.29	493
May	27.4	1,685
Jun.	18.5	1,101
Ju.	5.68	349
Aug.	2.15	132
Sep.	2.05	122
Oct.	1.54	95
Nov.	1.26	75
Dec.	1.09	67
		4,311 AF/year

[1]Shown in reservation application (page 32), and Order of the Board as "Brackett Creek-Skunk Creek to one mile up North, Middle, and South forks."

SUCE CREEK
Mouth to Lost Creek (USGS Site No. 17)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	0.83	51
Feb.	0.76	42
Mar.	0.93	57
Apr.	3.96	236
May	11.2	689
Jun.	34.5	2,053
Jul.	10.4	639
Aug.	3.27	201
Sep.	3.28	195
Oct.	1.53	94
Nov.	1.48	88
Dec.	1.09	67
		4,412 AF/year

TOM MINER CREEK
Mouth to Canyon Creek (USGS Site No. 9)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	20.7	1,273
Feb.	19.9	1,105
Mar.	21.9	1,347
Apr.	58.8	3,499
May	166.0	10,207
Jun.	188.0	11,187
Jul.	72.7	4,470
Aug.	24.6	1,513
Sep.	21.3	1,267
Oct.	37.0	2,275
Nov.	33.0	1,964
Dec.	25.0	1,537
		41,644 AF/year

TOM MINER CREEK
Canyon Creek to Trail Creek (USGS Site No. 8)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	22.0	1,353
Feb.	21.3	1,183
Mar.	23.3	1,433
Apr.	62.0	3,689
May	175.0	10,760
Jun.	211.0	12,555
Jul.	83.2	5,116
Aug.	28.3	1,740
Sep.	24.3	1,446
Oct.	39.4	2,423
Nov.	35.0	2,083
Dec.	26.6	1,636
		45,417 AF/year

TRAIL CREEK
West Pine Creek to South Boundary Sec. 35
(USGS Site No. 16)

50th Percentile May-Sep.
20th Percentile Oct.-Apr.

	Cfs	AF
Jan.	7.93	488
Feb.	7.52	418
Mar.	8.54	525
Apr.	26.3	1,565
May	74.3	4,568
Jun.	59.0	3,511
Jul.	19.3	1,187
Aug.	6.20	381
Sep.	5.93	353
Oct.	14.3	879
Nov.	13.1	780
Dec.	9.84	605
		15,260 AF/year

Yellowstone River at Livingston

Month	CFS	AF/Y	APPROX. %
January	1,330	81,760	20
February	1,320	73,292	20
March	1,350	82,989	20
April	2,490	148,132	20
May (1-10)	2,500	49,575	)
May (11-20)	1,900	37,677	)95 for May
May (21-31)	4,700	93,202	)
June (1-10)	7,700	152,693	)
June (11-20)	9,000	178,472	)95 for June
June (21-30)	8,000	158,642	)
July (1-10)	5,400	107,083	)
July (11-20)	3,800	75,355	)95 for July
July (21-31)	2,500	49,575	)
August (1-10)	1,600	31,728	)
August (11-31)	2,125	88,492	)95 for August
September	1,555	92,508	95
October	2,350	144,463	20
November	1,790	106,488	20
December	1,490	91,596	20
Total of Months	(Av. 2,553 cfs)	1,843,722 af/y	
Plus Dominant Discharge of	18,200 cfs	36,091 af	for one 24-hour period
Total Reservation	(Av. 2,596 cfs)	1,879,813 af/y	

MIDDLE YELLOWSTONE BASIN

(Boulder River to Big Horn River)

Big Timber Creek at Mouth

Month	CFS	AF/Y
January	10	615
February	10	555
March	10	615
April	20	1,190
May	85	5,225
June	180	10,710
July (1-20_)	100	3,967
July (21-31)	30	655
August	25	1,535
September	20	1,190
October	13	800
November	10	595
December	10	615
Total Reservation	(Av. 39 cfs)	28,267 af/y

Boulder River at Contact

Month	CFS	AF/Y
January	50	3,075
February	50	2,875
March	50	3,075
April	50	2,975
May	150	9,220
June	1,080	64,265
July	380	23,365
August	170	10,450
September	110	6,545
October	85	5,225
November	50	2,975
December	50	3,075
Total Reservation	(Av. 189 cfs)	137,120 af/y

Boulder River at Big Timber

Month	CFS	AF/Y
January	80	4,920
February	80	4,441
March	80	4,920
April	80	4,760
May	300	18,445
June	1,690	100,540
July	490	30,122
August	60	3,690
September	95	5,650
October	130	7,995
November	80	4,760
December	80	4,920
Total Reservation	(Av. 269 cfs)	195,163 af/y

BLUEWATER CREEK
Mouth to Headwaters
(USGS Gage No. 06207800)

85th Percentile Jan.-Dec.

	Cfs	AF
Jan.	26.5	1,629
Feb.	27.5	1,527
Mar.	27.0	1,660
Apr.	28.0	1,666
May	27.0	1,660
Jun.	25.5	1,517
Jul.	24.0	1,476
Aug.	25.0	1,537
Sep.	26.0	1,547
Oct.	27.0	1,660
Nov.	27.0	1,607
Dec.	27.0	1,660
		19,146 AF/year

BRIDGER CREEK
Headwaters to Krone Ditch Headgate (USGS Site No. 40)

90th Percentile Jan.-Dec.

	Cfs	AF
Jan.	1.48	91
Feb.	1.48	82
Mar.	1.52	94
Apr.	4.77	284
May	25.3	1,556
Jun.	43.7	2,600
Jul.	3.44	212
Aug.	1.01	62
Sep.	1.01	60
Oct.	1.98	122
Nov.	2.46	146
Dec.	1.75	108
		5,417 AF/year

BUTCHER CREEK
Headwaters to West Butcher Creek

85th Percentile Jan.-Dec.

	Cfs	AF
Jan.	0.5	31
Feb.	0.6	33
Mar.	1.0	61
Apr.	1.6	95
May	3.7	228
Jun.	3.7	220
Jul.	1.1	68
Aug.	0.3	18
Sep.	0.5	30
Oct.	0.8	49
Nov.	0.7	42
Dec.	0.6	37
		912 AF/year

BUTCHER CREEK
West Butcher Creek to Mouth

85th Percentile Jan.-Dec.

	Cfs	AF
Jan.	5.3	326
Feb.	10.2	566
Mar.	8.7	535
Apr.	12.7	756
May	18.4	1,131
Jun.	32.5	1,934
Jul.	50.0	3,074
Aug.	58.0	3,566
Sep.	36.0	2,142
Oct.	18.0	1,107
Nov.	8.8	524
Dec.	5.8	357
		16,018 AF/year

CASTLE CREEK
Mouth to 1,500 ft. above Picket Pin Creek

85th Percentile Jan.-Dec.

	Cfs	AF
Jan.	9.2	566
Feb.	9.3	516
Mar.	10.6	652
Apr.	15.2	904
May	39.3	2,416
Jun.	56.5	3,362
Jul.	22.0	1,353
Aug.	10.0	615
Sep.	11.3	672
Oct.	13.8	848
Nov.	12.2	726
Dec.	10.2	627
		13,257 AF/year

CLARKS FORK YELLOWSTONE RIVER[1]

90th Percentile Oct.-May
70th Percentile June-Sep.

	Cfs	AF
Jan.	300.0	18,446
Feb.	299.0	16,606
Mar.	308.0	18,938
Apr.	357.0	21,243
May	1,051.0	64,623
Jun.	3,569.0	212,370
Jul.	1,537.0	94,506
Aug.	399.0	24,534
Sep.	393.0	23,385
Oct.	332.0	20,414
Nov.	401.0	23,861
Dec.	330.0	20,291
		559,217 AF/year

[1]Measured at USGS gage No. 06208500 "Clarks Fork River at Edgar."

CLARKS FORK YELLOWSTONE RIVER[1]

90th Percentile Oct.-May
70th Percentile June-Sep.

	Cfs	AF
Jan.	186.0	11,437
Feb.	194.0	10,774
Mar.	189.0	11,621
Apr.	250.0	14,876
May	1,062.0	65,300
Jun.	3,477.0	206,896
Jul.	1,640.0	100,840
Aug.	423.0	26,009
Sep.	240.0	14,281
Oct.	117.0	7,194
Nov.	200.0	11,901
Dec.	229.0	14,081
		495,210 AF/year

[1]Measured at USGS gage No. 06207500 "Clarks Fork River near Belfry."

CLEAR CREEK
Headwaters to Mouth

85th Percentile Jan.-Dec.

	Cfs	AF
Jan.	9.8	602
Feb.	7.3	405
Mar.	14.0	861
Apr.	9.1	541
May	1.5	92
Jun.	1.4	83
Jul.	3.8	234
Aug.	7.8	480
Sep.	10.6	631
Oct.	39.1	2,404
Nov.	20.6	1,226
Dec.	13.1	805
		8,364 AF/year

DRY CREEK
Headwaters to Mouth

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	2.2	135	
Feb.	2.7	150	
Mar.	4.6	283	
Apr.	3.7	220	
May	1.5	92	
Jun.	0.7	42	
Jul.	0.4	24	
Aug.	7.4	455	
Sep.	10.6	631	
Oct.	12.0	738	
Nov.	2.6	155	
Dec.	2.2	135	
		3,060	AF/year

EAST FISHTAIL CREEK
West Fishtail Creek to its East Fork

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	1.2	74	
Feb.	1.2	67	
Mar.	1.5	92	
Apr.	2.4	143	
May	8.5	523	
Jun.	9.5	565	
Jul.	3.2	197	
Aug.	1.4	86	
Sep.	2.0	119	
Oct.	1.7	104	
Nov.	1.6	95	
Dec.	1.3	80	
		2,145	AF/year

East Boulder River at Mouth

Month	CFS	AF/Y
January	15	922
February	15	832
March	15	922
April	15	892
May	20	1,229
June	165	9,815
July	50	3,073
August	22	1,352
September	20	1,189
October	18	1,106
November	15	892
December	15	922
Total Reservation	(Av. 32 cfs	23,146 af/y

EAST ROSEBUD CREEK
Custer Nat'l Forest Boundary to W. Rosebud Creek

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	58.2	3,578	
Feb.	58.4	3,243	
Mar.	58.3	3,585	
Apr.	73.2	4,356	
May	296.2	18,213	
Jun.	732.3	43,575	
Jul.	317.2	19,504	
Aug.	93.0	5,718	
Sep.	52.6	3,130	
Oct.	41.7	2,564	
Nov.	62.4	3,713	
Dec.	68.2	4,193	
		115,372	AF/year

FISHTAIL CREEK
Confluence of East & West Fishtail Creeks to Mouth

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	4.1	252	
Feb.	4.2	233	
Mar.	4.9	301	
Apr.	7.2	428	
May	36.3	2,232	
Jun.	51.5	3,064	
Jul.	19.9	1,224	
Aug.	9.0	553	
Sep.	10.3	613	
Oct.	6.0	369	
Nov.	5.4	321	
Dec.	4.5	277	
		9,867	AF/year

LITTLE ROCKY CREEK
Mouth to Forest Service Road #1414 Crossing

85th Percentile Jan.-Dec.

	Cfs	AF
Jan.	0.3	18
Feb.	0.3	17
Mar.	0.4	24
Apr.	0.6	36
May	6.6	406
Jun.	7.2	428
Jul.	2.4	148
Aug.	1.0	61
Sep.	1.5	89
Oct.	0.4	24
Nov.	0.4	24
Dec.	0.3	18
		1,293 AF/year

LOWER DEER CREEK
Headwaters to I-90 (USGS Site No. 39)

90th Percentile Jan.-Dec.

	Cfs	AF
Jan.	3.09	190
Feb.	3.09	172
Mar.	3.12	192
Apr.	10.4	619
May	51.9	3,191
Jun.	101.0	6,010
Jul.	13.7	842
Aug.	4.55	280
Sep.	4.03	240
Oct.	4.28	263
Nov.	4.90	292
Dec.	3.61	222
		12,513 AF/year

PICKET PIN CREEK
Mouth to Mouth of Swamp Creek

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	2.0	123	
Feb.	2.0	111	
Mar.	2.4	148	
Apr.	3.7	220	
May	13.7	842	
Jun.	16.6	988	
Jul.	5.8	357	
Aug.	2.5	154	
Sep.	3.5	208	
Oct.	2.9	178	
Nov.	2.6	155	
Dec.	2.2	135	
		3,619	AF/year

RED LODGE CREEK
Custer Nat'l Forest to Cooney Reservoir

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	11.0	676	
Feb.	18.0	1,000	
Mar.	21.5	1,322	
Apr.	41.0	2,440	
May	51.0	3,136	
Jun.	77.0	4,582	
Jul.	25.0	1,537	
Aug.	22.0	1,353	
Sep.	19.0	1,130	
Oct.	25.5	1,568	
Nov.	21.5	1,279	
Dec.	11.5	707	
		20,730	AF/year

ROCK CREEK (CLARKS FORK YELLOWSTONE)
Mouth to Custer National Forest
(USGS Gage No. 06209500)

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	29.0	1,783	
Feb.	27.0	1,500	
Mar.	25.5	1,568	
Apr.	30.0	1,785	
May	113.0	6,948	
Jun.	418.5	24,902	
Jul.	326.5	20,076	
Aug.	205.5	12,636	
Sep.	108.5	6,456	
Oct.	66.0	4,058	
Nov.	45.0	2,678	
Dec.	34.5	2,121	
		86,511	AF/year

SAGE CREEK
Headwaters to Crow Reservation

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	2.3	141	
Feb.	2.3	128	
Mar.	2.8	172	
Apr.	4.2	250	
May	11.3	695	
Jun.	13.3	791	
Jul.	4.6	283	
Aug.	2.0	123	
Sep.	2.8	167	
Oct.	3.3	203	
Nov.	3.0	178	
Dec.	2.5	154	
		3,285	AF/year

Stillwater River at Mouth
90%ile Flow

Month	CFS	AF/Y
January	200	12,294
February	205	11,382
March	210	12,909
April	225	13,385
May	560	34,425
June	2,075	123,447
July	1,030	63,318
August	480	29,507
September	480	28,555
October	380	23,360
November	225	13,385
December	225	13,831
Total Reservation	(Av. 524 cfs)	379,795 af/y

SWEET GRASS CREEK
Mouth to Forest Service Boundary (Gage No. 06200500)

90th Percentile Jan.-Dec.

	Cfs	AF
Jan.	8.0	492
Feb.	8.0	444
Mar.	8.0	492
Apr.	10.0	595
May	84.0	5,165
Jun.	252.0	14,995
Jul.	112.0	6,887
Aug.	41.0	2,521
Sep.	26.0	1,547
Oct.	20.0	1,230
Nov.	16.0	952
Dec.	10.0	615
		35,935 AF/year

UPPER DEER CREEK
Headwaters to a Point Upstream from I-90 Bridge (USGS Site No. 38)

90th Percentile Jan.-Dec.

	Cfs	AF
Jan.	3.06	188
Feb.	3.06	170
Mar.	3.08	189
Apr.	13.3	791
May	64.6	3,972
Jun.	130.0	7,736
Jul.	7.17	441
Aug.	2.25	138
Sep.	2.11	126
Oct.	4.23	260
Nov.	4.85	289
Dec.	3.57	220
		14,520 AF/year

West Boulder River at Mouth

Month	CFS	AF/Y
January	50	3,073
February	50	2,776
March	50	3,073
April	50	2,974
May (1-20)	50	1,983
May (21-31)	300	6,543
June	300	17,847
July (1-20)	300	11,898
July (21-31)	200	4,362
August	75	4,601
September	75	4,462
October	75	4,610
November	60	3,569
December	50	3,073
Total Reservation	(Av. 103 cfs)	74,853 af/y

WEST FISHTAIL CREEK
East Fishtail Creek to Richmond - Kennedy Ditch

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	0.9	55	
Feb.	0.9	50	
Mar.	1.1	68	
Apr.	1.7	101	
May	11.4	701	
Jun.	13.4	797	
Jul.	4.7	289	
Aug.	2.0	123	
Sep.	2.8	167	
Oct.	1.2	74	
Nov.	1.2	71	
Dec.	1.0	61	
		2,557	AF/year

WEST FORK STILLWATER RIVER
Mouth to Castle Creek

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	21.1	1,297	
Feb.	21.3	1,183	
Mar.	23.5	1,445	
Apr.	32.8	1,952	
May	135.5	8,332	
Jun.	238.1	14,168	
Jul.	104.1	6,401	
Aug.	49.4	3,037	
Sep.	45.1	2,684	
Oct.	32.3	1,986	
Nov.	28.0	1,666	
Dec.	23.5	1,445	
		45,596	AF/year

WEST FORK STILLWATER RIVER
Castle Creek to Sweetgrass/Stillwater County Line

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	8.5	523	
Feb.	8.7	483	
Mar.	9.9	609	
Apr.	14.3	851	
May	133.7	8,221	
Jun.	234.5	13,954	
Jul.	102.4	6,296	
Aug.	48.6	2,988	
Sep.	44.5	2,648	
Oct.	12.8	787	
Nov.	11.4	678	
Dec.	9.5	584	
		38,622	AF/year

WEST FORK STILLWATER RIVER
Sweetgrass/Stillwater County Line to Tumble Creek

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	3.0	184	
Feb.	3.1	172	
Mar.	3.6	221	
Apr.	5.8	345	
May	102.0	6,272	
Jun.	210.0	12,496	
Jul.	73.0	4,488	
Aug.	28.0	1,722	
Sep.	24.0	1,428	
Oct.	5.0	307	
Nov.	4.4	262	
Dec.	3.4	209	
		28,106	AF/year

WEST ROSEBUD CREEK
Custer Nat'l Forest Boundary to Fiddler Creek

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	38.2	2,349	
Feb.	38.4	2,133	
Mar.	41.6	2,558	
Apr.	56.7	3,374	
May	192.7	11,848	
Jun.	358.4	21,326	
Jul.	162.0	9,961	
Aug.	77.9	4,790	
Sep.	66.9	3,981	
Oct.	59.2	3,640	
Nov.	50.7	3,017	
Dec.	42.8	2,632	
		71,609	AF/year

WEST ROSEBUD CREEK
Fiddler Creek to Mouth

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	48.6	2,988	
Feb.	48.8	2,710	
Mar.	52.5	3,228	
Apr.	70.9	4,219	
May	180.9	11,123	
Jun.	331.1	19,702	
Jul.	149.7	9,205	
Aug.	71.8	4,415	
Sep.	62.4	3,713	
Oct.	75.9	4,667	
Nov.	64.6	3,844	
Dec.	54.6	3,357	
		73,171	AF/year

WILLOW CREEK
Forest Boundary to Cooney Reservoir

85th Percentile Jan.-Dec.

	Cfs	AF	
Jan.	6.0	369	
Feb.	4.0	222	
Mar.	9.0	553	
Apr.	16.0	952	
May	19.0	1,168	
Jun.	26.0	1,547	
Jul.	24.0	1,476	
Aug.	20.0	1,230	
Sep.	24.0	1,428	
Oct.	19.0	1,168	
Nov.	16.5	982	
Dec.	7.5	461	
		11,556	AF/year

YELLOWSTONE RIVER AT BILLINGS
(as modified by the Board
on November 21, 1980)

Month	CFS	AF
January	2,483	152,688
February	2,484	137,940
March	2,883	177,278
April	3,580	213,048
May (1-20)	5,121	203,132
May (21-31)	12,200	266,177
June (1-7)	17,236	239,306
June (8-30)	18,716	853,816
July (1-10)	10,274	203,781
July (11-31)	4,000	166,611
August	3,500	215,205
September	3,107	184,878
October	3,573	219,694
November	3,478	206,976
December	2,781	171,008
Average	4,989	3,611,538

Plus Dominant Discharge of 34,507 cfs +68,430 af/day for one 24-hour period

LOWER YELLOWSTONE BASIN

(Big Horn River to North Dakota State Line)

Bighorn River at its Mouth

Month	CFS	AF/Y
January	3,300	202,863
February	3,200	177,679
March	4,000	245,895
April	3,600	214,167
May	3,800	233,600
June	5,200	309,352
July (1-20)	3,800	150,710
July (21-31)	3,200	69,802
August	2,800	172,127
September	2,600	154,676
October	2,700	165,979
November	3,100	184,421
December	3,200	196,716
Total Reservation	3,422	2,477,987

HANGING WOMAN CREEK
East Fork to Tongue River (Gage No. 06307600)

Historic Minimum Monthly Flows[1]

	Cfs	AF
Jan.	0.30	18.4
Feb.	0.60	33.3
Mar.	0.66	40.6
Apr.	0.61	36.3
May	0.52	32.0
Jun.	0.34	20.2
Jul.	0.01	0.6
Aug.	0.00	0.0
Sep.	0.00	0.0
Oct.	0.04	2.5
Nov.	0.18	10.7
Dec.	0.06	3.7
		198.3 AF/year

[1]Period of record September 1973 through September 1984. The 1934-82 common base period was not used on this stream.

OTTER CREEK
Bear Creek to Tongue River (Gage No. 06307740)

Historic Minimum Monthly Flows[1]

	Cfs	AF
Jan.	1.67	102.7
Feb.	1.87	103.8
Mar.	2.65	162.9
Apr.	1.59	94.6
May	2.61	160.5
Jun.	2.14	127.3
Jul.	0.28	17.2
Aug.	0.08	4.9
Sep.	0.13	7.7
Oct.	0.40	24.6
Nov.	1.63	97.0
Dec.	2.05	126.0
		1,029.2 AF/year

[1]Period of record October 1972 through September 1984. The 1934-82 common base period was not used on this stream.

Powder River at its Mouth
(90%ile Flow Based on USGS Data at Locate)

Month	CFS	AF/Y
January	31.9	1961
February	71.8	3986
March	291	17,888
April	347	20,643
May	424	26,064
June	184	10,946
July	70	4303
August	14.5	891
September	8.87	527
October	9.43	579
November	61.6	3664
December	61	3749
Total	(Av. 131 cfs)	95,201 af/y

PUMPKIN CREEK
Deer Creek to Tongue River (Gage No. 06308400)

Historic Minimum Monthly Flows[1]

	Cfs	AF
Jan.	0.00	0.0
Feb.	0.00	0.0
Mar.	0.01	0.6
Apr.	0.00	0.0
May	0.00	0.0
Jun.	0.00	0.0
Jul.	0.00	0.0
Aug.	0.00	0.0
Sep.	0.00	0.0
Oct.	0.00	0.0
Nov.	0.00	0.0
Dec.	0.00	0.0
		0.6 AF/year

[1]Period of record October 1972 through September 1984. The 1934-82 common base period was not used on this stream.

ROSEBUD CREEK
Cottonwood Creek to Yellowstone River (Gage No. 06296003)

80th Percentile Jan.-Dec.

	Cfs	AF
Jan.	7.0	430
Feb.	18.0	1,000
Mar.	22.0	1,353
Apr.	36.0	2,142
May	28.0	1,722
Jun.	37.0	2,202
Jul.	9.0	553
Aug.	7.0	430
Sep.	2.0	119
Oct.	9.0	553
Nov.	10.0	595
Dec.	12.0	738
		11,837 AF/year

Tongue River
At Inlet to Present and/or Future Reservoir

Month	CFS	AF/Y
January	160	9,836
February	160	8,883
March	200	12,294
April	200	11,898
May (1-20)	700	27,762
May (21-31)	1,200	26,175
June	1,350	80,312
July	360	22,130
August	100	6,147
September	100	5,949
October	200	12,294
November	200	11,898
December	150	9,221
Total	(Av. 338 cfs)	244,799 af/y

Tongue River at the Yellowstone
(Minimum 75 cfs at its Mouth)

Month	CFS	AF/Y
January	75	4,611
February	75	4,164
March	75	4,611
April	75	4,462
May	75	4,611
June	75	4,462
July	75	4,611
August	75	4,611
September	75	4,462
October	75	4,611
November	75	4,462
December	75	4,611
Total Reservation	(Av. 75 cfs)	54,289 af/y

Yellowstone River at Miles City
(80%ile Flows Less Depletions through Miles City)

Month	CFS	AF/Y
January	3,829	235,400
February	3,998	221,995
March	6,359	390,929
April	5,848	347,957
May	12,280	754,904
June	26,188	1,557,980
July	10,278	631,856
August	3,862	237,415
September	4,338	266,682
October	5,849	359,578
November	5,508	327,730
December	4,009	246,466
Total Reservation	(Av. 7,705 cfs)	5,578,892 af/y

Yellowstone River at Sidney
(80%ile Less Depletions through Sidney)

Month	CFS	AF/Y
January	3,738	229,831
February	4,327	240,281
March	6,778	416,711
April	6,808	405,031
May	11,964	735,528
June	25,140	1,495,644
July	10,526	647,090
August	2,670	164,166
September	3,276	194,917
October	6,008	369,377
November	5,848	347,920
December	3,998	245,814
Total Reservation	(Av. 7,586 cfs)	5,492,310

Appendix C

Notification letters sent to junior water users in 1988

1st letter
Murphy Rights

Montana Department of Fish, Wildlife & Parks

1420 East Sixth Ave.
Helena, MT 59620
June 28, 1988

Dear Water User:

Once again Montanans are faced with a situation in which stream flows will be unusually low in many of our streams. These low flows are an inconvenience, and at times even a hardship, to those persons who depend on that water for their livelihood. They also cause adverse affects on fish and wildlife.

In 1969, the state legislature enacted a law which authorized the Department of Fish, Wildlife and Parks to appropriate water in specified sections of 12 "Blue Ribbon" trout streams for the preservation of fish and wildlife habitat. A copy of that law is enclosed for your information.

Following this authorization, the department appropriated waters in each of the 12 designated streams. In 1982 these instream rights (which have become known as "Murphy Rights") were refiled under Senate Bill 76, Montana's Water Adjudication Act, and are presently in various stages of the adjudication process. The department claims priority dates between December 14, 1970 and January 7, 1971, depending on the stream involved.

It is apparent that water levels in some of these 12 streams will drop this summer to a point below the quantities specified in our claims. Because of the ongoing adjudication and the fact that some water users are unaware of the extent of our rights, the department at this time will not enforce those rights when the flow levels are first reached. However, we will enforce our rights if flows further drop to a level which may be crucial to fish and wildlife survival. When those flow levels are reached, we will again contact you and request that you respect the instream rights and the water needs of Montana's fish and wildlife resources. (By relinquishing a portion of our claimed rights this year, we do not waive our use of the water quantities that will be specified in the final decrees.)

This letter is being sent to water users of record who have permits or claimed rights junior to the instream rights of the department on the sections of streams designated in the law.

89-801. **What waters may be appropriated.** (1) The right to the use of the unappropriated water of any river, stream, ravine, coulee, spring, lake, or other natural source of supply may be acquired by appropriation, and an appropriator may impound flood, seepage, and waste waters in a reservoir and thereby appropriate the same.

(2) But the unappropriated waters of the streams and portions of streams hereafter named shall be subject to appropriation by the fish and game commission of the state of Montana in such amounts only as may be necessary to maintain stream flows necessary for the preservation of fish and wildlife habitat. Such uses shall have a priority of right over other uses until the district court in which lies the major portions of such stream or streams shall determine that such waters are needed for a use determined by said court to be more beneficial to the public. The unappropriated water of other streams and rivers not named herein may be set aside in the future for appropriation by the fish and game commission upon consideration and recommendation of the water resources board, fish and game commission, state soil conservation committee, the state board of health and approval of the legislature.

(a) Big Spring creek in Fergus county from its mouth in T17N, R16E, Sec. 26 to the state fish hatchery in T14W, R19E, Sec. 5.

(b) Blackfoot river in Missoula and Powell counties from its mouth in T13N, R18W, Sec. 21 to the mouth of its North Fork in T14N, R12W, Sec. 9.

(c) Flathead river in Flathead county from its mouth in T27N, R20W, Sec. 34 to the Canadian border in T37N, R22W, Sec. 4 & 5, including the section commonly known as the North Fork of the Flathead river.

(d) Gallatin river in Gallatin county from its mouth in T2N, R2E, Sec. 9 to the junction of its East Fork in T2N, R3E, Sec. 27.

(e) Gallatin river in Gallatin county (commonly called the West Gallatin) from the Beck & Border ditch intake in T2S, R4E, Sec. 14 to where it leaves the Yellowstone Park boundary in T9S, R5E, Sec. 18.

(f) Madison river in Madison and Gallatin counties from its mouth in T2N, R2E, Sec. 17 to Hebgen dam in T11S, R3E, Sec. 23.

(g) Missouri river in Lewis and Clark, Broadwater and Cascade counties from its junction with the Smith river in T19N, R2E, Sec. 9 to Toston dam in T4N, R3E, Sec. 7.

(h) Rock creek in Granite and Missoula counties from its mouth in T11N, R17W, Sec. 12 to the junction of its East and West Forks in T6N, R15W, Sec. 31.

(i) Smith river in Cascade and Meagher counties from the mouth of Hound creek in T17N, R3E, Sec. 20 to the Fort Logan bridge in T11N, R5E, Sec. 31.

(j) Yellowstone river in Stillwater, Sweetgrass and Park counties from the North-South Carbon-Stillwater county lines in T3S, R21E, Sec. 10 to where it leaves the Yellowstone Park boundary in NT9S, R8E, Sec. 23.

(k) Middle Fork Flathead river in Flathead county from its mouth in T31N, R19W, Sec. 7 to the mouth of Cox creek in T27N, R12W, (a nonsectioned township).

(l) South Fork Flathead river in Flathead and Powell counties from its mouth at Hungry Horse reservoir in T26W, R16W, Sec. (unknown), to its source at the junction of Danaher and Youngs creeks in T20W, R13W, Sec. 36.

89-801.1. **Established rights of use unaffected.** Nothing herein contained shall in any way affect or diminish any rights to the use of the waters of such streams or portions of streams heretofore established nor any legal or statutory rights given in connection with such established uses.

89-801.2. **Notice of appropriation.** The appropriation hereby authorized shall be made by filing a written notice of appropriation in the office of the county clerk and recorder of each county through which flows the river on which the appropriation is made, and by filing a copy of such notice with the director of the Montana water resources board. The notice shall state the quantity of water claimed, measured as provided in Title 89, R. C. M. 1947, the purpose for which it is claimed, the name of the appropriator, and the date of appropriation.

2nd letter - Murphy Rights

Montana Department of Fish, Wildlife & Parks

1420 East Sixth Avenue
Helena, Montana 59620

July 29, 1988

Dear Water User:

In our letter to you of June 28, 1988, we said we would again contact you regarding water withdrawals on the "Blue Ribbon" trout streams where we claim senior instream water rights with priority dates of December 1970 and January 1971. We stated that when it appeared that the claimed instream flow levels were reaching a crucial point, we would ask you to cease your junior diversion for as long as the flows were below our claims.

Instream flows have now dropped to a point below our claims where fish and wildlife habitat is threatened. If you are presently diverting water, you are required to cease your diversion at this time. When streamflows again rise above our instream rights, you can again utilize your junior water right or water use permit.

U.S. Geological Survey (USGS) stream gages have been assigned to monitor flow conditions in streams where we hold instream rights. The gage assigned to monitor <u>your</u> diversion is listed in the enclosure. Also listed are the instream rights by month which that gage monitors. The streamflow level at your designated gage can be obtained by calling the Department of Natural Resources and Conservation Water Rights field office in Bozeman (586-3136), Missoula (721-4284), Kalispell (752-2288), or Helena (444-6695). These offices will have up-to-date flow information for you to use in complying with this notification. It is your responsibility to monitor flow conditions so as to not interfere with our senior water rights.

Thank you for your cooperation. Your adherence to the law and conscientious use of water during this drought period will assist us in protecting the instream flows established for the protection of fish and wildlife.

Sincerely,

James W. Flynn
Director

drg
Enclosure

BLACKFOOT RIVER

1. The DFWP senior instream water rights claimed are from the mouth of the Blackfoot River to the mouth of the North Fork of the Blackfoot River.

2. The priority date of the instream right is January 6, 1971.

3. The USGS gage assigned to monitor flow levels and protect these rights is on the Blackfoot River near Bonner.

4. The DFWP instream flows by month which the above gage monitors are:

April 1-15	700 cfs[1]
April 16-30	1,130 cfs
May 1-31	2,000 cfs
June 1-30	2,000 cfs
July 1-15	1,523 cfs
July 16-31	700 cfs
August 1-31	700 cfs
September 1-30	650 cfs
October 1-31	650 cfs

You must not divert water under your junior right or permit as long as the flow is below that shown for the period indicated above.

Your cooperation is appreciated.

---

[1]Cubic feet per second. 1 cfs equals 448.8 gallons per minute or 40 miners inches.

MADISON RIVER

1. The DFWP senior instream water rights claimed are from the mouth to Ennis Dam.

2. The priority date of the instream rights is December 28, 1970.

3. The USGS gage assigned to monitor flow levels and protect these rights is on the Madison River near McAllister.

4. The DFWP instream flows by month which the above gage monitors are:

January 1 - May 31	1,200 cfs[1]
June 1 - June 30	1,500 cfs
July 1 - July 15	1,423 cfs
July 16 - December 31	1,300 cfs

You must not divert water under your junior right or permit as long as the flow is below that shown for the period indicated.

Your cooperation is appreciated.

---

1 Cubic feet per second. 1 cfs equals 448.8 gallons per minute or 40 miners inches.

MISSOURI RIVER (SEC. 2)

1. The DFWP senior instream water rights claimed are from Canyon Ferry Reservoir to Toston Dam.

2. The priority date of the instream rights is December 17, 1970.

3. The USGS gage assigned to monitor flow levels and protect these rights is on the Missouri River at Toston.

4. The DFWP instream flows by month which the above gage monitors are:

September 15 - December 31	3,000 cfs[1]
January 1 - January 31	1,500 cfs
February 1 - May 15	3,000 cfs
May 16 - June 30	4,000 cfs
July 1 - July 15	3,816 cfs
July 16 - September 14	1,500 cfs

You must not divert water under your junior right or permit as long as the flow is below that shown for the period indicated above.

Your cooperation is appreciated.

---

1 Cubic feet per second. 1 cfs equals 448.8 gallons per minute or 40 miners inches.

SMITH RIVER

1. The DFWP senior instream water rights claimed are from the mouth of Hound Creek to the Fort Logan bridge.

2. The priority date of the instream right is December 22, 1970.

3. The USGS gage assigned to monitor flow levels and protect these rights is on the Smith River near Fort Logan.

4. The DFWP instream flows by month which the above gage monitors are:

April 1-30	90 cfs[1]
May 1-31	150 cfs
June 1-30	150 cfs
July 1-31	90 cfs
August 1-31	90 cfs
September 1-30	90 cfs
October 1-31	90 cfs

You must not divert water under your junior right or permit as long as the flow is below that shown for the periods indicated above.

Your cooperation is appreciated.

---

[1]Cubic feet per second. 1 cfs equals 448.8 gallons per minute or 40 miners inches.

1st letter - yellowstone

Montana Department of Fish, Wildlife & Parks

1420 East Sixth Ave.
Helena, MT 59620
June 28, 1988

Dear Water Permit Holder:

Once again Montanans are faced with the likelihood that streamflows will be unusually low in many of our streams. These low flows are an inconvenience, and at times even a hardship, to those persons who depend on that water for their livelihood, and they also have adverse affects on fish and wildlife.

Foreseeing such possibilities, the 1973 Montana legislature passed the Montana Water User Act, which established a process for reserving water in Montana's streams for fish, wildlife and water quality. Between 1974-1979 the reservation process was completed in the Yellowstone River basin. The Board of Natural Resources allocated flows among the reservants by an order signed on December 15, 1978. A significant portion of the flows were reserved for instream purposes. Consequently, Yellowstone basin water use permits having priority dates after December 15, 1978 are subject to the instream flows granted by the Board.

During drought years, flows are likely to fall below the instream reservations on many Yellowstone basin streams. When these conditions occur, the Department of Fish, Wildlife and Parks notifies all junior water permit holders to cease their diversions for as long as flows are below our reservations.

Streamflows on some streams are already below the instream reservations for this time of year. However, the purpose of instream flows during a normal spring high water period is to provide flushing flows which maintain the size and shape of the stream channel which provides the physical habitat for fish and other aquatic life. This year spring flows were not high enough to perform those functions, yet they are still high enough that the fishery itself has not yet been adversely affected. Therefore, the department will not enforce the provisions of the reservations until the high flow period ends and we begin to experience lower summer flows. At that time, if flows fall below the instream reservations, we will notify you to cease your diversion(s).

2nd letter - yellowstone

Montana Department of Fish, Wildlife & Parks

1420 East Sixth Avenue
Helena, Montana 59620
July 29, 1988

Dear Water Permit Holder:

In our letter to you dated June 28, 1988, we said we would again contact you regarding your junior use of water when stream flows in the Yellowstone basin dropped below our instream reservations which have a priority date of December 15, 1978.

Flows have now dropped below our reservations. If you have not already ceased your junior diversion(s), you are required to do so at this time so as to be in compliance with the terms of your water use permit. You must discontinue water use for as long as flows are below our reservations.

Ten USGS gage sites within the Yellowstone basin have been chosen to monitor flow conditions. The gage assigned to monitor <u>your</u> diversion is listed on the enclosure. Also listed are the granted instream flows by month which that gage monitors. Current streamflow levels for your designated gage can be obtained by calling the Department of Natural Resources and Conservation Water Rights Bureau field office in Billings (657-2105), Bozeman (586-3136), or Miles City (232-6359). When flows are no longer below the instream reservations, you can again utilize your water use permit. It is the responsibility of the permit holder to monitor flow conditions so as to remain in compliance with the terms of his water use permit.

Thank you for your cooperation. Your adherence to the law and conscientious use of water during this drought period will assist us in protecting the flows granted for the protection of fish, wildlife and water quality.

Sincerely,

James W. Flynn

James W. Flynn
Director

drg

BOULDER RIVER

1. The DFWP senior instream water reservation is for the Boulder River at Big Timber.

2. The priority date of the instream right is December 15, 1978.

3. The USGS gage assigned to monitor flow levels and protect this right is on the Boulder River at Big Timber.

4. The DFWP instream flows by month which the above gage monitors are:

January	80 cfs[1]
February	80 cfs
March	80 cfs
April	80 cfs
May	300 cfs
June	1,690 cfs
July	490 cfs
August	60 cfs
Septmber	95 cfs
October	130 cfs
November	80 cfs
December	80 cfs

You must not divert water under your junior permit as long as the flow is below that shown for the period indicated.

Your cooperation is appreciated.

---

1 Cubic feet per second. 1 cfs equals 448.8 gallons per minute or 40 miners inches.

STILLWATER RIVER

1. The DFWP senior instream water reservation is for the Stillwater River at its mouth.

2. The priority date of the instream right is December 15, 1978.

3. The USGS gage assigned to monitor flow levels and protect this right is on the Stillwater River near Absarokee.

4. The DFWP instream flows by month which the above gage monitors are:

January	200 cfs[1]
February	205 cfs
March	210 cfs
April	225 cfs
May	560 cfs
June	2,075 cfs
July	1,030 cfs
August	480 cfs
September	480 cfs
October	380 cfs
November	225 cfs
December	225 cfs

You must not divert water under your junior permit as long as the flow is below that shown for the period indicated.

Your cooperation is appreciated.

---

1 Cubic feet per second. 1 cfs equals 448.8 gallons per minute or 40 miners inches.

USGS STREAM GAGES
associated with Yellowstone River basin
reservation streams

Stream		Gage
Yellowstone River	*	06192500 near Livingston, MT
	*	06214500 at Billings, MT
	*	06309000 at Miles City, MT
	*	06329500 near Sidney, MT
Powder River	*	06326500 near Locate, MT
Rosebud Creek		06296003 at mouth, near Rosebud, MT
		06295250 near Colstrip, MT
Tongue River		06306300 at State Line, near Decker, MT
	*	06308500 at Miles City, MT
Hanging Woman Creek		06307600 near Birney, MT
Otter Creek		06307740 at Ashland, MT
Pumpkin Creek		06308400 near Miles City, MT
Big Horn River	*	06294500 above Tullock Creek, near Bighorn, MT
Clarks Fork River	*	06207500 near Belfry, MT
		06208800 near Silesia, MT
Butcher Creek		
Willow Creek		06211500 near Boyd, MT
Red Lodge Creek		06211000 above Cooney Reservoir, near Boyd, MT
Clear Creek		
Dry Creek		
Rock Creek		06209500 near Red Lodge, MT
Sage Creek		
Bluewater Creek		
Stillwater River	*	06205000 near Absarokee, MT
Castle Creek		
Picket Pin Creek		
West Fork of Stillwater River		
Little Rocky Creek		

West Fishtail Creek

East Fishtail Creek

Fishtail Creek

West Rosebud Creek

East Rosebud Creek

Bridger Creek

Lower Deer Creek

Upper Deer Creek

Sweet Grass Creek

Boulder River * 06200000 at Big Timber, MT

East Boulder River

West Boulder River

Big Timber Creek

Mission Creek

Little Mission Creek

Shields River * 06195600 near Livingston, MT

Smith Creek

Flathead Creek

Cottonwood Creek

Rock Creek

Brackett Creek

Bear Creek

Cinnabar Creek

Mol Heron Creek

Cedar Creek

Tom Miner Creek

Rock Creek

Big Creek	06191800 near Emigrant, MT
Six Mile Creek	
Fridley Creek	
Eight Mile Creek	
Mill Creek	
Trail Creek	
Suce Creek	
Coke Creek	
Billman Creek	
Fleshman Creek	
Armstrong Spring Creek	
Nelson Spring Creek	
McDonald Spring Creek	
Emigrant Spring Creek	

* Drought Monitoring Sites Used as of 1988

USGS STREAM GAGES
associated with Murphy Rights streams

Stream		Gage
Big Spring Creek Mouth-State Fish Hatchery		
Blackfoot River Mouth-Clearwater River Clearwater River-North Fork	*	12340000 near Bonner, MT
Flathead River Mouth-South Fork South Fork-Middle Fork	*	12363000 at Columbia Falls, MT
Gallatin River Mouth-E. Gallatin River Beck & Border Ditch-YNP	*	06052500 at Logan, MT 06043500 near Gallatin Gateway, MT
Madison River Mouth-Ennis Reservoir	*	06041000 below Ennis Lake, near McAllister, MT
Ennis Reservoir-West Fork West Fork-Quake Lake		06038800 at Kirby Ranch, near Cameron, MT
Quake Lake-Hebgen Dam	*	06038500 below Hebgen Lake, near Grayling, MT
Middle Fork Flathead River Mouth-Bear Creek Bear Creek-Cox Creek	*	12358500 near West Glacier, MT
Missouri River Smith River-Holter Dam	*	06078200 near Ulm 06066500 below Holter Dam, near Wolf Creek, MT
Canyon Ferry Reservoir-Toston Dam	*	06054500 at Toston, MT
North Fork Flathead River Middle Fork-Bowman Creek Bowman Creek-Border	*	12355500 near Columbia Falls, MT 12355000 at Flathead, British Columbia
Rock Creek Mouth-Ranch Creek Ranch Creek-Headwaters	*	12334510 near Clinton, MT
Smith River Hound Creek-Cascade County Line Cascade County Line-Sheep Creek Sheep Creek-Fort Logan Bridge	*	06076690 near Fort Logan, MT
South Fork Flathead River Hungry Horse Reservoir-Powell/Flathead County Line Powell/Flathead County Line-Headwaters	*	12359800 above Twin Creek, near Hungry Horse

Yellowstone River

~~YNP-Tom Miner Creek~~		~~06191500 at Corwin Springs, MT~~
Tom Miner Creek-Boulder River	*	06192500 near Livingston, MT
Boulder River-Stillwater River		
Stillwater River-Carbon/Stillwater County Line		

* = Drought Monitoring Sites Used as of 1988

Appendix D (Con't)

Stream gages associated
with Ashley Creek, Young Creek
and Tobacco River instream rights

Ashley Creek

Continuous recording stream gage located southwest of Kalispell on south Meridan Road. Operated and maintained by DFWP.

Young Creek

Staff gage located at Young Creek fish trap near mouth of Young Creek. Operated and maintained by DFWP.

Tobacco River

USGS gage #12301300 - Tobacco River near Eureka, Montana

Appendix E

Position statement on modification of Yellowstone River instream reservation at Billings to benefit upper river conservation districts.

BEFORE THE BOARD OF NATURAL RESOURCES AND CONSERVATION
STATE OF MONTANA

In the matter of application for reservation of water No. 1781-r by the Montana Fish and Game Commission and No. 10,006-r by the Montana Department of Health and Environmental Sciences	)	POSITION STATEMENT AND OBJECTIONS

COMES NOW the Montana Department of Fish, Wildlife, & Parks on behalf of itself and the Montana Fish and Game Commission and hereby submits its position statement and objections to the order establishing periodic review of Reservation of Water No. 1781-r.

POSITION STATEMENT

Pursuant to Order of Board of Natural Resources establishing water reservations, dated December 15, 1978, paragraph 117 at page 49 thereof, wherein the reservant, in this case the Montana Department of Fish, Wildlife, & Parks for itself and the Montana Fish and Game Commission, is required to submit to the Board of Natural Resources & Conservation an annual progress report. The Montana Department of Fish, Wildlife, & Parks submitted its first annual report on December 15, 1979. A portion of the report considered water availability for the Yellowstone River at Billings. As this portion is relatively short, it is reproduced here in its entirety, charts included.

WATER AVAILABILITY - YELLOWSTONE RIVER AT BILLINGS

> An apparent dilemma exists in the reservations granted for the Yellowstone at Billings with respect to availability of water allocated to the conservation districts. The problem is perceived as follows.
>
> The Department of Fish, Wildlife, & Parks was granted an instream flow reservation for August and September of 4,090 and 3,415 cfs respectively. This corresponds roughly to the 65th percentile flow and means that water in excess of our reservation occurs approximately 65 years out of 100. Flows granted for May, June, and July represent approximately the 85th percentile level. The instream reservations were given second priority in this reach.

The conservation districts at Billings and upstream were granted reservations totaling 207,764 af/yr and were given third priority. To economically develop efficient, full-service irrigation systems, a good water supply is usually considered to be necessary about 8 years out of 10, on the average (Draft EIS Vol. I 1976).

Since these conservation district reservations are junior to the instream reservation, they are subject to a certain water availability constraint. For the months of August and September, the constraint imposed by the 65th percentile instream flow level does not allow for the economic development of the water reserved for the conservation districts in this reach of river.

Since the conservation districts at and above Billings were granted a water reservation for future irrigation opportunities, it seemed advisable to explore the possibility of modifying the instream reservation at Billings to allow for the economic utilization of that water by the districts. The two entities holding instream reservations for this reach of river are the Department of Fish, Wildlife & Parks (DFWP) and the Department of Health & Environmental Sciences (DHES). During May 1979, the conservation districts, through their legal counsel, were informed of our intent in this matter.

During the interim, the DFWP and DHES met frequently to consider the problem of increasing water availability for the mainstem Yellowstone at Billings while, at the same time, not jeopardizing the purpose or intent of the instream reservations. After considering such matters as probable potential for future irrigation, net depletion considering the return flow and priority of reservations, the DFWP determined that the instream flow reservation could be reduced during the irrigation season (May 1 through September 30) to the levels indicated in Table 5. These levels should not cause serious degradation of the aquatic and recreational resources in that reach of the Yellowstone. The priority of the instream reservation would prevent future irrigation withdrawals from increasing the frequency or severity of low flow events. At the same time, water availability would be increased to the 91st to 82nd percentile level from July 11 through September 30.

In addition, the purpose of the high water period (May-July 10) is to provide flows sufficient to initiate bedload movement (Dominant Discharge) and sediment transport. The annual flushing action cleanses intergravel spaces assuring successful fish reproduction and adequate food production. With adequate high flows, the existing channel morphology is assured.

Table 5. Revised DFWP Proposed Instream Flow Reservation, Yellowstone River at Billings, Montana. (May 1 - September 30)

Month	Cfs	Ac-ft		Approx. Percentile
May (1-20)	5,124	203,199		90.0
May (21-31)	12,204	266,214		
Jun (1-7)	17,242	239,337		87.8
Jun (8-30)	19,042	868,487		
Jul (1-10)	10,277	203,786	84.3%	91.1
Jul (11-31)	4,000	153,720	97.5%	
Aug	3,500	215,156		83.0
Sep	3,000	178,470		82.3

It is recognized that the only real possibility for altering the spring hydrograph and materially affecting channel configuration on the Yellowstone is a mainstem impoundment. Normal irrigation demands on the Yellowstone during the high flow months should not significantly affect the spring hydrograph. With this in mind, it is suggested that those lands which are developed for irrigation with waters granted to the conservation district and subject to water availability constraints from July 11 through September 30, would not be subject to water availability constraints from May 1 through July 10.

The principal irrigated crop in the Yellowstone basin upstream from Billings is hay, although some cash crop farming exists. The lack of water availability constraints during the high flow months should allow for the production of two hay crops during most years, even if water is somewhat restricted during August and September during drought years.

The above approach to increasing water availability in the Yellowstone from Billings upstream was offered to the DHES for their concurrence. After water quality responsibilities were considered in that reach of river, it was concluded that DHES could not agree to the September flow figures proposed by DFWP without violating existing water quality standards. DHES will not consider flows for September which were less than those originally granted (3,415 cfs). We are not able to resolve that difference. Therefore, at the present time the flows at Billings can be adjusted to the extent shown in Table 6 without objection by DFWP and DHES.

Table 6. Revised Instream Flow Reservation Proposed for Yellowstone River at Billings. (May 1 - September 30)

Month	Flow Cfs	Ac-ft		Approx. Percentile
May (1-20)	5,124	203,199		90.0
May (21-31)	12,204	266,214		
Jun (1-7)	17,242	239,337		87.8
Jun (8-30)	19,042	868,487		
Jul (1-10)	10,277	203,786	84.3%	91.1
Jul (11-31)	4,000	153,720	97.5%	
Aug	3,500	215,156		83.0
Sep	3,415	203,185		65.0

Since the publication of the first annual report of December 15, 1979, the Montana Department of Fish, Wildlife, & Parks has determined that its position in the adjustment of the instream flow reservation for the Yellowstone River at Billings be similar to that reflected in Table 5 of the previously cited report.

A comparison of the figures suggested in Table 5 with those proposed by the Board of Natural Resources and Conservation in the proposed Order shows the Board's proposed changes to be slightly different than those suggested by the Montana Department of Fish, Wildlife, & Parks. The difference, however, between the Montana Department of Fish, Wildlife, & Parks' and Board of Natural Resources & Conservation's figures is not so great as to cause serious degradation of the aquatic and recreational resources in the reach of the Yellowstone River affected by the proposed reservation review.

A critical factor in the determination that the department's suggested changes and the Board's proposed changes will not cause serious aquatic degradation to the reach of the Yellowstone River affected by the proposed change is the second priority held by the Department of Fish, Wildlife, & Parks and the Department of Health and Environmental Sciences in that reach of the river. With this second priority, it is possible to modify downward the instream reservations to the extent proposed, but no further, and still maintain substantial protection for the aquatic resources against increasingly severe low flow events of the Yellowstine River in this reach. Those low flow events which occur below the established instream flow level should not become more frequent or severe with development by the applicable conservation districts of water reserved to them by the Board in this same reach of the Yellowstone River.

It is further the position of the department if the Board acts in this matter that no modifications to the December 15, 1978, Order of the Board of Natural Resources & Conservation, other than those proposed, be made and that all findings and conclusions of

the Board in that original order be confirmed except as may have been modified pursuant to court order.

OBJECTIONS

Based upon the proposed findings, the Board has concluded the objectives of the Fish and Game Commission reservation and the Department of Health & Environmental Sciences reservation are not being met for the Yellowstone River at Billings, Montana.

The Department of Fish, Wildlife, & Parks objects to this conclusion for the reasons that the proposed findings do not go to the issue of objectives of the Department of Fish, Wildlife, & Parks and, further, the proposed findings fail to consider inadequacy of reservation facilities, noncompliance with Montana or federal statutes or environmental standards, incompatibility with local or regional planning efforts, use of the water reserved for other than beneficial uses as defined by Montana law or noncompliance with conditions of the December 15 Board Order all as set forth in paragraph 121 at page 50 of the Order establishing water reservations.

Done and dated this 17th day of November, 1980.

FOR: F. WOODSIDE WRIGHT
DEPARTMENT ATTORNEY

Appendix F

Reservoir operation guidelines and water purchase contracts and agreements (in alphabetical order)

Canyon Ferry - Missouri River
Newlan Creek Reservoir - Smith River

Painted Rocks Reservoir - Bitterroot River
(Proposed) Ruby River Reservoir - Ruby River
Tiber Reservoir - Marias River
Yellowtail Reservoir - Bighorn River

AGREEMENT AND WATER PURCHASE CONTRACT

WHEREAS, MEAGHER COUNTY NEWLAN CREEK WATER DISTRICT (herein DISTRICT), owns and controls the Newlan Creek Reservoir within Meagher County, Montana, which reservoir presently has water in storage in excess of an amount for which the DISTRICT has commitments or can be beneficially used for agricultural purposes; and

WHEREAS, the Montana Department of Fish, Wildlife and Parks (herein FWP) has a program and funds available to protect, maintain and preserve fisheries in the Smith River; and

WHEREAS, at a meeting between the directors of the DISTRICT and representatives of FWP held June 24, 1987, it was agreed by unanimous vote by a quorum of the Board of Directors of the DISTRICT that it would make available for purchase by FWP a quantity of the stored waters held in Newlan Creek Reservoir for an experimental program intended to protect, maintain and preserve the fisheries in the Smith River;

NOW, THEREFORE, it is mutually agreed between the parties as follows:

1. Reservoir Manager, Mike T. Bergan, will cooperate in releasing flows of water from the reservoir as desired by FWP representatives; at no time will the flows released be greater than 30 cfs or such lesser flow as it is determined the Newlan Creek stream channel can carry without causing unwanted flooding or overflowing on private lands or damage to irrigation, control or diversion structures on or adjacent to Newlan Creek.

2. FWP covenants and agrees that it will be responsible for and make restitution for any damage occasioned to irrigation, diversion or control structures of downstream landowners which is caused by or results from flows requested to b e released, and FWP will indemnify and hold the DISTRICT harmless from and against all claims for damages thus occasioned.

3. FWP agrees to pay to DISTRICT Three Dollars ($3.00) for each acre foot of water thus released and delivered to the Newlan Creek channel immediately below the reservoir and as determined by the DISTRICT'S measuring device immediately downstream from the reservoir outlet. The DISTRICT'S Reservoir Manager shall keep an accurate record of flows released and at the conclusion of furnishing water, but in no event later than December 31, 1987, FWP shall make prompt payment to the DISTRICT upon receipt of a statement setting forth the quantities of water delivered. FWP representatives shall have free access to measuring and recording devices for verification purposes.

4. In no event shall DISTRICT be required or obligated to deliver more than 2,000 acre feet under this agreement during 1987.

IN WITNESS WHEREOF, the parties have executed this agreement this 24th day of July, 1987, by their duly authorized officers or representatives.

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

By James W. Flynn
Director

MEAGHER COUNTY NEWLAN CREEK WATER DISTRICT

By Donald R. Buckingham
Vice-President

Marshall A. Hanson
Director

Elmer R. Witt
Director

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
PAINTED ROCKS RESERVOIR
WATER PURCHASE CONTRACT
WITH
DEPARTMENT OF FISH, WILDLIFE AND PARKS

This contract dated as of the 15th day of July, 1988, between the Department of Natural Resources and Conservation of the State of Montana, duly created, authorized and acting, and by virtue of the Laws of Montana, hereinafter called the "Department" and the Department of Fish, Wildlife and Parks, hereinafter called the "Water Purchaser":

WITNESSETH

WHEREAS, the Department is the owner of an irrigation and flood control project (herein called the "Project") comprising a dam, reservoir and control works in Ravalli County, Montana, known as Painted Rocks Reservoir; and

WHEREAS, the Department has acquired the right to store, control and/or divert all unappropriated waters of West Fork of the Bitterroot River, Ravalli County, Montana, and all tributaries thereto, together with the return flow of all waters furnished or supplied by seeping or overflowing from the previous place of use of said water, pursuant to declarations duly filed on the 18th day of September, 1937, in the office of the County Clerk and Recorder of Ravalli County, Montana, in Volume II, page 76, and

has further acquired all other water and water rights and made all other filings, which are necessary to enable it to obtain sufficient waters so that the project may be operated at its full capacity; and

WHEREAS, it is agreed by the parties hereto that the waters to which the Department is entitled will be sufficient to permit the operation of said Project, so that water can be made available for purchase during the 1988 irrigation season and the Water Purchaser recognizes the right of the Department to impound, during the nonirrigation season, all of the aforesaid waters; and

WHEREAS, the Department is desirous of selling available water during the 1988 irrigation season; and

WHEREAS, the Water Purchaser is desirous of purchasing a portion of said available water during the 1988 irrigation season in order to maintain a continuous flow of water in the Bitterroot River in an amount sufficient to maintain fisheries.

NOW, THEREFORE, in consideration of the premises and of the mutual terms, covenants and conditions hereof, it is mutually covenanted and agreed as follows:

Section 1. The Department agrees to furnish the Water Purchaser 10,000 acre-feet of water during the 1988 irrigation season, between May 1, 1988 and October 1, 1988 at the call of the Water Purchaser, with delivery commencing within five (5) days thereafter, provided that sufficient water is available.

Section 2. The Water Purchaser shall delegate to Dennis Workman the authority to contact the Engineering Bureau of the Department to request water delivery.

Section 3. The Water Purchaser shall obtain the water from the Painted Rocks Reservoir and it shall be measured at the dam. The Water Purchaser is responsible for the conveyance of water from the dam to its intended place of use.

Section 4. The Water Purchaser agrees to pay to the Department the lump sum of $20,000 on or before August 1, 1988. The lump sum payment includes principal and all operation and maintenance costs that are incurred by the Department in the execution of this agreement.

Section 5. All money required to be paid hereunder by the Water Purchaser to the Department shall be paid at the Department of Natural Resources and Conservation in Helena, Montana, or such other place as the Department shall appoint in writing.

Section 6. The term of this agreement commences upon execution hereof and terminates on October 1, 1988.

Section 7. It is expressly understood that all the right, title, and interest in and to the Project and the water rights exercised in connection therewith shall be and remain in the Department, and that the Water Purchaser shall acquire no right, title or interest in the Project or such water rights. The Water Purchaser shall acquire no rights or equities under this contract which will in any manner prejudice the right of the Department to terminate this contract in the event that the Water Purchaser shall be in default hereunder.

Section 8. The provisions of this contract shall apply to and bind the successors and assigns of the respective parties, but the Water Purchaser shall make no assignment of this contract without the written consent of the Department.

Section 9. It is agreed that this contract is subject to the Laws of the State of Montana.

IN WITNESS WHEREOF, the Department of Fish, Wildlife and Parks, Water Purchaser, and the Department of Natural Resources and Conservation, have caused this contract to be executed on the day and year first above written.

James W. Flagg

Water Purchaser
Department of Fish, Wildlife
and Parks

STATE OF MONTANA)
)
County of Lewis and Clark)

On this 28th day of July, in the year one thousand nine hundred and eighty ~~seven~~, before me, Dorothy R. Millsop, Notary Public within and for said County and State, personally appeared James W. Flynn, whose name is subscribed to the within instrument and acknowledged to me that he executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my notarial seal the day and year in this certificate first above written.

DOROTHY R. MILLSOP NOTARIAL SEAL STATE OF MONTANA

Dorothy R. Millsop
My Commission Expires 10/1/88

DEPARTMENT OF NATURAL RESOURCES
AND CONSERVATION

Gary Fritz
Administrator, Water Resources Division
Department of Natural Resources
and Conservation

STATE OF MONTANA)
)
County of Lewis & Clark)

On this 19th day of July, in the year one thousand nine hundred and eighty ~~seven~~, before me Donald D. McIntyre, Notary Public within and for said County and State, personally appeared Gary Fritz, and executed the within instrument for and on behalf of the Department of Natural Resources and Conseervation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my notarial seal the day and year in this certificate first above written.

Donald D. McIntyre
NOTARY PUBLIC [illegible]
My Commission Expires [illegible] 90

Draft Water Exchange Proposal on the Bitterroot River

May, 1988

The Department of Fish, Wildlife and Parks wishes to extend to those who irrigate from the Bitterroot River a water exchange proposal similar to the agreement of 1987. The exchange consists of:

1. A quantity of water up to 3,000 acre feet would be made available by DFWP, early in the irrigation season, for irrigation use at any flow rate from Painted Rocks Reservoir.

2. DFWP could request participating irrigators to reduce irrigation diversion to maintain instream flows of 402 cfs (16,080 inches) at Bell Crossing after September 15.

3. DFWP would keep flow records at Bell Crossing and monitor reservoir releases.

4. DFWP would pay costs associated with the river commissioner to protect water purchased for instream flow. In years when irrigators also buy water costs for the commissioner would be shared.

In return, irrigators would agree to the following:

1. Pay DNRC to have the dam gates opened and closed when water is released for irrigation.

2. Sign the petition for the appointment of a river commissioner in years when the DFWP needs one to deliver stored water to Bell Crossing.

3. A water commissioner would deliver sufficient water to provide a flow of not less than 100 cfs (4000 inches) at Bell Crossing.

4. Fall shutdown of irrigation ditches will be done in a manner to stimulate fish movement out of canals back to the river.

One person would be appointed to represent the department and one person to represent the irrigators in matters concerning the management of Painted Rocks water. At a minimum, holders of 15 percent of the water right must be party to this agreement.

7th Draft

4/7/88

RECEIVED
APR 11 1988
FISHERIES DIV.

PLAN TO AVOID DEWATERING OF THE RUBY RIVER PROJECT

The Ruby River Project was one of many built throughout the West during the drought years of the 1930s. These projects were intended not only to assure a reliable supply of water to agricultural lands, but to provide emergency employment for people hard hit by the Depression.

The reservoir has a capacity of 38,850 acre-feet and supplies water for private diversions along the Ruby River and for two state-owned canals, Vigilante and West Bench. The project provides a firm supply of water for irrigation in the Ruby River Valley. An important trout fishery exists below the dam as well.

In most years, early irrigation season streamflows in the Ruby River below the dam are sufficient to maintain instream flows to satisfy all irrigation demands. In years when there is little runoff, however, initial irrigation withdrawals can dewater the river in some stretches. This situation has occurred twice in recent years.

In May of both 1985 and 1987, below normal snowpack, extremely low spring percipitation, high spring temperatures, and poor soil moisture conditions, coupled with large initial

irrigation withdrawals, resulted in the cessation of streamrlow in the vicinity of Harrington Bridge near Sheridan (T5S R5W Sec. 6). This dewatering resulted in shortages of irrigation water for downstream water users and a large kill of brown trout of all ages. In both years, water diverted into canals between the Ruby Dam and the town of Alder resulted in little streamflow at the Alder and Laurin Bridges. Unseasonably dry soils initially abosorbed most of the water turned into the canals and onto the fields, delaying the recharge to the groundwater system that typically carries some of the irrigation water back to the river. The large initial diversion for water occurred with little or no forewarning.

The stream channel in the Harrington reach appears to be very susceptible to dewatering, during low water years. The reach has deeply scoured meander pools separated by large elevated gravel bars. Streambed gravels must be quite porous because, in both 1985 and 1987, natural accretions downstream from the Harrington reach resulted in live streamflow. This flow, however, was only enough to allow trout survival over the short term, and was not enough to satisfy downstream irrigation needs. Releases from the dam of about 600 cfs in 1985 and 650 cfs in 1987 helped in restoring flows in the dewatered section at Harrington bridge. In 1987 flows entered the dewatered section 15-20 hours after increased releases were made at the dam.

The irrigation season of 1988 could cause a repeat of the dewatering problems of 1985 and 1987. This reach of the streambed could become dewatered unless one or more conditions

occur--irrigation recharges the groundwater system that feeds the river, irrigation diversions are reduced, outflows from the dam are increased, or sufficient precipitation occurs.

Releases from the Ruby River Dam are limited by problems with the outlet tunnel and stilling basin. Dam releases in excess of 450 cfs can result in cavitation in the transition area of the outlet tunnel and has resulted in erosion of the outlet stilling basin riprap. Therefore, a release of more than 450 cfs to satisfy all irrigation demands and instream fishery needs should be avoided if possible.

During 1985 and 1987, at the height of the dewatering problem, systematic observations were carried out by the DNRC Water Resources, personnel, by water users, and by Department of Fish, Wildlife and Parks personnel. Aerial observations in 1985 and similar, on the ground observations in 1987 revealed the characteristics of the dewatering of the Harrington reach. Dam releases of approximately 450 cfs were not sufficient to maintain streamflow in the Harrington reach. Moreover, increased releases to 500 cfs were not sufficient to reestablish streamflow in the reach. In both years, releases of about 450 cfs were nearly completely withdrawn by canals between the dam and the Alder bridge (T6S R4W Sec. 8/17). (At that time, an estimated 10-15 cfs was flowing under the Alder bridge.) In the reach between Laurin bridge (T5S R4W Sec. 32) and Silver Springs bridge (T5S R5W Sec. 10), the river slowly recharged from groundwater and tributary inflow to a level adequate to meet irrigation demands and fishery needs. Immediately downstream from the Silver

Springs bridge, however, two major canals, the Clark-Sennett (T5S R5W Sec. 10) and Thompson (T5S R5W Sec. 9) ditches essentially withdrew the flow, resulting in complete cessation of streamflow one-half mile above and below the Harrington bridge, referred to as the Harrington reach.

The Harrington reach is the critical reach at which to monitor and maintain streamflow at the onset of the irrigation season, particularly in low runoff years. The best location to monitor the Harrington reach is upstream at the Silver Springs bridge. Both the Clark-Sennett and Thompson ditches withdraw from the Ruby River downstream from this bridge, and it can be assumed that both were withdrawing water during the periods of dewatering.

Table 1 shows staff gage heights at the various bridge locations from May 12 through May 22, 1987. Live streamflow in the Harrington reach ceased sometime on or before May 10 and resumed by the evening of May 13.

As shown in Table 1, a gage height of 1.10 feet at Silver Springs was indicative of no live flow in the Harrington reach despite release of 482 cfs at the dam on May 12. On May 13, the Silver Springs gage height of 1.15 feet was indicative of only a trickling flow between pools in only the upper half of the dewatered Harrington reach, while a Silver Springs evening gage height of 1.60 feet resulted in live flow throughout the Harrington reach. Dam releases of about 650 cfs at midnight May 12 contributed to the resumption of live flow in the Harrington reach.

Table 1.
Gage height readings (feet) from DNRC staff gages
at county road bridges on the Ruby River during May 1987

Date and Time*		Bridge Locations**				
		Alder	Laurin	Silver Springs	Harrington	Phipps
5/12	PM	3.90	0.90	1.10	0.0	--
5/13	AM	5.40	1.58	1.15	0.00	--
	Noon	5.50	1.90	1.38	0.00	--
	PM	5.46	1.85	1.60	***	--
5/14	AM	5.40	1.86	1.72	1.79	4.50
	PM	5.25	1.88	1.79	1.84	--
5/15	AM	5.20	1.66	1.66	1.81	--
	PM	4.79	1.63	1.66	1.77	--
5/16	AM	4.69	1.35	1.42	1.62	--
	PM	4.64	1.39	1.48	1.64	--
5/17	AM	4.58	1.34	1.80	1.95	--
	PM	4.50	1.31	1.73	1.93	5.05
5/18	AM	4.46	1.25	1.62	1.85	4.91
5/22	PM	4.05	0.95	1.87	2.00	5.22

* AM readings between 6:00 and 9:00;
PM readings between 5:00 and 7:00

**Downstream direction from Alder to Phipps

***Live flow occurred but was not measurable by the staff gage.

The May 13 noon gage height reading of 1.38 feet at Silver Springs did not produce flowing water throughout the Harrington reach, but the flow had increased over that observed the morning of May 13. On May 14, dam releases were dropped to 598 cfs and on May 15 dropped again to 521 cfs. On the morning of May 16, the gage height at Silver Springs had dropped to 1.42 feet and the Harrington gage had dropped to 1.62 feet. Average releases at the dam had dropped to 445 cfs.

The gage heights on May 16 were representative of stable flow throughout the Harrington reach. Therefore, based on available data, a gage height of 1.42 feet at the Silver Springs bridge

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indicates a flow regime which will result in sufficient flow to maintain a live stream throughout the Harrington reach. This gage height is selected under the assumption that the Clark-Sennett and Thompson ditches are withdrawing their maximum water allotment during the period.

The Proposed Plan

The purpose of this plan is to anticipate and prevent dewatering of the Ruby River by implementing a program for early start up of irrigation diversions during a low water year.

The Association and DNRC have worked together to meet the problem if it recurs. It is better to avoid the serious effects of dewatering of the river and the impacts to irrigation and the fisheries rather than reacting to alleviate the problem after the damage has been done. The plan proposed to implement this process is as follows:

Step 1. During the first half of March of each year, DNRC confers with the Association to discuss the snowpack, reservoir storage, streamflow, streamflow forecast, and soil moisture of the basin to determine what type of water year can be expected. If indications are that a dry, low runoff spring could exist, then:

Step 2. DNRC and the Association meet as soon as the April snow survey data is available to discuss expected conditions for the spring and actions to be taken by DNRC and the Association pursuant to this plan. Provisions are made for the Association's water users to begin selective irrigation

phasing-in

diversions as early as the second half of April if the dry, low runoff conditions persist. This procedure provides for earlier irrigation on the Association water users' land. The effect is two-fold: recharge from irrigation application enters the river earlier, and large initial diversions are reduced. If poor climatic conditions persist, then:

Step 3. The Association water users begin selective irrigation diversions as early as the second half of April. The beginning of irrigation on an agreed-upon date triggers the Ruby River monitoring by the Association's designated observers at the staff gages shown in Table 2. The damtender notifies DNRC as to the magnitude of withdrawals at the project's canal diversions and the expected dam releases and changes in diversions. Staff gages will be read and recorded twice a day by the observers. DNRC will contact the Association's contact person and/or observers on a timely basis to receive gage height readings.

Table 2.
Staff Gage Location and Observer

Location	Observer	Phone
Alder	Harold Kelly	842/5294 or 842-5152
Laurin	Charlie Galiger	842-5643
Silver Springs	Jay Barnosky	842-5261
Harrington	Jack Fenton	842-5577
Phipps	Sid Smith	684-5280

Association contacts:
Neil Todd, Damtender, 842-5562
Lowell Sauerbier, 842-5295
Jerry Burke, 842-5960
Charlie Galiger, 842-5643

DNRC contact:
Steve Fry, 444-6646 (work)
443-5043 (home)

Step 4. If flows at Silver Springs drop to a gage height of 1.60 feet, the Association's contact person and/or observers notify DNRC as soon as possible. Releases from the dam may have to be increased and/or diversions into project and private canals will have to be reduced on short notice. The Association and DNRC will identify, by consultation, the specific actions to be carried out in Step 5.

Step 5. If flows at Silver Springs further drop to a gage height of 1.42 feet, the Association's contact person and/or observers immediately notify DNRC. DNRC and/or the Association will increase releases from the dam and/or reduce diversions to maintain an adequate flow through the Harrington reach. With the information currently available, this is accomplished by maintaining a gage height of 1.42 feet at Silver Springs.

Step 6. The Association observers will continue to monitor and report gage heights until flows at Harrington Bridge are adequate and stable. At that time, with the agreement of the Association and DNRC, the Association will notify the damtender to cut back the dam releases in increments and/or adjust canal diversions back to normal operating conditions.

The Harrington reach will continue to be monitored to prevent recurrence of dewatering. If dewatering appears imminent then Step 5 will be repeated.

It is important to note that under conditions like those in May 1985 & 1987 in which the reservoir inflows were near 100 cfs, a minimum of 20 cfs must flow in the stretch of river between Silver Springs bridge and Harrington bridge in order to meet downstream senior water rights. (See Appendix A)

This proposed plan is derived from a limited amount of data. It is possible that the critical point of 1.42 feet at Silver Springs bridge could be adjusted upward or downward as more data become available. Gage heights will be monitored and streamflow measurements made that can be compared with USGS flow data at the dam. Any adjustments to the plan can then be made, if necessary.

There is a possibility that maintaining sufficient streamflow through the Harrington reach could result in a new dewatered reach of river below that point occurring due to previously unsatisfied irrigation demand downstream. If this should occur, this action plan would have to be modified.

Before or during the Association's annual meeting of the years in which this plan is implemented, the results will be reviewed and the plans modified as needed.

Appendix A

Satisfaction of Claimed Rights

Early in the irrigation season of dry years like 1985 and 1987, flow to the Ruby River from tributaries and irrigation return flows can be virtually non-existent for up to several weeks. Under such extremely dry, low-water conditions, satisfaction of claimed rights depends on passing all inflows through the reservoir when those inflows are less then the claimed right flows needed below the dam. Similarly, if reservoir inflow is less than claimed right demands, diversions by rightholders should be reduced in order of priority until they are the same as reservoir inflow.

For early season, dry-year flow conditions, Table 3 identifies the relationship between reservoir inflows and the priority dates of claimed rights below Ruby Dam which would be satisfied by passage of these inflows. For a given reservoir inflow, Table 4 gives the river flows that should exist at various points downstream of the dam to assure that the claimed rights are satisfied in order of priority. If the water rights are adjudicated and decreed differently than as claimed then these figures will need to be modified accordingly.

In all cases, this is the minimum flow that should be in the river at any time for downstream irrigation water rights, since releases of stored water for use by Association members in the lower part of the Ruby drainage are not included. As an example, at a reservoir inflow of 100 cfs during the irrigation season and with no flow accretion from tributary inflows or return flows,

only those water right-holders with priority dates of April 15, 1866, or earlier should be diverting water. Other irrigators can only divert water if the water they are diverting is entirely water released from storage in the reservoir.

Table 3.
Inflow and Junior Rights

Reservoir Inflow (cfs)	Most Junior Right Satisfied
50	12/31/1865
100	4/15/1866
150	5/29/1866
200	5/15/1867
250	4/01/1872
300	4/01/1875
350	5/25/1876
400	6/01/1882
450	5/15/1886

Table 4.
Flow needed (cfs) to satisfy senior downstream rights

Reservoir Inflow	Coy Brown	Alder	Laurin	Silver Springs	Harrington	Phipps
50	13.2	13.2	10.7	6.0	6.0	-0
100	36.1	29.0	25.4	20.7	20.7	-0
150	77.1	63.2	33.6	21.9	21.9	-0
200	121.0	105.9	76.3	64.6	48.1	-0
250	144.5	124.9	94.9	79.3	54.4	6.3
300	180.4	157.9	128.3	112.7	75.1	27.0
400	269.5	223.8	184.2	162.4	77.2	29.1
450	307.7	240.9	201.3	167.8	82.6	34.5

Under this scenario, the table shows that there should be no less than 20 cfs flowing at both Silver Springs bridge and Harrington bridge to satisfy senior water rights further downstream. This example is particularly appropriate in light of the situation during May 14-16, 1987, when inflows to the

reservoir fell to 111 cfs, tributary inflows were minor, and return flows from recent irrigation had not yet reached the river to any significant degree. This illustration has been over simplified with the intent to show that senior water rights may need to be satisfied that are downstream of the Harrington reach.

The following assumptions were made:

-- This analysis deals only with decreed water rights, and not project contract water.

-- Decreed rights are satisfied in order of priority.

-- When there is insufficient water to satisfy all rights having the same priority date, those rights are satisfied on a pro-rata basis.

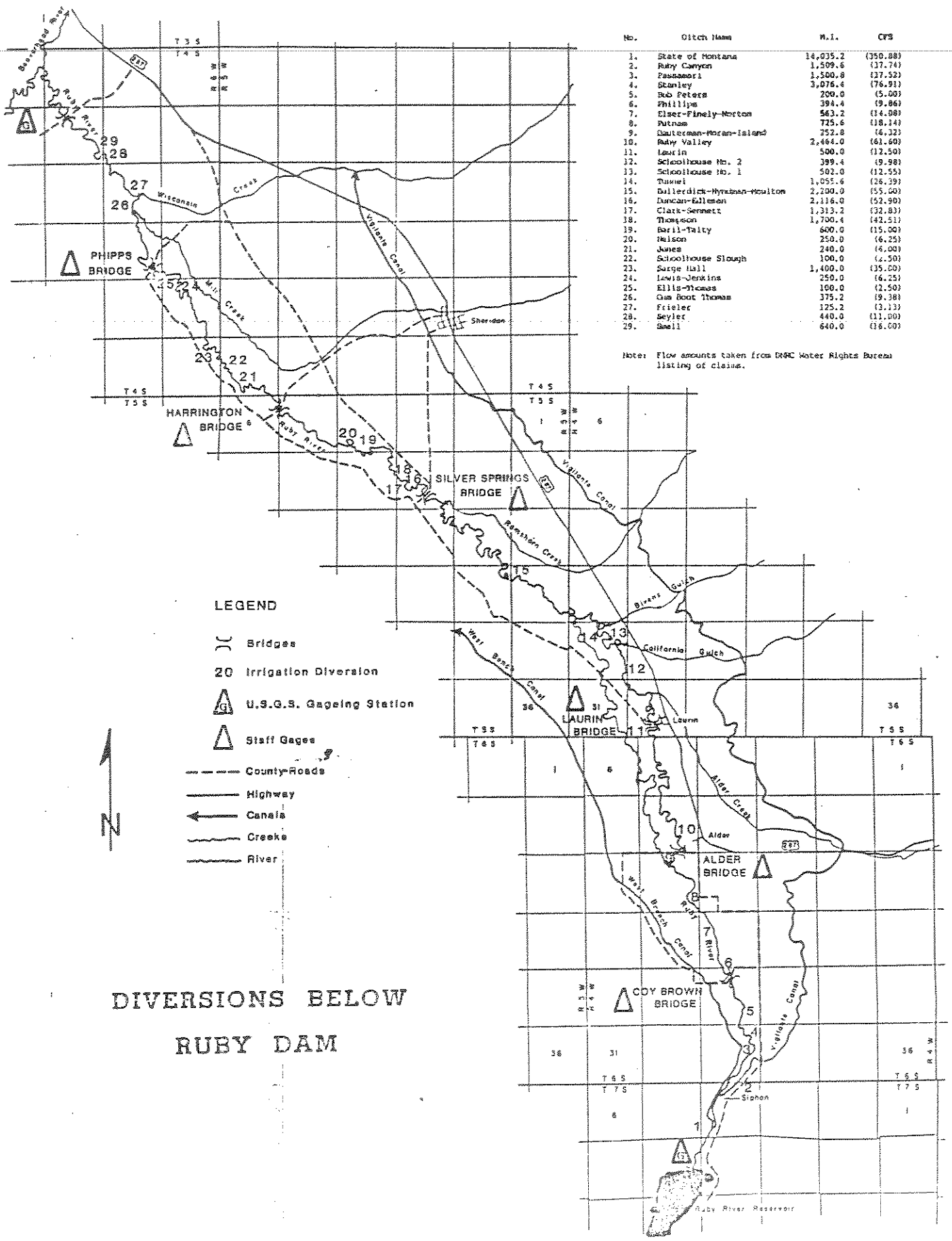
-- All water rights are satisfied by passing Ruby reservoir inflows through the reservoir (assuming no significant flow accretion occurs between the dam and the mouth of the Ruby River).

? -- One unit of flow at a bridge is equal to one unit of flow at a diversion downstream of that bridge.

-- All claimed water rights are valid.

-- Senior water rights are called for during this time period.

The Water Users' Association and DNRC will continue to work together to alleviate the problem of water shortages. If a drought recurs, the proposed plan will be put into action, and modified if it is necessary.



No.	Ditch Name	M.I.	CFS
1.	State of Montana	14,035.2	(350.88)
2.	Ruby Canyon	1,509.6	(37.74)
3.	Passamari	1,500.8	(37.52)
4.	Stanley	3,076.4	(76.91)
5.	Bob Peters	200.0	(5.00)
6.	Phillips	394.4	(9.86)
7.	Elser-Finely-Norton	563.2	(14.08)
8.	Putnam	725.6	(18.14)
9.	Gauterman-Moran-Island	252.8	(6.32)
10.	Ruby Valley	2,464.0	(61.60)
11.	Laurin	500.0	(12.50)
12.	Schoolhouse No. 2	399.4	(9.98)
13.	Schoolhouse No. 1	502.0	(12.55)
14.	Tunnel	1,055.6	(26.39)
15.	Ballerdick-Hyndman-Moulton	2,200.0	(55.00)
16.	Duncan-Ellman	2,116.0	(52.90)
17.	Clark-Sennett	1,313.2	(32.83)
18.	Thompson	1,700.4	(42.51)
19.	Baril-Talty	600.0	(15.00)
20.	Nelson	250.0	(6.25)
21.	Jones	240.0	(6.00)
22.	Schoolhouse Slough	100.0	(2.50)
23.	Surge Hall	1,400.0	(35.00)
24.	Lewis-Jenkins	250.0	(6.25)
25.	Ellis-Thomas	100.0	(2.50)
26.	Gum Boot Thomas	375.2	(9.38)
27.	Frieler	125.2	(3.13)
28.	Seyler	440.0	(11.00)
29.	Snell	640.0	(16.00)

Note: Flow amounts taken from DNRC Water Rights Bureau listing of claims.

DIVERSIONS BELOW RUBY DAM

APPENDIX B

IRRIGATION DIVERSIONS BELOW RUBY DAM

RUBY CANYON

	Date	Rate (cfs)
	*5/15/1865	7.50
	5/15/1866	5.00
	5/15/1872	14.16
	5/15/1967	4.00
RUBY CANYON TOTAL		**37.74 cfs**

PASSAMARI

	Date	Rate (cfs)
	5/15/1870	6.25
	5/15/1870	6.25
	5/15/1870	6.25
	5/15/1870	6.25
Total	***5/15/1870**	**25.00 cfs**
	6/20/1899	3.13
	6/20/1899	3.13
	6/20/1899	3.13
	6/20/1899	3.13
Total	**6/20/1899**	**12.52 cfs**
PASSAMARI TOTAL		**37.52 cfs**

STANLEY

	Date	Rate (cfs)
	4/1/1865	1.50
	4/1/1865	1.25
	4/1/1865	0.50
Total	***4/1/1865**	**3.25 cfs**
	4/00/1865	**1.25 cfs**
	5/15/1865	7.50
	5/00/1865	5.00
Total	**5/65**	**12.50 cfs**
	00/00/1865	4.41
	00/00/1865	3.00
	00/00/1865	1.50
	00/00/1865	1.25
	00/00/1865	0.88
	00/00/1865	0.75
	00/00/1865	0.50
Total	**00/00/1865**	**12.29 cfs**

*Earliest priority on ditch.

STANLEY DITCH, cont.

	Date	Rate (cfs)
	4/1/1866	7.50
	4/1/1866	5.63
	4/1/1866	4.41
	4/1/1866	2.50
	4/1/1866	2.50
	4/1/1866	2.50
	4/1/1866	1.00
	4/1/1866	0.63
	4/1/1866	0.40
Total	**4/1/1866**	**27.07 cfs**
Total	**4/00/1866**	**1.50 cfs**
	5/29/1866	2.50
	5/29/1866	2.00
	5/00/1866	1.75
	5/00/1866	1.75
	5/00/1866	0.60
Total	**5/1866**	**8.60 cfs**
	00/00/1875	0.58
	00/00/1875	0.20
	5/15/1876	0.50
	00/00/1876	1.70
	00/00/1876	0.58
	00/00/1876	0.25
Total	**1875 & 76**	**3.81**
	5/15/1886	1.79
	5/15/1886	1.10
Total	**5/15/1886**	**2.89**
STANLEY TOTAL		**73.16**

BOB PETERS DITCH

	Date	Rate (cfs)
	*5/15/1869	1.46
	5/15/1876	3.54
PETERS TOTAL		**5.00 cfs**

COY BROWN BRIDGE PHILLIPS DITCH

	Date	Rate (cfs)
	*4/1/1866	1.25
	4/15/1866	4.68
	4/15/1866	1.48
	4/00/1866	2.45
PHILLIPS TOTAL		9.86

IRRIGATION DIVERSIONS BELOW RUBY DAM

ELSER-FINELY-NORTON DITCH

	Date	Rate (cfs)
	*5/15/1869	1.09
	00/00/1869	1.46
	00/00/1869	0.73
	5/15/1876	2.66
	5/15/1876	1.77
	00/00/1876	3.54
	5/15/1883	2.83
E.-F.-N.	**TOTAL**	**14.08**

PUTNAM DITCH

	Date	Rate (cfs)
	*4/15/1866	0.54
	4/00/1866	1.86
	4/00/1866	1.58
	5/00/1866	0.79
	5/00/1866	0.40
Total	**4&5/1866**	**5.17**
	5/1/1874	0.97
	5/15/1874	0.83
	5/15/1874	0.28
Total	**5/1874**	**2.08**
	00/00/1874	0.42
	5/15/1876	4.08
	5/15/1876	3.50
	5/15/1876	1.14
Total	**5/15/1876**	**8.72**
	00/00/1876	1.75
PUTMAN TOTAL		**18.14**

DAUTERMAN-MORAN ISLAND DITCH

	Date	Rate (cfs)
Total	*5/15/1869	1.63
	00/00/1875	3.13
	00/00/1875	1.56
D.-M. ISLAND TOTAL		6.32

*Earliest priority on ditch.

ALDER BRIDGE
RUBY VALLEY DITCH

	Date	Rate (cfs)
	4/1/1866	0.40
	4/1/1866	0.30
	4/1/1866	0.30
	4/1/1866	0.10
Total	*4/1/1866	1.10
	4/00/1866	0.42
	4/00/1866	0.40
	4/00/1866	0.40
	4/00/1866	0.40
	4/00/1866	0.23
	4/00/1866	0.13
	4/00/1866	0.13
	4/00/1866	0.09
	4/00/1866	0.09
	4/00/1866	0.09
	4/00/1866	0.04
Total	**4/00/1866**	**2.42**
	5/1/1866	2.89
	5/1/1866	1.80
	5/1/1866	1.80
	5/1/1866	1.80
	5/1/1866	1.80
	5/1/1866	1.78
	5/1/1866	1.35
	5/1/1866	1.33
	5/1/1866	1.03
	5/1/1866	0.60
	5/1/1866	0.60
	5/1/1866	0.49
	5/1/1866	0.45
	5/1/1866	0.41
	5/1/1866	0.41
	5/1/1866	0.41
	5/1/1866	0.41
	5/1/1866	0.31
Total	5/1/1866	19.67
	5/15/1866	1.80
	5/15/1866	1.78
	5/15/1866	0.30
Total	5/15/1866	3.88
	5/15/1886	2.89
	5/15/1886	2.88
	5/15/1886	2.88

IRRIGATION DIVERSIONS BELOW RUBY DAM

RUBY VALLEY, cont.

	Date	Rate (cfs)
	5/15/1886	2.85
	5/15/1886	2.85
	5/15/1886	2.85
	5/15/1886	2.58
	5/15/1886	2.38
	5/15/1886	2.38
	5/15/1886	2.14
	5/15/1886	1.61
	5/15/1886	0.95
	5/15/1886	0.95
	5/15/1886	0.79
	5/15/1886	0.65
	5/15/1886	0.65
	5/15/1886	0.65
	5/15/1886	0.65
	5/15/1886	0.31
	5/15/1886	0.19
Total	5/15/1886	34.53
RUBY VALLEY TOTAL		**61.60**

LAURIN DITCH

	Date	Rate (cfs)
	4/0/1865	1.42
	4/0/1865	1.08
Total	*4/0/1865	2.50
	0/0/1875	5.68
	0/0/1875	4.32
Total	0/0/1875	10.00
LAURIN TOTAL		**12.50 cfs**

LAURIN BRIDGE
SCHOOLHOUSE NO. 2

	Date	Rate (cfs)
	*5/15/1866	0.54
	6/1/1882	1.63
	6/0/1882	1.88
	6/0/1882	1.88
	6/0/1882	1.88
	6/0/1882	0.25
Total	6/0/1882	5.89 cfs

*Earliest priority on ditch.

SCHOOLHOUSE #2, cont.

	Date	Rate (cfs)
	5/15/1886	0.64
	5/15/1886	0.64
	5/15/1886	0.64
Total	5/15/1886	1.92 cfs
SCHOOLHOUSE #2 TOTAL		**9.98 cfs**

SCHOOLHOUSE NO. 1

	Date	Rate (cfs)
	5/15/1865	1.88
	5/15/1865	0.94
Total	*5/15/1865	2.82
	5/0/1865	1.88 cfs
	5/15/1868	1.56
	5/15/1868	1.56
	5/15/1868	0.78
Total	5/15/1868	3.90
	5/15/1886	2.27
	5/15/1886	2.27
	5/15/1886	1.13
	5/15/1886	1.13
Total	5/15/1886	6.80
SCHOOLHOUSE #1 TOTAL		**15.40 cfs**

TUNNEL DITCH

	Date	Rate (cfs)
	*4/0/1866	6.48
	5/15/1878	5.81
	4/1/1888	3.75
	5/1/1954	7.50
TUNNEL TOTAL		**23.54 cfs**

BULLERDICK-HYNDMAN-MOULTON

Date	Rate (cfs)
4/15/1893	8.00
4/15/1893	3.75
4/15/1893	3.75

IRRIGATION DIVERSIONS BELOW RUBY DAM

BULLERDICK-HYNDMAN-MOULTON, cont.

	Date	Rate (cfs)
	4/15/1893	3.75
	4/15/1893	3.75
	4/15/1893	3.50
	4/15/1893	1.75
	4/15/1893	1.25
	4/15/1893	0.50
	4/15/1893	0.25
Total	**4/15/1893**	**30.25**
	6/15/1893	10.00
	6/15/1893	7.50
	6/15/1893	0.25
Total	**6/15/1393**	**17.75**
	4/15/1907	5.25
	4/00/1907	0.50
	00/00/0000	1.25
Subtotal		7.00 cfs
B-H-M TOTAL		55.00 cfs

SILVER SPRINGS BRIDGE DUNCAN-EDLEMAN

	Date	Rate (cfs)
	5/15/1876	2.50
	5/15/1876	0.63
Total	***5/15/1876**	**3.13 cfs**
	6/3/1876	4.50
	6/3/1876	2.50
	6/3/1876	2.50
	6/3/1876	2.00
	6/3/1876	1.88
	6/3/1876	1.00
	6/3/1876	1.00
	6/3/1876	0.88
	6/3/1876	0.88
Total	**6/3/1876**	**17.14 cfs**
	5/7/1881	2.23
	5/7/1881	2.08
	5/7/1881	2/08
	5/7/1881	0.83
Total	**5/7/1881**	**7.22 cfs**
	10/1/1898	9.11
	10/1/1898	5.06
	10/1/1898	5.06

*Earliest priority on ditch.

DUNCAN-EDLEMAN, cont.

	Date	Rate (cfs)
	10/1/1898	2.03
	10/1/1898	1.65
Total	**10/1/1898**	**22.91 cfs**
	00/00/0000	2.50 cfs
DUNCAN-EDLEMAN TOTAL		**52.90 cfs**

CLARK-SENNETT DITCH

	Date	Rate (cfs)
	4/1/1875	13.29
	4/1/1875	9.96
	4/1/1875	3.33
Total	**4/1/1875**	**26.58**
	4/8/1900	6.25
CLARK-SENNETT TOTAL		**32.83**

THOMPSON DITCH

	Date	Rate (cfs)
	0/0/1866	7.50
	0/0/1866	2.38
Total	***0/0/1866**	**9.88 cfs**
	10/18/1904	20.63
	10/18/1904	9.50
Total	**10/18/1904**	**30.13 cfs**
	1/1/1915	2.50 cfs
THOMPSON TOTALS		**42.51 cfs**

BARIL-TALTY DITCH

	Date	Rate (cfs)
	*5/15/1867	7.50
	*5/15/1867	7.50
BARIL-TALTY TOTAL		**15.00 cfs**

IRRIGATION DIVERSIONS BELOW RUBY DAM

NELSON DITCH

	Date	Rate (cfs)
	*5/1/1879	6.25 cfs
NELSON TOTAL		6.25 cfs

HARRINGTON BRIDGE
JONES DITCH

	Date	Rate (cfs)
	*4/15/1865	6.00 cfs
JONES TOTAL		6.00 cfs

SCHOOLHOUSE SLOUGH

	Date	Rate (cfs)
	*10/6/1928	2.50 cfs
SCHOOL HOUSE TOTAL		2.50 cfs

SARGE HALL

	Date	Rate (cfs)
	4/1/1866	5.00
	4/1/1866	1.25
	4/15/1866	3.75
	4/1866	10.00 cfs
	0/0/1866	25.00 cfs
SARGE HALL TOTAL		35.00 cfs

LEWIS-JENKINS DITCH

	Date	Rate (cfs)
	*0/0/1866	1.25
	0/0/1890	2.50
	0/0/1890	1.25
	0/0/1890	1.25
LEWIS-JENKINS TOTAL		6.25 cfs

ELLIS-THOMAS

	Date	Rate (cfs)
	*4/15/1900	2.50
ELLIS-THOMAS TOTAL		2.50 cfs

PHIPPS BRIDGE
GUMBOOT THOMAS

	Date	Rate (cfs)
	*0/0/1868	1.88
	6/1/1882	3.75
	6/1/1882	3.75
GUMBOOT THOMAS TOTAL		9.38

FRIELER DITCH

	Date	Rate (cfs)
	*4/1/1871	3.13
FRIELER TOTAL		3.13 cfs

SEYLER DITCH

	Date	Rate (cfs)
	*4/1/1872	10.00
	4/1/1872	1.00
SEYLER TOTAL		11.00 cfs

SMALL DITCH

	Date	Rate (cfs)
	*4/1/1872	5.00
	4/1/1872	2.50
	4/1/1872	2.50
	4/1/1872	1.00
Total	4/1/1872	11.00 cfs
	4/1/1942	5.00
SMALL TOTAL		16.00 cfs

*Earliest priority on ditch.

TIBER RESERVOIR

MARIAS RIVER

RECEIVED
JUL 29 1988
FISHERIES DIV.

RECOMMENDED OPERATING GUIDELINES

FOR

FISH, WILDLIFE AND RECREATION

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

SECOND DRAFT
FEBRUARY 24, 1988

INTRODUCTION

Tiber Reservoir and the Marias River downstream from Tiber Dam to its mouth near Loma, Montana offers a variety of fishing, boating, hunting and other recreational opportunities. These water bodies clearly provide most of the water-based recreational resources in this portion of Montana.

Tiber Dam is located on the Marias River near Chester. It was completed in 1955 to serve for irrigation and flood control. Problems with spillway settling soon after completion of the dam caused revision in reservoir operating capacity until repairs were completed in 1981. The reservoir is operated by the Bureau of Reclamation primarily for flood control and for increased fishery and recreation benefits.

Since past reservoir operations were impeded due to spillway damage and repair, a comprehensive plan for maintenance of fish and wildlife habitat has not been developed. Now that the reservoir can be operated in a more normal fashion, it has significant potential for increasing recreational resources. This document is intended to identify reservoir operational levels and flow release patterns which optimize recreational values and minimize impacts on fish and wildlife.

STATEMENT OF RESOURCE

FISHERIES - TIBER RESERVOIR

Tiber Reservoir is the largest water body in northcentral Montana. The reservoir and the Marias River are the principal sites for water based recreation in Liberty and Toole counties. Fisheries from the basis for most of the recreation. Fishing pressure in Tiber was estimated at 13,200 angler days in 1984-85 and 16,200 angler days for the 1985-86 season.

Game fish commonly found in Tiber Reservoir include walleye, northern pike and burbot. Other game fish occasionally found are rainbow trout, lake trout and channel catfish. In addition, shovelnose sturgeon, brown trout, sauger and mountain whitefish have been recorded. The predominant forage fish is yellow perch and they are also a popular sport fish taken quite regularly by fishermen. Spottail shiner have recently been introduced to complement perch as forage. Nine other species (mostly minnows and suckers) occur in the reservoir.

The Marias River above Tiber Dam was chemically treated in 1954-55 with a fish toxicant prior to the closing of the dam in an attempt to remove carp and goldeye from the fishery above the reservoir. Early sampling suggested success in terms of goldeye, but carp were found in the reservoir. Rainbow trout were stocked heavily in the reservoir following the rehabilitation attempt. Nearly 10 million fingerling rainbow trout were stocked in 1956 and 1957, with rainbow stocking continuing through 1963. Typical

of new environments, trout fishing was excellent in 1957. However, by 1959, angling success had declined and trout condition was poor.

Management of Tiber Reservoir for cool/warm water species was initiated in 1971 when walleye were stocked in the reservoir. Walleye plants continued for three additional years to establish a self-sustaining population with a total of 5.1 million fry stocked. Northern pike first appeared in 1973 presumably coming down the drainage from Lake Frances. Yellow perch were first documented in 1963 and thought to be of the same origin as the northern pike.

The fishing in Tiber Reservoir is considered good to excellent at the present time. Size of walleye presently kept by fishermen averages approximately 17 inches and 2 pounds, with maximum sizes available approaching 15 pounds. Northern pike range from 2-4 pounds with occasional 15-20 pounders taken. Anglers take a number of perch from 1/2 to 1 1/4 pounds. The fishery in the summer period is composed of about 70% walleye, 20% northern pike, and the remainder is perch and rainbow trout. Northern pike are the most often caught fish during the winter along with perch and a few rainbow trout and burbot. Fish stocking is not needed as long as natural reproduction maintains adequate numbers. Stocking of northern pike may be necessary in the future if water levels are undesirable during the critical spawning period.

The reservoir fish populations and the resulting fishery are greatly influenced by the pattern of reservoir operation. In previous years (1966-1981), reservoir operations restricted levels to a desired maximum of 2985 and a minimum of 2960 feet msl. These restrictions were in place due to settling of the spillway following the 1964 flood. Throughout this time period, reservoir levels annually fluctuated 5 to 34 feet. The northern pike, walleye and yellow perch fishery began to develop in the early 1970's. Fish populations have fluctuated due to inadequate spawning sites and limited food production that result from the pattern and timing of water level fluctuations. Northern pike, perch and certain forage species need flooded vegetation for spawning and rearing. Thus, water levels become important during the critical spawning period of April 15 - June 1. Critical period means that time period that covers spawning and egg incubation. Since the early 1970's, water levels during the critical spawning period flooded shoreline vegetation in 1975 and 1978 and produced good year classes of northern pike and perch along with other primary food organisms. For those years not mentioned, conditions were undesirable and little or no recruitment to the northern pike and perch population occurred. In more recent years (1982 - 1986), the reservoir has been operated at higher levels following completion of the new spillway. Shoreline vegetation was flooded during spawning in four out of the five years and resulted in increased northern

pike and perch populations. Reservoir levels during these five years fluctuated from 8 - 18 feet annually.

Walleye and spottail shiner spawn on sand, gravel and rubble substrate. They are not as dependent on specific water levels provided the levels are stable or increasing during the spawning period of April 15 - June 1. Adequate walleye reproduction has occurred in Tiber Reservoir for several years.

MARIAS RIVER DOWNSTREAM OF TIBER DAM

FISHERIES

The Marias River from Tiber Dam to its confluence with the Missouri River is about 80 miles long. The river meanders through a narrow floodplain confined by breaks and grasslands. Stream gradient averages 3.7 ft/mi and sand, gravel and small cobble comprise the channel substrates. The only perennial tributary in this reach is the Teton River which enters near the confluence with the Missouri River.

Flow and temperature regimens of the Marias are modified by regulation and storage at Tiber Dam. Spring flows are usually stored in Tiber Reservoir and released during late summer and fall. Water is normally released from Tiber Dam through the river tunnel outlet during the summer months and has resulted in conditions suitable for cold water fisheries in the river downstream for over 20 miles.

There are both cold and warm water fisheries in the Marias River below Tiber. The cold water fishery begins immediately

below the dam extending about 20 miles downstream and is composed of rainbow trout, brown trout and mountain whitefish. Clear, cold water and clean gravelly riffles are common in this section. Past studies have shown that these salmonids grow exceptionally well and large size individuals are not uncommon. The whitefish population was represented in good numbers while the rainbow and brown trout populations have been depressed in past years. Poor winter survival of juvenile trout due to low flows appeared to be the problem which limited trout numbers. At present, the trout population appears to be improving.

Angling pressure for salmonids is low and local anglers mostly use this resource. If a healthy trout population could be maintained in the river, angling pressure would undoubtedly increase since stream trout fishing is scarce in this area of Montana. A trout fishery in this area is an especially valuable resource.

The majority of the warmwater fishery extends from about 20 miles below Tiber Dam downstream to the confluence with the Missouri. During certain times of the year warmwater sportfish are also found below the dam. Sauger is the most numerous resident game fish. Other common gamefish include walleye, northern pike, burbot and channel catfish. In addition, shovelnose sturgeon, sauger, buffalo and blue suckers migrate from the Missouri River into the Marias during their spawning period. The sturgeon are exceptionally large, averaging over 5

pounds with individuals up to 15 pounds. Considerable angling for these species occurs in the lower Marias during April through July.

WILDLIFE

There are substantial wildlife values associated with the Marias River below Tiber Dam. Wildlife species which are found within the river corridor include Canada geese, many species of ducks, osprey, both bald and golden eagles, prairie falcon, blue heron, mule and whitetailed deer, beaver, raccoons and a host of other less-conspicuous animals.

The wildlife species most influenced by flow conditions of the river are beaver and Canada geese. Beaver are common from the dam downstream for about 30 miles. They build their lodges in the banks and may be susceptible to abnormal flow conditions.

Canada geese nest on the Marias River below Tiber Dam. Most goose nesting occurs on islands because of the protection provided against mammalian predators. When flows are high enough the side channels form a barrier against a predator's attempt to cross onto the island. Past studies have demonstrated that inadequate flows during the spring significantly reduces goose nest success.

Recreation

The river offers fishing opportunities for both warm and coldwater fish species. Hunting for waterfowl and big game occurs throughout the course of the river with the exception of a

wildlife preserve that borders both banks for the river for about 10 miles. The Marias is an excellent floating river affording spectacular scenery while winding through picturesque canyons and badlands. About 40 miles the river flows through very remote and wild country. Good river flows are essential for recreational floating by canoe, raft or boat.

RECOMMENDED RESERVOIR OPERATING GUIDELINES

TIBER RESERVOIR

To maintain a desirable fishery in Tiber Reservoir, certain conditions are necessary. Water levels must be managed to allow for ample reproduction of both gamefish and forage fish species. As previously discussed, perch and northern pike need submerged vegetation for spawning. Walleye, spottail shiner and some other minnows spawn on sand, gravel and rubble substrate and are successful as long as water levels are stable or gradually increasing.

Spawning of walleye, northern pike and perch is related to water temperature and water levels. Water temperatures during peak spawning for northern pike are 42-44 F. for walleye, 46-48 F. and for yellow perch, 48-50 F. To project an exact time period for spawning is impossible since climatic conditions are unpredictable. However, on most years peak spawning for northern pike, walleye and yellow perch will occur from April 15 through May 15. Egg incubation requires about two weeks, so most

hatching has occurred by June 1. Rapidly raising water levels will increase spawning activity but not to the degree that is stimulated by water temperature.

Spawning conditions will not be suitable on most years for vegetative spawners such as northern pike and yellow perch. Vegetative flooding during yellow perch spawning (usually late April to May 15) must occur at least one year out of three to maintain a suitable forage base for walleye. Reservoir levels may have to be periodically manipulated to produce the right conditions. The following recommendations are presented to maintain or enhance the sport fishery in the reservoir.

I. Critical Spawning Period (April 15 - May 15)
   A. Normal reservoir operation.

      1. Water levels stable or increasing (to prevent exposure to eggs.

      2. Water levels exceeding previous years' peak to flood existing shoreline vegetation for northern pike yellow perch spawning. (Example, 1985 and 1986 operation).

   B. Drought condition operation

      1. Maintain summer reservoir elevation lower than 2985 feet M.S.L. to allow exposed shoreline to vegetate.

      2. Encourage shoreline vegetating by planting select areas (Willow Creek Arm, Island area, Dike area and upper end of Reservoir).

      3. Flood vegetation the following year during spawning period if anticipated runoff conditions are suitable.

C. Manipulated drought operation

1. Purposely hold summer reservoir elevation to 2985 M.S.L. to allow shoreline vegetation to develop.

2. Maintain elevation at 2985 M.S.L. as long as possible for optimum summer recreational use.

3. Pull reservoir down to minimum elevation of 2970 M.S.L.* in winter. This would provide replacement storage required downstream and also maintain 500 cfs river flow below reservoir.

4. Hold reservoir maximum elevation below 2985 M.S.L. up to two year period to allow for maximum shoreline growth.

5. Flood vegetation in subsequent year during spawning period.

*Note: Minimum reservoir levels in winter are not critical and can be at discretion of the Bureau.

II. Post Spawning Period (After May 15).

A. Continue to maintain or rise water level elevations.

B. During years of significant vegetative flooding, maintain reservoir at maximum level as long as possible to provide suitable habitat for young game fish and forage fish.

MARIAS RIVER.

Location and volume of water discharges from Tiber Dam are important considerations for providing suitable environmental conditions for the downstream tailwater fishery. Water temperatures should be cold and river flows must be adequate to fulfill essential habitat requirements.

I. Water temperatures.

Water releases from Tiber should only be discharged from the lower level of the reservoir at the river outlet works during the warm season, June through September. If during this period large volume releases are essential, then the river outlet should be operated near the maximum capacity of 1,000 cfs and the remaining water releases may be discharged from the auxiliary outlet. During the cooler months water can be released from either level. Daily flow fluctuations or sudden changes in water releases should be avoided.

II. Streamflow

A. An instream flow of 500 cfs has been identified as the recommended minimum flow and should be maintained throughout the year. A flow of 317 cfs is recommended as an emergency flow for short periods only. Preferred flows through the year range between 600 to 900 cfs.

B. For migratory fish such as the shovelnose sturgeon, a flow greater than the base flow is required to attract them from the Missouri into the Marias. A flow of 1,144 cfs is recommended. This is the normal accretion flow from the Marias required to augment the flow in the Missouri River to 14,000 cfs, the instream flow determined for paddlefish migration in the Missouri River. The duration this high flow should be maintained is May 19 - July 5. Fish spawning migrations into the lower Marias are currently undergoing further study.

C. Studies have determined that a flow of 534 cfs is required to protect the goose nesting islands in the 20 mile reach below the dam. However, for uniformity, a flow of 500 cfs is the recommended minimum flow for goose nest protection from mid-March to mid-May.

Below is a summary of the recommended river flows which would provide adequate flow conditions for the Marias River fisheries:

Flow Recommendations

Water Release (cfs)

Period	Preferred Flows	Minimum	Purpose
Year-round	600-900	~500	Riffle maintenance Winter habitat conditions-juvenile trout. Canada goose nesting
May 20-July 5	1144		Migratory fish
Oct 15-Mar 15	600-900 (stable flows)	500	Brown trout spawning & incubation period
May 20-Sept 10	800-1500	800	Recreational floating

D. Additional Considerations

1. An emergency minimum flow of 317 cfs is recommended only for short periods of time.

2. River tunnel outlet should be operated at all times from June through September.

3. If necessary to dewater river tunnel for inspection, it should be done prior to June or after September.

4. Late fall and winter flow releases should be stable and set prior to the onset of brown trout spawning (October 15).

5. During low runoff conditions, the fisheries plan calls for favoring maintenance of river flows over reservoir water levels. If water supply conditions are extremely poor, river maintenance flows can be reduced, the magnitude being determined by the Tiber/Marias Advisory Committee.

Appendix G

Members of Upper Missouri River Advisory Committee - 1988

Upper Missouri Advisory Committee Meeting

April 15, 1988

Name	Organization	Address	Phone #
Larry Peterman	DFWP	1420 East 6th Ave. Helena, MT	444-3183
Mike Erwin	Bureau Reclamation Environmental Affairs	Box 36900 Billings, MT	657-6421
Frank Pickett	MPC, Env. Dept.	40 E. Broadway Butte, MT	723-5421
Lance Elias	MPC, Power Operations	40 E. Broadway Butte, MT	494-8193
Gordon Aycock	Bureau of Reclamation	P.O. Box 36900 Billings, MT	657-6416
Steve Clark	Bureau of Reclamation	7661 Canyon Ferry Rd. Helena, MT	475-3310
Ed Siemers	Hauser Dam	3497 Lincoln Rd. East Helena, MT	
Jim Keane	CFRA	P.O. Box 4794 Helena, MT	
Rich Meyers	Independent Record	317 Cruse Ave. Helena, MT	
Pete Schendel	Bureau of Reclamation	7661 Canyon Ferry Road Helena, MT	
Ron Schofield	Helena Valley Irrigation Dist.	3840 N. Montana Helena, MT	442-3292
Alex Ferguson	Farmer-Rancher Missouri River Angler	780 River Road Cascade, MT	468-2700
Clair Willits	Missouri River Fly Fishers	14 Park Garden Est. Great Falls, MT	452-9414

Liter Spence	DFWP	1420 East 6th Avenue Helena, MT	444-3888
Bruce Rehwinkel	DFWP	P.O. Box 262 Townsend, MT	266-3367
Pete Test	Missouri River Chapter Trout Unlimited	344 Clancy Helena	442-1973
Steve Leathe	DFWP	4600 Giant Springs Rd. Great Falls, MT	454-3441
Mark Lere	DFWP	1420 East 6th Ave. Helena, MT	443-7681
Pete Cardinal	Missouri River Angler	Box 95 Cascade, MT	468-2743

Appendix H

State-owned reservoirs which influence downstream fisheries

(to be added)

Appendix I

Trigger flows and related circumstances which initiate implementation of emergency fishery regulations

(to be added)

Appendix J

Guidelines for reducing fish losses in irrigation ditches