Curtis E. Larsen
Robert N. Lane
Montana Department of
Fish, Wildlife and Parks
1420 East Sixth Avenue
Helena, MT 59620
(406) 444-4594

BEFORE THE MONTANA BOARD OF NATURAL

RESOURCES AND CONSERVATION

* *

IN THE MATTER OF WATER RESERVATION APPLICATION NOS. 69903-41O 71895-41I 72578-41L 70115-41F 71966-41S 71579-41T 70117-41H 71997-41J 72580-41A 70118-41H 71998-41S 72581-41I 70119-41H 72153-41P 72582-41I 70270-41B 72154-41K 72583-41P 71537-41P 72155-41A 72584-41S 71688-41L 72256-41P 72585-41M 71889-41Q 72307-41Q 72586-41P 71890-41K 72574-41O 72587-41G 71891-41P 72575-41K 72588-40C 71892-41G 72576-40E 73198-41I 71893-41K 72577-41P 73199-41S 71894-41I IN THE UPPER MISSOURI RIVER BASIN	**BRIEF OF DFWP IN SUPPORT OF ITS INSTREAM APPLICATIONS AND IN OPPOSITION TO THE RESERVATION APPLICATIONS OF THE CONSERVATION DISTRICTS, THE BUREAU OF RECLAMATION AND THE CITY OF BOZEMAN**

* * * * * * * * * * * * * * *

INTRODUCTION

The Department of Fish, Wildlife and Parks (DFWP) application for instream reservations on 281 stream reaches, one lake, and one swamp in the Missouri River Basin above Fort Peck Dam meet the criteria established by statute, ARM 85-2-316, MCA, and by rule, ARM 36.16.107B, and, therefore, these instream reservation applications should be granted by the Board of Natural Resources and Conservation (Board). The most significant positions taken and issues argued in this brief are outlined in this introduction.

DFWP is a qualified applicant applying for instream reservations to protect fishery, wildlife and recreational values which are beneficial uses. The flows requested are needed because the fishery, wildlife and recreational values warrant protection. The amount of the instream requests were established by the Wetted Perimeter Method and other methods which have been established as accurate and suitable methods.

The instream reservations are in the public interest based on a weighing and balancing of the required factors, including a conservative benefit and cost comparison to competing consumptive reservation requests for irrigation. A conservative, but realistic, value of 75 mills per kilowatt-hour as the replacement cost for lost hydropower generation was used in the analysis. The instream benefits outweigh the costs when compared to competing consumptive reservations for all irrigation projects except eleven projects. These eleven projects fail to meet other public interest criteria, primarily because of adverse environmental impacts that cannot be quantified in monetary terms, and they will adversely affect claimed existing water rights. Further, the value of protecting resources on streams where there is no competition from a present reservation request is included as a benefit of those instream reservations.

The DFWP has a management plan demonstrating its capacity to diligently monitor and protect the instream reservations. The instream reservations can only preserve the status quo up to the minimum flow needed to sustain a healthy fishery. They do not consume or divert water, are complementary with any other instream uses and downstream uses, and, consequently, cannot adversely affect existing water rights.

Eighteen Conservation Districts have requested reservations for a total of 219 proposed irrigation projects covering 154,604 acres. Except for eleven projects, the costs outweigh the benefits when compared to competing uses, including instream reservations for recreation and downstream hydropower generation, for all of the proposed irrigation projects. The value of the water for irrigation projects were calculated using a number of assumptions favorable to the irrigation projects.

However, the eleven projects, that initially pass the benefit/cost test, do not pass other public interest criteria and, therefore, should not be granted reservations. Reservations for projects that are at least marginally feasible could be granted with priorities junior to the instream reservations, provided they would not significantly impact the instream reservations, do not have unacceptable adverse environmental impacts, and do not adversely impact existing water rights. Many of the irrigation projects would adversely impact claimed existing water rights by consuming water needed, at times, for existing uses. These existing rights include senior irrigators, downriver hydropower generation rights held by the Montana Power Company (MPC) and the Bureau of Reclamation (BUREC), instream "Murphy rights" held by DFWP and an instream flow right held by the Bureau of Land

Management (BLM) for the segment of the Missouri River designated as Wild and Scenic.

Of the remaining 17 municipalities that applied for water reservations, DFWP is objecting only to the application by the City of Bozeman. The City of Bozeman has failed to show that the amount of water to be supplied by a dam on Sourdough (Bozeman) Creek is needed. The application should be denied, unless sufficiently conditioned, because of the failure to demonstrate a need for the amount and because of adverse environmental impacts of the construction and operation of the proposed dam.

DFWP will address some issues that have been raised already by other parties, such as the significance of water availability to the differing types of reservation requests

FACTS

The reservations requested by all the applicants have been analyzed by DNRC in a draft environmental impact statement (draft EIS) and a final environmental impact statement (final EIS) and with individual environmental assessments (EAs) for each application. There has been an extensive contested case hearing on all the applications, including prefiled written testimony and exhibits and a hearing at which testimony and exhibits were introduced and witnesses were cross-examined. DFWP is submitting, concurrently with this brief, comprehensive proposed findings of fact, conclusions of law and a recommended order. The argument presented here is based on the proposed findings of fact.

ARGUMENTS

The statutory criteria of Section 85-2-316(4)(a), MCA, and the rules of the Board, contained primarily in ARM 36.16.107B, implementing the criteria, govern this proceeding. These criteria must be established by the applicant to the satisfaction of the Board before the Board may by order create a reservation of water. Section 85-2-316(4)(a), MCA. The reservation procedure is a contested case under the Montana Administrative Procedures Act, although the formal rules of evidence do not apply. Section 85-2-121, MCA.

Purpose. The criteria that the purpose of the reservation must be established is defined by two elements -- the applicant must be qualified to reserve water and the purpose of the reservation must be a beneficial use. ARM 36.16.107B(1)(a)&(b).

There has been no contention that DFWP, or for that matter any of the other applicants, is not a qualified applicant. DFWP, as an executive branch agency of the state, qualifies as an eligible applicant under Section 85-2-316(1), MCA. In applying for instream reservations of water, DFWP is fulfilling its mandate, as the representative of the public's interests, to provide for the protection, preservation and propagation of all fish and wildlife and their habitat in the state. Section 87-1-201, MCA.

The instream reservations of water are for the benefit of the public for fish, wildlife and recreational uses. The minimum flow levels would protect the diversity of fish and wildlife species, preserve riparian habitats, protect the environment, help maintain water quality, and provide optimum opportunities for diverse outdoor recreation. Fish, wildlife and recreational uses are defined by Board rule as beneficial uses for water reservations. ARM 36.16.102(3). The reservation statute, Section 85-2-316(1), MCA, allows the Board "to reserve waters for existing or future beneficial uses or to maintain a minimum flow, level, or quality of water". Beneficial use, as defined by statute, includes fish and wildlife and recreational uses. Section 85-2-102(2), MCA. There is no doubt that the instream reservation requests of DFWP are for an allowed purpose. In fact, these instream reservations meet the purpose test as both beneficial uses and as maintaining a "minimum flow, level, or quality of water" to protect fish, wildlife and recreation.

__Need.__ The need for the reservation must be established. Section 85-2-316(4)(a)(ii). The Board has determined in ARM 36.16.107B(2)(b) that to establish a reservation is needed it must find:

> ...where the applicant may not be eligible to apply for a water use permit, the applicant has demonstrated that the water resource values warrant reserving water for the requested purpose;

DFWP is not eligible to apply for an instream water use permit to protect a minimum flow level for fish, wildlife and recreational purposes. The reservation statute provides specific authority for establishing minimum instream flows. The beneficial water use permit statutes, however, require a person appropriating water for a new beneficial use to obtain a permit through an administrative process before the Department of Natural Resources and Conservation

(DNRC). Section 85-2-301, MCA; and generally, Title 85, Chapter 2, part 3, MCA. Appropriation is defined, in Section 85-2-102(1), MCA, as meaning to:

> (a) divert, impound, or withdraw (including by stock for stock water) a quantity of water;
>
> (b) in the case of a public agency, to reserve water in accordance with 85-2-316; or
>
> (c) in the case of the department of fish, wildlife, and parks, to lease water in accordance with 85-2-436. (emphasis added).

Under this definition, a permit cannot be obtained for the use of water as an instream flow. There is no diversion, impoundment or withdrawal when the use is to maintain the water instream for its use instream. Although a pre-1973 water right claim was at issue, the case of the Matter of Dearborn Drainage Area (1988), 234 Mont. 331, 766 P.2d 228, can be read as concluding that an appropriation of water requires a diversion. Further, there is specific authority in subsection (b) of 85-2-102(1) for a public agency to reserve water under Section 85-2-316, MCA. That authority coupled with an explicit provision for the reservation of minimum flows, levels, or quality of water in the reservation statute means it is highly improbable DFWP can appropriate instream flow through a water use permit. The most reasonable conclusion is that a reservation of water is the exclusive means for DFWP to protect instream flows through the appropriation of water. Consequently, DFWP must demonstrate that the water resource values warrant reserving minimum instream flows for fish, wildlife and recreation to establish the reservation is needed.

The conservation districts and the BUREC have a different threshold test to establish that reservations of water are needed for their proposed irrigation projects since the project sponsors are eligible to apply for water use permits for irrigation. They must show a "reasonable likelihood" of pending competition for the available water, ARM 36.16.107B(2)(a), or that there are constraints that would restrict the project sponsors from perfecting a water use permit, ARM 36.16.107B(2)(c). Neither the conservation districts nor the BUREC have submitted any evidence showing restrictions on perfecting permits for irrigation projects and have not presented any evidence of future instate or out-of-state competing water uses except for the competition from the instream reservation applicants. To the extent that this competition is sufficient to establish the need criteria for further considering the proposed irrigation projects, it, conversely, is sufficient to establish the need for considering the instream reservation requests.

The most salient point is that DFWP is absolutely dependent on the reservation process to establish minimum instream flows to the extent presently possible. The same is not true for the conservation district and BUREC irrigation projects. They are always eligible to apply for water use permits. The instream applicants have no second chance. Thus, the instream flow applicants have an unqualified need to obtain protection for instream values through a reservation. The irrigation projects do not have a similar need.

There are significant public policy values to not reserving water for consumptive projects that do not pass a benefit/cost analysis or, at least, are not economically or financially feasible. If conditions change such that the benefits become greater than costs for some projects or they become economically or financially feasible, then the project sponsors can apply for water use permits. Also, instream reservations are the only reservations that can be reallocated to an applicant who is a qualified reservant if the Board finds part of an instream reservation is not required for its purpose and the applicant's need outweighs the need for the instream reservation. Section 85-2-316(11), MCA. All of these decisions would then be made at the time when the merits of specific irrigation projects can be most realistically assessed.

The disadvantage of granting reservations for irrigation projects that are not likely, under present analysis, to be developed is to discourage other feasible consumptive uses as they may develop in the future. Although reservations may be revoked or modified under the periodic reviews of Section 85-2-316, MCA, it is poor public policy to place this burden on future consumptive users by reserving or tying up water for irrigation projects that probably will never be built. Reservations are not needed for irrigation projects that are not feasible.

DFWP has presented extensive evidence in its application and testimony demonstrating the fisheries, wildlife and recreational values that would be preserved by its reservation requests. This evidence, which was essentially uncontroverted, establishes the second prong of the need test for instream flows under ARM 36.16.107B(2)(b); that the water resource values warrant reservations.

The stream and river segments for which DFWP made application for reservations are those with the most significant fishery values in the Missouri River Basin above Fort Peck Dam. The DFWP approach was conservative with the 281 stream reach applications representing approximately 9% of the 2,739 streams in the basin that support a fishery or have the potential for a fishery.

The streams and rivers were chosen to protect the most valuable and significant fishery and recreational resources. The instream reservations will preserve a base flow for instream values by protecting the status quo of stream and river flows up to the minimum flows necessary to provide a healthy fishery. Minimum instream flows will maintain existing resident fish populations, will provide passage for migratory fish species in certain streams, will protect spawning and rearing habitats of both resident and migratory species, and will protect the production of aquatic food organisms and forage fish used as food by fish. The values to be protected are as varied and diverse as Montana itself. A brief summary, to the extent possible with 281 instream, one lake and one swamp reservation requests, of the fisheries, wildlife and recreation within the basin will illustrate the water resource values that warrant water reservations.

There are nationally recognized wild trout fisheries in the basin: the Gallatin, with its trophy-sized trout; the fabled

Madison; the now widely recognized and extremely popular Missouri; the Smith, combining its stunning canyon scenery with an exceptional fishery; the Big Hole and Beaverhead offering trophy fishing along with well used floating opportunities. Other streams provide trout fisheries in wilderness settings, some are local fishing holes primarily used by children, others are spring-fed streams highly valued by connoisseurs for their outstanding fisheries of selective trout, while many streams provide the only significant recreational fishing within a local region.

Many of the tributaries, along with nurturing a resident fishery, are spawning and rearing habitat for the fish in a mainstem river, lake or reservoir. For example, the trout spawning tributaries to the Missouri River in reach 3 are the Little Prickly Pear Creek, the Dearborn River and Sheep Creek.

The side-channels of the larger rivers, such as the Missouri River, are critical spawning and rearing habitat for the resident game and nongame species. The water flows in the relatively shallow side-channels are susceptible to dewatering in the more severe low water years.

The streams and rivers represent the most important recreational fisheries in the basin, including nationally and, even internationally, recognized recreational rainbow and brown trout fisheries. A magazine devoted to trout fishing recently published a feature article on "America's 100 Best Trout Streams". According to this article, six of America's best 100 trout streams, the Beaverhead, Big Hole, Gallatin, Madison, Missouri and Smith rivers, are in the Missouri basin.

The basin has excellent warm water fisheries, including the lower Missouri between the Marias River and Fort Peck Reservoir and the Musselshell River which flows from a coldwater fishery to a classic warmwater prairie stream. A number of rivers such as the lower Judith River present a transition from a coldwater to a warmwater environment.

Other streams have special value because of their location. Many stream have high recreational value in their closeness to towns or cities. The Marias River in reach 2 is the only trout stream within a 50 mile radius in northcentral Montana. The Marias in reach 3 has a warmwater fishery that is especially attractive to residents of the western part of the state because of its relative proximity. Bean Lake, a popular and productive fishery, is the only natural lake of any significance in all of northcentral Montana. Big Spring Creek near Lewistown is one of the largest spring-fed streams in the state and is one of the most important trout streams in central Montana.

Trout anglers spent about $50 million dollars in 1985 pursuing their sport in the Missouri River Basin above Fort Peck Reservoir. In addition, the net economic value was estimated in 1987 to be over $61.5 million for the basin. The net economic value is the value of fishing determined by what people would be willing to pay over the amount they actually did spend to fish. These values are for fishing only. They do not include other water-based recreation, such as floating, camping, picnicking, swimming, bird watching, sightseeing and hunting.

However, recreational fishing valued in dollars is not the only value inherent in minimum instream flows. All forms of water-based recreation, including fishing, are important to the human experience, providing both enjoyment and relief from day-to-day pressures. The preservation of the living residents of our rivers and streams is in itself a value, although it largely eludes monetary quantification.

The reservations would protect the more abundant game and nongame species, such as rainbow, brown, cutthroat and brook trout, mountain whitefish, burbot, walleye, sauger, kokanee, northern pike, shovelnose sturgeon, fresh water drum, cisco, smallmouth bass and black bullhead, as well as unique, unusual and rare species.

The American Fisheries Society and DFWP have designated certain fish as "Species of Special Concern". This management tool signifies fish that have limited numbers in the state, limited distribution, or a limited amount of preferred habitat still available. Instream flows will protect the habitats of game fish species of special concern such as the westslope cutthroat trout, fluvial Arctic Graying, pallid sturgeon, and paddlefish, as well as nongame species such as sturgeon chub, sickelfin chub and the northern redbelly dace x finescale dace hybrid.

The westslope cutthroat trout is a native Montanan, although genetically pure westslope cutthroat occupy only an estimated 1.1% of their historic range in Montana streams. The fish is now generally found in the isolated headwaters of tributaries. Another indigenous fish, the fluvial, or permanently stream dwelling, Arctic grayling is now restricted to the upper reaches of the Big Hole River. This is the only fluvial Arctic grayling population still remaining south of Canada and Alaska. It is now extinct in Michigan where it was also native. Fluvial Arctic grayling were once widely distributed and abundant in the Missouri River and its tributaries upstream from Great Falls. Fluvial Montana Arctic grayling are reduced in distribution to only about 8% or less of their historical range. This fish is now classified as a category 1 species, the final category before listing as a federal threatened or endangered species. The most likely significant factors in the fluvial Arctic grayling's decline in Montana are reductions in stream flows for irrigation, blockage by reservoirs and diversions, and flooding of streams by reservoirs. Therefore, maintenance of adequate water flows may be the most critical requirement for the continuing existence of the fluvial Arctic grayling in the upper Big Hole River.

The paddlefish is an ancient and unique relic, reaching back in geological time to the era of the dinosaurs. Paddlefish have been significantly reduced over their worldwide range. The Missouri River population is only one of six major self-sustaining populations in the United States. This population, in comparison with the other five remaining populations, has a superior growth rate and is older and more secure, due largely to the free-flowing characteristics of the Missouri River which provide essential and irreplaceable spawning areas for paddlefish. High spring flows trigger a migration of paddlefish from Fort Peck Reservoir to the critical spawning areas.

The pallid and shovelnose sturgeons, two other relics of the dinosaur era, reside in the Missouri River above Fort Peck Reservoir. The pallid sturgeon exists as a rare, ancient species over 200 million years old. However, the activities of man have pushed the pallid sturgeon to the bring of extinction in the last 50 years. The relatively unaltered Missouri River above Fort Peck Reservoir may be critical to the species' recovery, if not survival. The species has been recently listed as a federal endangered species. The average size of the healthy and vigorous shovelnose sturgeon population equals or exceeds the maximum size of those from other rivers in the Missouri and Mississippi basins.

The paddlefish, pallid sturgeon, sicklefin chub, blue sucker, and sturgeon chub are species of special concern, with the pallid sturgeon, sicklefin chub, blue sucker, and sturgeon chub rare throughout their entire geographic range. Another species of special concern, the northern redbelly dace x finescale dace hybrid, is a peculiar minnow that produces only females as exact clones of the mother.

Maintaining the status quo of present flows will help avert a number of identified problems, such as thermal pollution in the Madison River below Ennis Dam, where additional reductions in river flows could mean fatal summer water temperatures for trout. Stream conditions can also be improved highlighting the need to protect base minimum flows. For example, recent upgrades in Bozeman's sewage treatment plant have allowed the fishery in the East Gallatin River to prosper once again. Other streams suffering pollution from old mining wastes could recover with reclamation. The Boulder River, a tributary to the Jefferson River, and the Dry Fork of Belt Creek are examples of streams with this potential. Other rivers, such as the Jefferson, Sun, and Musselshell, have unused potential because of dewatering by consumptive uses that could be realized if adequate minimum flows ever become available. Spawning tributaries have been rehabilitated such as Willow Spring Creek, now a spawning tributary for the Jefferson River's rainbow trout. This illustrates the potential that exists when adequate water is available at critical times.

The requested flows are also necessary to help protect the habitat for those numerous wildlife species which depend on the streams and their riparian zones for food, water and shelter, including the bald eagle, peregrine falcon, whooping crane and grizzly bear, all of which are federally listed threatened or endangered species. Specifically, Antelope Butte Swamp, a perennial wetland area in the Blackleaf Wildlife Management Area along the east front of the Rocky Mountains, is an example of the dependance of wildlife on riparian habitat. Grizzly bears in particular are drawn to the swamp during the spring to feed on succulent plants that grow in the moist environment of the swamp. Canadian geese nest on islands in the Missouri River where adequate flows are needed to protect the nests from mammalian predators. Bald eagles concentrate at the mouth of Trout Creek on the Missouri

River above Hauser Reservoir during the fall kokanee spawning season.

These water resource values justify the minimum instream reservations requested by DFWP, and show the need for the reservations.

Amount. The Board must find "amount of water necessary for the purpose of the reservation". Section 85-2-316(4)(a)(iii). The Board's rules, ARM 36.16.107B(3)(a), require a finding "that the methodologies and assumptions used to determine the requested amount are accurate and suitable".

For a reservation process covering the immense and water resource rich Missouri River Basin above Fort Peck Reservoir, the DFWP needed an accepted and proven minimum instream flow setting method that could be practically applied to the task at hand. DFWP selected and applied what is called the Wetted Perimeter Method to the majority of the streams and rivers for which instream reservations are requested, with other methods used where they were better suited to a particular type of stream or where other constraints prevented the application of the Wetted Perimeter Method.

The details of the Wetted Perimeter Method have been carefully described by DFWP throughout this reservation process, including in the proposed findings of fact. The method relates one critical element needed for a fishery, the food producing capacity of a stream, to stream flows. Stream riffles are the primary food producing areas of Montana's stream-dwelling game fish. They are distinct segments of streams that are readily distinguished, and they are the area of a stream that is most sensitive to flow reductions. The amount of riffle area, wetted perimeter, covered with water is plotted as flows increase. The rate of increase in wetted perimeter is a function of the stream channel profile. As flows increase, there is a point where the stream approaches its maximum width, with the water starting to move up the sides of the banks and where the rate of increase of the wetted perimeter starts to decline more rapidly with increases in flows. Beyond this point, called the upper inflection point, large increases in flow result in only small increases in wetted perimeter. The upper inflection point is the minimum flow that protects most of a stream's fishery values. On the average, the upper inflection point flow equals about 40% of the average annual flow of a stream.

For many streams, there is usually a lower inflection point on the graph of wetted perimeter versus flows. This lower inflection point marks a change in the stream channel's profile. It is the flow at which the water starts to move up the sides of the active channel of a stream. This point does not measure the minimum flow required for a heathy fishery but maps a change in the stream channel profile more than anything else.

Other methods for setting minimum instream flows were also evaluated and studied by DFWP before the Wetted Perimeter Method was selected as the principal instream flow setting method.

The best and most accurate means of determining minimum flow needs is to directly observe the response of fish populations to flow variations over a period of many years. This Biological-Flow Relationship Method was impractical to use in this reservation process because of the intense data requirements and time commitment, although it was used where studies have been done. The flow requests for reach 2 of the Gallatin River, reach 4 of the Madison River, Narrows Creek, and the Missouri River Mainstem reaches 2 through 6 are based totally, or partially, on biological studies.

The Wetted Perimeter Method is one of the methods designed to develop minimum flow recommendations by examining a characteristic of streams that is related to habitat as it changes with flow. Two other methods of this type, The Habitat Quality Index and The R-2 Cross method, were tested and evaluated by DFWP, but were found unsuitable for use in Montana. The Wetted Perimeter Method was studied by both DFWP and Montana State University. These studies support the validity of the minimum flow recommendations generated by the Wetted Perimeter Method. It is a well recognized and commonly used minimum flow method, particularly in the Pacific Northwest and Rocky Mountain areas which are the areas in the United States most similar to Montana.

The United States Fish and Wildlife Services Instream Flow Group, a recognized leader in the application and development of instream flow methods, has found the Wetted Perimeter Method to be the type of method appropriate for setting minimum flows for protecting instream resources in state water allocations like this reservation process. In contrast, the more advanced incremental methods, such as the instream flow group's Instream Flow Incremental Method, are designed for measuring trade-offs for water projects, such as release patterns from reservoirs, rather than providing minimum flow recommendations. The incremental methods require a costly, complex and time-consuming analysis. These methods were rejected as having limited practical application to the water reservation process.

The Wetted Perimeter Method was the primary method used, with other methods chosen when they were either more suitable or there were constraints on the use of the Wetted Perimeter Method. For example, a fixed percentage technique was used for 27 stream reaches because of time and access limitations and a base flow approach, which is more applicable to the relatively constant flows of spring-fed streams, was applied to 17 streams.

As much attention was paid to the application of the Wetted Perimeter Method as to its selection. DFWP personnel were trained at workshops conducted by DFWP, often in conjunction with the United States Geological Survey (USGS). The data was collected by 12 teams, typically lead by a field biologist, and the process was governed by written procedures and standards. A number of checks and balances were used so the results would be accurate and reliable. All data was reviewed by Fred Nelson, the individual in DFWP responsible for instream flow methods development and application, and Mr. Nelson consulted with team leaders on the application of the methods. The upper inflection point was generally selected as the instream flow recommended, with the biologist who collected the data and who was familiar with the stream making the selection of the inflection point from the wetted perimeter graph. The exercise of professional judgment is a necessary component of the Wetted Perimeter Method, as it is for any instream flow method. Flows lower than the upper inflection point, but never higher, were sometimes chosen by the responsible fishery biologist based on a professional evaluation that the lower request was sufficient to provide minimum instream flow protection. Lower inflection point flows were made only for streams suffering from dewatering and when the resource or potential resource values were less significant.

The riffles selected for instream flow determinations were generally at the lower end of a stream reach where the reservations would be monitored. The resulting minimum flows recommended, therefore, represent the needs of the fishery in the lower portions of designated stream reaches.

The only direct expert testimony on the suitability and accuracy of the Wetted Perimeter Method was the testimony of Fred Nelson, Robert G. White and Virginia G. Thomas, all supporting the method for use in establishing minimum instream flows for reservation applications.

The testimony of Thomas A. Wesche, although apparently intended to be critical of the Wetted Perimeter Method, never concluded the method or its assumptions were not suitable or accurate. Wesche felt there was not enough support for the assumption that macroinvertebrate production in a stream is a limiting factor. As a consequence, he suggested more complex methods using a variety of environmental factors. However, he never stated that any other method using more variables would be practical for Montana's reservation process or would produce better results. In effect, his expert opinion seemed to be that nature is complex, therefore a more complex model or method must be better. He did not testify to a better method.

Wesche also felt that the Wetted Perimeter Method was based only on the quantity of food production and it would be better to have a model that considered other habitat parameters such as water velocity and depth. Although this was described as a weakness, he did not conclude that another method produces better results for setting minimum instream flows. Again, his testimony was only to the effect that some other method, if more complex, might be an improvement over the Wetted Perimeter Method. There was no consideration of the fact that flows recommended by the Wetted Perimeter Method also provide water velocity and depth in a stream riffle where food production occurs.

Wesche correctly concluded that some channel configurations are not suited to the Wetted Perimeter Method. However, DFWP understands this and applied the method with professional judgment. For example, the method was not applied to braided sections of rivers. It was also not applied to spring creeks where the stability of flows precludes its use.

Other criticisms were made of DFWP's application of the Wetted Perimeter Method, generally claiming that the wrong riffle section may have been selected or that the inflection point was not properly chosen. All this criticism was based on a review of DFWP's application and was not based on any personal professional knowledge of the streams and rivers involved. DFWP forcefully rebutted these claims.

In summary, the application of DFWP and the testimony presented convincingly support a finding that the methods and assumptions used by DFWP are accurate and suitable. There was, in fact, no testimony to the contrary.

Water Availability. Showing that water is available is not a criteria for instream reservation applications under the statutes and rules, although such a showing is applicable to consumptive use reservation applications because it is incorporated as part of the requirement that a reservation applicant must show the reservation will not adversely affect existing water rights.

For any complete application, including those for conservation district projects, ARM 36.16.105B(2) requires that "[a]n analysis of the physical availability of flows or aquifer yields must be provided." For gaged streams, the available water resources data must be presented in a specific manner and for nongaged streams the flows must be estimated with a technique approved by DNRC. DFWP met this application requirement with a final written report by the USGS entered into evidence through Charles Parrett, U.S. Geological Survey, as DFWP Exhibit 12 and supplemented with additional testimony for 9 streams for which data was not available in time to include in the report itself. Although the base period of record, 1937 to 1986, was criticized, a comparison with long term records of 75 to 101 years shows the base period average annual flows are closer to the long term averages than to the averages for the period of record advocated, 1930 to 1990. The streamflow measurement techniques used by the USGS are generally accepted by the hydrology communities.

There is no requirement that an instream flow applicant prove that water is always available at all times to meet the amount requested. An instream reservation applicant need only prove the amount needed for the reservation. However, a consumptive use reservation applicant does need to show that water is available, at least often enough to make the project feasible, to show that the consumptive use will not adversely affect existing water rights. This requirement will be discussed later in more detail.

Public Interest. This criteria provides for direct comparisons of competing reservation applications. An analysis of proposed instream reservations that do not have competing reservation requests for the same water is also provided.

The Board's rule, ARM 36.16.107B(4), implementing the use of the public interest criteria provides:

> For the board to adopt an order reserving water, it must find, in its judgment and discretion, that the reservation is in the public interest, as required by 85-2-316(4)(a)(iv), MCA, based on a weighing and balancing of the following factors, after making a specific finding for each factor: ....

The listed factors are a benefit and cost analysis, a consideration of any reasonable alternative with greater net benefits, a consideration of any irretrievable loss of a natural resource, a consideration of any adverse impacts to public health, safety and welfare, and a consideration of any other factors. ARM 36.16.107B(4)(a) through (f).

The first factor, a benefit and cost analysis, provides for a direct monetary comparison by adding all direct and indirect benefits and subtracting all direct and indirect costs for each reservation that competes for the same water with another reservation. This comparison is made with those benefits and costs that can be reasonably quantified. Benefits and costs that cannot be reasonably quantified must also be weighed in the balancing.

All of the conservation district proposed projects compete with instream reservation requests. On the other hand, the instream reservation requests of the Department of Health and Environmental Sciences (DHES) and BLM, the claimed Murphy Rights of DFWP, the claimed reserved water rights of the BLM for the Wild and Scenic portion of the Missouri River, the hydropower claims of MPC and BUREC, the claims of existing water users and claims of Indian Tribes are all not in competition with each other for the purposes of this analysis. Existing rights are protected because any reservations will be subject to them. All instream claims and reservation requests and downstream existing claimed rights, including claims for hydropower, use the same water. They are complementary to each other.

DFWP has compared its reservation requests with the competing conservation district projects in a benefit and cost analysis in its proposed findings of fact. The value of water for each irrigation project was determined by DRNC, although the analysis was based on a number of assumptions favorable to the projects. The analysis assumed the most profitable crop, alfalfa, would be grown, the highest possible yields would be obtained, water would be available eight years out of ten, and alfalfa prices would not be depressed. As a result of these assumptions, the calculated irrigation values of water are high.

The recreation values of water were derived using the Contingent Valuation Method of valuing nonmarket goods, which is a widely accepted nonmarket method, especially for water resource uses. Although DNRC in the Final EIS computed the hydropower values per acre-foot based on replacement values of both 50 mills and 100 mills per kilowatt-hour, DFWP used 75 mills as the most appropriate hydropower replacement value that was supported by expert testimony. Also, the value of water for recreation lost to consumptive use was calculated only for the stream reach first impacted. Subsequent losses to downstream reaches were not added. This approach was conservative and undervalues losses to recreation.

Using the above assumptions, eleven projects have net benefits greater than the indirect cost to instream uses for recreation and hydropower. However, when the other identified and unquantified indirect costs of these projects are included, none of them pass the benefit and cost analysis. For example, project GA-201 would divert arsenic-laden water from the Madison River into the Gallatin River drainage and will cause thermal pollution in the lower

Madison River, likely causing massive fish fills in some years. When both of these unquantified costs are added to the equation, the costs to instream uses incurred by hydropower, recreation, water quality and fish and wildlife exceed the irrigation benefits of project GA-201. The symmetry of the benefit and cost analysis means that all of the competing instream reservations have net benefits greater than net costs.

Further, for the 242 instream reservation requests that do not compete with proposed consumptive use reservation requests, the benefit of protecting the existing instream uses by maintaining status quo flow levels was calculated in the expert witness testimony of John Duffield. Reservations on these streams will provide direct benefits to instream uses through legal protection for continued instream water use. This direct benefit is on the order of $32 million per year. Not considering these direct benefits of instream reservations would mean that instream values are recognized only when a competing project is proposed.

DFWP recognized for a number of proposed projects that have been rated as at least marginally financially feasible, it may be in the public interest to grant reservations to some of these projects if they are junior to the instream reservations. These are the projects that do not have significant impacts on instream flows, would not significantly worsen existing water quality and aquatic life, and would not adversely impact water levels in Canyon Ferry Reservoir. It would be in the public interest to grant reservations, junior in priority to the instream flows, to the projects listed in the proposed findings of fact.

So far in this summary of DFWP's analysis of the benefit/cost factor of public interest, only the quantified benefits and costs have been used. Unquantified benefits include those flowing from protecting the natural resource of our rivers and streams in themselves. This includes nationally and locally renowned trout rivers and stream with their spawning tributaries, excellent warmwater fisheries, the ancient paddlefish, the endangered pallid sturgeon, and the native westslope cutthroat trout and fluvial Arctic grayling whose range has been drastically reduced. Recreational floating in the Smith River and other rivers will benefit. Riparian plant communities dampen flooding through erosion control and provide habitat for wildlife and birds. Instream flows preserve biological, recreational, scenic and historic values of streams and rivers.

Adequate flows will maintain water quality, another benefit unquantified in monetary terms, but extremely significant. The carcinogenic impact of arsenic concentrations in the Madison River commands a response and the answer is in the diluting flows of the Jefferson, Gallatin and other rivers and streams.

Instream flows will help maintain hydropower generation capacity on the Missouri River, will support the expanding tourist industry of Montana, will help maintain water levels at existing headgates, and provide a legal buffer for existing water uses from future competing water development.

There will be some direct administration costs for DFWP in monitoring and protecting reservations. Industry, such as mining, may have additional indirect costs in obtaining new water but these costs will not be significant. Instream flow reservations will not have adverse impacts on existing irrigation water rights. DFWP will have the same right as any junior right holder to object to changes in senior rights that are adverse to an instream reservation. To the extent this is an indirect cost, the past history of DFWP in protecting its Murphy rights and Yellowstone reservations shows that it is de minimus, and not significant in comparison to other quantified benefits and costs.

In summary, the benefits of granting all instream flows exceed the indirect costs to foregone irrigation and all other direct and indirect costs. This identifies the optimal set of reservation requests with the greatest net benefits. Consequently, there are no other reasonable alternatives with greater net benefits. ARM 36.16.107B(4)(c).

However, future new water use permits will incrementally cause an irretrievable loss of water quality, fisheries, and opportunities for recreation if instream flows are not protected with water reservations. ARM 36.16.107B(4)(d). The competing conservation district projects demonstrate the likelihood of this loss.

Significant adverse impacts to public health, welfare and safety must be considered as a factor. ARM 36.16.107B(4)(e). Many of the conservation district projects will have adverse impacts on aquatic life by further dewatering streams already dewatered by existing water uses. These impacts will be severe on the Jefferson River, the Boulder River, the Missouri above Canyon Ferry Reservoir, the Smith River, the Sun River, the lower reaches of Belt Creek, the Marias River and the Teton River. In addition, the cumulative impact of all the proposed projects above Canyon Ferry Reservoir could lower reservoir levels four to six feet in the driest year. Consumptive use reservations in the Missouri River Basin will increase the concentration of arsenic in the Missouri River and adjacent ground water systems. This will aggravate the substantial health risk that already exists from arsenic concentrations in the Missouri River. On the other hand, the impacts of instream flows to public health, welfare and safety are positive and beneficial.

The unquantified benefits and costs and other factors involved in the public interest criteria weigh significantly in favor of protecting instream flow values. The benefit of providing a legal baseline or minimum protection of the aquatic and riparian ecology of many of Montana's most significant waterways is enormous. Benefits to society do not depend solely on the extent they can be described directly in economic benefits to people. Preserving our natural and wild heritage for ourselves and the future is reason enough to do so. It is fortunate in this process that the strictly economic benefits lend full support to a decision to help protect the irreplaceable natural treasures of the most wondrous of Montana's streams and rivers.

Management Plans. DFWP has a management plan for measuring, protecting and reporting on instream uses as required by ARM 36.16.107B(7). This plan is based on the DFWP's experience with monitoring and protecting its Yellowstone reservations and Murphy rights.

The adequacy of DFWP's management plan does not seem to be in dispute. However, the manner in which instream flows will be monitored and measured deserves some emphasis. DFWP has applied for instream reservations for stream segments or "reaches". These reaches describe the lengths of streams or rivers where fisheries, wildlife and recreational values warrant protection. The needed flows were determined at a point on each reach, generally near the downstream end of the reach. The instream reservation will be measured and monitored at the point where the flow was derived or at some other point downstream but within the reach. The flow requested is the minimum flow needed in the stream at the point of its determination and does not represent the flow requirements throughout the length of the stream reach.

The monitoring of instream flows at a downstream point in the reach is a practical approach to protecting fisheries, wildlife and recreational values within the reach. However, the monitoring will only detect changes in flows at the point of monitoring. Changes in use, such as changes in points of diversion, occurring completely above the point of monitoring cannot, therefore, adversely affect the instream reservation unless more water is consumed. This eliminates most objections that have been made based on an assumption by objectors that instream reservations could prevent senior appropriators from changing a point of diversion upstream. There are limited but justified exceptions. A change in a point of diversion from a mainstem river to a tributary protected by a reservation would result in decreased flows at a monitoring point near the mouth of the tributary. This change could adversely affect the instream reservation on the tributary and DFWP could object to protect the tributary reservation.

In over twenty years of protecting Murphy rights and almost fourteen years of protecting Yellowstone basin reservations, DFWP has objected to only 8 changes in use. These objections prevented none of the changes, although one change application was withdrawn. Thus the impact on existing water rights has been negligible, if measurable at all.

For conservation district projects, the Board must find the project sponsor has the capability to feasibility finance the project with reasonable diligence as part of a management plan. ARM 36.16.107B(7). Only those projects that are at least marginally feasible financially can meet this requirement.

__Affect on Existing Water Rights.__ The Board must find that a proposed water reservation, as stated in Section 85-2-316(9)(e), MCA, "may not adversely affect any rights in existence at that time." See also, ARM 36.16.107B(8).

This requirement is met by instream reservation requests. The instream reservations cannot adversely affect existing water users because no water is removed or consumed. The instream reservations will only preserve the present status quo of stream flows against future additional consumptive uses of water that would erode or further erode the minimum instream flows needed for healthy fisheries. They do not compete with other instream uses, but would be complementary or concurrent uses of the same water. Instream flow rights are not additive.

Nearly all of the conservation district projects will most likely adversely affect existing water rights. Although this determination cannot be conclusively made until the final adjudication of existing rights, the claims of existing water users are sufficient to prevent the Board from concluding there will be no adverse affect. Therefore, the granting of any new irrigation reservations must be conditioned on a determination of water availability, which will not be known until the statewide adjudication process is complete.

A number of claimed water rights are particularly controlling. If MPC's largest claimed water right of 10,000 cfs for hydropower generation at Cochrane Dam is adjudicated as claimed, future consumptive uses upstream will be severely limited. Water would be available in only about one year in ten during April through July and about five years in ten during May and June. Water would not be available from August through March. The BUREC has substantial claimed water rights at Canyon Ferry. Irrigation projects above Cochrane Dam and Canyon Ferry will potentially adversely affect existing water rights except when water is spilling over the dams.

The large proposed irrigation project on the Madison River, GA-201, will adversely affect DFWP's claimed Murphy right on the Madison in six years out of ten. The Virgelle project of the BUREC will adversely affect BLM's claimed reserved rights in the Wild and Scenic portion of the Missouri River unless the project is conditioned on the maintenance of these instream flows. BUREC has acknowledged any reservation granted for the Virgelle project should be junior in priority to the instream flows in the Wild and Scenic portion of the Missouri River. The instream reservation requests of DFWP in reaches 5 and 6 of the Missouri are essentially identical to BLM's claimed reserved rights and would also be protected by conditioning the reservation for the Virgelle project.

Reservations for the conservation district irrigation projects cannot be granted unless they are conditioned to existing water rights and conditioned to a determination of water availability through the statewide adjudication process.

CONCLUSION

The instream reservation requests of DFWP meet all of the criteria established in the reservation statute and implementing Board rules, are in the public interest in themselves and when compared to competing consumptive use irrigation projects, are complementary to the instream reservation requests of DHES and BLM, and cannot adversely affect existing water rights. They should be granted subject only to the municipal reservations. The reservation requests for conservation district irrigation projects are not in the public interest when compared to the competing instream reservation requests of DFWP and DHES, will most likely impact existing water rights, and the projects that are not at least marginally financially feasible are not likely to be pursued. Reservations for these projects should not be granted except for projects that are at least marginally financially feasible and whose potential competition with instream reservations is not substantial. These latter projects could be granted in the public interest if they are junior to the instream reservations. The BUREC project at Virgelle could be granted if it is conditioned to instream flows and does not violate water quality standards. The City of Bozeman has not yet demonstrated a need for the amount of its reservation request, but the reservation could be granted subject to appropriate conditions.

This Board, at long last in the management of water in Montana, has an opportunity to protect the natural and wild heritage of our rivers and streams in the basin.

As Bill Thomas, in his poem "The River", cautions and advises:

> Before there was man, there was the river...
> a complete ecosystem...
> a vital link to creation.
> Whenever we endanger the quality of our river,
> we indeed are doing great harm to ourselves.

DATED: April 8th, 1992.

Department of Fish, Wildlife and Parks

By Robert N. Lane

Robert N. Lane
Chief Legal Counsel
Curtis E. Larsen
Agency Legal Counsel

CERTIFICATE OF SERVICE

I hereby certify that on the 8th day of April, 1992, the Montana Department of Fish, Wildlife and Parks' (Department) filed the attached DEPARTMENT OF FISH, WILDLIFE AND PARKS' BRIEF OF DFWP IN SUPPORT OF ITS INSTREAM APPLICATIONS AND IN OPPOSITION TO THE RESERVATION APPLICATIONS OF THE CONSERVATION DISTRICTS, THE BUREAU OF RECLAMATION AND THE CITY OF BOZEMAN . A copy was served by hand-delivering the original and two (2) true and accurate copies to:

Peter T. Stanley
% Department of Natural Resources and Conservation
1520 East Sixth
Helena, MT 59620

and by depositing true and accurate copies, postage prepaid, in the United States Post Office at Helena, Montana, to the following locations:

Loren Tucker
P.O. Box 36
Virgnia City, MT 59755

J. B. Anderson
112 S. Washington
Dillon, MT 59725

Gary Spaeth
111 N. Broadway Ave.
Red Lodge, MT 59068

Holly J. Franz
Gough, Shanahan, et. al.
P.O. Box 1715
Helen, MT 59624-1715

Monte J. Boettger
507 Montana Bldg.
Lewistown, MT 59457

Cindy Younkin
P.O. Box 1288
Bozeman, MT 59715

Ted J. Doney
P.O. Box 1185
Helena, MT 59601

Steve Brown
1313 11th Avenue
Helena, MT 59601

Paul B. Smith
P.O. Box 565
Boulder, MT 59632

James Hubble
P.O. Box 556
Standford, MT 59479

Mona Jamison
P.O. Box 1698
Helena, MT 59601

Dale Schwanke
P.O. Box 2269
Great Falls, MT 59403

Keith Strong
P.O. Box 1566
Great Falls, MT 59403

Carl Davis
P.O. Box 187
Dillon, MT 59725

W.G. Gilbert III
P.O. Box 235
Dillon, MT 59725

John Bloomquist
P.O. Box 1302
Dillon, MT 59725

John Chaffin
P.O. Box 31394
Billings, MT 59107

Robert N. Lane

Robert N. Lane
Chief Legal Counsel

149. The paddlefish, pallid sturgeon and sturgeon chub are all fish species residing in Reach #5 which are considered "Species of Special Concern". Pallid sturgeon and sturgeon chub are considered rare throughout their entire geographic range. (DFWP Exh. 29, p. 3).

150. Side channels are important fish habitats in Reach #5. A side channel is a channel diverging from the main channel and containing less than 20% of the river's flow. In reaches 4, 5 and 6, there are about 70 side channels ranging in length from 0.2 to 1.4 miles. (Gardner Obj., DFWP Exh. 5, p. 2).

151. Side channels in Reach #5 provide important rearing habitat for sauger, bigmouth and smallmouth buffalo and goldeye as well as spawning areas for buffalo. Side channels are also important for production of forage fish. (Gardner Obj., DFWP Exh. 5, p. 2).

152. Side channels become dewatered when water levels become too shallow to support fish or contain only pools which are disconnected from the main channel due to declining river flow. Sometimes only pools of standing water remain that can eventually dry up or become unsuitable for fish life due to high water temperatures and low dissolved oxygen. The loss of side channel habitat means less food production for fish and fewer numbers of species that depend on the side channels for rearing of young fish, notably the sauger. (Gardner Obj., DFWP Exh. 5, p. 2).

153. Riffle habitat is essential for forage food production which includes aquatic insects and small riffle fish such as sculpin, dace and stonecat. (Gardner Obj., DFWP Exh. 5, p. 2).

154. Considerable Canada goose nesting occurs in Reach #5. An average of 38% of the total nests surveyed between Fort Benton and Fort Peck Reservoir were in Reach #5. Flow levels around goose-nesting islands determine whether the nests will have protection from mammalian predators. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-31 and 3-32).

155. Missouri River Reach #6 extends from the Judith River to the upper end of Fort Peck Reservoir. An exceptional warmwater fishery is found in this reach. Paddlefish, sauger, shovelnose sturgeon and channel catfish are the predominant game fish species found throughout the reach. Burbot also occur. (Berg Dir., DFWP Exh. 29, p. 4).

156. Six paddlefish spawning areas have been identified in Reach #6 in the vicinities of Holmes Rapids, Dauphine Rapids, Bullwhacker Creek, Cow Island, Two Calf Islands, and Robinson Bridge. These spawning areas are critical for paddlefish recruitment into the sport fishery which occurs on the Charles M. Russell Game Range in the lower 20 miles of this reach. (Berg Dir., DFWP Exh. 29, p. 4).

157. There is a significant paddlefish sport fishery on the Charles M. Russell Game Range. Anglers come from a wide geographic area and the sport fishery is of statewide importance. (Berg Dir., DFWP Exh. 29, p. 4).

158. Paddlefish are a "Species of Special Concern" in Montana due to their limited distribution and limited habitat available, but not because of low abundance. Paddlefish populations in Montana are not being adversely affected by angler harvest because

overall angler success and the average size of paddlefish are not declining. (Berg Dir., DFWP Exh. 29, p. 4).

159. Missouri River Reach #6 also contains three other "Species of Special Concern" - the pallid sturgeon, sicklefin chub, and sturgeon chub. All three are rare throughout their geographical range and the pallid sturgeon is a federally endangered species. (Berg Dir., DFWP Exh. 29, pp. 4-5).

160. Twenty-three non-game species have been identified in Reach #6. Blue sucker, smallmouth buffalo, bigmouth buffalo, and fresh water drum are four non-game migratory species that are dependent on high spring flows in the Missouri River for successful reproduction. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-35).

161. Side channels in Reach #6 are important for forage fish production and rearing areas for sauger, goldeye, smallmouth buffalo and bigmouth buffalo. Water level conditions in side channels are related to main river flow. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-36).

162. Paddlefish residing in Fort Peck Reservoir and the Missouri River require a flow of 15,302 cfs in Reach #6 to initiate their annual spring spawning migration from May 19 through July 5. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-37; Berg Dir., DFWP Exh. 29, p. 6)

163. A fair amount of Canada goose nesting occurs on the Missouri River in Reach #6. An average of 13% of the total nests surveyed between Fort Benton and Fort Peck Reservoir are within this reach. Flow levels around goose-nesting islands determine whether the nests will have protection against mammalian predators.

The goose-nesting period is March 15 - June 1. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-36 and 3-37).

Hauser/Holter Reservoir Sub-basins

164. DFWP has requested instream flow reservations on ten Missouri River Basin tributaries between Canyon Ferry and Holter dams. These streams are: Spokane Creek, McGuire Creek, Trout Creek, Prickly Pear Creek, Sevenmile Creek, Tenmile Creek, Silver Creek, Beaver Creek, Willow Creek, and Cottonwood Creek. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-39 to 3-81).

165. Spokane Creek, McGuire Creek and Trout Creek are all spring-like streams that flow into Hauser Lake. Spokane Creek contains brown and rainbow trout, kokanee and mountain whitefish. Brown trout, kokanee and mountain whitefish migrate from Hauser Reservoir into Spokane Creek to spawn. McGuire Creek contains brown and rainbow trout and kokanee. The creek also provides important spawning habitat for rainbow and brown trout and kokanee migrating from Hauser Reservoir. Trout Creek contains brown and rainbow trout, kokanee and mountain whitefish. The stream contains good populations of resident brown and rainbow trout. In addition, Trout Creek is a spawning and rearing tributary for brown and rainbow trout and kokanee migrating from Hauser Reservoir. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-41, 3-42, 3-44, 3-47 and 3-48; Lere Dir., DFWP Exh. 14, p. 4).

166. Trout Creek is the most important tributary for spawning and rearing of kokanee, brown trout, mountain whitefish and rainbow trout that migrate from Hauser Reservoir. Spawning rainbow and

brown trout up to 9 pounds have been collected. It is also an important rearing stream for juveniles of these salmonids. Trout Creek also contains a good resident fish population of rainbow and brown trout. Bald eagles concentrate at the mouth of Trout Creek during the fall kokanee spawning season. Trout Creek is a designated public viewing area for the fall congregation of bald eagles. (Lere Dir., DFWP Exh. 14, pp. 5 and 6).

167. Silver Creek is a spring-like stream entering Lake Helena. It contains brown, rainbow and brook trout and kokanee. It also provides spawning and rearing habitat for these species which migrate from Hauser Reservoir and Lake Helena. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-67 and 3-68).

168. Prickly Pear Creek flows into Lake Helena. Sevenmile and Tenmile creeks are tributaries to Prickly Pear Creek. Tenmile and Sevenmile creeks provide fisheries for rainbow trout and brook trout. Brown trout are found in the lower portion of Tenmile Creek. Game fish populations in both streams are greater in upstream sections because of dewatering of the lower reaches. (Lere Dir., DFWP Exh. 14, p. 8; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-59 through 3-60 and 3-64 through 3-65).

169. Prickly Pear Creek Reach #1 (Rabbit Gulch to East Helena) supports a relatively good resident trout population of rainbow and brown trout. The upper section of this reach contains a good brook trout population. In addition to the resident fishery, this reach also provides spawning habitat for rainbow and brown trout that migrate out of the Lake Helena - Hauser Reservoir complex. The reach has important recreational values due to its close proximity

to the Helena area. (Frazer Dir., DFWP Exh. 26, p. 21; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-52 and 3-53).

170. Prickly Pear Creek Reach #2 (East Helena to Lake Helena) supports a resident population of brown and rainbow trout. Brown and rainbow trout from the Lake Helena - Hauser Reservoir complex also migrate through this reach to spawn. It has a high recreational value because of its close proximity to Helena. (Frazer Dir., DFWP Exh. 26, p. 22; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-56).

171. Beaver Creek, Willow Creek and Cottonwood Creek are all tributaries to Holter Lake. Beaver Creek is the most important tributary for spawning and rearing of rainbow trout that migrate from Holter Reservoir as well as from the 3.5 mile section of Missouri River between Hauser Dam and Holter Reservoir. Extensive rainbow spawning occurs in Beaver Creek during the spring high flow period and they provide an excellent fishery at that time. Brown trout from the Missouri River occasionally use Beaver Creek for spawning in the fall. There are also resident populations of rainbow, brown and cutthroat trout which provide a good fishery in Beaver Creek. (Lere Dir, DFWP Exh. 14, p. 6; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-70 and 3-71).

172. Cottonwood and Willow creeks contain rainbow, brown and brook trout that provide a moderate fishery. Migrant rainbow and brown trout and kokanee from Holter Reservoir sometimes use these two streams for spawning. (Lere Dir., DFWP Exh. 14, p. 7; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-74, 3-75, 3-78 and 3-79).

Little Prickly Pear Creek Sub-basin

173. Reach #1 of Little Prickly Pear Creek (Canyon Creek to Clark Creek) supports a good resident trout population consisting of brown, rainbow and brook trout, and mountain whitefish. Brown trout are the dominant trout species. The lower end of Reach #1 also provides important spawning and rearing habitat for the extremely popular Blue Ribbon trout fishery in the Missouri River below Holter Dam. (Frazer Dir., DFWP Exh. 26, DFWP, p. 13).

174. An estimated 15,000 rainbow trout spawn in Little Prickly Pear Creek. There is also a large, unquantified brown trout spawning run. (Leathe Dir., DFWP Exh. 20, p. 7; Frazer Dir., DFWP Exh. 26, p. 15).

175. Reach #2 of Little Prickly Pear Creek (Clark Creek to mouth) supports a resident trout fishery dominated by rainbow trout, with lesser numbers of brown trout and brook trout. It is an important recreation area between Helena and Great Falls and supports heavy public use. (Frazer Dir., DFWP Exh. 26, p. 14).

176. Reach #2 of Little Prickly Pear Creek also provides important spawning and rearing habitat for rainbow and brown trout that migrate out of the Missouri River. A majority of the spawning and rearing occurs in Reach #2. (Frazer Dir., DFWP Exh. 26, pp. 14 and 15).

177. Virginia Creek, Canyon Creek, Lyons Creek and Wolf Creek are tributaries to Little Prickly Pear Creek. These four streams have resident fish populations consisting of rainbow, brown and brook trout. Lyons Creek and Wolf Creek also are important spawning streams for migratory rainbow and brown trout from the

Missouri River and Little Prickly Pear Creek. Rearing of the young fish from these migratory spawners also occurs in these streams. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-101 through 3-107; Frazer Dir., DFWP Exh. 26, pp. 17, 28 and 39).

178. Virginia and Canyon Creeks contain resident populations of brook, rainbow and brown trout. Brook trout comprise 76% of the population in Virginia Creek. Rainbow trout make up 49% of the population in Canyon Creek, with brook and brown trout equally providing the remaining 51%. These two streams provide moderate to good fisheries for these resident salmonids. The Canyon Creek fishery is very popular with local anglers. (Lere Dir., DFWP Exh. 14, p. 8; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-93 through 3-98).

Dearborn River Sub-basin

179. The Dearborn River is a tributary to the Missouri River below Holter Dam and is one of the most important trout streams in Montana. It is known to have good fishing for resident trout (mostly rainbow) in the 8-12 inch range, particularly in its upper reaches. Brown trout are found in the lower river and will average somewhat larger than the rainbow. Brook trout are present in the headwaters. The Dearborn provides up to 2,500 angler-days of fishing annually. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-118; Leathe Dir., DFWP Exh. 20, p. 5).

180. In addition to its resident fishery, the Dearborn is an important spawning tributary for rainbow trout that reside in the Missouri River. The results of a spring 1988 spawning survey indicated that the Dearborn River is the most important spawning

stream for rainbow trout which inhabit the Missouri River between Holter Dam and Cascade. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-119; Leathe Dir., DFWP Exh. 20, pp. 5 through 7).

181. Fish trapping and a helicopter survey of the Dearborn River in the spring of 1988 confirmed that large numbers of rainbow trout utilized the stream for spawning. Over 2,300 mature rainbow trout, averaging 14.9 inches in length, were captured and marked. It was estimated that approximately 20,000 rainbows use the Dearborn River for spawning. During the April helicopter survey of the lower 42 miles of the Dearborn, approximately 6,000 spawning nests (redds) were counted. Spawning rainbows were observed on many redds. Spawning areas were easily identified because of the abnormally low water and good visibility occurring under near-drought conditions. Most spawning was concentrated in the lower 30 miles of river. (Leathe Dir., DFWP Exh. 20, p. 6; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-118 and 3-119).

182. Tag returns by anglers fishing the Missouri River confirmed that the rainbow spawners in the Dearborn River were inhabitants of the Missouri River. (Leathe Dir., DFWP Exh. 20, p. 6).

183. Spawning habitat in the Dearborn River is critical to the perpetuation of the Missouri River fishery. The Dearborn is one of only three tributaries to the Missouri River where Missouri River fish spawn. The other two streams are Sheep Creek and Little Prickly Pear Creek, but the Dearborn is the most heavily used spawning stream. (Leathe Dir., DFWP Exh. 20, p. 7).

184. During the fall, a substantial mountain whitefish spawning run utilizes the Dearborn River. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-119).

185. Instream flow requests have been made for the Middle and South forks of the Dearborn River and Flat Creek. The Middle and South forks of the Dearborn both have very good rainbow trout populations. Numbers of rainbows longer than three inches range between 350 and 400 per thousand feet of stream. The Middle Fork contains rainbows up to 16 inches long. Rainbow trout from the Dearborn River also use the Middle and South Forks for spawning only in their lower reaches. Beaver dams apparently limit upstream fish migration of these 12-16 inch fish. This size fish is uncommon in these streams and no such sized fish were observed above beaver dam barriers in the stream. (Leathe Dir., DFWP Exh. 20, p. 8).

186. Flat Creek has relatively low trout populations but is the most heavily fished of the three tributary streams. Fishing pressure is approximately 340 angler-days per year. Flat Creek contains rainbow, brook and brown trout, and mountain whitefish. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-130 and 3-131).

187. Wegner Creek and Stickney Creek are tributaries to the Missouri River near the town of Craig. The lower reaches of both streams are intermittent and flows only reach the Missouri River during spring runoff periods. Although both streams support resident rainbow trout populations in upstream sections, their principal value lies in their being spawning streams. During spring runoff, both streams are important spawning streams for

Missouri River rainbow trout when flows are available. When natural spring flows occur during good water years, spawning rainbow trout are able to migrate through the normally dewatered sections and reach the perennial flowing sections upstream. (Frazer Dir., DFWP Exh. 26, pp. 26 and 27; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-109, 3-110, 3-112 and 3-113).

<u>Sheep Creek (Missouri River)</u>

188. Sheep Creek flows directly into the Missouri River near Cascade 24 miles downstream from Holter Dam. It is a critically important spawning stream for rainbow trout that reside in the Missouri River. (Leathe Dir., DFWP Exh. 20, p. 9).

189. Approximately 3,500 to 4,400 rainbow spawners, averaging about 16 inches long, migrate into Sheep Creek each year to spawn. Brown trout and mountain whitefish also migrate from the Missouri River to spawn in Sheep Creek. (Leathe Dir., DFWP Exh. 20, p. 9).

190. Tag returns by anglers fishing the Missouri River show that spawning rainbow in Sheep Creek inhabit the Missouri River from four miles upstream to 15 miles downstream from the mouth of Sheep Creek. Sheep Creek is the most important spawning area for rainbows residing in this portion of the Missouri River. (Leathe Dir., DFWP Exh. 20, p. 10).

191. Sheep Creek contains a resident population consisting of rainbow, brown and brook trout and provides up to 800 angler-days of use each year. However, its principal importance is as a spawning tributary for the Missouri River. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-134 and 3-135).

Smith River Sub-basin

192. The Smith River is one of the most popular trout fisheries in the state. An average of over 12,000 anglers per year fished the Smith River with about two-thirds of the use above the mouth of Hound Creek. The Smith River has been managed as a wild trout fishery since trout stocking was discontinued in 1974. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-142 and 3-143).

193. Three stream reaches have been established by DFWP on the Smith River. Rainbow, brown, brook and cutthroat trout and mountain whitefish and burbot are present in all three reaches. Rainbow trout are the predominant species present in all three reaches, followed by brown trout and whitefish. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-143, 3-146 and 3-149).

194. The most popular fishing on the Smith River is the 60-plus mile scenic floating section between Camp Baker (at the mouth of Sheep Creek) and Eden Bridge (below Hound Creek). Fishing comprises one of the most important activities while floating this stretch of river. Access to this reach is gained almost exclusively by floating. Floating is currently limited to about mid-April through the first week in July in an average water year. When streamflow at the USGS gauge above Sheep Creek at Camp Baker is 100 cfs or less, floating becomes difficult and interest drops off. Sheep Creek contributes flow just below the boat launch site and this flow is necessary to successfully float when the Smith River above Sheep Creek reaches its minimum level of 100 cfs. (Spence Obj., DFWP Exh. 4, p. 6; Wipperman Dir., DFWP Exh. 21, p. 3; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-143).

195. An instream flow in the Smith River will maintain the existing rainbow and brown trout populations in the river and maintain habitat for spawning and rearing of game fish and the production of aquatic food organisms used by rainbow and brown trout. Maintenance of existing habitat and trout populations will continue to provide a quality experience for outdoor recreation associated with the river. (Wipperman Dir., DFWP Exh. 21, p. 3).

196. DFWP has filed instream flow requests on 10 tributaries to the Smith River. These are the South Fork Smith River, North Fork Smith River, Newlan Creek, Big Birch Creek, Sheep Creek, Eagle Creek, Rock Creek, Tenderfoot Creek, North Fork Deep Creek and Hound Creek. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-151 through 3-186).

197. All of the 10 Smith River tributaries support significant trout populations and comprise an important fishery resource. Most of the streams provide a few hundred days of fishing recreation each year and a few sustain more than one thousand angler-days in some years. (Leathe Dir., DFWP Exh. 20, p. 3).

198. Rainbow and brook trout tend to predominant in the Smith River tributaries, with the largest fish typically ranging from 11-14 inches long. Brook trout populations are especially high in the South Fork Smith River, Big Birch Creek and in Newlan Creek. Sheep Creek has an exceptional rainbow trout population above Moose Creek with more than 900 fish per 1,000 feet of stream. Rock Creek and Tenderfoot Creek also have outstanding rainbow and/or hybrid cutthroat trout populations. Eagle Creek supports populations of

rainbow, cutthroat and brook trout. (Leathe Dir., DFWP Exh. 20, p. 3).

199. The North Fork of Deep Creek contains a genetically pure westslope cutthroat trout population (a "Species of Special Concern" in Montana). This is the only species occupying the reach of stream where instream flows have been requested. Rock outcrops form natural barriers that prevent the upstream migration of hybrid cutthroat trout from the South Fork into the North Fork of Deep Creek. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-182).

<u>Sun River Sub-basin</u>

200. Sun River Reach #1 begins at Diversion Dam below Gibson Reservoir and flows for 32 miles downstream to the confluence of Elk Creek. The present trout fishery is rated as fair and there has been a considerable amount of angler use over the years. Rainbow and brown trout and mountain whitefish are the principal game fish species in Reach #1. Brown trout become more abundant in the lower portion of this reach. Sizes of trout and whitefish are about average compared to other populations in the state. (Gardner Dir., DFWP Exh. 36, p. 3; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-192).

201. Reach #1 of Sun River contains brown trout and whitefish which average about 11 inches in length, with some brown trout reaching up to 23 inches; rainbow trout average about 8 inches with some specimens reaching nearly 18 inches in length. Reach #1 of the Sun River experiences severe dewatering during the summer irrigation season. Inadequate streamflows and elevated water

temperatures have suppressed the trout fishery in this reach. There is an excellent potential for improving the fishery if adequate instream flows could be provided. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-192).

202. Sun River Reach #2 extends from Elk Creek to the mouth. The present fishery is rated as fair for the majority of this section and there has been a considerable amount of angler-use over the years. Brown and rainbow trout, mountain whitefish, northern pike and burbot are found in this reach. Brown trout are the most abundant game fish. Whitefish are fairly common in the upper half of the reach, while rainbow trout are uncommon in the lower river. A small population of northern pike and burbot reside in the lower 25 miles of this reach. The average size of brown and rainbow trout and whitefish are 14 inches, 12 inches and 10 inches, respectively, with some brown trout reaching 23 inches in length and some rainbow reaching 17 inches. The brown trout population is well represented by large-sized fish. Rainbow trout and whitefish sizes are about average compared to other populations in the state. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-195; Gardner Dir., DFWP Exh. 36, p. 3).

203. DFWP has requested instream flows on four tributaries to the Sun River. These are North Fork Willow Creek, Willow Creek, Ford Creek and Elk Creek. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-198 through 3-209).

204. The principal fish species in these four tributaries are brook trout, followed by rainbow and brown trout. Brook trout comprise 100% of the game fish in North Fork Willow Creek and

provide a good fishery for people in the local area. Brook trout range up to 12 inches in length. Willow Creek contains mostly brook trout with some rainbow trout also present. Brook trout can range up to 12 inches in length. A pure strain of westslope cutthroat trout, a "Species of Special Concern" in Montana, occurs in the upper reaches of Willow Creek. Ford Creek supports an excellent brook trout population and is an important fishery in the area. The fishery is approximately 90% brook trout and 10% rainbow and cutthroat trout. Brook trout up to 1.25 pounds have been recorded. Elk Creek has one of the most important trout fisheries in the Augusta area and includes rainbow, brown and brook trout. The brook trout are somewhat more abundant in the upper reaches. (Hill Dir., DFWP Exh. 35, pp. 4 and 5; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-198 through 3-209).

Belt Creek Sub-basin

205. Belt Creek Reach #1 (headwaters to Big Otter Creek) has a very good trout fishery. The fishery is comprised of rainbow, brown, brook and cutthroat trout and mountain whitefish. Rainbow trout are the predominant fish throughout the reach, followed by whitefish and brown trout. Cutthroat and brook trout are not as common in the mainstem as they are in some of the tributary streams and headwater areas. Average size of rainbow and brown trout and whitefish is 7 inches, 10 inches and 13 inches, respectively. Belt Creek receives a substantial amount of fishing pressure due to its convenient access and close proximity to Great Falls. Approximately 8,000 angler-days of use has occurred annually in

recent years. Approximately 3,000 catchable rainbow trout are stocked annually in the lower end of Reach #1 because an adequate self-sustaining trout population cannot be maintained. (Gardner Dir., DFWP Exh. 36, p. 3; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-214 and 3-215).

206. Belt Creek Reach #2 (Big Otter Creek to Missouri River) has a moderate cold water and warm water fishery. Fish species present include sauger, rainbow trout, brown trout and mountain whitefish. A marginal resident trout fishery exists in this reach because of low stream flows, high temperatures and siltation. Rainbow trout are the most common species found. Brown trout occur throughout the reach but in fewer numbers. Some spawning by rainbow and brown trout from the Missouri River occurs in Belt Creek during their spawning seasons. Mountain whitefish also migrate into Belt Creek from the Missouri River to spawn. Sauger migrate up Belt Creek from the Missouri River during the late spring and reside in the stream until fall as long as flow conditions are adequate. Sauger range from 12-16 inches in length. (Gardner Dir., DFWP Exh. 36, p. 3; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-217).

207. DFWP has requested instream flows on five tributaries to Belt Creek. These are: Dry Fork Belt Creek, Tillinghast Creek, Pilgrim Creek, Logging Creek and Big Otter Creek. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-220 through 3-238).

208. These five Belt Creek tributary streams contain various mixtures of rainbow, cutthroat, brown and brook trout. The maximum sizes range from about 9 inches for rainbow trout up to 19 inches

for brown trout. Brook and cutthroat trout reach sizes of 13 inches and 10 inches, respectively. Dry Fork Belt Creek populations appear to be less abundant than those of nearby streams due in part to the toxic affect of heavy metals pollution from old mines. However, good instream flows and habitat conditions occur and there is a good potential for trout fishery restoration when these abandoned mines are reclaimed. Tillinghast Creek has a very good trout fishery with a light amount of angler use because of its remote location and somewhat restricted access. Brook trout are the most abundant game fish. Pilgrim Creek is unique because the trout population is comprised entirely of cutthroat trout. Cutthroat numbers are very good and the fishery receives a moderate amount of angler use. Logging Creek has a very good trout fishery with a moderate amount of angler use. Brook trout are the most abundant game fish, followed by rainbow and brown trout. Total numbers of brook and rainbow trout were 1,183 trout per mile, an abundant fish population for small streams in this area. Fishing pressure is moderate, except where considerable use occurs at a forest service campground. Big Otter Creek has an uncommon spring-like aquatic system and a good trout fishery containing exceptionally large-sized brown trout for a creek of this size. Brown trout are the predominant fish found throughout Big Otter Creek, followed by brook and rainbow trout. The stream receives a considerable amount of angler use. (Gardner Dir., DFWP Exh. 36, pp. 3 and 4; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-220 through 3-246).

Highwood Creek

209. Highwood Creek is a tributary to the Missouri River. This creek has an excellent trout fishery and considerable fishing pressure. Brook, rainbow, cutthroat and brown trout occupy the stream, with brook trout being the predominant fish throughout the reach. Rainbow trout are common but less numerous. Cutthroat trout are confined to the headwater areas and brown trout have been noted only in the lower portions of the reach. Brook and rainbow trout reach 11 and 12 inches in length, respectively. (Gardner Dir., DFWP Exh. 36, p. 4; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-239 and 3-240).

Shonkin Creek

210. Shonkin Creek is a Missouri River tributary that has an excellent trout fishery consisting primarily of brook trout and a few rainbow trout. This productive creek is one of only two principal trout streams found in Chouteau County and receives a fair amount of angler use, mostly by local residents. There are an estimated 1,890 brook trout per mile of stream, an especially abundant fish population for streams in this area. (Gardner Dir., DFWP Exh. 36, p. 4; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-244).

Marias River Sub-basin

211. Reach #1 of the Marias River (above Tiber Reservoir) has a fair warmwater fishery and is an important spawning stream for walleye from Tiber Reservoir. Some coldwater species (rainbow trout and mountain whitefish) also inhabit this reach, but are in lower numbers. Other species include burbot, northern pike and

channel catfish. Walleye up to 28 inches in length, whitefish up to 17 inches, rainbow up to 22 inches, burbot up to 16 inches and northern pike up to 33 inches have been found in this reach. (Gardner Dir., DFWP Exh. 36, p. 6; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-253).

212. The average walleye size in Marias River Reach #1 is fairly large for a river population. The river reach also provides rearing habitat for young walleye. Large rainbow trout (average of 2 pounds) occupy the river mainly in the spring and early summer, preferring Tiber Reservoir during the rest of the year. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-253).

213. Angler use of Marias River Reach #1 is moderate to light, most likely due to its remote and fairly inaccessible location. (Gardner Dir., DFWP Exh. 36, p. 6; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-254).

214. Marias River Reach #2 from Tiber Dam to Circle Bridge on Highway 223 consists of a 21-mile cold water trout fishery that produces trophy-sized brown trout. Deep, cold water releases from Tiber Dam provide conditions that are favorable for rainbow and brown trout. Stream trout fisheries are uncommon in northcentral Montana and the Marias river is, therefore, of special value. This 21-mile tailwater fishery below Tiber Dam is the only trout stream within a 50-mile radius and receives a moderate amount of angler use. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-258; Gardner Dir., DFWP Exh. 36, p. 6).

215. Reach #2 of the Marias River contains mountain whitefish, rainbow trout, brown trout, sauger, walleye, northern pike, and

burbot. Whitefish are the most abundant game fish in the reach and occur in high numbers. Rainbow and brown trout occur in fair numbers and attain exceptionally large sizes. The other species occur in lower numbers. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-257).

216. Marias River Reach #2 contains rainbow trout up to 22 inches, brown trout up to 32 inches, sauger up to 22 inches, walleye up to 23 inches, northern pike up to 47 inches and burbot up to 32 inches in length. The reach also contains 14 nongame fish species. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-257 and 3-258).

217. Marias River Reach #3 extends from Circle Bridge to the mouth. This reach has an excellent resident and migratory warmwater fishery. Resident species include sauger, walleye, channel catfish and smallmouth bass. Migratory species from the Missouri River include shovelnose sturgeon, blue sucker, walleye, sauger and channel catfish. This reach contains sauger up to 22 inches, whitefish up to 17 inches, shovelnose sturgeon up to 43 inches, walleye up to 28 inches, channel catfish up to 31 inches, burbot up to 18 inches, and brown trout up to 16 inches in length. The maximum sizes of adult shovelnose sturgeon surpass most other known size data for the species and underscore the value of this high quality population. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-261 and 3-262).

218. Blue sucker, smallmouth buffalo, bigmouth buffalo, and fresh water drum are the migratory species found in Reach #3 of the Marias River during their spawning seasons. They reside in the Missouri River during the rest of the year. There are also 16

nongame fish which are residents of Reach #3. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-262).

219. The central location of the warmwater fishery in Marias River Reach #3 makes it especially attractive for residents of the western part of the state, where trout fishing is the major activity. The lower six miles of this reach receive intensive angling pressure during the spring spawning season. Moderate angler use occurs during the rest of the year. (Gardner Dir., DFWP Exh. 36, p. 7; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-262).

220. DFWP has requested instream flows on nine tributaries to the Marias River. These are: Birch Creek, South Fork Dupuyer Creek, North Fork Dupuyer Creek, Dupuyer Creek, South Badger Creek, North Badger Creek, Badger Creek, South Fork Two Medicine River and Cut Bank Creek. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-265 through 3-291).

221. These nine Marias River tributary streams contain mixtures of brook, rainbow, westslope cutthroat trout and mountain whitefish. In addition to those species, Cut Bank Creek contains brown trout and burbot. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-265 through 3-291).

222. South Fork Dupuyer, North Fork Dupuyer, South Badger, North Badger and Badger creeks, and South Fork Two Medicine River all contain westslope cutthroat trout, a "Species of Special Concern" in Montana. Westslope cutthroat trout are found mostly in the headwaters of these tributary streams which arise on the east slope of the continental divide. Westslope cutthroat comprise 100% of the fish populations in these streams above natural barriers

which prevent other species from mixing with these populations. (Hill Dir., DFWP Exh. 35, pp. 5 through 7; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-267 through 3-288).

223. Brook trout are the principal species in Birch Creek and Dupuyer Creek. Specimens up to one pound have been taken in Dupuyer Creek. These two streams also contain rainbow trout and whitefish. (Hill Dir., DFWP Exh. 35, pp. 5 and 6; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-265, 3-266 and 3-275).

224. Cut Bank Creek is an important fishery because it is the only trout stream readily available to persons in the Cut Bank area. Brown trout, introduced in 1965, have established a self-sustaining population. Catchable rainbow trout are stocked annually to supplement a few wild rainbow. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-290).

Teton River Sub-basin

225. The Teton River basin supports an abundance of fish and wildlife that provides good fishing and hunting. Native westslope cutthroat trout are found in headwater streams. Rainbow, brook and brown trout occur in the middle to upper reaches of several streams, while sauger, burbot, channel catfish and northern pike are found in the lower Teton River. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-294).

226. DFWP has requested an instream flow in the Teton River only from its headwaters to the discharge from Priest Butte Lake near Choteau. Brook, brown and rainbow trout, and mountain whitefish are the principal game fish in this reach, with the

latter three providing a significant fishery in the lower portion of the reach. (Hill Dir., DFWP Exh. 35, p. 8; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-295).

227. The Teton River provides a trout fishery for the people in the local area. Above Choteau, 90% of the fishery is small brook trout with fewer numbers of brown and rainbow trout and mountain whitefish. These are mostly pan-sized fish. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-296).

228. Below Choteau, the fishery is mostly brown trout, followed by whitefish and rainbow trout. Brown trout up to 22 inches, whitefish up to 21 inches and rainbow trout up to 18 inches in length have been taken in this reach. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-296 and 3-297).

229. DFWP has requested instream flows on five tributaries to the Teton River. These are: McDonald Creek, South Fork Deep Creek, North Fork Deep Creek, Deep Creek and Spring Creek. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-300 through 3-312).

230. McDonald Creek provides a good fishery for small brook trout, the only game species present. South Fork Deep, North Fork Deep, Deep and Spring creeks contain both brook and rainbow trout. Deep Creek also contains brown trout up to 14 inches in length, as well as whitefish. Westslope cutthroat trout are also found in South Fork Deep, North Fork Deep and Deep creeks. (Hill Dir., DFWP Exh. 35, pp. 8 through 9; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-300 through 3-312).

231. Spring Creek is very important to the community of Choteau because it flows right through town. Annual plants of

catchable rainbow trout are made within the town of Choteau for a children's fishing area. (Hill Dir., DFWP Exh. 35, p. 9).

Judith River Sub-basin

232. The Judith River is the third largest tributary to the Missouri River between Canyon Ferry Dam and Fort Peck Reservoir. It is a popular recreation area for fishing, hunting, picnicking, hiking and floating. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-315 and 3-316).

233. Judith River Reach #1 (South and Middle forks to Big Spring Creek) has a very good trout fishery that receives a considerable amount of angler use. Large brown trout are found in this reach during the fall spawning season. Brown trout are the predominant game fish, followed by mountain whitefish and rainbow trout. An excellent population of brook trout exists in the upper portion of Reach #1. Low numbers of cutthroat trout also occur in the upper portion of this reach. (Gardner Dir., DFWP Exh. 36, p. 5; DFWP 72155-41A, Bd. DFWP Exh. 37-A.3, p. 3-317).

234. The upper portion of Judith River Reach #1 contains an estimated 1,420 trout per mile, which is an abundant fish population for streams typical of this area. Brook trout up to 13 inches, brown trout up to 20 inches, and rainbow trout up to 15 inches in length have been taken in this reach. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-317).

235. Judith River Reach #2 (Big Spring Creek to its mouth) has a fair fishery for both warmwater and coldwater species. It is an important spawning tributary for Missouri River channel catfish.

Other game fish species present include sauger, mountain whitefish, brown trout, rainbow trout, smallmouth bass, walleye, cisco and burbot. (Gardner Dir. DFWP Exh. 36, p. 5; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-320).

236. In Judith River Reach #2, sauger and channel catfish are the most abundant game fish. Sauger up to 24 inches and channel catfish up to 32 inches in length are present. Twelve nongame species also occur in this reach. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-320).

237. The lower Judith River (Reach #2) has a diverse fishery which reflects the variety of habitat conditions present and the transition from a coldwater to a warmwater environment. This reach receives only a light amount of fishing pressure, most likely due to its remote and fairly inaccessible location. (Gardner Dir., DFWP Exh. 36, p. 5; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-321).

238. DFWP has requested instream flows on nine tributaries to the Judith River. These are: South Fork Judith River, Lost Fork Judith River, Middle Fork Judith River, Yogo Creek, Big Spring Creek, East Fork Big Spring Creek, Beaver Creek, Cottonwood Creek and Warm Spring Creek.

239. South Fork Judith, Lost Fork Judith, Middle Fork Judith and Yogo creeks, all of which are headwater tributaries to the Judith River, contain very good to fair populations of pan-size rainbow, brook and cutthroat trout and mountain whitefish. Rainbow and brook trout are predominant. Middle Fork Judith River also contains a few brown trout. (Gardner Dir., DFWP Exh. 36, pp. 5 and 6; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-324 through 3-338).

240. South Fork Judith River receives a considerable amount of angler use, whereas Middle Fork, Lost Fork and Yogo creeks receive moderate to light fishing pressure. (Gardner Dir., DFWP, Exh. 36, pp. 5 and 6; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-324 through 3-338).

241. Big Spring Creek is one of the largest spring-fed streams in the state. The majority of the flow originates from a large spring located approximately nine miles southeast of Lewistown. The stream is high in dissolved solids, exceptionally productive and, for its size, rated as one of Montana's finest fishing waters. Local sportsmen and tourists consider the stream to be the most important trout stream in central Montana. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-341, 3-342 and 3-343).

242. The productive nature of Big Spring Creek is due to stable year-round flows provided by the large spring; stable water temperatures in the mid-50's at the spring which provide optimum trout growth; productive water rich in dissolved solids from underground limestone formations which provide for good food production and fish growth; and the relatively stable banks, stream channel and well-developed riparian zone which provide trout habitat. (Poore Dir., DFWP, Exh. 15, p. 3).

243. Big Spring Creek Reach #1 (from the state fish hatchery to Cottonwood Creek) contains primarily rainbow and brown trout with rainbow making up a majority of the population. A few brook trout and whitefish also occur. Up to 245 rainbow trout per mile 15 inches and longer, and up to 125 brown trout per mile 15 inches and longer, have been found in Big Spring Creek. Reach #1 has also

produced many fish over 10 pounds and several between 18 and 20 pounds. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-343 and 3-344; Poore Dir., DFWP Exh. 15, p. 3).

244. Big Spring Creek Reach #1 receives substantial angler use. Between 1982-86, an average of 11,000 angler-days of use occurred on this reach. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-344).

245. Big Spring Creek Reach #2 (from Cottonwood Creek to the mouth) contains brown trout, rainbow trout, mountain whitefish and sauger. Whitefish are the most common salmonids, followed by rainbow and brown trout. Sauger are found in this reach when they move in from the Judith River, probably to spawn. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-347).

246. Fishing pressure on Big Spring Creek Reach #2 is much less than Reach #1, but still substantial. An average annual use of 3,200 angler days occurred between 1982-86. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-347).

247. DFWP has requested instream flows on three tributaries to Big Spring Creek. These are: East Fork Big Spring Creek, Beaver Creek and Cottonwood Creek. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-350 through 3-360).

248. These three Big Spring Creek tributaries contain pan-size rainbow, brook and brown trout. Rainbow are the predominant fish in the East Fork, brook trout in Beaver Creek and brown trout in Cottonwood Creek. Brown trout up to 17 inches and two pounds have been taken from Beaver Creek. All three streams have good to moderate trout fisheries with moderate to light angler use.

(Gardner, Dir., DFWP Exh. 36, p. 5; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-350 through 3-360).

249. Warm Spring Creek flows directly into the Judith River and has the potential to provide one of the best smallmouth bass fisheries in the state. Because of its productivity and diversity of fish and invertebrate species, Warm Spring Creek is one of the most unique streams in the state. (Poore Dir., DFWP Exh. 15, p. 6).

250. To some degree, the same factors which make Big Spring Creek so productive also apply to Warm Spring Creek: Stable stream flow, stable water temperatures, high dissolved solids and channel and bank stability. (Poore Dir., DFWP Exh. 15, pp. 6 and 7).

251. Warm Spring Creek contains rainbow, brown and brook trout, smallmouth bass, sauger and channel catfish. Rainbow are the most abundant game fish. Brown trout are less abundant but reach larger size (up to 20 inches and averaging 17 inches). (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-363).

252. Warm Spring Creek also contains smallmouth bass which are growing well and reproducing. Smallmouth bass were introduced because water temperatures are somewhat excessive for natural reproduction of rainbow and brown trout. The lower end of Warm Spring Creek also contains sauger and channel catfish which originate from the Judith River. (Poore Dir., DFWP Exh. 15, p. 6).

253. Warm Spring Creek receives an average of 1,200 angler days per year. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-364).

Cow Creek

254. Cow Creek is a northern tributary to the Missouri River. DFWP has requested flows on two miles of Cow Creek from the confluence of the North and South forks to the county bridge near T.U. Reservoir. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-367).

255. Brook trout are the only game fish present in this reach of Cow Creek. However, they occur in large numbers (4,187 fish per mile). Brook trout are mostly pan-size but range up to 12 inches in length. (DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-367 and 3-368).

256. This reach of Cow Creek provides year-round habitat for brook trout as well as being the primary spawning areas for fish inhabiting downstream beaver ponds. Cow Creek has an excellent trout fishery and fishing pressure is light. (Gardner Dir., DFWP Exh. 36, p. 4; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-368).

Musselshell River Sub-basin

257. The Musselshell River is 364 miles long and is one of Montana's longest rivers. It is characterized by three fishery habitat types: 1) coldwater in the upper 55 miles; 2) coldwater/warmwater transitional zone for 146 miles; and 3) a classic warmwater prairie stream for 163 miles. Each reach has unique fishery qualities. (Fredenberg Dir., DFWP Exh. 27, pp. 2 and 3).

258. Musselshell River Reach #1 (from the confluence of the North and South forks to Deadmans Basin Diversion Dam) is a brown trout stream with abundant bank cover, deep pools and a dense riparian zone. Historically, when sufficient flows are present,

Musselshell Reach #1 has provided large fish, with brown trout over five pounds not uncommon. Drought conditions between 1985 and 1988 produced a decline in the brown trout population. (Fredenberg Dir., DFWP Exh. 27, p. 3; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-376).

259. The fishery potential of Musselshell Reach #1, given adequate flows, could be similar to the fishery of the East Gallatin River. In the East Gallatin, trout populations commonly reach 400-500 trout per 1,000 feet of stream, with individual brown trout weighing up to 10 or 12 pounds. Currently, Musselshell Reach #1 is achieving much less than half of its potential. (Fredenberg Dir., DFWP Exh. 27, p. 4).

260. Musselshell River Reach #2 (a 146-mile section from Deadmans Basin Diversion downstream to Musselshell Diversion) is a transitional zone between a coldwater and warmwater fishery. The trout fishery found in Reach #1 ends abruptly below Deadman's Diversion due to chronic dewatering and trout are, therefore, not a factor in the fishery of this reach. (Fredenberg Dir., DFWP Exh. 27, p. 4).

261. In Musselshell Reach #2, smallmouth bass are presently the most important game fish. A very poor fishery exists throughout Reach #2 due to dewatering and water quality degradation. (Fredenberg Dir., DFWP Exh. 27, p. 5; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-383).

262. Musselshell Reach #2 contains a peculiar minnow, the northern redbelly dace x finescale dace hybrid, which is classified as a "Species of Special Concern" in Montana due to its limited

numbers and habitat. This hybrid fish is a parthenogenetic species, which means that all of the individuals are female and they reproduce exact clones of the mother through development of an unfertilized egg. (Fredenberg Dir., DFWP Exh. 27, p. 5; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-383).

263. Musselshell River Reach #3 extends for 163 miles from the Musselshell Diversion to its mouth at Fort Peck Reservoir. This reach has significant fishery values and represents the free-flowing, warmwater portion of the Musselshell River. (Fredenberg Dir., DFWP Exh. 27, p. 5; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-386).

264. Musselshell Reach #3 contains sauger, channel catfish, smallmouth bass, black bullhead, northern pike and walleye. This reach is a very important spawning tributary for channel catfish, sauger and smallmouth bass from Fort Peck Reservoir because irrigation withdrawals are minimal and there are no barriers to upstream migration in this 163 miles of river. (Fredenberg Dir., DFWP Exh. 27, p. 6; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-387).

265. Musselshell Reach #3, despite its remote location, had about 4,600 fisherman days of use in 1989. (Fredenberg Dir., DFWP Exh. 27, p. 6).

266. DFWP requested instream flows on 11 tributaries to the Musselshell River. These are: South Fork Musselshell River, Alabaugh Creek, Cottonwood Creek, North Fork Musselshell River, Checkerboard Creek, Spring Creek, Big Elk Creek, American Fork Creek, Careless Creek, Swimming Woman Creek and Flatwillow Creek.

(DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-390 through 3-436 and 3-440 through 3-443).

267. All of the requested Musselshell River tributaries except Careless, Swimming Woman and Flatwillow creeks are in Reach #1 of the Musselshell River. (DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-372).

268. South Fork Musselshell, Alabaugh Creek and Cottonwood Creek all contain rainbow, brook and brown trout. Brown trout are the dominant species in these three streams. All three streams provide good to excellent fisheries and produce some large fish. Brown trout up to 18 inches are present and specimens up to four pounds have been taken. (Frazer Dir., DFWP Exh. 26, pp. 4, 10 and 23; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-390 through 3-402).

269. North Fork Musselshell Reach #1 (above Bair Reservoir) contains an excellent pan-size brook trout population along with a few rainbow trout. Bair Reservoir is a barrier to all fish movement from downstream reaches of the North Fork. (Frazer Dir., DFWP Exh. 26, p. 18; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-406 through 3-412).

270. Checkerboard Creek supports an excellent trout fishery comprised mostly of brook trout, with lesser numbers of rainbow and brown trout. Brook and rainbow trout over 12 inches long are present. Spring Creek is a good fishery for pan-sized brook and rainbow trout. Big Elk and American Fork creeks provide good fisheries for brook and brown trout. Brook trout predominate in the upper reaches and brown trout in the lower reaches. Both streams contain brown trout up to 14 inches in length. Careless

and Swimming Woman creeks both contain brook trout and are important local fisheries. (Frazer Dir., DFWP Exh. 26, pp. 8 and 25; Fredenberg Dir., DFWP Exh. 27, pp. 7 and 8; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-414, 3-418, 3-421 and 3-422, 3-425 and 3-426, 3-430, 3-433 and 3-434).

271. Flatwillow Creek is the largest drainage emerging from the Snowy Mountains and, as such, is the best stream trout fishery in Petroleum County and surrounding locale. The stream contains brown, rainbow and brook trout. The mainstem of Flatwillow Creek above U.S. Highway 87 is a high quality trout stream that has regional importance. Brown trout are the predominant fish, followed by rainbow and brook trout. Brown trout up to 24 inches long have been taken from this stream reach. (Fredenberg Dir., DFWP Exh. 27, p. 6; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-441 and 3-442).

Collar Gulch

272. Collar Gulch is a small tributary to Fords Creek which originates in the Judith Mountains about 12 miles northeast of Lewistown. This stream contains a small population of genetically pure westslope cutthroat trout, a "Species of Special Concern" in Montana, which have survived in the isolated perennial headwaters of the stream for many years. Cutthroat up to 10 inches in length are present. (Poore Dir., DFWP Exh. 15, p. 8; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-437 through 3-439).

Big Dry and Little Dry Creeks

273. Big Dry and Little Dry creeks are both low-gradient prairie streams. Little Dry Creek is a tributary to Big Dry Creek. Both streams contain channel catfish and walleye. Catfish are residents of the stream system and walleye are migratory species from Fort Peck Reservoir. Walleye are one of the most popular game fish in Fort Peck Reservoir. Walleye gather in the reservoir near the mouth of Big Dry Creek each spring and, if spring flows allow, they will migrate up Big Dry Creek 30 to 35 miles to spawn. They also migrate eight miles up Little Dry Creek to spawn. Walleye eggs, larvae and young-of-the-year fingerlings have all been collected in Big and Little Dry creeks when high spring flows coincide with the normal walleye spawning period. Therefore, Big Dry and Little Dry creeks are important spawning and rearing areas for walleye when flows are available. (Frazer, DFWP Exh. 26, pp. 6, 7, 11 and 12; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-445, 3-446, 3-448 and 3-449).

Bean Lake

274. Bean Lake is a natural lake located 15 miles southwest of Augusta in Lewis and Clark County. It is the only natural lake of any significance in all of northcentral Montana. It is a popular recreation area and provides nearly 10,000 angler days of fishing per year. It is one of the few lakes and reservoirs which have public access and where the waters are not committed for other uses such as irrigation. Bean Lake has no water inflow; water supply is entirely from precipitation, ground water and seepage. It is an

important rainbow trout fishery with a satisfactory catch rate and some older trout being taken in excess of four pounds. (Wipperman Dir., DFWP Exh. 21, pp. 5 and 6; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-451 through 3-453).

Antelope Butte Swamp

275. Antelope Butte Swamp is part of the Blackleaf Wildlife Management Area lying approximately 14 miles west of Bynum in Teton County. The swamp is a perennial wetland area of approximately 240 acres, which is fed by Noname Creek and a private diversion from Muddy Creek. The area is managed by DFWP as a winter range for migratory wildlife such as elk and mule deer. It has a diversity of plant communities which provide year-round and seasonal habitats for whitetail and mule deer, elk, black and grizzly bear, wolf, (both grizzly and wolf are federally protected threatened and endangered species), mountain lion, bobcat, lynx, beaver, mink, muskrat, sharptailed, ruffed, spruce and blue grouse, as well as numerous waterfowl species. Grizzly bears in particular are drawn to the area during the spring to feed on succulent plants that grow in the moist environment of the swamp. As part of the Blackleaf Wildlife Management Area, the swamp provides the needs for both game and nongame wildlife and a resource that is available for the recreational enjoyment by the public. (Olson Dir., DFWP Exh. 16, pp. 2 and 3; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-455 through 3-459).

(2) Threatened and Endangered Fish Species and Species of Special Concern

276. Fish "Species of Special Concern" which occur in Missouri basin streams above Fort Peck Dam include the following species:

Westslope cutthroat trout
Arctic grayling
Pallid sturgeon
Sturgeon chub
Paddlefish
Northern redbelly dace x finescale dace hybrid
Sickelfin chub
Blue Sucker

277. "Species of Special Concern" is a DFWP and American Fisheries Society designation that reflects the limited numbers of these fish present in the state, their limited distribution or the limited amount of preferred habitat still available to them. These fish have been eliminated or severely reduced in numbers over much of their former range. (Spence Dir., DFWP Exh. 17, p. 11).

Westslope Cutthroat Trout

278. The westslope cutthroat trout,a "Species of Special Concern", is native to Montana west of the Continental Divide and to the Missouri River and its tributaries in the mountains east of the Continental Divide. The Montana Natural Heritage Program (MNHP) lists genetically pure westslope cutthroat as rare in Montana. It is estimated that genetically pure westslope cutthroat occupy only 1.1% of their historical range in Montana streams. The decline of westslope cutthroat trout may be due to several factors, including hybridization with non-native rainbow trout, competition from introduced species, over-fishing and habitat alteration. (Bd.

Exh. 40, DEIS, p. 89; Hill Dir., DFWP Exh. 35, p. 4; DFWP 72155-41A, Bd. Exh. 37-A.2, p. 2-10).

Arctic Grayling

279. The status of fluvial (permanently stream dwelling) Arctic grayling, Thymallus arcticus, in Montana has been of increasing concern in recent years. Stream populations of this indigenous fish, which is an important component of the sport fishery of Montana, have declined severely. (Kaya Dir., MTU/AFS Exh. 10, p. 2).

280. The U.S. Fish and Wildlife Service (USFWS) classifies fluvial Montana grayling as a category 1 species, the final category before listing as threatened or endangered. On October 3, 1991, USFWS received a petition from private foundations to list the stream-dwelling grayling as an endangered species throughout its known historical range in the lower 48 states. (Kaya Dir., MTU/AFS Exh. 10, p. 4; Bd. Exh. 41, FEIS, p. 32).

281. The Arctic grayling was native to two areas in the lower 48 states: Michigan, where it is now extinct, and in the Missouri River drainage above Great Falls, where it was once abundant. Once widely distributed in the Missouri River and its tributaries upstream from Great Falls, fluvial Montana grayling are now restricted to the upper reaches of a single tributary, the Big Hole River. This is the only confirmed fluvial grayling population still remaining south of Canada and Alaska. Lake dwelling grayling are abundant and secure in Montana in lakes in which they have been

planted. (Kaya Dir., MTU/AFS Exh. 10, p. 2; Bd. Exh. 40, DEIS, p. 89; DFWP 72155-41A, Bd. Exh. 37-A.2, p. 2-10).

282. There is some evidence that suggests that a grayling population that resides in Ennis Lake and moves back and forth between the Madison River channels and Ennis Lake may be another remnant of this same fluvial population (Fredenberg Cross, Tr. Day 12, pp. 116, 117 and 122).

283. Fluvial Montana grayling are reduced in distribution to only about 8% or less of their historical range. The Michigan grayling underwent a similar earlier decline and disappeared about 1936. Repeated attempts to establish or restore stream populations in Michigan and Montana have not succeeded. (Kaya Dir., MTU/AFS Exh. 10, p. 2).

284. The total estimated size of the current fluvial grayling population in the 50 miles of the Big Hole River where they live is approximately 1,500 grayling one year old or older. (Kaya Dir., MTU/AFS Exh. 10, p. 4).

285. Some Montana streams contain more than 1,500 age one or older trout per single mile. (Kaya Dir., MTU/AFS Exh. 10, p. 4).

286. The cause of decline in stream-dwelling Arctic grayling populations is not well understood but is believed to be identified with low stream flows, changes in land use, over-harvest and competition from introduced non-native species. (Kaya Dir., MTU/AFS Exh. 10, pp. 4 and 5; Bd. Exh. 40, DEIS, p. 89; DFWP 72155-41A, Bd. Exh. 37-A.2, p. 2-10; Kaya Cross, Tr. Day 13, p. 78).

287. Degradation of fluvial grayling habitat in Montana appears most frequently to have been related directly or indirectly

to agricultural irrigation. The most important disturbances have been reduction in streamflows through withdrawals of water for irrigation, blockage of streams by dams for reservoirs and diversions, and flooding of streams by reservoirs. (Kaya Dir., MTU/AFS Exh. 10, p. 5).

288. One of the main requirements for a healthier and more productive grayling population in the Big Hole River drainage, ie., more fish, is more water. (Kaya Cross, Tr. Day 13, p. 83).

289. Among the factors most commonly cited as being detrimental to Big Hole River grayling is the partial dewatering of the river and its tributaries during summer by irrigation diversions. In addition to this reduction in habitat for grayling of all ages, other possible affects of dewatering include interference with seasonal migrations, stranding of incubating eggs or young fish, increased predation on young fish through their being concentrated in remnant waters with adults and other fishes, reduced food availability through habitat reduction for aquatic invertebrates, and increased maximum daily temperatures. (Kaya Dir., MTU/AFS Exh. 10, pp. 6 and 7).

290. Weak year classes of grayling are associated with lower flows and strong year classes with flows normal or slightly above average. During years of low flow, many adults move downstream after spawning instead of remaining in upstream areas through the summer, suggesting that low flows may be altering their migration patterns by making them leave their summer feeding areas. (Kaya Dir., MTU/AFS Exh. 10, p. 7).

291. Grayling populations in the Big Hole River are higher during years when flows are higher and lower during low flow years. (Kaya Re-cross, Tr. Day 13, pp. 100 through 102).

292. Irrigation diversions are also causing loss of grayling, especially young fish. Fry and juveniles are found in the ditches and may be carried into irrigated fields or left stranded in the ditches when headgates are closed at the end of the irrigation season. (Kaya Dir., MTU/AFS Exh. 10, p. 7).

293. Water withdrawals from the Big Hole River may be contributing to elevated water temperatures during the summer through a relationship between reduced flows and increased stream temperatures. (Kaya Dir., MTU/AFS Exh. 10, pp. 7 and 8).

294. Restrictive fishing regulations since 1984 have not improved the Big Hole River grayling population. (Kaya Cross, Tr. Day 13, p. 85).

295. Since fishing harvest of grayling is now severely restricted by present catch and release fishing regulations, maintenance of adequate water flows may be the most critical requirement for the continued existence of the severely depressed population of fluvial grayling in the upper Big Hole River. (Kaya Dir., MTU/AFS Exh. 10, p. 8).

Pallid Sturgeon

296. The pallid sturgeon, Scaphirhynchus albus, is one of the two sturgeons in the genus Scaphirhynchus found in North America. The other species is the more common shovelnose sturgeon (S. platorynchus. Pallid sturgeon are one of the largest fish found in

the Missouri River, with specimens approaching 6 feet and 85 pounds. (Dryer Dir., MTU/AFS Exh. 5, p. 1).

297. The original distribution of the pallid sturgeon included the Mississippi River and large tributaries from Iowa to Louisiana, the Missouri River from Great Falls to the mouth, and the Yellowstone River below the mouth of the Tongue River. (Bd. Exh. 40, DEIS, p. 88).

298. Sturgeon are ancient fish which have survived and remained relatively unchanged for over 200 million years. Man's actions, however, have pushed the pallid sturgeon to the brink of extinction within less than 50 years. Possible contributing factors to the decline of the species includes channelization and damming of rivers which has greatly reduced the migratory range of the fish, operation of the dams which alter water quality and flows, overfishing and environmental contaminants. (Dryer Dir., MTU/AFS Exh. 5, p. 3; Bd. Exh. 40, DEIS, p. 88).

299. In October 1990, the pallid sturgeon was listed as an endangered species throughout its entire range. This designation means that the species is in danger of extinction throughout all or a significant portion of its range. (Dryer Dir., MTU/AFS Exh. 5, pp. 2 and 3).

300. The pallid sturgeon's unique position in the Missouri River aquatic ecosystem has already been severely unbalanced by man, especially as one moves further and further downstream of Montana. The Missouri River above Fort Peck Reservoir is the least altered of the entire 2,000+ mile Missouri and Mississippi River mainstem systems which encompass the range of the pallid sturgeon.

Maintaining the natural Missouri River ecosystem in Montana is important to recovery of the pallid sturgeon. (Dryer Dir., MTU/AFS Exh. 5, p. 4).

301. During the 1960's, 500 observations of pallid sturgeon were made over its entire range. By contrast, throughout the 1980's there were only 65 recorded observations of pallid sturgeon over its entire range. Since 1980, only seven pallid sturgeon have been recorded in the Missouri River above Fort Peck Reservoir in Montana. (Dryer Dir., MTU/AFS Exh. 5, p. 3).

302. Pallid sturgeon are long-lived fish achieving ages of more than 40 years. The time required to reach sexual maturity for males is seven to nine years with a 2-3 year interval between spawning years. Females reach sexual maturity in 15-20 years with 3-10 year intervals between spawning years. (Dryer Dir., MTU/AFS Exh. 5, p. 2).

303. New depletions from proposed water reservation applications <u>could</u> alter normal natural water temperatures and turbidity and <u>will</u> alter the volume and velocity of flow in the Missouri River. Alterations in the flow from a naturally-occurring flow regime during spring and early summer months could affect any existing spawning by remnant populations or it could affect the potential for spawning of recovering or introduced populations during a recovery program. Reduced flows which alter production and survival of forage fish may also affect feeding habits of pallid sturgeon because of the predominance of fish, primarily cyprinids, in their diet. (Dryer Dir., MTU/AFS Exh. 5, p. 3).

Sturgeon Chub

304. The sturgeon chub is a member of the minnow family and is not a game fish. This fish lives in medium to large rivers that are turbid and warm, in areas of strong current with a sand or gravel bottom. It grows to be about four inches long. The sturgeon chub is a candidate for listing as an endangered and threatened species. (Bd. Exh. 40, DEIS, p. 89; Dryer Dir., MTU/AFS Exh. 5, p. 4).

Paddlefish

305. Paddlefish are Montana's largest game fish with female specimens often reaching five to six feet in length and weighing 75 to 125 pounds. Once abundant 150 million years ago, these primitive fish are presently found in only two river basins -- the Yangtze in China and the Mississippi/Missouri. (DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1-40).

306. Stream channelization, dams, overharvesting and alteration of streamflows have reduced the range of paddlefish in the United States to only six isolated self-sustaining populations in the Mississippi/Missouri basins. The paddlefish population in Fort Peck Reservoir and the Missouri River above the reservoir is the oldest and most secure of all the North America populations. Growth rates of this population are also better than any of the other five populations. This is due largely to the unaltered free-flowing characteristics of this reach of the river which provides essential and irreplaceable spawning areas for paddlefish. (DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1-40 and 1-41).

307. The paddlefish is not yet listed as an endangered species but it is a "Species of Special Concern" in Montana. (Berg Dir., DFWP Exh. 29, p. 3).

Northern Redbelly Dace x Finescale Dace Hybrid

308. This hybrid fish is produced when northern redbelly dace are crossed with finescale dace. The hybrid is a parthenogenetic species, which means that all of the individuals are female and they produce exact clones of the mother through development of an unfertilized egg. This peculiar minnow has been found in three locations in the Missouri River basin above Fort Peck Dam and in the Musselshell River. (Bd. Exh. 40, DEIS, p. 89; Fredenberg Dir., DFWP Exh. 27, p. 5).

Sickelfin Chub

309. The Montana Natural Heritage Program (MNHP) notes that the sickelfin chub is critically imperiled in Montana and rare throughout the rest of its range. The sickelfin chub is a member of the minnow family and may grow to 3.5 inches in length. It has been found along the lower portion of the Missouri River above Fort Peck Reservoir. The sickelfin chub is a candidate for listing as a federal endangered or threatened species. (Bd. Exh. 40, DEIS, p. 89; Dryer Dir., MTU/AFS Exh. 5, p. 4).

Blue Sucker

310. The blue sucker is rare in Montana. It has been found in the Missouri River below Fort Benton, Marias River, the lower Judith River and the lower portion of the Yellowstone River. The

blue sucker is not a game fish in Montana. The state record weight for a blue sucker is 11.5 pounds. The blue sucker is a candidate for listing as a federal endangered or threatened species. (Bd. Exh. 41, FEIS, p. 143; Dryer Dir., MTU/AFS Exh. 5, p. 4).

(3) Riparian Values

311. Riparian communities are the plants and animals associated with stream courses and floodplains. From a wildlife standpoint, the habitat diversity provided by riparian vegetation is perhaps the greatest value provided by flowing water. (Casey Dir., DFWP Exh. 28, p. 2).

312. Riparian soils are often geomorphically very young and coarse textured and, therefore, transmit water readily and have a low water retention capacity. Therefore, a dependable water supply is essential to assure that riparian soils will serve as growth media for woody vegetation. (Casey Dir., DFWP Exh. 28, p. 3).

313. Decreased flow can result in decreased riparian cover because of induced soil moisture stress. Also, providing more consistent flows in intermittent or ephemeral streams has been shown to increase riparian vegetation. Light to moderate flooding also favors establishment and regeneration of riparian communities and some species such as willows and cottonwoods are dependent on seasonal flooding for perpetuation of multi-aged stands. (Casey Dir., DFWP Exh. 28, p. 3).

314. The importance of riparian habitats to wildlife has been well documented in the scientific literature and their importance

in the arid west is well accepted by the scientific community. (Casey Dir., DFWP Exh. 28, p. 3).

315. Because of their biological importance and because of documented losses of riparian acreage through conversion to agriculture and other land uses, maintenance of riparian habitats is important wildlife across Montana and elsewhere in the west. (Casey Dir., DFWP Exh. 28, p. 3).

316. Wooded riparian areas have been shown throughout the west to support higher densities of breeding birds than any other habitats. Breeding bird communities are frequently used as a "barometer" of habitat richness and health because they are relatively easy to measure and respond quickly and dramatically to environmental changes. (Casey Dir., DFWP Exh. 28, p. 3).

317. The relationship between diversity of breeding birds and riparian habitats has been documented. Cottonwood communities in the Missouri River breaks supported more than 2-5 times as many breeding pairs and twice the species of birds as did the upland habitats investigated (upland habitats specifically were greasewood-sagebrush, sagebrush-grassland, and pine-juniper). (Casey Dir., DFWP Exh. 28, p. 4).

318. Many big game species which feed in a variety of habitats, including agricultural lands, are dependent on wooded riparian habitat for security and thermal cover during critical times of the year. Many wildlife species are found almost exclusively in riparian habitats. These include numerous songbird species, waterfowl, ospreys and bald eagles, beavers, river otters, and mink. (Casey Dir., DFWP Exh. 28, p. 4).

319. Mature stands of cottonwood and younger stands of willow/cottonwood on islands are two important nesting habitats for Canada geese. (Casey Dir., DFWP Exh. 28, p. 4).

320. The importance of riparian habitat to specific wildlife species has been quantified. (Casey Dir., DFWP Exh. 28, p. 4).

321. The biological abundance and diversity found within riparian areas attracts increasing numbers of persons who recreate along streams, including photographers, bird watchers, science students, hunters, berry pickers and naturalists. (DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1-45).

322. Instream water reservations will help maintain the health and vigor of riparian plant species through the provision of water (either surface or subsurface) during critical periods in their growth cycle. Although riparian habitat maintenance is viewed as an important, but secondary, benefit of the water reservations requested by DFWP, instream flows in all cases should help maintain existing riparian vegetation which has corresponding benefits to the wildlife community. (Casey Dir., DFWP Exh. 28, pp. 2 and 5).

323. Water reservation requests from other entities which would result in seasonal dewatering or impoundment could, in many cases, result in loss of riparian habitats over time, either through prevention of seasonal flooding essential to regeneration or through induced moisture stress during the growing season. (Casey Dir., DFWP Exh. 28, p. 5).

(4) Wildlife Values

324. Although the number of species varies from stream to stream, all of the streams where DFWP has requested flows for fishery purposes also harbor a wide diversity of wildlife species. (DFWP 72155-41A, Bd. Exh. 37-A.2, pp. 2-8 through 2-615; Bd. Exh. 37-A.3, pp. 3-1 through 3-459).

325. In addition to those numerous wildlife species occurring along the stream corridors, a number of threatened and endangered wildlife species occur in some stream reaches:

Bald Eagle

326. The bald eagle occurs year-round in the upper Missouri basin and is federally classified as an endangered species. From 30-50 eagles winter on area reservoirs and rivers. Winter densities are typically highest in the area of Ennis Reservoir on the Madison River and along the headwaters of the Missouri River near Three Forks, where 12-15 eagles may be present at each location. Bald eagles commonly pass through the upper basin during fall and spring migrations. The Missouri basin between Canyon Ferry Dam and Fort Peck Reservoir also provides important habitat for bald eagles. Three active bald eagle nesting sites have been identified along the Missouri River corridor between Hauser Lake and Great Falls. (DFWP 72155-41A, Bd. Exh. 37-A.2, p. 2-9; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-5).

Peregrine Falcon

327. The peregrine falcon is an endangered species and occurs as a casual migrant in the upper Missouri basin in spring and fall.

Following recent efforts to reintroduce peregrines to their former breeding range in the upper basin, three breeding pairs are presently established and more are anticipated in the near future. The Missouri River basin between Canyon Ferry Dam and Fort Peck Reservoir also provides important habitat for peregrine falcons. Two active peregrine nesting sites have been identified along the river corridor between Hauser Lake and Great Falls and attempts are underway to reintroduce peregrine falcons along this stretch of the river. (DFWP 72155-41A, Bd. Exh. 37-A.2, p. 2-9; DFWP 72155-41A, Bd. Exh. 37-A.3, p. 3-5).

Whooping Crane

328. The whooping crane is a federally designated endangered species and occurs primarily in the Redrock Lakes National Wildlife Refuge in Montana. (DFWP 72155-41A, Bd. Exh. 37-A.2, p. 2-9).

Grizzly Bear

329. Grizzly bears designated as threatened by the federal government use the mountain wildlands of the Madison, Gallatin and Ruby river drainages year long for winter denning, feeding and day-bedding and as a travel corridor. In the lower Missouri basin, grizzly bears also inhabit the headwater streams and foothills along the east slope of the Continental Divide, including streams in the Marias and Teton river sub-basins. The grizzly bear utilizes many of these areas during the spring, summer and fall. (DFWP 72155-41A, Bd. Exh. 37-A.2, pp. 2-9 and 2-10; Hill Dir., DFWP Exh. 35, pp. 4 through 9).

C. FINDINGS ON THE AMOUNT OF THE INSTREAM RESERVATIONS OF WATER APPLIED FOR BY DFWP [SECTION 85-2-316(4)(a)(iii), MCA]

(1) Instream Flow Methods

330. The instream flows requested by DFWP are intended to maintain fishery values. Several methods were used to determine the requested amounts of water. (DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1-11).

331. Positive relationships between fish abundance and the magnitude of a stream's annual low flows are well documented in the scientific literature. Higher flows generally lead to a greater abundance of fish. (DFWP Exh. 23, p. 7; White Dir., MTU/AFS Exh. 9, p.2).

332. The best and most accurate means for deriving minimum flow requests to protect fishery values is to directly observe the response of the fish populations to flow variations over a period of many years. Because of the intensive data requirements and long-term commitment, this approach is impractical for a water reservation process, requiring the use of an array of less time-consuming and more practical alternatives. (Nelson Dir., DFWP Exh. 22, p. 4; Thomas Dir., MTU/AFS Exh. 8, p. 3).

333. These alternative, or shortcut, instream techniques are designed to determine how much water a stream needs to protect aquatic life, and are divided into three general groups of methods: 1) non-field, 2) incremental, and 3) habitat retention. (Nelson Dir., DFWP Exh. 22, p. 4; Thomas Dir., MTU/AFS Exh. 8, p. 3).

334. Because non-field methods are usually performed in the office and are commonly based on a flow quantity derived from the

historic flow record, they are normally confined to deriving preliminary recommendations. This limits their suitability for use in Montana's water reservation process. (Nelson Dir., DFWP Exh. 22, p. 4; Nelson Cross, Tr. Day 8, p. 128).

335. Incremental methods attempt to predict the actual amount of suitable fish habitat that is present as flow changes incrementally. They provide a means for measuring trade-offs as opposed to providing minimum flow recommendations. This method is costly, complex and time-consuming and has limited application to the water reservation process. (Nelson Dir., DFWP Exh. 22, p. 5 and Nelson Reb., DFWP Exh. 44, pp. 2 through 4 and Attachment B, p. 180; Nelson Cross, Tr. Day 8, pp. 135, 136, 138, 139, 140, 141 and 232; Thomas Dir., MTU/AFS Exh. 8, p. 4).

336. Habitat retention methods examine various components of a stream's hydraulic characteristics at various flows for the purpose of developing generalized habitat-flow relationships. The outcome is a minimum flow recommendation that is intended to fully protect some aspect of the stream resource. These methods, also termed standard-setting methods, are most appropriate for the water reservation process. (Nelson Dir., DFWP Exh. 22, p. 5; Nelson Reb., DFWP Exh. 44, p. 3 and Attachment B, p. 180; Thomas Dir., MTU/AFS Exh. 8, p. 4).

337. No existing instream flow method can quantitatively predict the response of a stream's fish community to incremental changes in flow. These relationships are solely the product of stream-specific, long-term, biological studies. (Nelson Dir., DFWP Exh. 22, pp. 12 and 13).

338. Habitat retention methods examined by DFWP for use in the reservation process included the Wetted Perimeter Inflection Point Method (Wetted Perimeter for short), Habitat Quality Index, and R-2 Cross Method (also referred to as the Sag Tape Method and, in Wyoming, as the Habitat Retention Method). (Nelson Reb., DFWP Exh. 44, pp. 4 and 5).

339. The Habitat Quality Index and R-2 Cross methods, when tested and investigated by DFWP, were found unsuited for use in Montana's water reservation process. (Nelson Reb., DFWP Exh. 44, pp. 4 and 5; Nelson Cross, Tr. Day 9, pp. 102 and 103).

340. The Wetted Perimeter Method was chosen to derive minimum instream flow requests for the majority of streams in DFWP's application. (DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1-18).

341. The Wetted Perimeter Method originated in Washington and Idaho in the early-1970's. (Nelson Dir., DFWP Exh. 22, pp. 5 and 6 and DFWP Exh. 24, p. 4).

342. Wetted perimeter is a well recognized and commonly used minimum flow method, particularly in the Pacific Northwest and Rocky Mountain region of North America. (Nelson Reb., DFWP Exh. 44, pp. 1 and 2 and Attachment A, pp. 23 through 27; White Dir. MTU/AFS Exh. 9, p. 3; Thomas Dir., MTU/AFS Exh. 8, p. 3).

343. Biological studies by DFWP and Montana State University support the validity of the minimum recommendations generated by the Wetted Perimeter Method. (Nelson Cross, Tr. Day 9, pp. 96 through 98; White Dir., MTU/AFS Exh. 9, p. 2).

344. Wetted perimeter is the distance along the bottom and sides of a channel cross-section that is in contact with water when

the stream is viewed in cross-section. (Nelson Dir., DFWP Exh. 22, p. 6 and Attachment B).

345. The relationship between wetted perimeter and flow for stream riffles generally, but not always, shows two inflection points where the rate of increase of wetted perimeter changes. Below the lower inflection point, flow is spreading out horizontally across the stream bottom, causing the wetted perimeter to increase rapidly for very small increases in flow. A point is eventually reached (at the lower inflection point) where the water starts to move up the sides of the active channel and the rate of increase of wetted perimeter begins to decline. At the upper inflection point, the stream is approaching its maximum width and begins to move up the banks as flow increases. Large increases in flow beyond the upper inflection point cause only small increases in wetted perimeter. (Nelson Dir., DFWP Exh. 22, p. 7 and Attachments C and D).

346. The relationship between wetted perimeter and flow is derived for stream riffles. A riffle is a section of stream in which the water flow is rapid and shallower than the sections above and below. It has a substratum of gravel and rubble and is a very distinct habitat type that can be readily distinguished visually. Streams usually consist of a succession of pools and riffles. (Nelson Dir., DFWP Exh. 22, p. 6; Nelson Redirect, Tr. Day 9, p. 100).

347. Riffles are the primary stream habitat where aquatic invertebrates, the main food of Montana's stream-dwelling game fish, are produced. (Nelson Dir., DFWP Exh. 22, pp. 6 and 7).

348. Food supply is a major factor influencing the abundance of game fish in Montana's streams. (Nelson Dir., DFWP Exh. 22, p. 11 and DFWP Exh. 23, pp. 10 through 12).

349. The underlying assumption of the wetted perimeter methodology is that food becomes limiting as flow associated reductions in wetted perimeter occur. This is a very reasonable assumption since many stream fish species rely on aquatic and invertebrates as their primary food source and the primary food production area is in riffles. (White Dir., MTU/AFS Exh. 9, p. 3).

350. As riffle areas are dewatered, food production is assumed to be reduced, resulting in a decrease in the carrying capacity of the stream. (White Dir., MTU/AFS Exh. 9, p. 3).

351. Aquatic invertebrates - gill-breathing organisms that inhabit the small spaces within the riffle bottom - require a cover of flowing water to supply life-sustaining oxygen. (Nelson Dir., DFWP Exh. 22, p. 7).

352. The Wetted Perimeter Method provides the minimum streamflow that will cover most of a stream's riffle area with water. This is the upper inflection point flow. (Nelson Dir., DFWP Exh. 22, pp. 6 and 7).

353. The upper inflection point flow is derived from the plot of the relationship between wetted perimeter and flow for the stream riffles of interest. These plots are generated using DFWP's wetted perimeter computer program, which is calibrated using surveyed channel measurements that are taken at different flows for each stream of interest. (Nelson Dir., DFWP Exh. 22, pp. 9 and 10).

354. A number of checks were used by DFWP in developing and analyzing wetted perimeter information so that the results would be as reliable and accurate as possible. (Nelson Cross, Tr. Day 9, pp. 104, 105, 106, 107, 124 and 125).

355. Wetted perimeter field data, used to calibrate the wetted perimeter computer program, were collected by a team of DFWP personnel, usually consisting of a team leader - typically a biologist - and two or more field workers. Approximately 12 teams collected the wetted perimeter data presented in DFWP's application. (Nelson Dir., DFWP Exh. 22, p. 10).

356. DFWP personnel were trained in the use of the Wetted Perimeter Method at workshops conducted by DFWP, often in conjunction with the USGS. Training included: Theory of the Wetted Perimeter Method, surveying and field techniques, selection of study sites, data coding, flow measuring procedures, and field exercises. (Nelson Dir, DFWP Exh. 22, pp. 2 and 10; Nelson Cross, Tr. Day 12, p. 230; Frazer Cross, Tr. Day 9, pp. 156, 157, 168).

357. Application of the Wetted Perimeter Method by DFWP's field personnel was governed by procedures and standards discussed in DFWP's 1980 publication titled "Guidelines for Using the Wetted Perimeter (WETP) Computer Program of the Montana Department of Fish, Wildlife and Parks", which was updated in 1985 and 1989. (DFWP Exh. 24, pp. 1 through 28 and A-1 through C-19; and Nelson Dir., DFWP Exh. 22, p. 2).

358. In 1985, at the suggestion of the USFWS Instream Flow Service Group, the stage at zero flow was incorporated into DFWP's wetted perimeter computer program. This addition improved the

accuracy of the wetted perimeter predictions for flows that are less than the lowest calibration flows measured in the field. The wetted perimeter information presented in DFWP's application reflects this 1985 modification. (DFWP Exh. 24, pp. 8 and 9; Nelson Cross, Tr. Day 9, p. 112; Nelson Cross, Tr. Day 8, pp. 119 and 120; Nelson Cross, Tr. Day 5, p. 82; Nelson Cross, Tr. Day 5, pp. 92 and 93).

359. When using the Wetted Perimeter Method, there are no benefits from incorporating depth and velocity parameters. (Nelson Cross, Tr. Day 9, p. 99).

360. There are no instream flow methods that establish confidence levels around the flow predictions. (Nelson Cross, Tr. Day 9, pp. 103 and 104).

361. At the upper inflection point flow, a stream's food-producing potential is near maximum because most of the riffle habitat is covered with water. Maintaining near maximum food-producing potential will, in turn, benefit game fish populations. (Nelson Dir., DFWP Exh. 22, p. 12 and DFWP Exh. 23, pp. 11 and 12; White Dir., MTU/AFS Exh. 9, p. 3).

362. Riffles are also used by many game fish species for spawning and for the rearing of their young. Flow requests that protect the food-producing capacity of riffles will also help to protect the fishes' spawning and rearing areas. (DFWP Exh. 23, p. 53).

363. Riffles are the area of a stream that is most sensitive to flow reductions. Therefore, a flow request that wets most of the riffle area will, at the same time, help to protect a stream's

pools and runs - areas where adult fish normally reside. (DFWP Exh. 23, p. 53).

364. Flows at the upper inflection point are needed to provide minimum instream flow protection for those streams having the more significant fishery values. These include streams that have national, regional or local importance as sport fisheries; streams that support significant numbers of game fish for their stream type and size; streams that support "Species of Special Concern" (westslope cutthroat trout and arctic grayling, for example); streams that provide crucial reproductive habitats for reservoir, lake or mainstem river populations of game fish; and streams that have the capacity to provide outstanding fisheries but are prevented from reaching their potential due to stream dewatering and other forms of habitat degradation. (Nelson Dir., DFWP Exh. 22, pp. 8 and 9 and Hill Reb., DFWP Exh. 47, p. 1).

365. Upper inflection point flows are warranted for the preponderance of streams in DFWP's application because DFWP's application generally addressed only those streams in the Missouri River Basin above Fort Peck Dam having the more significant fishery values. (Spence Dir., DFWP Exh. 17, p. 13).

366. The upper inflection point flow requests, when averaged for all streams, equal about 40% of the average annual flow. (Bd. Exh. 41, FEIS, p. 85; DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1-20; Nelson Cross, Tr. Day 12, p. 204).

367. The fishery biologists who derived the instream flow requests using the Wetted Perimeter Method had the option of requesting a flow lower than the upper inflection point if, based

on their professional evaluation of the stream resource, a lower flow request was sufficient to provide minimum instream flow protection. The lowest possible flow request, which is the lower inflection point flow, was limited to those streams having the less significant fishery resource values. (Nelson Dir., DFWP Exh. 22, pp. 7 through 9).

368. Instream flow requests at the lower inflection point or between the lower and upper inflection points were made for the following 24 stream reaches. (DFWP 72155-41A, Bd. Exh. 37-A.2, pp. 2-1 through 2-620 and Bd. Exh. 37-A.3, pp. 3-i through 3-464):

Red Rock-Beaverhead R. Sub-basin
Blacktail Deer Creek

Ruby River Sub-basin
Ruby River (Reach #1)
Middle Fork Ruby River
East Fork Ruby River
West Fork Ruby River
Cottonwood Creek

Big Hole River Sub-basin
Pattengail Creek
Birch Creek

Jefferson River Sub-basin
Boulder River (Reach #3)

Gallatin River Sub-basin
Porcupine Creek
Middle Fork of the West Fork Gallatin River
South Fork of the West Fork Gallatin River
Big Bear Creek
Hyalite (Middle) Creek - Reach #2

Little Prickly Pear Cr. Sub-basin
Virginia Creek

Dearborn River Sub-basin
Flat Creek

Smith River Sub-basin
Smith River - Reach #3

Sun River Sub-basin
Sun River - Reach #1
Sun River - Reach #2

Belt Creek Sub-basin
Belt Creek - Reach #2

Judith River Sub-basin
Judith River - Reach #2
Cottonwood Creek

Musselshell River Sub-basin
Musselshell River - Reach #1
Musselshell River - Reach #2

369. The low inflection point flow requests, when averaged, equal about 20% of the average annual flow. (Bd. Exh. 41, FEIS, p. 85).

370. The instream flows requested by DFWP are intended to maintain fishery values. Flows less than what have been requested will not serve that purpose. (Nelson Cross, Tr. Day 13, p. 18).

371. Flow requests based on the Wetted Perimeter Method apply to the non-winter period from approximately April through October. This is the period when fish grow and feed intensively and are being recruited into the population. Food supply appears to be a major limiting factor during this period. Fish food diversity and abundance are related to trout standing crops. Adequate summer flows are critical to preserving aquatic life. (Nelson Dir., DFWP Exh. 22, p. 15; Nelson Cross, Tr. Day 8, pp. 121, 122; Thomas Dir., MTU/AFS Exh. 8, p. 7).

372. The limiting factor that regulates fish populations during the winter is fish habitat. The policy of DFWP when deriving flow requests for winter (approximately November through March) is to fully protect winter flows. This is based on the fact that winter is the most critical period influencing game fish densities in undepleted streams. Also, in winter, stream flows are typically at their annual lows in Montana's undepleted streams. (Nelson Dir., DFWP Exh. 22, pp. 15 and 16; Nelson Reb., DFWP Exh. 45, p. 7; Nelson Cross, Tr. Day 12, p. 195; Nelson Cross, Tr. Day 8, pp. 121, 122).

373. Upper inflection point flow requests derived from the Wetted Perimeter Method typically exceed base winter flows. Winter

flows would, therefore, be fully protected if upper inflection point requests were extended through the winter. In DFWP's application, requests based on the Wetted Perimeter Method were, for the majority of streams, extended through winter (DFWP Exh. 23, pp. 59 and 60).

374. A common criticism of the Wetted Perimeter Method is that inflection points are sometimes poorly defined and difficult to identify. In Montana, the Wetted Perimeter Method has been primarily applied to fairly high gradient mountain streams that contain well-defined riffles having rectangular cross-sectional profiles. Due to this riffle configuration, inflection points, particularly upper ones, are readily discernible for the majority of streams. However, exceptions do occur and require some level of professional judgment in identifying inflection points. (Nelson Dir., DFWP Exh. 22, p. 13).

375. Professional judgment, which plays a role in formulating flow recommendations with all instream flow methods, including the Wetted Perimeter Method, is an accepted and often desired component of instream flow methods. (Nelson Dir., DFWP Exh. 22, pp. 13 and 14; Nelson Reb., DFWP Exh. 44, Attachment A, p. 27; Nelson Cross, Tr. Day 9, p. 120; Thomas Dir., MTU/AFS Exh. 8, p. 5).

376. High inflection point determinations were made by biologists who were instructed to use all the resources they had available in coming to that determination. These resources included their own visual observations of the stream, photographs they took of the stream and the knowledge they gained by being on the stream -- all used in conjunction with the graphical

relationship of wetted perimeter and flow that was generated for each stream. (Nelson Cross, Tr. Day 12, p. 230).

377. Biological assumptions are a prominent component of all instream flow methods, including the Wetted Perimeter Method. (Nelson Dir., DFWP Exh. 22, pp. 10 and 11; White Dir., MTU/AFS Exh. 9, p. 3).

378. The Wetted Perimeter Method is intended to be applied towards the lower end of the stream where the reservation is intended to be monitored. Instream reservations would not be monitored throughout the length of the stream. (Nelson Cross, Tr. Day 8, p. 158).

379. The Wetted Perimeter Method is not applicable to braided stream segments because they are difficult to model hydraulically, making most computer models, including WETP, unworkable. Waters having little or no riffle development, such as cascading mountain streams that plunge from pool to pool and some low gradient, prairie streams, are another exception, as are spring creeks. The seasonably stable flows that characterize spring creeks prevent the collection of field data at a high, medium and low flow, which is information required to calibrate the wetted perimeter computer program. Other methods must be applied to these waters. (Nelson Dir., DFWP Exh. 22, p. 15; Thomas Dir., MTU/AFS Exh. 8, pp. 4-5).

380. For 61 stream reaches in its application, DFWP relied upon four alternative approaches for deriving flow requests. (Nelson Dir., DFWP Exh. 22, p. 19).

381. The first of the four alternate approaches, termed the Fixed Percentage Technique, was applied to 27 highly valued stream

reaches, where time constraints, access limitations and other considerations prevented the use of the Wetted Perimeter Method. (Nelson Dir., DFWP Exh. 22, p. 19; DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1 through 19). These are:

<u>**Beaverhead-Red Rock Sub-basin**</u>
Browns Canyon Creek
Red Rock River (Reach #1)
Reservoir Creek
West Fork Dyce Creek

<u>**Big Hole Sub-basin**</u>
Big Lake Creek
Delano Creek
Jacobson Creek
Rock Creek
Wyman Creek

<u>**Gallatin Sub-basin**</u>
Hell Roaring Creek

<u>**Jefferson Sub-basin**</u>
Halfway Creek

<u>**Madison Sub-basin**</u>
Cougar Creek
Duck Creek
Elk River
Moore Creek
Red Canyon Creek
Trapper Creek
Watkins Creek

<u>**Ruby Sub-basin**</u>
Coal Creek

<u>**Upper Missouri Sub-basin**</u>
Deep Creek

<u>**Smith Sub-basin**</u>
North Fork Deep Creek

<u>**Musselshell Sub-basin**</u>
Collar Gulch Creek

<u>**Marias Sub-basin**</u>
Badger Creek
Birch Creek
Cut Bank Creek
North Fork Deep Creek
South Fork Deep Creek

382. For the Fixed Percentage Technique, the high inflection point flows that were derived for those streams in which the Wetted Perimeter Method was applied, were expressed as percentages of the average annual flow for each stream. These percentages were then arrayed by sub-basin and the individual percentages in each sub-basin were averaged to derive a sub-basin mean. The mean percentage for each sub-basin was then used to calculate flow requests for the tributary streams in that sub-basin (the above 27)

for which flow requests from the Wetted Perimeter Method were not available. High inflection point flows, when averaged by sub-basin, ranged from 27-48% of the average annual flow. (Nelson Dir., DFWP Exh. 22, p. 19).

383. The second of the four alternative instream flow approaches, termed the Base Flow Approach, was applied to 17 high quality spring-fed streams where seasonally stable flows prevented the required collection of wetted perimeter calibration data at a series of different flows. (Nelson Dir., DFWP Exh. 22, p. 21; Thomas Dir., MTU/AFS Exh. 8, p. 5).

384. Spring-fed streams have the potential to grow and sustain trout at levels that far exceed the biological capability of most other streams, making them a highly valued fishery and recreational resource. (Nelson Dir., DFWP Exh. 22, p. 21; Thomas Dir., MTU/AFS Exh. 8, p. 5).

385. The base flow - the lowest mean monthly flow for the year, which typically occurs in winter - is sufficient to protect fishery values on spring-fed streams. Base flow is the typical low flow event on undepleted streams. (Nelson Dir., DFWP Exh. 22, p. 21).

386. DFWP requested the base flow for the following 17 waters (DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1 through 24):

Beaverhead-Red Rock Sub-basin
Poindexter Slough

Belt Creek Sub-basin
Big Otter Creek

Gallatin Sub-basin
Ben Hart Spring Creek
Thompson Spring Creek

Lake Helena-Hauser Reservoir
McGuire Creek
Spokane Creek
Silver Creek

Jefferson Sub-basin
Willow Spring Creek

Madison Sub-basin
Antelope Creek
Black Sand Spring Creek
Blaine Spring Creek
O'Dell Spring Creek
S.F. of the Madison River

Ruby Sub-basin
Warm Springs Creek

Sun Sub-basin
North Fork Willow Creek

Teton Sub-basin
McDonald Creek
Spring Creek

387. Stickney and Wegner creeks - tributaries to the Missouri River - had flow requests determined by a method similar to the Base Flow Approach. These streams, which are intermittent in their lower reaches, are important in the spring when runoff provides flows which allow rainbow trout to enter from the Missouri River to spawn and for young fish to migrate back to the Missouri River when flows are available. Requested flows were the mean monthly flows for the four months of the year when spawning/rearing occurs. (Nelson Dir., DFWP Exh. 22, pp. 21 and 22; DFWP 72155-41A, Bd. Exh. 37-A.3, pp. 3-112 to 3-114).

388. The third of the four alternative instream flow approaches is termed Water Quality and Flow Management Maintenance. For Beaver Creek, Cabin Creek and the West Fork Madison River in the upper Madison River Sub-basin, all remaining unappropriated water was requested instream to help insure that adequate fishery maintenance flows are provided to the upper Madison River when Hebgen Reservoir is filled each year and flow releases into the river are reduced. (DFWP 72155-41A, Bd. Exh. 37-A.2, pp. 2-429, 2-433 and 2-442).

389. For Reach #1 of the East Gallatin River, Bridger Creek, Rocky Creek, and Sourdough Creek - headwaters in the East Gallatin River Sub-basin - all remaining unappropriated water was requested instream to provide the dilution flows that are needed to protect the water quality component of fish habitat in the East Gallatin River, a stream with a history of pollution problems. (DFWP 72155-41A, Bd. Exh. 37-A.2, pp. 2-536 through 2-546 and 2-569 through 2-575).

390. The fourth alternative method relies on Biological-Flow Relationships developed from long-term field studies. Streams in which flow requests are based, in whole or in part, on biological studies are: Gallatin River - Reach #2; Madison River - Reach #4; Narrows Creek; and Missouri River mainstem Reaches #2 through #6. (DFWP 72155-41A, Bd. Exh. 37-A.2, pp. 2-31 through 2-32, 2-402 through 2-405, and 2-484 through 2-486; and Bd. Exh. 37-A.3, pp. 3-6 through 3-38).

391. The instream flow requests in DFWP's application reflect, in general, the minimum flow needs of the fisheries in the lower (downstream) portions of the designated stream reaches. (Nelson Cross, Tr. Day 12, p. 194; Nelson Cross, Tr. Day 8, p. 174).

392. Maintaining the status quo pertains to the fish populations that are presently in a stream. By maintaining the existing flows, low flows will occur less frequently, i.e., the status quo of current low flows is maintained, which in turn maintains the status quo of existing fish populations. (Nelson Cross, Tr. Day 13, p. 8).

393. The purpose of a high inflection point flow recommendation is to provide a flow that would wet much of the riffle wetted perimeter. Flows which occur up to that point will be beneficial to the fish because of their impact on riffle food production. Flows above the upper inflection point will still be beneficial but will have less benefit than flows up to the high inflection point. Flows above the high inflection point are relinquished when making such a recommendation. (Nelson Cross, Tr. Day 13, pp. 7 and 8).

394. The Wetted Perimeter Method does not incorporate existing water availability into the method. The method generates a minimum flow recommendation and that recommendation is not adjusted to reflect what the historic low flow event is. The instream flow recommendation is not downgraded to equal the historic low flow event. (Nelson Cross, Tr. Day 13, pp. 9 and 10).

395. The U.S. Fish and Wildlife Service's Instream Flow Group has been involved for many years in the application and development of instream flow methods. Procedures such as the WETP method used by DFWP are appropriate for protecting the existing instream resource for purposes of state water plans and state water allocations such as permits or reservations, and for identifying target flows for use during project feasibility studies. (Bd. Exh. 41, FEIS, p. C-10; Trihey and Stalnaker (1985), Bd. Exh. 41, FEIS, p. R-9).

396. More advanced incremental methods such as the instream flow group's Instream Flow Incremental Method (IFIM), are most appropriate for time series analysis to identify limiting flow

conditions, fine tuning a resource maintenance objective (maximum utilization of available water), avoiding or minimizing flow-related impacts for specific projects and comparing mitigation alternatives. (Bd. Exh. 41, FEIS, p. C-10).

397. DNRC believes that, when properly implemented, the WETP method accurately portrays the amount of riffle bottom remaining wet as flows change. (Bd. Exh. 41, FEIS, p. C-10).

398. The instream flow methods used by DFWP to determine the amount of water needed for fishery resources are accurate and suitable and provide reasonable estimates of the amount of water needed to maintain instream benefits.

(2) Water Availability

399. For a water reservation application to be complete, an analysis must be made to estimate the physical availability of flows or aquifer yields. For gauged streams, the amount of water physically available on a monthly basis must be demonstrated using available water resources data. Statistical information on stream flows must include monthly means and 20, 50 and 80th percentile exceedence frequency flows. For drainages in which gauging records are not available, monthly flows must be calculated using a state-of-the-art flow estimation technique proved by the department (DNRC). (ARM 36.16.105B(2),(2a) and (2b)).

400. DFWP contracted with the Helena office of the U.S. Geological Survey (USGS) to obtain the physical availability of flows on the streams in its application. (DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1-29).

401. The USGS completed Water-Resources Investigations Report 89-4082 entitled "Estimates of Monthly Streamflow Characteristics at Selected Sites in the Upper Missouri River Basin, Montana, Base Period Water Years 1937-86", containing streamflow estimates at 312 sites. Streamflow characteristics that were estimated were the monthly mean discharges that are exceeded 90, 80, 50 and 20 percent of the years of extended record (1937-86) and the mean monthly discharge for each month. (DFWP Exh. 12, p. 1; Parrett Dir., DFWP Exh. 11, p. 2).

402. Of the 312 sites presented in Report 89-4082, 100 sites had gauged records, 139 had miscellaneous measurement records, and 73 had no streamflow records. (DFWP Exh. 12, p. 3).

403. Of the 73 sites where no flow measurements were made, flows were estimated using basin characteristics for 52 sites, concurrent measurements for 14 sites and a drainage area ratio adjustment for 7 sites. No sites were estimated using only the channel width method. (DFWP Exh. 12, Table 1, pp. 21-27).

404. Flow estimating sites for the water availability study were selected by the USGS so that they would be reflective of the flows available to the entire reach even though the estimated flow at that site may not be the flow at other specific points on the stream. (Parrett Cross, Tr. Day 7, pp. 138 and 143).

405. The 1937-86 base period of record was selected and the general study approach determined following consultation with the Department of Natural Resources and Conservation and the U.S. Geological Survey. (Parrett Cross, Tr. Day 7, pp. 102, 150 and 151).

406. Estimates of monthly streamflow characteristics for sites with streamflow gauging stations are considered to be the most reliable. For those gauge sites where the period of actual streamflow record includes the 1937-86 base period, the estimates of monthly streamflow characteristics are based entirely on recorded streamflows and are considered to be perfectly reliable (zero error). (USGS Report 89-4082, DFWP Exh. 12, p. 14).

407. For estimates of streamflow made at ungauged sites, weighted-average flow estimates based on three methods (basin characteristics, channel width, and concurrent measurement) are generally considered to be the most reliable. If only one estimation method is used, the concurrent measurement method generally provides more reliable estimates than any of the other individual estimating methods. (DFWP Exh. 12, p. 16).

408. The 18 conservation districts and other objectors to DFWP questioned the validity of the streamflow estimates using the 1937-86 base period because it did not include the drought years prior to 1937 or following 1986. (Elwell Obj., Upper Musselshell Water Users Exh. 2, p. 1).

409. The mean annual flow for the base period 1937-86 is more reflective of the long term mean annual flows of streams in the Missouri River basin than is the 1930-90 period. (Parrett Cross, Tr. Day 7, p. 132; Holland-Grasshopper Exhs. 1 and 2 [graphs]).

410. Water year 1986 was selected as the ending date because it was the latest complete water year available when the study was begun. Water years 1987-89 were not included because these years were not concluded or even yet begun. Water year 1990 began

October 1, 1989, three months after DFWP's application was submitted. (Spence Reb., DFWP Exh. 46, pp. 12 and 13).

411. When considering the impact of a flood event on the mean annual flow of a stream, a flood discharge does not necessarily affect the mean annual flow, for the year, the mean monthly flow or the long term mean annual flow. (Parrett Cross, Tr. Day 7, p. 112).

412. The method by which the USGS estimated streamflows for a particular month is different than the measurements a person such as an irrigator might make by measuring through a weir three or four times a day over a period of months. In estimating streamflow, frequent measurements over a weir are not necessarily more accurate than the USGS estimates. Reading a staff gauge or other indicator of the stage of a stream will have a lot of inaccuracy unless the rate of discharge of the stream is measured at the same time. (Parrett Cross, Tr. Day 7, p. 114).

413. The streamflow measurement techniques used by the USGS in the water availability study are generally accepted as being suitable techniques for estimating streamflows and have been generally accepted by the hydrology communities. Given the scope of the water availability project, no better techniques could have been used. (Parrett Cross, Tr. Day 7, p. 150).

(3) Murphy Rights

414. The 1969 Montana Legislature authorized DFWP to file for instream water rights to protect flows on Blue Ribbon trout streams

for fish and wildlife habitat. These rights became known as Murphy Rights after the bill's sponsor. (Bd. Exh. 40, DEIS, p. 61).

415. DFWP filed for Murphy Rights on six streams in the Missouri basin. (Bd. Exh. 40, DEIS, Table 4-13, p. 62; Bd. Exh. 41, FEIS, Table 4-13, p. 141; Spence Reb., DFWP Exh. 46, Att. A).

416. All of the Murphy Rights filed in the Missouri River basin have priority dates in December 1970. (Spence Reb., DFWP Exh. 46, Att. A).

417. A comparison of the water right filings on the six Murphy Right streams and the instream reservations requested on those same streams is shown in Table 2. The instream reservations are not additive to the Murphy Rights if granted but are complementary with those Murphy Rights for a given time of year. To the extent they overlap, they would overlap at the same quantities for the periods in which they overlap. (DFWP Stipulation, Tr. Day 8, pp. 139 and 140; Nelson Cross, Tr. Day 4, pp. 31 and 32).

(4) 50% Limitation

418. The amount of instream flow which the Board can grant is limited to no more than 50% of the average annual flow of record on gauged streams. Ungauged streams can be allocated at the discretion of the Board. (85-2-316(6), MCA).

419. This limitation in many cases can result in the granting of an instream flow that is too low, thus potentially damaging the existing fishery and impacting future recreational opportunities. (Spence Reb., DFWP Exh. 46, p. 10).

Table 2

Summary of DFWP "Murphy rights" and reservation requests on Murphy Right streams in the Missouri basin.

	MURPHY RIGHT			RESERVATION REQUEST	
STREAM	REACH	DATES	AMOUNT CFS	DATES	AMOUNT CFS
Madison River	Hebgan Dam to Quake Lake	4/1-7/31 8/1-3/31	500 500	1/1-12/31	800
Madison River	Quake Lake to mouth of West Fork	1/1-12/31	500	1/1-12/31	800
Madison River	Mouth of West Fork to Ennis Lake	1/1-5/31 6/1-7/15 7/16-12/31	900 1400 1050	1/1-12/31	1,000
Madison River	Ennis Lake to mouth	1/1-5/31 6/1-6/30 7/1-7/15 7/16-12/31	1200 1500 1423 1300	1/1-12/31	1,300
West Gallatin River	Yellowstone Park to Shedd's Bridge	5/16-7/15 7/16-5/15	800 400	1/1-12/31	170/ 400
Gallatin River	Mouth to junction with East Gallatin River	5/1-5/15 5/16-5/31 6/1-6/15 6/16-6/30 7/1-8/31 9/1-4/30	947 1278 1500 1176 850 800	1/1-12/31	1,000
Missouri River	Toston Dam to Canyon Ferry Reservoir	1/1-1/31 2/1-5/15 5/16-6/30 7/1-7/15 7/16-9/14 9/15-12/31	2400 2400 4000 3816 2400 2400	1/1-12/31	2,400
Missouri River	Holter Dam to mouth of Smith River	1/1-12/31	3000	5/19-7/5 7/6-5/18	6,398 4,100
Smith River	Fort Logan Bridge to confluence of Sheep Creek	5/1-6/30 7/1-4/30	150 90	1/1-12/31	90
Smith River	Confluence of Sheep Creek to Cascade-Meagher county line	4/1-4/30 5/1-6/30 7/1-8/31 9/1-3/31	140 150 140 125	1/1-12/31	150
Smith River	Cascade-Meagher county line to confluence of Hound Creek	5/1-5/15 5/16-6/15 6/16-6/30 7/1-4/30	372 400 398 150	1/1-12/31	150
Big Spring Creek	State Fish Hatchery to mouth	1/1-12/31	110	1/1-12/31	110/ 100

(Bd. Exh. 41 (FEIS) p. 141; Spence Reb. DFWP Exh. 46, Attachment A)

420. The 50% limitation can be too restrictive when gauged streams are: 1) badly depleted, 2) spring-fed, 3) regulated, 4) when gauged sites chosen are located at or near the upstream boundary of the designated stream reach, and 5) when all remaining unappropriated flow is needed to protect fishery values. (DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1-25).

421. There are 36 stream reaches in DFWP's application where the instream flow reservation requests exceed 50% of the average annual flow of record at a gauged site. (Spence Reb., DFWP Exh. 46, p. 10; DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1-30 through 1-31b).

422. The flow levels requested for each stream in this application are the flows required to maintain the fishery resources at a desired level. Any flows granted that are less than requested will have some detrimental impacts on the resource. (Spence Reb., DFWP Exh. 46, p. 11).

423. The impacts of the 50% limitation can be minimized if any reductions in the flow requests are made during the high flow period of the year (May 15-July 1) rather than during the irrigation season months when flows are already often too low. (Spence Reb., DFWP Exh. 46, p. 11).

424. The period of record as a gauged stream should have a minimum of 10 years of record to be used to calculate 50% of the average annual flow. (DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1-28).

D. <u>FINDINGS THAT THE INSTREAM RESERVATIONS OF WATER APPLIED FOR BY DFWP ARE IN THE PUBLIC INTEREST [MCA § 85-2-316(4)(a)(iv); ARM 36.16.107B(4)]</u>

425. For the board to adopt an order reserving water, it must find, in its judgment and discretion, that the reservation is in the public interest, based on a weighing and balancing of the following factors, making a specific finding for each factor.

<u>(1) Benefit/Cost Factor</u>

426. This factor requires a weighing of the direct and indirect benefits and direct and indirect costs of granting the DFWP instream flow reservations.

427. The direct benefits of reserving the requested instream flows include the preservation of the fisheries resources in the basin, and continuation of fishing opportunities, recreational floating, and continued maintenance of existing riparian communities. (Bd. Exh. 37-A.1, DFWP App., Vol. 1, p. 1-33; DFWP Exh. 37, Knudson Dir., p. 5; DFWP Exh. 31, Duffield Dir., Attach. C, DFWP Exh. 28, Casey, p. 2).

428. Significant fisheries resources would be protected by DFWP's reservations. DFWP has applied for instream reservations only on those streams with significant fishery resources. (Findings 27 to 275; DFWP Exh. 37, Knudson Dir., p. 3).

429. Portions of the Madison, Big Hole, Gallatin, Beaverhead and Missouri Rivers are nationally known fishing streams. (DFWP Exh. 37, Knudson Dir., p. 3).

430. The Ruby, East Gallatin, Jefferson, and Red Rock Rivers are also very important trout streams. (DFWP Exh. 37, Knudson Dir., p. 4).

431. Tributaries to major rivers serve as vital spawning streams for the larger rivers, as well as habitat for resident fish. (DFWP Exh. 37, Knudson Dir., p. 4).

432. Fish migrations from reservoirs and lakes throughout the basin provide important stream fishing opportunities. Tributaries to reservoirs and lakes that contain a trout fishery support spawning runs when adequate habitat, water quality and instream flows exist in these streams. (DFWP Exh. 37, Knudson Dir., p. 4).

433. From Great Falls to Fort Peck Reservoir, the Missouri River and its tributaries support a warmwater fishery of significance. (DFWP Exh. 37, Knudson Dir., p. 5).

434. Paddlefish are Montana's largest gamefish and reside in this reach of the Missouri River. (Finding 305 to 307).

435. Pallid and shovelnose sturgeon also reside in this reach of the Missouri. The pallid sturgeon is listed as an endangered species. (DFWP Exh. 37, Knudson Dir., p. 6).

436. The middle Missouri is an under-utilized fishery resource, and opportunities for steady growth in the recreational use of the middle Missouri are very good. (DFWP Exh. 37, Knudson Dir., p. 6).

437. The rivers and streams above Canyon Ferry Dam accounted for 375,239 of the total 1,193,000 days spent fishing in Montana during 1985. (DFWP Exh. 37, Knudson Dir., p. 3).

438. Several Endangered Species and Species of Special Concern reside in streams in the Missouri River basin. (Findings 276 to 277).

439. Preserving instream flows will directly benefit recreational floating by helping to maintain existing water depth and velocities on those streams large enough to accommodate canoes, rafts and other types of floating craft. Flows which are sufficient to enable these craft to operate will benefit recreational floaters as well as anglers who float to fish these streams. (DFWP Exh. 37, Knudson Dir., p. 7).

440. The Missouri River and its tributaries are extensively used and are popular for floating. (DFWP Exh. 37, Knudson Dir., p. 7).

441. The portion of the Missouri River from Fort Benton to Fort Peck Reservoir was designated as a National Wild and Scenic River in 1976. (DFWP Exh. 37, Knudson Dir., p. 7; Bd. Exh. 40, DEIS, p. 65).

442. DFWP's reservation requests for reaches 4, 5, and 6 of the Missouri River would help preserve the biological, recreational, scenic and historical values of this portion of the Missouri. (DFWP Exh. 37, Knudson Dir., p. 7; Bd. Exh. 37-A.1, DFWP App., p. 1-45).

443. Instream flows enhance the attributes of river bottom lands by keeping riparian plant communities healthy and viable, and by providing habitat for wildlife and birds that people enjoy. (DFWP Exh. 28, Casey Dir., p. 2; DFWP Exh. 37, Knudson Dir., p. 7).

444. Maintenance of existing riparian vegetation provides the benefit of dampening the effects of flooding through erosion control, and supplying organic material to the aquatic system, enhancing its productivity. (DFWP Exh. 28, Casey Dir., p. 5).

445. Maintaining instream flows would provide indirect benefits for hydropower production, pollution control, and public health. (DFWP Exh. 39, Elliott Dir., p. 3).

446. During the drought year of 1988, the mean arsenic concentration in August at Toston was nearly twice the federal drinking water standard. Arsenic concentrations were high because of low flows in the Jefferson and Gallatin Rivers. (DFWP Exh. 39, Elliott, Dir., p. 4).

447. Instream flow reservations will maintain water quality by diluting carcinogenic substances, such as arsenic, and other toxic substances in the Missouri basin. (DFWP Exh. 39, Elliott Dir., p. 4).

448. Streamflow dilution provided by instream flows would help maintain safe drinking water supplies for municipalities and individuals that take drinking water from the Missouri and Madison Rivers. (DFWP Exh. 39, Elliott Dir., p. 4).

449. Maintaining instream flows through a reservation would help maintain existing water volumes to dilute wastewater discharges from municipalities and industrial sources, as well as return flows from irrigation. (DFWP Exh. 39, Elliott Dir., p. 4).

450. Instream flow reservations would help maintain the electrical generating capacity of hydropower plants on the Missouri River. (DFWP Exh. 39, Elliott Dir., p. 3).

451. Instream flow reservations and flows required for hydropower generation are mutually beneficial. (DFWP Exh. 37, Knudson Dir., p. 9).

452. Stream-based recreation has a significant economic impact in Montana, and tourism-related businesses constitute an expanding industry in Montana. DFWP's instream flow reservation would help protect the outstanding scenic and recreational values that attract tourists to Montana. (DFWP Exh. 37, Knudson Dir., p. 9).

453. River-based outfitting businesses, as well as service sector businesses, including motels, campgrounds, restaurants and sporting good stores, benefit from maintenance of adequate instream flows. (DFWP Exh. 37, Knudson Dir., p. 9).

454. Recreational and aesthetic attributes of rivers and streams attract new businesses and economically independent residents to Montana. (DFWP Exh. 37, Knudson Dir., p. 10).

455. If DFWP's reservations are granted, existing water users would be provided with assurances of future water availability. Reserved instream flows will help maintain water levels at existing headgates and provide a legal buffer to future water development plans. (DFWP Exh. 37, Knudson Dir., p. 11; DFWP Exh. 10, Graham Dir., p. 7).

456. Direct costs to DFWP of an instream reservation include monitoring streamflows on certain stream reaches. DFWP may have to install some gauging stations and may have some administrative costs to implement its reservation program, but these costs will be slight. (DFWP Exh. 37, Knudson Dir., p. 12; Bd. Exh. 37-A.1, DFWP App., p. 1-91).

457. Reservations of instream flows in the Missouri River basin would have no indirect costs to existing industrial water

users, but may affect future use of water by industries, primarily mining. (DFWP Exh. 39, Elliott Dir., p. 5; DFWP Exh. 37, Knudson Dir., p. 13).

458. Water for industrial development could be supplied from other sources, such as groundwater, storage or purchase of existing water rights. (DFWP Exh. 39, Elliott Dir., p. 5; DFWP Exh. 37, Knudson Dir., p. 13).

459. The possibility of indirect costs to industry is not significant, and has not been quantified. (Bd. Exh. 41, FEIS, p. S-8; DFWP Exh. 39, Elliott Dir., p. 5; DFWP Exh. 37, Knudson Dir., p. 13).

460. Instream flow reservations will not have adverse impacts on existing irrigation water rights, nor would they preclude the use of groundwater or storage for the development of additional irrigation. (Bd. Exh. 41, FEIS, pp. 55, 108; DFWP Exh. 37, Knudson Dir., p. 13).

461. Instream reservations are not inconsistent with the water storage section of the state's water plan. (Bd. Exh. 41, FEIS, p. 71).

462. There are presently about 8,500 storage projects in the Missouri River basin upstream from Fort Peck Dam. If existing trends continue, few new storage projects will be built over the next 25 years because of existing environmental, financial and economic constraints, and because storage projects have already been constructed at many of the best sites. (Bd. Exh. 40, DEIS, pp. 66, 237).

463. Instream flow reservations could not command the release of stored water, whether under pre-July 1, 1985 rights or post-July 1, 1985 rights. (DFWP Exh. 46, Spence Reb., p. 4).

464. Instream flow reservations may have some indirect costs to existing water right holders, if the reservants object to changes in existing rights. All junior water right holders, including reservants, have the right to object to changes in senior water rights. (DFWP Exh. 11, Spence Dir., p. 7). Such objections are not impacts on existing water rights, but only on changes to those rights.

465. Reservant's objections, if any, may increase transaction costs for existing water right holders who wish to transfer or otherwise change water rights. (Tr. Day 10, Duffield Cross, p. 171). An objection may, in some cases, prevent a change from occurring, but only if flows at DFWP's monitoring point are decreased as a result of the change. (Finding No. 519).

466. DFWP's history of objections to changes in water rights with respect to its "Murphy" rights and Yellowstone basin reservation rights, shows that it objects infrequently to such changes. (DFWP Exh. 11, Spence Dir., p. 7).

467. There is little or no risk that an existing water right holder will not be able to beneficially use water on account of an objection to a change from an instream reservant. (Findings 522-525).

468. Objectors to instream reservations in this proceeding have not quantified any indirect costs to existing water right

holders, which would result from granting the instream reservations. (Tr. Day 10, Duffield Cross, pp. 67-171).

469. The indirect costs that may result to existing water right holders by granting instream reservations are minor, and not significant in comparison to the other benefits and costs which have been quantified. (Tr. Day 10, Duffield Cross, p. 67, 171).

470. The costs of applying for the reservations and of conducting the contested case hearing are not direct or indirect costs in the benefit/cost test. [DFWP Exh. 31, Duffield Dir., Attach. C; ARM 36.16.102(7)].

471. For DFWP's instream reservations, the benefits and costs to be considered may be summarized as follows:

Direct Benefits	Fish, Wildlife and Recreation Fisheries Maintenance, Fishing Opportunities, Riparian Protection
Indirect Benefits	Hydropower Water Quality
Direct Costs	DFWP Fishery/Recreation Enforcement
Indirect Costs	Foregone Water Consumption for Irrigation or Other Uses

(DFWP Exh. 31, Duffield Dir., Attach. C; Findings 425-470).

472. Under the Instream Alternative described by DNRC in the EIS, all municipal applications would be given first priority, all instream applications would be given second priority and marginally feasible irrigation projects would be given third priority. (Bd. Exh. 40, DEIS, p. 133).

473. Taken as a whole, this alternative has net benefits of $327.2 million, and since it provides the greatest net benefits, appears to be in the public interest. (Bd. Exh. 41, FEIS, p. S-8).

474. DNRC's analysis of the benefits and costs to be realized from granting instream flow reservations did not place values on existing instream flows as direct benefits that are realized by the instream flow reservants. (DFWP Exh. 31, Duffield Dir., p. 3-4; Bd. Exh. 41, FEIS, p. 36).

475. Positive direct benefits are realized by an instream flow reservant by maintaining status quo flow levels, and they should be included in the benefit/cost analysis. Rights of instream use need to be established to provide security of supply. It is not necessary to have known competing uses, with associated opportunity costs, to value existing instream uses as direct benefits to the reservant. (DFWP Exh. 48, Duffield Reb., p. 3; Tr. Day 10, Duffield Cross, pp. 68-70).

476. With respect to instream flow requests where there are competing uses for irrigation, the valuation of water allocations may be performed from either the standpoint of a positive increase in the diversionary use (irrigation) or from the standpoint of a decrease in instream flows, because they are symmetrical. A negative number for net benefits from irrigation means that instream flows have positive net benefits. DNRC's analysis was from the standpoint of the consumptive change in status quo. (DFWP Exh. 48, Duffield Reb., p. 3).

477. Taken as a whole, the net benefits of granting DFWP's instream reservations where there are competing uses is $188.6

million (symmetric to the negative benefits of granting all irrigation projects). (DFWP Exh. 31, Duffield Dir., p. 22).

478. In order to determine the efficient or optimal allocation of water that yields the highest net benefits, it is necessary to identify the set of reservation requests, i.e., the combination of competing irrigation and instream reservations, that yields the highest net benefits. (Bd. Exh. 41, FEIS, p. 38; DFWP Exh. 31, Duffield Dir., p. 6).

479. There are 242 instream use requests by DFWP on streams or stream reaches where there are no conflicts with proposed consumptive use reservation requests. (Bd. Exh. 40, DEIS, p. 255, Table 3; Bd. Exh. 41, FEIS, p. 196, Revised Table K-3).

480. The instream reservation requests with no competition from other uses are shown in Table 3 attached hereto. (Bd. Exh. 40, DEIS, App. K., Table K-3; Bd. Exh. 41, FEIS, p. 196).

481. A reservation for these streams and stream reaches in the amounts requested by DFWP will protect existing instream uses. A reservation for these streams and stream reaches have direct benefits to the reservant because a reservation provides legal protection for continued instream water use. (Bd. Exh. 40, DEIS, p. 254; DFWP Exh. 48, Duffield Reb., p. 3; Tr. Day 10, Duffield Cross, p. 69).

482. The direct benefit to DFWP and the public from the recreation, fish and wildlife values in these reaches with no competing claims is about $32 million per year. (DFWP Exh. 31, Duffield Dir., p. 19).

Table 3

Table K-3. Reservation requests for instream flows on streams with no competing requests

APPLICANT	STREAM	FISHERIES VALUE CLASS[c]
GALLATIN RIVER DRAINAGE		
DFWP	Baker Creek	2
DFWP	Big Bear Creek	[a]
DFWP	Bridger Creek	4
DFWP	Cache Creek	4
DFWP	East Fork Hyalite Creek	2
DFWP	Gallatin River #1	2
DFWP	Hell Roaring Creek	[a]
DFWP	Hyalite Creek #1	3[b]
DFWP	Middle Fork West Fork Gallatin River	4
DFWP	Porcupine Creek	4
DFWP	Reese Creek	2
DFWP	Rocky Creek	2
DFWP	South Cottonwood Creek	6
DFWP	South Fork Spanish Creek	4
DFWP	South Fork West Fork Gallatin River	4
DFWP	Spanish Creek	1
DFWP	Squaw Creek	1
DFWP	Taylor Fork	3
DFWP	West Fork Gallatin River	1
DFWP	West Fork Hyalite Creek	2
DFWP	East Gallatin River #1	2
MADISON RIVER DRAINAGE		
DFWP	Madison River #1	1
DFWP	Black Sand Spring Creek	2
DFWP	Cougar Creek	3
DFWP	Duck Creek	3
DFWP	Grayling Creek	[a]
DFWP	Red Canyon Creek	[a]
DFWP	Watkins Creek	[a]
DFWP	Trapper Creek	[a]
DFWP	Cabin Creek	4
DFWP	Beaver Creek	4
DFWP	Antelope Creek	2
DFWP	Elk River	4
DFWP	West Fork Madison River	3
DFWP	Standard Creek	4
DFWP	Squaw Creek	4
DFWP	Ruby Creek	3
DFWP	Indian Creek	4
DFWP	Blaine Spring Creek	2
DFWP	O'Dell Spring Creek	[a]
DFWP	Jack Creek	3
DFWP	Moore Creek	2[b]
DFWP	North Meadow Creek	3
DFWP	Hot Springs Creek	4
DFWP	Cherry Creek	4
DFWP	Madison River #2	1
DFWP	Madison River #3	1
JEFFERSON AND BOULDER RIVER DRAINAGES		
DFWP	Boulder River #1	4
DFWP	Hells Canyon Creek	2[b]
DFWP	Willow Spring Creek	2
DFWP	Halfway Creek	1[b]
DFWP	Whitetail Creek	4
DFWP	South Boulder River	3[b]
DFWP	South Willow Creek	3
DFWP	North Willow Creek	3
DFWP	Willow Creek	2
DFWP	Little Boulder River	4
BIG HOLE RIVER DRAINAGE		
DFWP	South Fork Big Hole River	[a]
DFWP	Big Hole River #1	1
DFWP	Big Hole River #2	1
DFWP	Big Hole River #3	1
DFWP	Warm Springs Creek	3
DFWP	Miner Creek	1
DFWP	Rock Creek	1
DFWP	Big Lake Creek	1
DFWP	Francis Creek	2
DFWP	Steel Creek	1
DFWP	Swamp Creek	1
DFWP	Joseph Creek	3
DFWP	Trail Creek	3
DFWP	Ruby Creek	3
DFWP	Johnson Creek	3
DFWP	Mussigbrod Creek	2
DFWP	North Fork Big Hole River	1
DFWP	Pintlar Creek	3[b]
DFWP	Fishtrap Creek	3[b]
DFWP	LaMarche Creek	3
DFWP	Seymour Creek	3
DFWP	Sullivan Creek	[a]
DFWP	Twelvemile Creek	[a]
DFWP	Corral Creek	3
DFWP	Tenmile Creek	[a]
DFWP	Sevenmile Creek	[a]
DFWP	Sixmile Creek	[a]
DFWP	Oregon Creek	[a]
DFWP	California Creek	[a]
DFWP	American Creek	[a]
DFWP	French Creek	4
DFWP	Governor Creek	1
DFWP	Deep Creek	3
DFWP	Bear Creek	3
DFWP	Bryant Creek	[a]
DFWP	Jacobsen Creek	[a]
DFWP	Wyman Creek	4
DFWP	Pattengail Creek	3
DFWP	Wise River	3
DFWP	Delano Creek	[a]
DFWP	Jerry Creek	4
DFWP	Divide Creek	3
DFWP	Canyon Creek	3
DFWP	Moose Creek	3
DFWP	Trapper Creek	4
DFWP	Camp Creek	4
DFWP	Willow Creek	3

Table 3 (continued)

Table K-3 (continued)

APPLICANT	STREAM	FISHERIES VALUE CLASS[c]
DFWP	Birch Creek	4
BLM	Deep Creek	3
BLM	Bear Creek	3
BLM	Canyon Creek	3
BLM	Moose Creek	3
BLM	Camp Creek	4
BLM	Willow Creek	3
RUBY RIVER DRAINAGE		
DFWP	Ruby River #1	3[b]
DFWP	Ruby River #2	2
DFWP	Coal Creek	[a]
DFWP	Middle Fork Ruby River	[a]
DFWP	East Fork Ruby River	4
DFWP	West Fork Ruby River	4
DFWP	Cottonwood Creek	3[b]
DFWP	Warm Spring Creek	3[b]
DFWP	North Fork Greenhorn Creek	1
DFWP	Mill Creek	4
DFWP	Wisconsin Creek	5
BLM	North Fork Greenhorn Creek	1
BEAVERHEAD RIVER DRAINAGE		
DFWP	Beaverhead River #1	1
DFWP	Red Rock River #1	2[b]
DFWP	Red Rock River #2	2[b]
DFWP	Red Rock Creek	1[b]
DFWP	Hell Roaring Creek	1[b]
DFWP	Corral Creek	2
DFWP	Tom Creek	3
DFWP	Narrows Creek	2
DFWP	Odell Creek	2
DFWP	Jones Creek	3
DFWP	Peet Creek	2
DFWP	Long Creek	3
DFWP	East Fork Clover Creek	4
DFWP	Indian Creek	2
DFWP	Cabin Creek	2
DFWP	Simpson Creek	2
DFWP	Deadman Creek	3
DFWP	Big Sheep Creek	2[b]
DFWP	Black Canyon Creek	[a]
DFWP	Shenon Creek	4
DFWP	Frying Pan Creek	[a]
DFWP	Trapper Creek	[a]
DFWP	Bear Creek	2
DFWP	Rape Creek	1
DFWP	Bloody Dick Creek	3
DFWP	Browns Canyon Creek	[a]
DFWP	Medicine Lodge Creek	3
DFWP	Horse Prairie Creek	3[b]
DFWP	East Fork Dyce Creek	[a]
DFWP	West Fork Dyce Creek	[a]
DFWP	Reservoir Creek	[a]
DFWP	Grasshopper Creek	4
DFWP	Poindexter Slough	1
DFWP	East Fork Blacktail Deer Creek	3[b]
DFWP	West Fork Blacktail Deer Creek	4
DFWP	Blacktail Deer Creek	3[b]
BLM	Hell Roaring Creek	1
BLM	Corral Creek	2
BLM	Tom Creek	3
BLM	Odell Creek	2
BLM	Jones Creek	3
BLM	Peet Creek	2
BLM	Long Creek	3
BLM	Indian Creek	2
BLM	Cabin Creek	2
BLM	Simpson Creek	2
BLM	Deadman Creek	2
BLM	Big Sheep Creek	2[b]
BLM	Black Canyon Creek	[a]
BLM	Frying Pan Creek	[a]
~~BLM~~	~~Trapper Creek~~	~~[a]~~
BLM	Bear Creek	2
BLM	Rape Creek	1
BLM	Bloody Dick Creek	3
BLM	Medicine Lodge Creek	3
BLM	East Fork Dyce Creek	[a]
BLM	West Fork Dyce Creek	[a]
BLM	East Fork Blacktail Deer Creek	3[b]
BLM	West Fork Blacktail Deer Creek	4[b]
BLM	Shenon Creek	4
BLM	Trapper Creek	[a]
MISSOURI RIVER DRAINAGE - THREE FORKS TO HOLTER DAM		
DFWP	Avalanche Creek	4
DFWP	Beaver Creek	3
DFWP	Confederate Gulch	4
DFWP	Crow	
DFWP	Dry Creek	3[b]
DFWP	Duck Creek	4
DFWP	Sixteen Mile Creek	3
DFWP	Cottonwood Creek	4
DFWP	Willow Creek	3
DFWP	Beaver Creek	3[b]
~~DFWP~~	~~Prickly Pear Creek~~	~~2[b]~~
~~DFWP~~	~~Tenmile Creek~~	~~4[a]~~
DFWP	Sevenmile Creek	4
DFWP	Silver Creek	3
DFWP	Trout Creek	3
DFWP	McGuire Creek	[a]
DFWP	Canyon Creek	4
DFWP	Little Prickly Pear Creek #1	2
DFWP	Little Prickly Pear Creek #2	2
DFWP	Lyons Creek	2
DFWP	Spokane Creek	3
DFWP	Virginia Creek	4
DFWP	Wolf Creek	3

Table K-3 (continued)

APPLICANT	STREAM	FISHERIES VALUE CLASS[c]
MISSOURI RIVER DRAINAGE - HOLTER DAM TO BELT CREEK		
DFWP	Sheep Creek	3
DFWP	Wegner Creek	[a]
DFWP	Stickney Creek	3
DEARBORN RIVER DRAINAGE		
DFWP	Middle Fork Dearborn River	4
DFWP	South Fork Dearborn River	4
DFWP	Flat Creek	4
DFWP	Bean Lake	NA
SMITH RIVER DRAINAGE		
DFWP	South Fork Smith River	[a]
DFWP	North Fork Smith River	[a]
DFWP	Newlan Creek	4
DFWP	Big Birch Creek	4
DFWP	Sheep Creek	2[b]
DFWP	Eagle Creek	4
DFWP	Rock Creek	3
DFWP	Tenderfoot Creek	3
DFWP	North Fork Deep Creek	[a]
SUN RIVER DRAINAGE		
DFWP	North Fork Willow Creek	[a]
DFWP	Willow Creek	4
DFWP	Ford Creek	4
~~DFWP~~	~~Elk Creek~~	~~3~~
BELT CREEK DRAINAGE		
DFWP	Belt Creek #1	3
DFWP	Dry Fork Belt Creek	3
DFWP	Tillinghast Creek	3
DFWP	Pilgrim Creek	2
DFWP	Logging Creek	4
MARIAS RIVER DRAINAGE		
DFWP	South Fork Dupuyer Creek	2
DFWP	North Fork Dupuyer Creek	3
DFWP	Dupuyer Creek	4
DFWP	South Badger Creek	3
DFWP	North Badger Creek	1[b]
DFWP	Badger Creek	3
DFWP	South Fork Two Medicine River	2

APPLICANT	STREAM	FISHERIES VALUE CLASS[c]
TETON RIVER DRAINAGE		
DFWP	McDonald Creek	4
DFWP	South Fork Deep Creek	4
DFWP	North Fork Deep Creek	2
DFWP	Deep Creek	4
DFWP	Spring Creek	3
DFWP	Antelope Butte Swamp	NA
MISSOURI RIVER DRAINAGE - BELT CREEK TO FORT PECK DAM		
DFWP	Cow Creek	6
DFWP	Highwood Creek (upper)	3[b]
DFWP	Shonkin Creek (upper)	3
JUDITH RIVER DRAINAGE		
DFWP	Middle Fork Judith River	[a]
DFWP	Beaver Creek	4
DFWP	Cottonwood Creek	4
DFWP	Lost Fork Judith River	6
DFWP	Yogo Creek	4
DFWP	South Fork Judith River	6
MUSSELSHELL RIVER DRAINAGE		
DFWP	Musselshell River #1	6
DFWP	South Fork Musselshell River	4
DFWP	Alabaugh Creek	4
DFWP	Cottonwood Creek	4
DFWP	North Fork Musselshell River #1	3
DFWP	North Fork Musselshell River #2	3
DFWP	Checkerboard Creek	4
DFWP	Spring Creek	4
DFWP	Big Elk Creek	4
DFWP	American Fork Creek	4
DFWP	Careless Creek	[a]
DFWP	Swimming Woman Creek	[a]
DFWP	Collar Gulch Creek	[a]
DFWP	Flatwillow Creek	4
FORT PECK RESERVOIR DRAINAGE		
DFWP	Big Dry Creek	3[b]
DFWP	Little Dry Creek	[a]

[a] some or all reaches unclassified
[b] some reaches have lower classification
[c] 1 = outstanding fisheries resource
2 = high value fisheries resource
3 = substantial fisheries resource
4 = moderate fisheries resource
5 = limited fisheries resource
6 = unrated

483. The direct and indirect costs of granting the instream reservation requests where there are no competing uses are negligible. (Findings 462 and 474).

484. Other potential new water uses with higher values have not been identified in these reaches, so the benefits of granting these requests substantially exceed the nominal direct and indirect costs. (Bd. Exh. 40, DEIS, p. 255; DFWP Exh. 31, Duffield Dir., p. 18-19).

485. The value per acre-foot of water for irrigation for each project should be compared to the value of that water for instream uses, which include hydropower generation, fish and wildlife, recreation and water quality. The use with the highest value passes the benefit/cost test. This value comparison is set forth in Findings 595-598, with respect to the consumptive requests. (Bd. Exh. 41, FEIS, p. 38).

486. The value of an acre-foot of water for all 17 of the remaining municipal applications exceeds the estimated value for instream uses. (Bd. Exh. 41, FEIS, Appendix B).

487. The remaining instream flow requests, for which there are competing consumptive irrigation uses, all have instream values greater than such consumptive use values, when all quantifiable and unquantifiable values are considered. A comparison of such values is set forth in Irrigation Findings. (Findings 600-618).

488. The benefits of granting all instream flows requested exceed the indirect costs to foregone irrigation and all other direct and indirect costs. (Finding 473).

(2) Net Benefits of Reservation Greater than Net Benefits of Not Granting the Reservation [ARM 36.16.107B(4)(b)]

489. By definition, "net benefits" mean indirect and direct benefits less indirect and direct costs. Indirect costs include economic opportunity costs that the requested flow reservations may have to parties other than the reservant. [ARM 36.16.107B(4)(b)]. Thus, this factor is similar to the benefit/cost criteria upon which findings of fact have been made above.

490. A no-action alternative to granting instream flow reservations would result in costs to recreation, fish and wildlife, aesthetic qualities and other economics. In some cases, further consumptive appropriations will result in detrimental affects to aquatic life, wildlife and recreation. (DFWP Exh. 38, p. 75; Bd. Exh. 40, DEIS, p. 237).

491. Other alternative actions could be taken to improve or protect instream flows, such as intensification of water conservation measures, leasing of water rights, constructing offstream storage facilities, conditioning water permits, closing basins and applying the public trust doctrine. (DFWP Exh. 38, pp. 75-84).

492. These alternatives are either more costly, limited in applicability, legally untested or logistically infeasible for basin-wide utilization. (DFWP Exh. 37, Knudson Dir., p. 15).

(3) Reasonable Alternatives with Greater Net Benefits

493. These findings of fact have identified the optimal set of reservation requests with the greatest net benefits. (Findings 484-488, 760-766).

494. There are no other reasonable alternatives with greater net benefits. (Bd. Exh. 41, FEIS, pp. S-8, 34).

(4) Irretrievable Loss of a Natural Resource

495. Depending on the location, timing, and amount of water diverted, new water use permits will cause an irretrievable loss of water quality, fisheries, and opportunities for recreation. (Bd. Exh. 40, DEIS, p. 244).

496. Incremental streamflow depletions will continue to reduce critical components of the natural environment, including fishery resources, wildlife riparian areas and water quality. (DFWP Exh. 38, p. 73).

497. Reservations for instream flow are the only way to protect streamflow for water quality, fisheries and recreation on nearly all streams where such reservations are requested. (Bd. Exh. 40, DEIS, p. 244).

498. The competing applications for consumptive uses of water throughout the basin in this proceeding demonstrate there is a reasonable likelihood that such competing water uses would result in an irretrievable loss of a natural resource if instream flow reservations were not granted. (Findings 623-742).

(5) Adverse Impacts to Public Health, Safety and Welfare

499. DFWP's instream flow reservation would not have adverse impacts to public health, safety and welfare. (Bd. Exh. 40, DEIS, pp. 243-244; DFWP Exh. 38, p. 42).

500. The impacts to public health, safety and welfare from instream flow reservations are positive and beneficial. (Bd. Exh. 40, DEIS, pp. 243-244; DFWP Exh. 38, pp. 41-42).

(6) Other Factors

501. The instream flows requested by DFWP are necessary to maintain the existing resident fish populations, to provide passage for migratory fish species in certain streams, to protect spawning and rearing habitats of both resident and migratory species, to protect the habitats of game fish "Species of Special Concern" such as the westslope cutthroat trout, Arctic grayling, pallid sturgeon and paddlefish, as well as nongame species such as sturgeon chub, sickelfin chub and the northern redbelly dace x finescale dace hybrid. The requested flows are also necessary to help protect the habitat for those wildlife species which depend on the streams and their riparian zones for food, water and shelter, including the bald eagle, peregrine falcon, whooping crane and grizzly bear, all of which are threatened or endangered species. (DFWP 72155-41A, Bd. Exh. 37-A.2 and 37-A.3, inclusive).

(7) Summary -- Public Interest, DFWP Application

502. Based on the foregoing findings of fact, DFWP's application for instream flow reservations on 281 stream reaches, one lake and one swamp is in the public interest.

503. DFWP's reservations should have second priority to the municipal reservations.

504. DFWP's reservation should have priority over the conservation district and BUREC reservations identified in Findings 764-765).

505. In those streams and stream reaches where DFWP's instream flow reservations overlap with DHES's and BLM's instream requests, all such reservations should be concurrent, rather than cumulative. (Bd. Exh. 40, DEIS, p. 11; Bd. Exh. 41, FEIS, p. 68).

506. In those streams and stream reaches where DFWP already has instream flow rights, the amount of water reserved should be concurrent with such prior right, rather than cumulative. (Finding 416).

E. FINDINGS ON THE MANAGEMENT PLAN (ARM 36.16.107B(7)

507. DFWP has a management plan for measuring, protecting, and reporting on instream reservations. (DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1-90 through 1-95 and 1-106 (Appendix B); DFWP Exh. 10, Graham Dir., pp. 5 and 6; DFWP Exh. 17, Spence Dir., pp. 7 through 10).

508. The management plan is modeled after the process DFWP has followed for its Yellowstone reservations. (DFWP 72155-41A,

Bd. Exh. 37-A.1, pp. 1-91 through 1-93; DFWP Exh. 10, Graham Dir., p. 5).

509. DFWP will notify new junior water use permit holders when a instream water reservation exists in the source of supply, either through a letter or the permit process. DFWP will object and request denial of permits only when the use of the water would routinely interfere with an instream reservation. Otherwise, in its objections to new permits, DFWP will request that the permit be specifically conditioned to the senior instream flow reservation. (DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1-92; DFWP Exh. 10, Graham Dir., p. 5).

510. When low flow or drought years threaten instream reservations, DFWP will initially advise junior users by letter of potential low flow conditions and, when flows deteriorate below instream reservations, junior water users will be requested by mail to cease their diversions until flows again rise above the reservations. (DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1-92 and 1-93; DFWP Exh. 10, Graham Dir., pp. 5 and 6; DFWP Exh. 19, Chronology of Enforcement Actions; Tr.-Day 8, Spence, p. 76).

511. Implementation of an instream flow reservation management plan for monitoring and protection of instream reservations will be an evolutionary process. The timing and degree of the monitoring of individual streams will depend on the extent of junior water use in and above a stream reach. (DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1-90 and 1-91; DFWP Exh. 10, Graham Dir., p. 5).

512. As circumstances require, DFWP may need to request DNRC to exercise its authority to enforce compliance by junior permit holders, or may need to use water commissioners, if legally available for reservations, to distribute water according to priority dates, or may need to use any other enforcement remedies available to a water right holder. (DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1-93; DFWP Exh. 10, Graham Dir., p. 6).

513. Enforcement of instream reservations can restrict only junior consumptive users or those diverting water without a right, such as the expansion of a senior right beyond the quantity of water the senior is entitled to use. (DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1-90; DFWP Exh. 10, Graham Dir., pp. 6 and 7).

514. Instream reservations will be monitored and measured using a "reach concept". DFWP has applied for instream reservations on designated stream or river segments or reaches. Each instream flow reservation request was derived at a point on the reach, generally near the downstream end of the reach. The instream reservation will be measured and monitored at these points on the reach or downstream from these points. (DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1-90 and 1-91; DFWP Exh. 17, Spence Dir., pp. 9 and 10).

515. The stream or river segments are the lengths of streams or rivers where fisheries, wildlife and recreational values warrant protection (see application descriptions in DFWP 72155-41A, Bd. Exh. 37-A.2 and Bd. Exh. 37-A.3; and, resource value descriptions for each stream in the prefiled direct testimony of DFWP witnesses).

516. When instream flows fall below the reservation flows at the monitoring points, all junior users above these gauge sites will be subject to restrictions whether they are on the reach mainstem or its tributaries. (DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1-90 and 1-91; DFWP Exh. 17, Spence Dir., pp. 9 and 10).

517. The stream reach does not represent a stream segment that has the same flow regime and instream flow requirement throughout its length. The values of the stream reach will be protected by monitoring the flows at or below the point where the minimum flow needs were determined. (DFWP 72155-41A, Bd. Exh. 37-A.1, p. 1-90; DFWP Exh. 17, Spence Dir., pp. 9 and 10).

518. The monitoring of instream flows at a downstream point in the reach is a practical approach to protecting fisheries, wildlife and recreational values within the reach. (Nelson Redirect, Tr. Day 9, pp. 107, 108).

519. The effect of monitoring at a point in each reach will be that the instream reservation could be adversely affected and DFWP could, therefore, object to any new proposed junior users or to changes in use above the monitoring point when the new uses or change would result in the consumption of additional water affecting the flows at the monitoring point. (DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1-90 through 1-92; DFWP Exh. 17, Spence Dir., pp. 9 and 10).

520. DFWP would not be able to object to changes or new uses occurring wholly within a reach, but above the monitoring point, unless the change or new uses decreased the flow at the monitoring point. A change in a point of diversion where the old and new

points of diversion are above the monitoring point and the same amount of water is consumed, would not adversely affect the instream reservation. (DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1-90 through 1-92; DFWP Exh. 17, Spence Dir., pp. 9 and 10).

521. A change in use that decreases flows at the monitoring point, such as a change in a point of diversion from the mainstem to a diversion on a tributary reach where the monitoring point is at the mouth of the tributary, could adversely affect an instream reservation on the tributary. (DFWP 72155-41A, Bd. Exh. 37-A.1, pp. 1-90 through 1-92; DFWP Exh. 17, Spence Dir., pp. 9 and 10).

522. From the time of establishment of instream reservations in the Yellowstone basin in December 1978 through October 2, 1991, the DNRC has issued 1,014 new water use permits and approved 499 changes in appropriation rights in the Yellowstone basin. DFWP objected to 83 of the new permit applications and to only two change applications. In most cases, DFWP did not request that the new permits be denied or even changed, but that they be specifically conditioned to recognize DFWP's senior instream flow rights in the Yellowstone basin. (DFWP Exh. 17, Spence Dir., p. 7).

523. DFWP has objected at the rate of approximately 1 permit in 20 and 1 change application in 100 on rivers that have Murphy Rights. Murphy Rights are instream rights established in 1970 on sections of 12 rivers, including, within the Missouri basin, Big Spring Creek, the Gallatin River, the Madison River, the Missouri River above Canyon Ferry and the Smith River. (DFWP Exh. 18, Murphy Right Streams; Tr.-Day 8, Spence, pp. 62-63).

524. Since July 1, 1973 for Murphy Rights and since December 1978 for Yellowstone River basin reservations, DFWP has objected to 6 change-in-use applications based on Murphy Rights and 2 changes based on Yellowstone River basin reservations. Six of the changes were approved with one conditioned subject to a Murphy Right, one change application was settled and one change application was withdrawn by the applicant. There were other objectors to the withdrawn application. (Tr.-Day 8, Spence, pp. 72-73 & 75).

F. <u>FINDINGS OF NO ADVERSE AFFECT ON EXISTING WATER RIGHTS [SECTION 85-2-316(9)(e), MCA; ARM 36.16.107B]</u>

525. The instream reservations applied for by DFWP would not remove or consume any water in a source of supply for an existing water right use. (See generally the application by DFWP for instream reservations, DFWP 72155-41a, Bd. Exhs. 37-A.1, 37-A.2 and 37-A.3).

526. The instream reservation requests of DFWP are intended to preserve the present status quo against future additional consumptive uses of water that would erode or further erode the minimum instream flows needed for healthy fisheries. (DFWP 72155-41a, Bd. Exh. 37-A.1, p. 1-90; DFWP Exh. 10, Graham Dir., p. 5 ; DFWP Exh. 17, Spence Dir., p. 10; DFWP Exh. 46, Spence Reb., pp. 2 & 16).

527. The instream uses cannot adversely affect other instream uses, such as instream uses for water quality or for downstream nonconsumptive rights like hydropower generation. These rights

would not compete against one another, but would be complementary uses of the same water. (DFWP Exh. 10, Graham Dir., pp. 7 & 8).

III. FINDINGS OF FACT: CITY OF BOZEMAN

528. The city of Bozeman is seeking a water reservation for a proposed 6,000 acre-feet municipal storage reservoir to be constructed upstream from Bozeman in the Gallatin National Forest at about stream mile 13 of Sourdough creek, also known as Bozeman creek. About 188 acres will be inundated by the proposed project. The purpose is to meet the city's projected water supply shortfall in the year 2025. (City of Bozeman 70188-41h, Bd. Exh. 4-A, Application, pp. 2 through 4 and 26 through 28).

529. The city of Bozeman's present reliable firm water supply is from 8,800 to 9,400 acre-feet per year. (City of Bozeman 70188-41h, Bd. Exh. 4-A, Application, p. 15; Bd. Exh. 4-C, Final EA, pp. 4 and 5; and MTU/AFS Exh. 1, p. 23).

530. The ongoing expansion of Hyalite Reservoir, when completed, will provide the city of Bozeman with an additional firm supply of water, amounting to about 1,900-2,400 acre-feet annually. (Ferris Cross, Tr. Day 1, p. 86; DFWP Exh. 101, Bd. Exh. 4-C, Final EA, p. 5; Bd. Exh. 41, FEIS, p. 100; and MTU/AFS Exh. 1, p. 23).

531. The total firm water supply of the city of Bozeman, including the water from the Hyalite Reservoir expansion, equals about 10,700-11,800 acre-feet annually. (Bd. Exh. 4-C, Final EA, p. 5; Bd. Exh. 41, FEIS, p. 100; and MTU/AFS Exh. 1, p. 23).

532. The population of Bozeman in 1990 was 22,660. From 1970 to 1990, Bozeman's population grew at an annual rate of

approximately 1.0 percent. If this trend continues, the year 2025 would see a population of about 32,000. (Bd. Exh. 41, FEIS, pp. 98 and 99; Bd. Exh. 4-C, Final EA, pp. 7 and 8).

533. The city of Bozeman projected a population of 37,000 for the city in the year 2025. A 1.2 percent annual growth rate was assumed. (City of Bozeman 70118-41h, Bd. Exh. 4-A, (application) pp. 10 and 11; Bd. Exh. 41, FEIS, p. 98, 99 and Table 3-6, p. 99).

534. According to an August 30, 1991 memo by Andy Epple, planning director for the city of Bozeman, a realistic population estimate for the city of Bozeman in the year 2025 is approximately 34,000. (DFWP Exh. 103).

535. The present average per capita daily water use for Montana communities in the Missouri River basin is 200-250 gallons per capita per day. (Bd. Exh. 4-C, Final EA, p. 5).

536. The city of Bozeman has accepted a per capita consumption rate of 250 gallons per day when planning for its future water needs. (City of Bozeman 70188-41h, Prehearing Memorandum dated Jan. 20, 1992, p. 4; Tr. Day 1, Forbes Cross, p. 102).

537. Bozeman's present per capita water use of 344 gallons per day is greater than most municipalities because of (1) approximately 8 miles of streamside conveyance losses (losing about 1.4 cfs or 1,000 af annually); (2) overflows from the regulating reservoirs; (3) unmanaged diversion gates on Bozeman and Hyalite creeks during the winter; and (4) old leaky water mains. (Bd. Exh. 41, FEIS, pp. 99-100, Table 3-13).

538. Only 57 percent of the city's water diversions actually are used by system customers. (Bd. Exh. 41, FEIS, p. 99).

539. The city of Bozeman reservation application did not include water that will be supplied by the current enlargement of Hyalite Reservoir, which is expected to provide an annual addition of 2.9 cfs (2,097 acre-feet per year) of water to the city. (Bd. Exh. 41, FEIS, p. 99-100, Table 3-13).

540. A projected population of 32,000 for the city of Bozeman in the year 2025 will require, at 250 gallons per capita per day, about 9,000 acre-feet of water annually. (Bd. Exh. 4-C, Final EA, p. 5).

541. A projected population of 37,000 for the city of Bozeman in the year 2025 will require, at 250 gallons per capita per day, about 10,400 acre feet of water annually. A projected population of 32,000 to 37,000 people in the year 2025 will require from 9,000 to 10,400 acre-feet of water annually. The current total firm water supply of the city of Bozeman, including water from the Hyalite Reservoir expansion, equals about 10,700 to 11,800 acre-feet annually. Therefore, the city of Bozeman already controls sufficient water to meet the needs of 37,000 people, as projected in its reservation application. (Bd. Exh. 4-C, Final EA, p. 5).

542. The city of Bozeman has failed to demonstrate that under present circumstances a 6,000 acre-feet storage reservoir is needed on Sourdough Creek to satisfy the city's future water demand. (Finding 540).

543. Sourdough Creek joins Rocky Creek at the city of Bozeman to form the East Gallatin River. (DFWP 72155-41A, Bd. Exh. 37-A.2, p. 2-539).

544. The East Gallatin River has a history of water pollution problems which continue today and periodically damage the river's fishery resources. (DFWP 72155-41A, Bd. Exh. 37-A.2, pp. 2-569 through 2-574; Nelson Obj., DFWP Exh. 1, p. 2).

545. Headwater tributaries to the East Gallatin River, which include Sourdough Creek, supply the water that is needed to dilute urban pollutants that enter the East Gallatin River at Bozeman as well as the effluent discharged at Bozeman's sewage treatment facility. (DFWP 72155-41A, Bd. Exh. 37-A.2, p. 2-541; Nelson Redir., Tr. Day 1, pp. 155 and 156).

546. DFWP, in its instream reservation application for Sourdough Creek, requested that all remaining unappropriated water remain instream to help provide the dilution flows that are needed to help prevent the further deterioration of the water quality component of fish habitat in the East Gallatin River. (DFWP 72155-41A, Bd. Exh. 37-A.2, p. 2-541).

547. If the city of Bozeman's proposed 6,000 acre-feet storage reservoir is constructed, Sourdough Creek's flow contribution to the East Gallatin River will be substantially reduced. The city could potentially remove up to 6,000 af/yr from Sourdough Creek. This equals 32% of the annual streamflow in a normal water year and 55% during a drought year. This block of water would no longer be available for dilution purposes in 11 miles of Sourdough Creek and the 5.1 miles of the East Gallatin River upstream from the city's sewage treatment plant. (Nelson Obj., DFWP Exh. 1, p. 3).

548. Portions of Sourdough Creek already suffer from periodic dewatering. The city of Bozeman presently withdraws about 3,724

acre-feet of water annually from Sourdough Creek. In addition, water to irrigate about 2,287 acres is annually removed from the Sourdough Creek drainage. (Nelson Obj., DFWP Exh. 1, pp. 3 and 4; and city of Bozeman 70118-41H, Bd. Exh. 4-A, Application, pp. 15 and 17).

549. Flow releases from the city of Bozeman's proposed 6,000 acre-feet storage reservoir on Sourdough Creek would not benefit instream flows and fisheries in Sourdough Creek. (Ferris Cross, Tr. Day 1, pp. 91 and 92; Nelson Sur., DFWP Exh. 2, pp. 1 and 2; Nelson Redir., Tr. Day 1, pp. 158 and 159).

550. Sourdough Creek supports a noteworthy small stream fishery for rainbow, brook and brown trout that reside year-long in the creek. Children are the primary users of the fishery. (Nelson Obj., DFWP Exh. 1, p. 3; DFWP 72155-41A, Bd. Exh. 37-A.2, pp. 2-539 and 2-540).

551. The city of Bozeman has not shown a need for a reservation that would have priority over an instream flow reservation on Sourdough Creek under present circumstances. (Findings 541-545).

552. A reservation granted to the city of Bozeman should be conditioned as follows:

a. The city should be required to improve the efficiency of its water system in order to attain a per capita consumption rate of 250 gallons per day, which is about the average per capita daily water use for Montana communities in the Missouri River basin;

b. The city should be required to use all additional water available to it from the enlarged Hyalite Reservoir prior to diverting any additional water from Sourdough (Bozeman) Creek; and

c. The city should regulate flow releases from the proposed reservoir to provide minimum fishery maintenance flows in Sourdough Creek downstream from the city's diversion point. (Findings 521, 536-539, 551).

IV. FINDINGS OF FACT: CONSERVATION DISTRICTS AND BUREAU OF RECLAMATION PROJECTS

A. Purpose [MCA §85-2-316(4)(a)(i); ARM 36.16.107B(1)]

553. Eighteen conservation districts organized under the state conservation district act have made reservation applications for 219 projects, primarily for new irrigation projects or to provide supplemental water for existing irrigation. (Bd. Exh. 40, DEIS, p. 248).

554. The Bureau of Reclamation (BUREC) is a federal agency, which would reserve water for diversion from the Missouri River to the Milk River for irrigation, municipal, and stock use, and for the Lake Bowdoin National Wildlife Refuge. (Bd. Exh. 40, DEIS, p. 248).

555. The proposed uses of water to be reserved for the conservation districts and BUREC are beneficial uses of water. (Bd. Exh. 40, DEIS, p. 248).

B. Need [MCA § 85-2-316(4)(a)(ii); ARM 36.16.107B(2)]

556. Reservations for the eighteen conservation districts and BUREC would establish an early priority date of July 1, 1985, for water to be used in the future. (Bd. Exh. 40, DEIS, p. 248).

557. If the conservation districts and BUREC do not receive water reservations, they could still develop the proposed projects through the water permitting process. (Bd. Exh. 40, DEIS, p. 248).

558. However, competing water users, including applicants who have applied for other water reservations, could limit the amount of water available for future appropriation. (Bd. Exh. 40, DEIS, p. 248).

C. Amount [MCA § 85-2-316(4)(a)(iii); ARM 36.16.107B(3)]

559. The amounts of water requested by the 18 conservation districts and BUREC are based on the requirements of individual irrigation projects and other uses. (Bd. Exh. 40, DEIS, p. 250).

560. DFWP does not propose any additional Findings of Fact concerning the amounts requested by the conservation districts for the various projects. DFWP does not contest the amount requested for each project.

D. Public Interest [MCA § 85-2-316(4)(a)(iv); ARM 36.16.107B(4)]

561. For the board to adopt an order reserving water, it must find, in its judgment and discretion, that the reservation is in the public interest, based on a weighing and balancing of the following factors, making a specific finding for each factor.

(1) Benefit-Cost Factor [ARM 36.16.107B(4)(a)]

562. This factor requires a weighing of the benefits and costs of each reservation application.

563. To be in the public interest, the expected benefits of a reservation should be reasonably likely to exceed the costs. Stated another way, the net benefits of a reservation must be greater than zero. (DFWP Exh. 31, Duffield Dir., p. 4).

564. The benefit/cost test may be stated in a formula, as follows:

Net Benefits = Direct Benefits +
Indirect Benefits - (Direct Costs + Indirect Costs).

(DFWP Exh. 31, Duffield Dir., p.4).

565. In general, the benefits and costs of irrigation projects in this proceeding are as follows:

Direct Benefits:	Irrigation Crop Revenues
Direct Costs:	Irrigation System Capital, Operations, Maintenance and Energy Costs
Indirect Costs:	Foregone instream uses Fish and Wildlife Recreation Hydropower Water quality

(Bd. Exh. 41, FEIS, pp. 35-39; DFWP Exh. 31, Duffield Dir., Att. 3)

566. All of the proposed irrigation projects conflict with instream uses, so that granting such projects will have indirect costs to instream uses. (Bd. Exh. 41, FEIS, p. 38; Bd. Exh. 40, DEIS, p. 255).

567. The values of leaving water instream for water quality and fish and wildlife purposes have not been quantified, but are

substantial. (Bd. Exh. 41, FEIS, p. 35; DFWP Exh. 31, Duffield Dir., pp. 15-16). The remaining elements of the benefit/cost formula have been quantified. (DFWP Exh. 31, Duffield Dir., Attach. D).

568. The Consumptive Use alternative described by DNRC in the draft and final EIS would provide for the granting of all proposed irrigation projects, with a second priority behind all the municipal applications. (Bd. Exh. 41, FEIS, p. S-2).

569. The present value of irrigation benefits for all projects may range from $132.1 million (Bd. Exh. 41, FEIS, Table 2-3, p. 36) to $144 million (DFWP Exh. 31, Duffield Dir., p. 14), but the indirect costs from irrigation to instream uses range from $304.6 million (Bd. Exh. 41, FEIS, Table 2-3, p. 36) to as high as $372 million for power costs and $103 million for foregone recreation. (DFWP Exh. 31, Duffield Dir., p. 15).

570. Taken as a whole, the benefits from all 219 proposed irrigation projects are far exceeded by the costs and do not pass a benefit/cost test. (DFWP Exh. 31, Duffield Dir., p. 15; Bd. Exh. 41, FEIS, pp. 36-37).

571. In order to determine which individual projects may pass the benefit/cost test, it is necessary to identify the set of reservation requests, i.e., the combination of competing irrigation and instream reservations, that yields the highest net benefits. (Bd. Exh. 41, FEIS, p. 38; DFWP Exh. 31, Duffield Dir., p. 6).

572. In order to determine the efficient or optimal allocation of water that yields the highest net benefits, the value per acre-foot of water for irrigation for each project should be

compared to the value of that water for instream uses, which include hydropower generation, fish and wildlife, recreation and water quality. The use with the highest value passes the benefit/cost test. (Bd. Exh. 41, FEIS, p. 38; DFWP Exh. 31, Duffield Dir., p. 6).

573. The value of water for irrigation was determined by DNRC, based on a detailed analysis of each project. (Bd. Exh. 41, FEIS, p. 35). For each project, DNRC estimated net present values for 300 scenarios, accounting for variability in future crop prices, production costs and crop yields for each proposed project. (Bd. Exh. 41, FEIS, p. 35). The irrigation benefits for each project are the median value today of 70 years of returns, less costs. (Bd. Exh. 41, FEIS, p. 35; DFWP Exh. 31, Duffield Dir., p. 10).

574. Several assumptions which are favorable to irrigation were made by DNRC in determining the value of water for the proposed projects. (Tr. Day 3, Tubbs Cross, p. 247).

575. DNRC assumed that the most profitable crop, alfalfa, would be grown on all the acres to be developed, although DNRC's surveys indicated farmers would grow alfalfa on only 65% of the lands to be irrigated. (Tr. Day 3, Tubbs Cross, p. 260)

576. DNRC assumed the highest attainable yields would be obtained, based on the assumption that each farmer would have an incentive to use the best management practices. (Tr. Day 3, Tubbs Cross, p. 252).

577. DNRC assumed water would be available at least eight years out of ten, which is considered the minimum necessary for a profitable irrigation operation. (Tr. Day 3, Tubbs Cross, p. 254).

578. DNRC assumed that alfalfa prices would not be depressed on account of an additional 150,000 acres of irrigated alfalfa production. (Tr. Day 3, Tubbs Cross, p. 253).

579. Projections are that alfalfa needs will decrease by more than 40% over the next 50 years. (Bd. Exh. 41, FEIS, p. 83).

580. As a result of the foregoing assumptions made in computing direct benefits to be derived from irrigation, the irrigation values of water are high.

581. The consumptive use values of water for irrigation must also take into account appropriate assumptions concerning the amount of water diverted that will return to the source. (Bd. Exh. 41, FEIS, p. 38 and App. B.).

582. DNRC initially assumed a 50% return flow from irrigation to the source in calculating irrigation benefits. (DFWP Exh. 31, Duffield Dir., p. 11; MPC Exh. 4, Bucher Dir., p. 3).

583. This assumption is not valid for this proceeding, as it would overestimate the value of projects using efficient sprinkler systems and underestimate the value of flood irrigation projects. (Bd. Exh. 41, FEIS, p. 38; MPC Exh. 4, Bucher Dir., p. 3; DFWP Exh. 31, Duffield Dir., p. 11).

584. Estimates of water consumed by each project derived by DNRC's Missouri River water availability model provide the most reasonable estimates of water consumed and return flows. (Bd. Exh. 41, FEIS, p. 38; MPC Exh. 4, Bucher Dir., p. 3).

585. The model considers crop water requirements and irrigation efficiencies for each project. In addition, no return flows are assumed for 65 proposed irrigation projects located on higher benchlands. (Bd. Exh. 41, FEIS, p. 38; MPC Exh. 4, Bucher Dir., pp 8-9; DFWP Exh. 31, Duffield Dir., p. 11).

586. Recreation values per acre-foot of water are as follows:

Subbasin	**July-August**	**Rest of Year**
Headwaters	$35.40	$8.23
Upper Missouri	$19.46	$4.76
Marias/Teton	$ 5.81	$1.63
Middle Missouri	$ 5.81	$1.63

(Bd. Exh. 41, FEIS, p. 38).

587. Nonmarket valuation methods must be used to value water for recreation. (DFWP Exh. 31, Duffield Dir., p. 29).

588. Such values were derived using the Contingent Valuation Method (CVM) of valuing nonmarket goods. (Bd. Exh. 41, FEIS, p. 92; DFWP Exh. 31, Duffield Dir., p. 32).

589. The scope and design of the Missouri River basin recreation survey and economic study produced valid estimates of the values of instream flows for recreation. (Bd. Exh. 41, FEIS, p. 92; DFWP Exh. 31, Duffield Dir., p. 34).

590. The CVM is widely recognized as an appropriate methodology, and is contained in the U.S. Water Resources Council's <u>Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Guides</u> (1983). (Bd. Exh. 41, FEIS, p. 92; DFWP Exh. 31, Duffield Dir., p. 31).

591. Eight thousand Montanans and 1000 nonresidents were randomly surveyed for the CVM study. Appropriate survey techniques were used to limit possible biases in responses. (Bd. Exh. 41, FEIS, p. 92; DFWP Exh. 34, p. 15; Tr. Day 10, Duffield Redirect, p. 238).

592. The sample size and methods used are appropriate to the information needs and are consistent with accepted professional practice. (Bd. Exh. 41, FEIS, p. 92; DFWP Exh. 34, p. 3; Tr. Day 10, Duffield Redirect, p. 238).

593. The hydropower values per acre-foot of water in the Missouri River basin are as follows:

Subbasin/dams	Value @ 50 mills	Value @ 75 mills	Value @ 100 mills
Headwaters Subbasin above Toston	$58.91	$88.37	$117.83
Upper Missouri Subbasin			
Toston Dam to Canyon Ferry Dam	$56.88	$65.32	$113.76
Canyon Ferry Dam to Hauser Dam	$51.81	$77.71	$103.61
Hauser Dam to Holter Dam	$49.98	$74.97	$ 99.96
Holter Dam to Morony Dam	$46.02	$69.04	$ 92.05
Marias/Teton Subbasin and Middle Missouri Subbasin			
Morony Dam to Fort Peck Dam	$33.36	$50.04	$66.72

(Bd. Exh. 41, FEIS, p. 39)

The 75 mill values in the above table were derived by a simple interpolation between the 50 mill and 100 mill values.

594. Seventy-five mills is an appropriate value for replacement cost of power. (DFWP Exh. 31, Duffield Dir., p. 17; MPC Exh. 2, Stauffer Dir., p. 3).

595. At a 75 mill value for power, the following projects have net benefits greater than the indirect costs to instream uses per acre-foot of water for recreation and hydropower:

Project No.	Consumptive Value(-)	Instream Value (=)	Net Benefit
GA-201	$157.25	$110.19	$47.06
TE-321	$ 90.17	$ 53.76	$36.41
TE-361	$ 83.52	$ 53.76	$29.76
CHI-61	$ 89.10	$ 53.76	$35.34
TE-591	$ 85.84	$ 53.76	$32.08
TE-101	$ 75.52	$ 53.76	$21.76
TE-581	$ 66.44	$ 53.76	$12.38
TEI-40	$ 63.48	$ 53.76	$ 9.72
CHI-80	$ 65.78	$ 53.76	$12.02
CHI-72	$ 62.03	$ 53.76	$ 8.27
CHI-74	$ 56.52	$ 53.76	$ 2.76

(Bd. Exh. 41, FEIS, pp 38-39; Appendix B)

596. The instream costs from the above projects do not take into account the cumulative losses to recreation downstream from the diversion points, but count recreation losses only in the subbasin where the diversion occurs. Water diverted from a stream high in the basin would have flowed through many recreation facilities, all the way down the river. (DFWP Exh. 31, Duffield Dir., p. 9).

597. The above consumptive values assume power costs to the irrigator of 50 mills. (Bd. Exh. 41, FEIS, App. B).

598. The remaining 209 projects which include BUREC's Virgelle poject, have values less than the instream values for recreation and hydropower and do not pass the benefit/cost test. (Bd. Exh. 41, FEIS, App. B).

599. Project GA-201 would divert arsenic-laden water from the Madison River and use the water for irrigation in a seed potato operation. (Bd. Exh. 23-C, Final EA, Gallatin CD, p. 1).

600. The irrigated lands for proposed project GA-201 are benchlands in the Gallatin River drainage. (Bd. Exh. 23-C, Final EA, Gallatin CD, p. 1).

601. The Gallatin River drainage does not presently have an arsenic problem. (Bd. Exh. 40, DEIS, p. 186).

602. Irrigation return flows from Project GA-201 would eventually contaminate aquifers in the lower Gallatin River basin. (Bd. Exh. 23-C, Final EA, Gallatin CD, p. 22).

603. Project GA-201 would also cause thermal pollution in the Madison River at and below the point of diversion by elevating the water temperature. (Final EA, Gallatin CD, p. 23; DFWP Exh. 3, Nelson Obj., p. 3; Tr. Day 4, Nelson Cross, p. 13).

604. This portion of the Madison River already suffers from abnormally elevated water temperatures in the summer. (DFWP Exh. 3, Nelson Obj., p. 5; Tr. Day 4, Nelson Cross, p. 13).

605. Heat-related fish kills have recently occurred in the lower Madison River. (DFWP Exh. 3, Nelson Obj., p. 2).

606. Additional flow depletions caused by GA-201 will aggravate the present thermal problem and will likely cause massive fish kills. (DFWP Exh. 3, Nelson Obj., p. 2; Bd. Exh. 40, DEIS, p. 204; Bd. Exh. 23-C, Final EA, Gallatin CD, p. 23).

607. The unquantified water quality costs from Project GA-201 caused by transporting arsenic-laden water out of the Madison basin and into the Gallatin basin and by increasing thermal pollution in the Madison River should be considered along with the quantified costs to instream uses.

608. For Project GA-201, the quantified and unquantified costs to instream uses incurred by hydropower, recreation, water quality and fish and wildlife exceed the irrigation benefits.

609. The other 10 projects which initially pass the benefit/cost test (TE-321, TE-361, CHI-61, TE-591, TE-101, TE-581, TEI-40, CHI-80, CHI-72 and CHI-74) are in the Teton River basin. (Bd. Exh. 41, FEIS, pp. 4,6). Although they pass the benefit/cost test, they would have severe adverse impacts on flows in the Teton River, with consequential adverse impacts on aquatic life and senior water rights. (Findings 610-612, 686-693).

610. These projects would reduce Teton River flows substantially, and more frequently to zero, causing water temperatures to rise and dissolved oxygen to drop to the point where aquatic life would be harmed. (Bd. Exh. 40, DEIS, p. 187; Bd. Exh. 33-C, Final EA, Teton County CD, p. 17).

611. There is little water legally available in the Teton River for new consumptive appropriations, and new permit applications are not encouraged. (Bd. Exh. 33-C, Final EA, Teton County CD, p. 12).

612. New consumption of water in the Teton River basin will cause water quality problems for water users in the lower reaches of the Teton River. Adverse effects on existing water right holders are likely to occur. (Great Falls Public Hearing, Tr. pp. 13, 14, 25-26, 29; Tr. Day 14, Horpestad Redirect, p. 104).

613. Based on the foregoing factors, the quantified and unquantified costs of granting projects in the Teton basin exceed the benefits and granting the applications for Projects TE-321, TE-

361, CHI-61, TE-591, TE-101, TE-581, TEI-40, CHI-80, CHI-72 and CHI-74 is not in the public interest.

<u>(2) Net Benefits of Reservation Greater Than Net Benefits of Not Granting the Reservation [ARM 36.16.107B(4)(b)]</u>

614. By definition, "net benefits" mean indirect and direct benefits less indirect and direct costs. Indirect costs include economic opportunity costs that the requested flow reservation mays have to parties other than the reservant. [ARM 36.16.107B(4)(b)]. Thus, this factor is similar to the benefit/cost criteria upon which findings of fact have been made above. The net benefits of not granting each irrigation project would be greater than granting the irrigation projects. (Bd. Exh. 41, FEIS, p. 39 and App. B; Findings 608, 612).

<u>(3) Reasonable Alternatives with Greater Net Benefits [ARM 36.16.107B(4)(c)]</u>

615. Granting instream flow reservations in all reaches requested, not granting the projects identified in Findings of Fact Nos. 608, 613, and 766, and granting instream flow reservations priority over the irrigation projects identified in Findings of Fact Nos. 764-765, results in the greatest net benefits to society. (Bd. Exh. 41, FEIS, p. 39 and App. B).

<u>(4) Irretrievable Loss of Resource Development Opportunity [ARM 36.16.107B(4)(d)]</u>

616. If the conservation district's or BUREC's reservation requests are not approved, the applicants may still apply for water permits. (Bd. Exh. 40, DEIS, p. 248).

617. Reservations of water for instream use may preclude future consumptive uses of water. (Bd. Exh. 40, DEIS, p. 243).

618. However, water reserved for instream use is not permanently unavailable for other uses. (Bd. Exh. 40, DEIS, p. 243).

619. There can be no actual loss of a resource development opportunity unless the proposed project is economically feasible and has benefits greater than the costs to other uses. (DFWP Exh. 31, Duffield Dir., p. 13).

620. In this proceeding, the net benefits from the proposed projects have been weighed against the costs to instream uses and other interests and the economic feasibility of each project determined.

621. There will be no irretrievable loss of a resource development opportunity if the proposed irrigation projects are not granted, except for the projects identified in Finding of Fact No. 765 and 766 with a priority behind instream reservations.

<u>(5) Public Health, Welfare and Safety Impacts [ARM 36.16.107B(4)(e)]</u>

622. Many of the proposed irrigation projects would have significant adverse impacts to public health, safety and welfare. (Bd. Exh. 40, DEIS, pp. 153-236; Bd. Exh. 41, FEIS, pp. S-3 to S-6).

(a) Water Quantity/Aquatic Habitat

General

623. Many streams in the Missouri River basin where water reservation requests have been made already suffer from low flow condition and would be further dewatered by irrigation projects developed through the use of reservations. (Bd. Exh. 40, DEIS, pp. 45-54; Bd. Exh. 41, FEIS, p. S-3). These streams are shown in Table 4.

624. In the headwaters sub-basin, streamflows ranging from extremely low to zero have been observed on several stream reaches, notably the Jefferson River near the mouth and for a stretch below the Waterloo Bridge south of Whitehall, and on the Gallatin River near the confluence with the East Gallatin River. (Bd. Exh 40 DEIS, p. 45).

625. In the upper Missouri sub-basin, irrigation causes most of the seasonal low flow conditions. Low flow conditions are common in the Sun River below the Diversion Dam that feeds Pishkun Canal and this condition persists throughout the summer as long as irrigation diversions are occurring. Flows in the middle and lower sections of the Smith River can also be seriously reduced in the late summer due to irrigation diversions. Natural low flow conditions occur in portions of Belt Creek for about 13 miles below Otter Creek where only intermittent flows occur during dry years. Irrigation and natural conditions cause severe low flow conditions in portions of Dry Creek, Confederate Gulch and Avalanche Creek on the east side of the Missouri River and Canyon Ferry Reservoir. (Bd. Exh. 40, DEIS, pp. 49 and 51).

Table 4

Table 4-4. Upper Missouri Subbasin—low flow problem areas

Stream-Tributary	Stream Reaches	Cause
Missouri River	Headwaters at Three Forks to Canyon Ferry Reservoir	Irrigation
~~(Three Forks to Canyon Ferry)~~		
Avalanche Creek	Cooney Gulch to Canyon Ferry Reservoir	Irrigation, Natural
Beaver Creek	Headwaters to Canyon Ferry Reservoir	Irrigation
Confederate Gulch	Debauch Gulch to mouth	Irrigation, Natural
Crow Creek	Tizer & Wilson Creeks to Williams Ditch intake	Irrigation
Deep Creek	Castle Fork to Missouri River	Irrigation
Dry Creek	Headwaters to Broadwater Missouri Canal	Irrigation, Natural
Duck Creek	Headwaters to Canyon Ferry Reservoir	Irrigation
Sixteenmile Creek	Billy Creek to mouth	Irrigation
Smith River	Portions of creek	Irrigation
Butte Creek	Portions of creek	Irrigation
Camas Creek	Portions of creek	Irrigation
Eagle Creek	Portions of creek	Irrigation
Hound Creek	Portions of creek	Irrigation
Newlan Creek	Portions of creek	Irrigation
N. Fork Smith River	Portions of creek	Irrigation
Sheep Creek	Portions of creek	Irrigation
Spring Creek	Portions of creek	Irrigation
Thomas Creek	Portions of creek	Irrigation
Missouri River		
(Canyon Ferry to Holter Dam)		
Spokane Creek	Helena Valley Canal to mouth	Natural, Irrigation
Trout Creek	Vigilante Campground to mouth	Irrigation
Prickly Pear Creek	East Helena Highway Bridge to Lake Helena	Irrigation
Tenmile Creek	Portions of creek	Irrigation
Silver Creek	Helena Valley Canal to mouth	Irrigation
Canyon Creek	Portions of creek	Irrigation
Little Prickly Pear	Headwaters to 5.5 miles downstream	Irrigation
Little Prickly Pear	Clark Creek to mouth	Irrigation
Wegner Creek	Portions of creek	Natural
Stickney Creek	North and South Forks to mouth	Natural
Sevenmile Creek	Headwaters to Tenmile Creek	Irrigation
Dearborn River	Portions of creek	Irrigation
South Fork Dearborn	Portions of creek	Irrigation
Sun River	Diversion dam to mouth	Irrigation
Big Muddy Creek	Portions of creek	Irrigation
Willow Creek	Portions of creek	Irrigation
Elk Creek	Portions of creek	Irrigation
Mill Coulee	Portions of creek	Irrigation
Ford Creek	Portions of creek	Irrigation
Smith Creek	Portions of creek	Irrigation
Belt Creek	Big Otter Creek to Missouri	Natural
Little Belt Creek	Portions of creek	Natural
Big Otter Creek	Portions of creek	Natural

Table 4-2. Headwaters Subbasin— low-flow problem areas

Stream/tributary	Stream reaches where low flow occurs	Cause of low flows
Beaverhead River	Clark Canyon ~~East Bench Diversion~~ Dam to Mouth	~~Reservoir~~, Irrigation
Poindexter Slough	Portions of slough	Irrigation
Spring Creek	Portions of creek	Irrigation
Rattlesnake Creek	Portions of creek	Irrigation
~~Big Sheep Creek~~	~~Cabin and Nicholls creeks to mouth~~	~~Irrigation~~
Blacktail Deer Creek	Middle Fork and West Fork to county road	Irrigation
Browns Canyon Creek	Portions of creek	Irrigation
Grasshopper Creek	Blue Creek to mouth	Irrigation
Horse Prairie Creek	Headwaters to mouth	Irrigation
~~Long Creek~~	~~Jones Creek to mouth~~	~~Irrigation~~
Medicine Lodge Creek	Bear Canyon to mouth	Irrigation
Big Hole River	Portions of river	Irrigation
Birch Creek	Mule Creek to mouth	Irrigation
Deep Creek	Sevenmile Creek to mouth	Irrigation
Jerry Creek	Portions of creek	Irrigation
Moose Creek	Portions of creek	Irrigation
Wise River	Mono & Jacobsen creeks to mouth	Irrigation
Willow Creek	Portions of creek	Irrigation
Trapper Creek	Portions of creek	Irrigation
Camp Creek	Portions of creek	Irrigation
Steel Creek	Portions of creek	Irrigation
Moose Creek	Portions of creek	Irrigation
East Gallatin River	Near confluence with Gallatin River	Irrigation
Thompson Springs Creek	Portions of creek	Irrigation
Ross Creek	Portions of creek	Natural
Reese Creek	Portions of creek	Irrigation
Dry Creek	Portions of creek	Irrigation
~~Baker Creek~~	~~Lane bridge to mouth~~	~~Irrigation~~
Bridger Creek	Headwaters to mouth	Irrigation
Hyalite Creek	Middle Creek ditch to I-90 bridge	Irrigation
~~South Cottonwood Creek~~	~~Jim Creek to Hart Ditch headgate~~	~~Irrigation~~
Sourdough Creek	Portions of creek	Irrigation
Smith Creek	Portions of creek	Irrigation
Camp Creek	Portions of creek	Irrigation
~~Big Bear Creek~~	~~Below forest boundary~~	~~Irrigation~~
Gallatin River	Shedds Bridge ~~West Fork and East Gallatin River~~ to mouth	Irrigation
Jefferson River	Portions of river—Waterloo Bridge to Three Forks	Irrigation, Natural
Boulder River	West Fork and South Fork to mouth	Irrigation
Little Boulder River	Moose Creek to mouth	Irrigation
East Boulder River	Portions of river	Irrigation
South Boulder River	Portions of river	Irrigation
Dry Boulder Creek	Portions of creek	Irrigation
North Willow Creek	Hollow Top Lake to mouth	Irrigation
South Willow Creek	Granite Lake to mouth	Irrigation
Whitetail Creek	Whitetail Reservoir to mouth	Irrigation
Cherry Creek	Portions of creek	Irrigation
Fish Creek	Portions of creek	Irrigation
Dry Creek	Portions of creek	Irrigation
Big Pipestone Creek	Portions of creek	Irrigation
Madison River	Hebgen Dam to ~~West Fork~~ Quake Lake	Reservoir
Ruby Creek	Lower portion	Irrigation
Indian Creek	Lower portion	Irrigation
Blaine Springs Creek	Ennis Fish Hatchery to mouth	Irrigation
Jack Creek	Lone Creek to mouth	Irrigation
Hot Springs Creek	North and Middle Forks to mouth	Irrigation
Cherry Creek	Lower 4.5 miles	Irrigation
North Meadow Creek	Portions of creek	Irrigation
Red Canyon Creek	Portions of creek	Natural
Red Rock River	Lima Dam to Clark Canyon Reservoir	Reservoir, Irrigation
Big Sheep Creek	~~Portions of creek~~ Canyon to mouth	Irrigation
Odell Creek	Portions of creek	Irrigation
Sage Creek	Portions of creek	Irrigation
Long Creek	~~Portions of creek~~ Jones Creek to mouth	Irrigation
Little Sheep Creek	Portions of creek	Irrigation
Ruby River	Ruby Reservoir to mouth	Irrigation
Wisconsin Creek	Portions of creek	Irrigation
Mill Creek	Portions of creek	Irrigation
Alder Gulch	Portions of creek	Irrigation
Sweetwater Creek	Portions of creek	Irrigation
Indian Creek	Portions of creek	Irrigation

Pintler Creek	Portions of creek	Irrigation
Swamp Creek	Portions of creek	Irrigation
Trail Creek	Portions of creek	Irrigation
North Fork Big Hole River	Portions of creek	Irrigation
Governor Creek	Portions of creek	Irrigation

Baker Creek	Lane Bridge to mouth	Irrigation
South Cottonwood Creek	Jim Creek to Hart Ditch headgate	Irrigation
Camp Creek	Portions of creek	Irrigation
Big Bear Creek	Below forest boundary	Irrigation

Table 4-6. Marias/Teton Subbasin—low-flow problem areas

Stream/tributary	Stream reaches where low flows occur	Cause of low flows
Marias River	Portions of river	Irrigation
Cut Bank Creek	Portions of creek	Irrigation
Dupuyer Creek	Portions of creek	Irrigation
North Fork Dupuyer Creek	To Dupuyer Creek	Irrigation
South Fork Dupuyer Creek	To Dupuyer Creek	Irrigation
North Fork Willow Creek	To Willow Creek	Irrigation
South Fork Willow Creek	To Willow Creek	Irrigation
Birch Creek	Portions of creek below diversions	Irrigation
Teton River	Below Priest Butte Lake	Irrigation
Deep Creek	Portions of creek	Irrigation
North Fork Deep Creek	To Deep Creek	Irrigation
South Fork Deep Creek	To Deep Creek	Irrigation
Willow Creek	To Deep Creek	Irrigation
McDonald Creek	To Teton River	Irrigation
Spring Creek	Portions of creek	Irrigation

Table 4-8. Middle Missouri Subbasin—low-flow problem areas

Stream/tributary	Stream reaches where low flows occur	Cause of low flows
Judith River	South Fork and North Fork to Big Springs Creek	Irrigation
South Fork Judith River	Portions of creek	Natural
Louse Creek	Portions of creek	Irrigation
McCarthy Creek	Portions of creek	Irrigation
Cottonwood Creek	Portions of creek	Natural
Musselshell River	Deadmans Basin diversion to Musselshell diversion	Irrigation
South Fork Musselshell River	Headwaters to North Fork and below diversion	Irrigation
Cottonwood Creek	Loco Creek to mouth	Irrigation
Checkerboard Creek	East and West forks to mouth	Irrigation
Spring Creek	Portions of creek	Natural
Big Elk Creek	Lebo Fork origin to mouth	Irrigation
American Fork Creek	South Fork to mouth	Natural
Careless Creek	Headwaters to Roberts Creek	Irrigation
Swimming Woman Creek	Headwaters to 8 miles above mouth	Irrigation
Collar Gulch	Portions of creek	Irrigation
Flagstaff Creek	Portions of creek	Irrigation

626. In the Marias/Teton sub-basin, low flow conditions occur on some small tributary streams in the Marias and Teton basins. July flows at the mouth of the Teton River near Loma cease during the driest two years in ten. Flows cease in August and September of average years. (Bd. Exh. 40, DEIS, pp. 52 and 166).

627. In the middle Missouri sub-basin, low flow conditions occur for several miles in an upper reach of the Judith River due to locally intensive irrigation. Low flow conditions are also found in the Musselshell River downstream from Deadmans Basin diversion and between Melstone and Mosby. These low flow conditions are caused largely by canal diversions for irrigation. (Bd. Exh. 40, DEIS, p. 54).

628. Reduced streamflow can decrease the habitat available to fish and aquatic organisms eaten by fish, resulting in lower numbers and weight of fish in a stream. (Bd. Exh. 40, DEIS, p. 201).

629. Several recent examples illustrate where low flows have affected fish populations. On the Musselshell River, the 1985 drought reduced brown trout populations by one-half near the Selkirk Fishing Access Site. Younger fish declined 72-93%. Fish populations in the Musselshell River below the Deadmans Basin diversion are about one-third of those found above the diversion which diverts a large portion of the Musselshell River into Deadmans Basin Reservoir. Following an increase in size and numbers of rainbow trout in the Big Hole River between 1986 and 1987, these populations decreased during the 1988 drought, primarily affecting younger fish. The number and weight of brown

trout larger than 18 inches in the Beaverhead River below Clark Canyon Dam has decreased as winter releases have been severely reduced during recent drought periods. (Bd. Exh. 40, DEIS, p. 202).

630. Generally, impacts of reduced streamflows due to additional water withdrawals would be noticed most on streams where flows are sometimes so low that aquatic habitat is already being adversely affected. In some instances, additional depletions would reduce flows to zero. (Bd. Exh. 40, DEIS, p. 202).

Gallatin River Sub-basin

631. The sources of supply for projects GA-13, GA-14, GA-24, GA-35, GA-40, GA-41, GA-44, GA-46, GA-79, GA-81, GA-92, GA-110, GA-124, GA-130, GA-143, and GA-151 are wells which would pump water from aquifers in the Gallatin River basin. (Bd. Exh. 23-C, Final EA, Gallatin CD, pp. 6-8).

632. Groundwater withdrawals for these projects will result in equivalent depletions from surface waters. (MPC Exh. 4, Bucher Dir., p. 9).

633. The groundwater withdrawal for these projects will deplete flows in the East Gallatin River by 19 cfs in August (from an average of 49 cfs down to 30 cfs). (Bd. Exh. 23-C, Final EA, Gallatin CD, p. 13).

634. Further flow reductions in the East Gallatin River would worsen an already undesirable situation for aquatic habitat and result in a moderate-to-major adverse impact. (Bd. Exh. 23-C, Final EA, Gallatin CD, p. 23).

Jefferson River Sub-basin

635. The Jefferson River is the proposed source of supply for the following projects: BR-52, BR-101, JV-25, JV-55, JV-95, JV-201, JV-202, JV-203, JV-204, and GA-102. (Bd. Exh. 41, FEIS, p. 5; DFWP Exh. 3, Nelson Obj., p. 11).

636. These projects would divert a total of 309.64 cfs from the Jefferson River. (DFWP Exh. 3, Nelson Obj., p. 15).

637. Taking into account return flows, July flows would be reduced by 228 cfs. (DFWP Exh. 3, Nelson Obj., p. 15).

638. Summer flows in the Jefferson River near Waterloo and at the mouth are already low or nonexistent in some years. (Bd. Exh. 40, DEIS, p. 158; Bd. Exh. 27-C, Final EA, Jefferson Valley CD, p. 8).

639. Development of these projects would cause the flow to cease in the Jefferson River during the driest two out of ten years in August, and the driest one year in ten in July. (Bd. Exh. 40, DEIS, p. 158). During a normal flow year (50th percentile), August flows would decrease 22 percent. (DFWP Exh. 3, Nelson Obj., p. 15). In wet years, August flows would decline 18.4 percent. (Bd. Exh. 40, DEIS, p. 158).

640. Water would be available only 2 years out of 10 for projects JV-201, JV, 202, JV-204 and JV-95. (Bd. Exh. 27-C, Final EA, Jefferson Valley CD, p. 8).

641. The Jefferson River has significant fisheries resources which are already depressed by existing low flow conditions, and which would be severely impacted by the proposed irrigation

projects. (DFWP Exh. 3, Nelson Obj., p. 17; Tr. Day 4, Nelson Cross, pp. 51 and 56; Tr. Day 5, Roos Cross, p. 63, 65).

642. The Jefferson River receives significant recreational use, which would be severely impacted by further depletions. (Tr. Day 4, Nelson Cross, p. 51).

Boulder River Sub-basin

643. The source of supply for Projects JV-17, JV-18, JV-63, JV-80 and JV-81 are wells adjacent to the Boulder River. (Bd. Exh. 27-C, Final EA, Jefferson Valley CD, p. 4).

644. Because of their proximity to the Boulder River, flows in the river would be substantially reduced. (Bd. Exh. 27-C, Final EA, Jefferson Valley CD, p. 15; MPC Exh. 4, Bucher Dir., pp. 10-11; DFWP Exh. 3, Nelson Obj., p. 9).

645. The mid-segment of the Boulder River where these proposed projects are located has an existing low-flow problem. (Bd. Exh. 27-C, Final EA, Jefferson Valley CD, p. 15; DFWP Exh. 3, Nelson Obj., p. 9).

646. During a normal flow year (50th percentile), August flows would be reduced by 20 percent. During a drought (90+ percentile), August flows would be reduced by 41 percent. (DFWP Exh. 3, Nelson Obj., p. 10).

647. These flow reductions would have adverse impacts on the fishery resources in the Boulder River. (Bd. Exh. 27-C, Jefferson Valley CD, p. 15, DFWP Exh. 3, Nelson Obj., p. 10).

Missouri River above Canyon Ferry Reservoir

648. Nine other proposed irrigation projects (BR-28, BR-34, BR-35, BR-38, BR-40, BR-41, BR-42, BR-50 and BR-111) would also impact flows in the Missouri River, Crow Creek, Warm Springs Creek and Deep Creek, above Canyon Ferry Reservoir. (DFWP Exh. 3, Nelson Obj., p. 18).

649. This reach of the Missouri River has a reputation as a trophy trout fishery, but the fishery resources have declined as a result of recent low flows. (DFWP Exh. 3, Nelson Obj., p. 19-20).

650. These projects, when combined with the other proposed projects above Canyon Ferry, would substantially reduce flows in the Missouri River above Canyon Ferry Reservoir. The projects on Crow, Warm Spings and Deep Creeks would have adverse impacts on the fishery reserves of those streams. (DFWP Exh. 3, Nelson Obj., p. 22; Bd. Exh. 40, DEIS, p. 159-161).

Missouri River Mainstem below Canyon Ferry Dam

651. There are 32 proposed new irrigation projects on the Missouri River mainstem between Holter Dam and Virgelle. These projects would divert 493 cfs from the Missouri River. Three of the 12 projects proposed by Chouteau County CD would divert 419 cfs or 92% of the requested amount. These projects are: CHS-3, CHS-5 and CHS-6. (Spence Obj., DFWP Exh. 4, p. 2).

652. Taking into account return flows which may return to the basin from the individual projects, as determined by DNRC, the depletions by these 32 projects on the Missouri River are: July -

372.5 cfs, August - 248.97 cfs, and September - 99.93 cfs. (Spence Obj., DFWP, Exh. 4, p. 3).

653. Depletions from these 32 projects contribute to the reduced streamflows that will occur in the Missouri River in DFWP Reaches #4, #5 and #6 and which will affect flows necessary to maintain side channels in the river. At the 90th percentile, these depletions contribute 36% of the total flow reduction in July at Virgelle, 31% in August and 20% in September. (Spence Obj., DFWP Exh. 4, p. 3).

654. Projects CHS-3, CHS-5 and CHS-6, alone, would contribute 31% in July, 26% in August and 18% in September (90th percentile) of the total loss in streamflow from all upstream depletions at Virgelle. These projects would also contribute sediment to the Missouri River because of their erosive soils. (Chouteau Co. CD, Final EA, Bd. Exh. 21-C, p. 19; Spence Obj., DFWP Exh. 4, p.3).

655. Projects CHS-3 and CHS-6 would deplete flows in the Missouri River near Fort Benton to a point at which side channels important to forage fish rearing would disappear. (Chouteau Co. CD, Final EA, BD. Exh. 21-C, p. 19).

Dearborn River Sub-basin

656. Flow reductions from a single irrigation project on the Dearborn River would be small and would be most pronounced in August, where flows would decline 2.7% at the mouth. DFWP has requested 110 cfs. In about 2 years in 10, August through February flows already fall below 50 cfs. Additional reductions will

exacerbate summer low flow problems. (Bd. Exh. 40, DEIS, p. 162; Lewis & Clark Co. CD Final EA, Bd. Exh. 29-C, p. 11).

657. The Dearborn project would convert 173 acres of rangeland to irrigated land. The land to be converted has slopes of 8-15%. Surface run-off and erosion would accelerate on these slopes and add sediment to the Dearborn River. The Dearborn River is an important spawning stream for rainbow trout from the Missouri River. Adding fine sediment to the stream may clog gravel beds important to these fish. (Bd. Exh. 40, DEIS, p. 193; Leathe Dir., DFWP Exh. 20, pp. 5-7; Lewis & Clark CD 72198-41I, Bd. Exh. 29-C, (EA) p. 11;Bd. Exh. 40, DEIS, p. 68).

Smith River Sub-basin

658. DFWP has requested an instream flow of 90 cfs in Reach #1 of the Smith River (above Sheep Creek). A flow of 90 cfs is currently not available during July through September in one year in ten (90th percentile) or in August or September, two years in ten (80th percentile). Three new projects above Sheep Creek (MEI-11, MEI-12, and MEI-20) would further deplete flows below the requested 90 cfs during low flow years and adversely affect the fishery.

659. In the Smith River near Eden, flow would be reduced substantially by five new projects proposed for development above Eden (MEI-11, MEI-12, MEI-20, CS-71 and CSI-120). (Bd. Exh. 40, DEIS, p. 163; Bd. Exh. 40, DEIS, p. 17). Flows during August would be reduced by 2 percent during the driest year in 10. (Spence Obj., DFWP Exh. 4, p. 7; Bd. Exh. 40, DEIS, p. 163).

660. The Smith River is an important recreational and fishery resource. Flow reductions caused by these consumptive use projects would adversely affect theses recreational and fishery resources.

661. The most popular fishery on the Smith River is between Camp Baker and the Eden Bridge. Public access to this river reach is gained almost exclusively by floating. (Spence Obj., DFWP Exh. 4, p. 6).

662. Floating the Smith River is currently limited to between about mid-April and the first week in July in an average water year. The minimum flow considered necessary to allow floaters to utilize this section of the river is more than 100 cfs. The floating season essentially ends when flows at Camp Baker fall below 100 cfs. During July and August flows are already well below 100 cfs at the 90th percentile and in August at the 80th percentile. The new depletions will only make those conditions worse. (Spence Obj., DFWP Exh. 4, pp. 6-7; Bd. Exh. 31-C, Final EA, Meagher Co. CD, p.10).

663. In 1991, the number of registered floaters who floated the Smith River between April 1 and August 31 was 2,874 persons. Most of those individuals floated prior to July 12 when the river generally became unfloatable because flows at Camp Baker dropped below 100 cfs. (Bd. Exh. 41, FEIS, p. 164).

664. DFWP has requested an instream flow of 150 cfs in Reach #2 of the Smith River from Sheep Creek to Hound Creek. Sheep Creek enters the Smith River at Camp Baker. (Spence Obj., DFWP Exh. 4, p. 6).

665. Existing flows in Reach #2 of the Smith River during July-September at the 90th and 80th percentiles are already below the 150 cfs requested by DFWP as necessary to provide a near-optimum fishery in Reach #2. Even in an average water year (50th percentile), flows are below 150 cfs in August and September. Further depletions by these projects would reduce these flows in August by as much as 92% during the driest one year in ten. (Spence Obj., DFWP Exh. 4, p. 7; Bd. Exh. 40, DEIS, p. 163).

Sun River Sub-basin

666. In the Sun River, July and August flows near Vaughn would decline substantially if all proposed projects were developed. July flows would cease near Vaughn during the driest one year in ten. (Bd. Exh. 40, DEIS, p. 163).

667. There are 25 proposed new irrigation projects in the Sun River basin requesting a total of 125.91 cfs. The largest project (CSS-200) would divert 65% of this amount or 82.02 cfs. Project CSS-200 is located in the lower Sun River a few miles upstream from Great Falls. (Spence Obj., DFWP Exh. 4, p. 8)

668. The Sun River already experiences severely reduced flows in late summer above Muddy Creek. Taken together, the additional diversions from the Sun River above Muddy Creek would cause at least a moderate adverse effect on aquatic habitat. (Cascade Co. CD Final EA, Bd. Exh. 20-C, p. 24).

669. DFWP has requested an instream flow of 100 cfs in the Sun River above Elk Creek (Reach #1). Existing flows at the Simms gauge below Elk Creek are already below 100 cfs in July, August and

September during 90th and 80th percentile flow years. (Spence Obj., DFWP Exh. 4, p. 9).

670. Depletions by five projects proposed above the Simms gauge would further reduce flows under already poor flow conditions. (Spence Obj., DFWP Exh. 4, p. 10).

671. The remaining 20 projects in the Sun River basin lie below Elk Creek and the Simms gauge within Reach #2 where DFWP has requested an instream flow of 130 cfs. (Spence Obj., DFWP Exh. 4, p. 10).

672. The lower Sun River experiences dewatering during the summer when irrigation demand is at its peak. Poor flows and elevated water temperatures during this period have limited the fishery to short river segments where irrigation return flows and seepage provide only marginal flow conditions for trout. (Spence Obj., DFWP Exh. 4, p. 10).

673. A principal impact of these 20 new projects would be to reduce flows to zero at Vaughn in July at the 90th percentile. Only during average years (50th percentile flows) are flows in July available to meet the instream flow request of 130 cfs. (Spence Obj., DFWP Exh. 4, p. 11).

674. New depletions on the lower Sun River will make worse an already poor condition where only a marginal fishery currently exists. (Spence Obj., DFWP Exh. 4, p. 11).

675. The diversion point for project CSS-200 (the largest proposed new project on the Sun River) is below the Vaughn gauge. Assuming water is still available, this project would deplete flows in the Sun River below the point of diversion by an additional

53.54 cfs in July; 30.48 cfs in August and 6.53 cfs in September. (Spence Obj., DFWP Exh. 4, p. 11).

676. Since the flow at the Vaughn gauge has already been reduced to 0 in July at the 90th percentile due to new upstream projects, there does not appear to be any water available for project CSS-200 in July at a 90th percentile flow level. (Spence Obj., DFWP Exh. 4, pp. 11 and 12).

677. Project CSS-200 will further deplete streamflows in July at the 90th and 80th percentile well below the 130 cfs recommended by DFWP for the lower Sun River fishery. The project may create an obstacle to boaters and floater on lower Sun River. (Spence Obj., DFWP Exh. 4, p. 12; Bd. Exh. 20-C, Cascade Co. CD, Final EA, p. 26).

678. New irrigation projects in the Sun River basin would contribute to overall deterioration of water quality in the lower Sun River. TDS concentrations are already high and return flows could raise TDS concentrations above the 500 mg/1 drinking water standard. (Bd. Exh. 40, DEIS, pp 182, 186 and 187).

Belt Creek Sub-basin

679. In the lower reaches of Belt Creek, major flow reductions would occur if the proposed projects were developed on Belt Creek. Average July, August and September flows would decline 17.1, 22.0 and 10.5 percent during dry years. (Bd. Exh. 40, DEIS, p. 164).

680. There are seven proposed new irrigation projects in the Belt Creek drainage that would divert a total of 34.05 cfs below the mouth of Big Otter Creek. (Spence Obj., DFWP Exh. 4, p. 12).

681. DFWP has requested 35 cfs in Belt Creek below the mouth of Big Otter Creek (Reach #2). Existing flows in Belt Creek are already less than 35 cfs during July, August and September, except in July at the 80th percentile. Proposed new depletions would have severe effects on existing streamflows, particularly during August and September at the 90th and 80th percentiles, causing flows during these months to be well below the 35 cfs requested by DFWP. (Spence Obj., DFWP Exh. 4, p. 13).

682. The requested instream flow of 35 cfs in Belt Creek is the low inflection point flow and was requested because aquatic habitat values in this reach are low, due partly to low streamflows. Lower Belt Creek already experiences reduced, late-summer flows which reduce aquatic habitat to marginal levels in dry years. Additional depletions will cause habitat conditions to become even worse than they are at the present time and adversely affect the resident trout fishery and the spring sauger migrations from the Missouri River. (Spence Obj., DFWP Exh. 4, pp. 13 and 14; Bd. Exh. 20-C, Cascade Co. CD, Final EA, p. 25).

683. Project CS-42 would increase streambank erosion and contribute sediment to Belt Creek. Projects CS-42 and CS-44 have a high potential to contaminate a shallow (10-15 feet) aquifer with pesticides and nutrients from fertilizers. (Bd. Exh. 40, DEIS, p. 187).

684. There are two proposed new projects in the Big Otter Creek drainage - one on Big Otter Creek and one on Little Otter Creek. DFWP has requested 5 cfs on Big Otter Creek but has no request on Little Otter Creek. (Spence Obj., DFWP Exh. 4, p. 14).

685. Except during average water years (50th percentile), existing flows in Big Otter Creek are less than or about equal to 5 cfs, except in June. Because of these existing low flow conditions, the two projects, though relatively small in themselves, would further reduce flows in Big Otter Creek in dry and average years to levels that fall below the minimum instream flow needed, thus adversely impacting the stream's fishery. (Spence Obj., DFWP Exh. 4, pp. 14 and 15).

Teton River Sub-basin

686. Existing flows in the Teton River are insufficient to support any new consumptive water uses. July flows at the mouth of the Teton River near Loma already cease during the driest two years in ten. Flows cease in August and September of average years. (Bd. Exh. 40, DEIS, p. 160).

687. Proposed projects would cause June flows in the Teton River to cease during dry years, July flows to cease in average years, and August flows to drop to 3 cfs during wet years. In wet years, July, August and September flows would decrease 14.4, 92.7 and 30.5%, respectively. (Bd. Exh. 40, DEIS, p. 168).

688. Flows in the Teton River at Loma during the driest two years in ten are already zero, except for the months of March and June. Therefore, due to existing flow conditions, flows for new

projects in the Teton River simply are not available during most months in a dry year. (Bd. Exh. 40, DEIS, p. 169).

689. DFWP has an instream flow request for 35 cfs in the Teton River in Reach #1 (headwaters to the discharge from Priest Butte Lake near Choteau). Four new projects are proposed in this reach which would divert a total of 25.33 cfs from the Teton River. The depletions by these four projects would be: July, 10.63 cfs; August, 3.37 cfs; and September, 1.11 cfs. (Spence Obj., DFWP Exh. 4, pp. 15 and 16).

690. July flows in a drought year (90th percentile) are currently 32 cfs on the average. An additional depletion of approximately 11 cfs in July would reduce existing flows at the 90th percentile level by 34% and at the 80th percentile level by 17%. It would produce a flow that is 30% below the flow requested by DFWP to maintain the fishery resources in this reach. About 43% of the overall depletion would occur from a single project (TEI-60). (Spence Obj., DFWP Exh. 4, pp. 16 and 17).

691. The lower Teton River already experiences extremely low flows in late summer. Additional upstream depletions would only further aggravate an already poor streamflow condition in the lower Teton River and contribute to lower flows in the Missouri River. (Spence Obj., DFWP Exh. 4, p. 17; Bd. Exh. 33-C, Teton Co. CD Final EA, p. 17).

692. Flows in the Teton River would be reduced substantially if all the proposed projects were developed and more frequently to zero, so water temperatures could rise and dissolved oxygen could

drop to where aquatic life might be harmed. (Bd. Exh. 40, DEIS, p. 187).

693. Removal of vegetation along the Marias River for Project TO-221 would allow erosion and sediments to pollute the Marias River. (Bd. Exh. 34-C, Toole Co. CD Final EA, Bd. Exh. 34-C, p. 10).

Marias River Sub-basin

694. Proposed projects on the Marias river would cause major reductions in the lower river flows during the summer months of average and dry years. Flows near Loma would cease altogether during July in the driest year in ten. (Bd. Exh. 40, DEIS, p. 165).

695. There are 29 proposed new projects to divert water in the Marias River basin. Twelve of these are above Tiber Reservoir and 17 below. The four largest projects are below Tiber and their diversion rates are: BSS-2, 289.61 cfs; HI-269, 18.82 cfs; LI-261, 24.31 cfs; and LI-262, 10.51 cfs. (Spence Obj., DFWP Exh. 4, p. 18).

696. Project BSS-2 would have a major impact on stream flows in the driest two years in ten (80th percentile) as measured at the USGS gauge on the Marias River near Loma. This project alone would reduce existing July streamflows by 33%, August flows by 25% and September flows by 13%. In a drought year (90th percentile), July flows would be reduced by 86%, August flows by 36%, and September flows by 20%. (Spence Obj., DFWP Exh. 4, p. 19).

697. DFWP has requested 200 cfs in the Marias River above Tiber Reservoir (Reach #1). Flows in the Marias above Tiber are already below 200 cfs in August and September of a drought year (90th percentile). The 12 new proposed projects above Tiber would further reduce streamflows below the 200 cfs instream flow requested by DFWP for the fishery in this reach by an additional 11 cfs in August and 5 cfs in September at the 90th percentile, creating flows of 169 cfs in August and 150 cfs in September. (Spence Obj., DFWP Exh. 4, p. 18).

698. In the Marias River below Tiber Reservoir, DFWP has requested 560 cfs in Reach #3. With the exception of July at the 80th percentile, streamflows are already below the requested amount in August and September, and at the 90th percentile level are below that amount in all three months. Project BSS-2, alone, would have a major impact on flow reductions and if projects HI-269, LI-261 and LI-262 are included, streamflows would become even further reduced. (Spence Obj., DFWP Exh. 4, pp. 19 and 20).

699. The accumulative effects of the 29 proposed new irrigation projects on streamflows at the mouth of the Marias River are shown below:

Depleted Flow Under the Consumptive Use Alternative (cfs)

	July	August	September
90%	0 (100%)	169 (54%)	186 (35%)
80%	310 (48%)	294 (38%)	351 (18%)
50%	785 (27%)	785 (22%)	698 (11%)

700. The above table shows that the lower Marias River (Reach #3) would be severely affected by depletions at the 80th and 90th

percentile flow levels. No flow would occur in July one year in ten. August and September flows would be only 30-33% of the required flow level of 560 cfs. Only during an average year (50th percentile) or better would the requested flow be met or exceeded July-September. (Spence Obj., DFWP Exh. 4, p. 20).

701. Most return flows and pollution (TDS and nutrients) from project BSS-2 would enter the Milk River basin, potentially creating substantial water quality risks. All six Liberty Co. CD irrigation projects would contribute TDS, sediment and nutrients in return flows to the Marias River. (Big Sandy CD Final EA, Bd. Exh. 18-C, p. 8; Liberty Co. CD Final EA, Bd. Exh. 26-C, p. 9).

<u>Judith River Sub-basin</u>

702. There are 21 proposed new irrigation projects in the Judith River basin which would divert a total of 103.62 cfs. (Spence Obj., DFWP Exh. 4, p. 21).

703. DFWP has requested instream flows on ten streams in the Judith River basin. Conservation districts have requested water reservations on three of those streams (Judith River, Big Spring Creek and Warm Spring Creek). (Spence Obj., DFWP Exh. 4, p. 21).

704. Seven new projects in the Judith River basin above Big Spring Creek would have total depletions of: July, 55.89 cfs; August, 46.27 cfs; and September, 9.35 cfs. (Spence Obj., DFWP Exh. 4, p. 21).

705. The depletions for proposed new irrigation in July and August are about twice as much as the requested instream flow (which is a high inflection point flow), and the resulting flow

reductions will adversely affect the fishery. (Spence Obj., DFWP Exh. 4, p. 22).

706. Project FEI-50, alone, would comprise 71% of the total depletions in each of the months July through September. (Spence Obj., DFWP Exh. 4, p. 22).

707. DFWP has requested an instream flow of 110 cfs in Big Spring Creek. There are four proposed irrigation projects in Big Spring Creek basin which will deplete a maximum of about 3 cfs. Any reservations granted for these four projects will be junior to the DFWP's instream Murphy Right. (Spence Obj., DFWP Exh. 4, pp. 22 and 23). (Spence Obj., DFWP Exh. 4, p. 22).

708. There are three proposed new irrigation projects on Warm Spring Creek that request a total of 19.15 cfs. The largest project (FEI-40) would divert 13.69 cfs of this amount. (Spence Obj., DFWP Exh. 4, p. 23).

709. The depletions which would occur in Warm Spring Creek from these three projects are: July, 12.76 cfs; August, 10.73 cfs; and September, 2.36 cfs. (Spence Obj., DFWP Exh. 4, p. 23).

710. DFWP has requested 110 cfs in Warm Spring Creek. Stream flows are already below 110 cfs in all months except September at the 80th percentile flow level. The projects would further reduce streamflows below that requested by DFWP in July through September of both dry and drought years (90th and 80th percentile). (Spence Obj., DFWP Exh. 4, p. 23).

711. The 21 proposed new irrigation projects in the Judith River basin will deplete existing streamflows as they exist at the mouth of the Judith River. The total amount requested for all 21

projects is 128.37 cfs. Of this amount, the three largest projects (FEI-40, FEI-50, and JBI-2) will divert 90.28 cfs which is 70% of the total diversions for the 21 projects. (Spence Obj., DFWP Exh. 4, p. 24).

712. DFWP has requested 160 cfs (the low inflection point flow) in the Judith River below Big Spring Creek (Reach #2). The 21 projects would reduce flows in the Judith River by as much as 33% in July of a drought year and 20% in August of a dry year. (Spence Obj., DFWP Exh. 4, pp. 24 and 25).

Musselshell River Sub-basin

713. The Lower Musselshell Conservation District has proposed the only new irrigation project in the Musselshell River basin. This project would involve pumping water from abandoned underground coal mines to supplement late summer flows in the Musselshell River. The requested amount is 90 cfs (8,150 AF/yr). (Spence Obj., DFWP Exh. 4, pp. 26 and 27).

714. At the time the conservation district application was developed, it was thought that the Jeffrey Mine was connected to larger mines to the south which have the volume to store the bulk of the water requested. However, more recent data collected by the Montana Bureau of Mines and Geology show that the Jeffrey Mine is not connected to the other mines. Thus, the project is not feasible as proposed. (Bd. Exh. 40, DEIS, p. 175).

Cumulative Effects of All Projects on the Missouri River

715. Eighteen conservation districts, 17 municipalities and the Bureau of Reclamation have submitted applications for new

consumptive uses in the Missouri basin above Fort Peck Dam. (Spence Obj., DFWP Exh. 4, p. 27; Bd. Exh. 40, DEIS, pp. 14 through 21, 35, 36, and 39).

716. The cumulative effects of these new uses on Missouri River streamflow were determined from DNRC's Missouri basin water availability model. Stream flow reductions from all municipal consumption would be less than 1 percent for all months during wet, average and dry years. (Bd. Exh. 41, DEIS, p. 30; Spence Obj., DFWP Exh. 4, p. 27).

717. The cumulative effects can be shown by comparing the base line (existing) flows on the Missouri River at the USGS gauge near Landusky to the flows which would occur at the same site under the Consumptive Use, Combination and Instream Alternatives. The Landusky gauge is the lowermost flow measuring point on the Missouri River above Fort Peck Reservoir. The Musselshell River is excluded from this analysis since it directly enters Fort Peck Reservoir at another location. (Spence Obj., DFWP Exh. 4, p. 27).

718. Table 5 shows the baseline flows and flows which would occur under each of the three alternatives for the 90th, 80th and 50th percentiles. (Spence Obj., DFWP Exh. 4, pp. 27 and 28).

719. Table 6 shows the flow reductions which would occur under the three alternatives at Landusky. (Spence Obj., DFWP Exh. 4, p. 29).

720. Under all three alternatives, the greatest reduction in flow will occur in July, followed by August and September. (Spence Obj., DFWP Exh. 4, p. 28).

Table 5

Baseline Flows

	June	July	August	Sept.	Oct.	12-Month Average
90%	6781	4323	3907	4368	4525	5043
80%	8989	4972	4100	4799	5411	6021
50%	15,554	8313	5875	5639	4118	8591

Source: DEIS page C-9

Consumptive Use Alternative Flows

	June	July	August	Sept.	Oct.	12-Month Average
90%	5973	3288	3097	3865	4530	4727
80%	8448	3784	3456	4368	5204	5681
50%	14,850	6944	5137	5367	6901	8291

Source: DEIS, page C-14

Combination Alternative Flows

	June	July	August	Sept.	Oct.	12-Month Average
90%	6453	3924	3584	4095	4529	4926
80%	8768	4428	3829	4617	5681	5888
50%	15,279	7800	5556	5502	6994	8475

Source: DEIS, page C-18

Instream Alternative Flows

	June	July	August	Sept.	Oct.	12-Month Average
90%	6705	4211	3828	4279	4527	5014
80%	8922	4829	4031	4746	5736	5983
50%	15,477	8171	5806	5604	7032	8560

Source: DEIS, page C-23

Table 6

Flow Reductions at Landusky Under Three Alternatives
(CFS)

Consumptive Use Alternative

	July	August	September
90%	1,035 (24%)	810 (21%)	503 (12%)
80%	1,188 (24%)	644 (16%)	431 (9%)
50%	1,369 (16%)	738 (13%)	272 (5%)

Combination Alternative

	July	August	September
90%	399 (9%)	323 (8%)	273 (6%)
80%	544 (11%)	271 (7%)	182 (4%)
50%	513 (6%)	319 (5%)	137 (2%)

Instream Alternative

	July	August	September
90%	112 (3%)	79 (2%)	89 (2%)
80%	143 (3%)	69 (2%)	53 (1%)
50%	142 (2%)	69 (1%)	35 (1%)

721. The greatest flow reductions will occur if all projects are developed. In July, a 24% reduction would occur at the 90th and 80th percentile flow levels. The next highest reductions would occur in August at the 90th and 80th percentiles where a 21% and 16% reduction would occur, respectively. Even in an average water year, 50th percentile, July flow reductions would be 16%, with lesser reductions in August and September. (Spence Obj., DFWP Exh. 4, p. 29).

722. Under the combination alternative, flows in July would be reduced 9% and 11%, respectively, for the 90th and 80th percentile flows. (Spence Obj., DFWP Exh. 4, p. 29).

723. Flow reductions are least for the Instream Alternative, the greatest reduction being 3% in July at both the 90th and 80th percentile flows. (Spence Obj., DFWP Exh. 4, p. 29).

724. DFWP has requested 5,800 cfs as an instream flow in Reach #6 of the Missouri River from July 6 to August 31 to maintain proper flow in side channels. (Spence Obj., DFWP Exh. 4, p. 29).

725. In July of dry years, flows are already below that amount by about 800-1,500 cfs. (Spence Obj., DFWP Exh. 4, p. 29).

726. Only in an average water year are flows above 5,800 cfs. During August, flows are well below 5,800 cfs at both the 90th and 80th percentiles by about 1,700-1,900 cfs, respectively. Even in an average water year, baseline flows are already approaching 5,800 cfs in August. (Spence Obj., DFWP Exh. 4, pp. 29 and 30).

727. Further reduction in the flow levels in the Missouri River will cause more frequent periods when flow levels in side

channels will be inadequate to maintain these important fish habitats. (Spence Obj., DFWP Exh. 4, p. 30).

Bureau of Reclamation

728. The Bureau of Reclamation has applied for up to 280 cfs (89,000 acre feet per year) from April 1 to October 30 to provide supplemental and new full service irrigation in the Milk River drainage. (Spence Obj., DFWP Exh. 4, p. 25).

729. Water would be diverted from the Missouri River about two miles above the town of Virgelle and transported through a canal to a point on the Milk River, about four miles upstream from the city of Havre. There would be no return flows to the Missouri River. (Spence Obj., DFWP Exh. 4, p. 25).

730. Depletions from this project would reduce fish habitat in side channels of the Missouri River which are important rearing areas for sauger, goldeye, smallmouth buffalo and bigmouth buffalo. (Spence Obj., DFWP Exh. 4, p. 25).

731. DFWP has requested 5,400 cfs for instream flows in the Missouri River from the mouth of the Marias River to the mouth of the Judith River (Reach #5) to maintain adequate flow in the side channels during the period July 6 - August 31. This flow is presently not available in July and August of low flow years. (Spence Obj., DFWP Exh. 4, p. 25; Spence Obj., DFWP Exh. 4, p. 26).

732. If an additional 280 cfs is diverted, already inadequate flows for side channels are further reduced below 5,400 cfs in July and August at the 90th and 80th percentiles, respectively. In an

average year (50th percentile), flows fall below 5,400 cfs in August. (Spence Obj., DFWP Exh. 4, p. 26).

733. DFWP has requested 4,300 cfs to maintain the main channel riffle areas between September 1 and March 14. This flow is not presently available in September at the 90th percentile and would not be present in September at either the 90th or 80th percentiles with an additional 280 cfs withdrawal. (Spence Obj., DFWP Exh. 4, p. 26).

Water Availability Model Predictions for
Canyon Ferry Reservoir Operation

734. DNRC developed a computer model to analyze physical and legal water availability in the Missouri basin and to assess the impacts that the proposed reservation requests could have on streamflows, reservoir levels and hydropower production. Canyon Ferry Reservoir was included in this analysis. (Bd. Exh. 40, DEIS, p. C-3).

735. Under baseline conditions and for each of the three alternatives reviewed in the DEIS, releases from Canyon Ferry Reservoir never dropped below 2,900 cfs during any month of the year under any percentile flow (Table 7). (Bd. Exh. 40, DEIS, Table C-2).

736. For baseline conditions and the three alternatives presented in the DEIS, the water availability model calculated reservoir elevations in Canyon Ferry Reservoir. (Bd. Exh. 40, DEIS, Table C-4).

Table C-2. Monthly streamflow percentile distributions (in cfs)

BASELINE CONDITIONS

MODEL NODE	%FLOW	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
CANYON FERRY 14	Average	4619	4668	4689	4172	4356	5360	5795	6205	6049	4959	3718	3812	4867
RESERVOIR	10	5511	5628	5846	5880	6000	8170	8810	9457	9214	7837	5460	5473	6941
OUTFLOWS TO	20	5373	5459	5577	5362	5591	6807	7399	8003	7750	6416	4603	4695	6086
MISSOURI RIVER	50	4831	4830	4835	4060	4172	5289	5777	6276	6067	4357	2928	3026	4706
	80	3901	3900	3905	2928	3242	2928	3142	3373	3287	2928	2928	3026	3291
	90	2928	3026	2928	2928	3242	2928	3026	2928	3026	2928	2928	3026	2987

Consumptive use alternative (continued)

MODEL NODE	%FLOW	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
CANYON FERRY 14	Average	4519	4603	4606	4127	4270	5310	5741	6141	5990	4611	3480	3654	4754
RESERVOIR	10	5498	5630	5840	5814	5950	8146	8785	9429	9187	7231	5178	5233	6827
OUTFLOWS TO	20	5364	5461	5581	5317	5430	6754	7341	7939	7689	5882	4281	4508	5962
MISSOURI RIVER	50	4766	4764	4770	4020	3985	5223	5707	6197	5995	3845	2928	3026	4602
	80	2928	3602	3606	2928	3242	2928	3026	2928	3026	2928	2928	3026	3091
	90	2928	3026	2928	2928	3242	2928	3026	2928	3026	2928	2928	3026	2987

Combination alternative (continued)

MODEL NODE	%FLOW	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
CANYON FERRY 14	Average	4584	4642	4650	4159	4340	5338	5770	6176	6021	4816	3634	3733	4822
RESERVOIR	10	5504	5625	5848	5868	5983	8162	8801	9447	9205	7595	5346	5359	6895
OUTFLOWS TO	20	5382	5464	5597	5346	5530	6789	7378	7980	7729	6202	4477	4608	6040
MISSOURI RIVER	50	4827	4826	4831	4058	4156	5265	5752	6244	6041	4150	2928	3026	4675
	80	3778	3777	3781	2928	3242	2928	3026	3082	3026	2928	2928	3026	3204
	90	2928	3026	2928	2928	3242	2928	3026	2928	3026	2928	2928	3026	2987

Instream alternative (continued)

MODEL NODE	%FLOW	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
CANYON FERRY 14	Average	4608	4658	4671	4168	4352	5352	5787	6197	6041	4916	3705	3787	4853
RESERVOIR	10	5508	5628	5848	5877	5995	8167	8807	9454	9211	7766	5427	5440	6927
OUTFLOWS TO	20	5376	5459	5578	5357	5571	6801	7392	7995	7743	6355	4565	4658	6071
MISSOURI RIVER	50	4832	4830	4836	4074	4166	5283	5770	6264	6060	4300	2928	3026	4697
	80	3865	3864	3868	2928	3242	2928	3095	3327	3241	2928	2928	3026	3270
	90	2928	3026	2928	2928	3242	2928	3026	2928	3026	2928	2928	3026	2987

Table 8

Table C-4. Monthly reservoir elevations, contents, and energy produciton

Baseline run

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Canyon Ferry Operations													
Elevations (feet):													
Average	3786	3786	3784	3782	3781	3779	3779	3784	3793	3791	3787	3785	3785
10th%	3793	3793	3791	3790	3791	3789	3791	3794	3797	3796	3793	3792	3792
20th%	3791	3792	3789	3788	3787	3787	3787	3792	3797	3796	3792	3791	3791
50th%	3789	3789	3787	3785	3784	3782	3780	3785	3797	3796	3791	3790	3788
80th%	3786	3786	3785	3783	3779	3775	3773	3778	3796	3791	3788	3786	3784
90th%	3774	3774	3773	3772	3770	3771	3765	3773	3788	3784	3779	3774	3775

Consumptive use alternative

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Canyon Ferry Operations													
Elevations (feet):													
Average	3784	3785	3783	3781	3780	3778	3778	3783	3792	3790	3785	3784	3784
10th%	3792	3792	3790	3790	3791	3790	3792	3794	3797	3796	3793	3791	3792
20th%	3791	3792	3789	3787	3787	3786	3787	3792	3797	3796	3792	3790	3790
50th%	3789	3789	3787	3785	3784	3780	3780	3785	3797	3795	3790	3790	3788
80th%	3782	3784	3783	3780	3778	3775	3771	3778	3793	3790	3785	3782	3782
90th%	3770	3770	3769	3768	3766	3769	3766	3773	3784	3779	3773	3770	3771

Combination alternative

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Canyon Ferry Operations													
Elevations (feet):													
Average	3785	3785	3784	3782	3781	3779	3778	3783	3793	3791	3786	3785	3784
10th%	3792	3793	3790	3790	3791	3790	3791	3794	3797	3796	3793	3792	3792
20th%	3791	3792	3789	3787	3787	3787	3787	3792	3797	3796	3792	3790	3791
50th%	3789	3789	3787	3785	3784	3782	3780	3785	3797	3796	3791	3790	3788
80th%	3785	3785	3785	3782	3779	3774	3772	3778	3796	3791	3787	3785	3783
90th%	3772	3772	3771	3771	3769	3770	3765	3773	3787	3783	3777	3773	3774

Instream alternative

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	AVG
Canyon Ferry Operations													
Elevations (feet):													
Average	3785	3786	3784	3782	3781	3779	3778	3784	3793	3791	3787	3785	3785
10th%	3793	3793	3791	3790	3791	3789	3791	3794	3797	3796	3793	3792	3792
20th%	3791	3792	3789	3788	3787	3787	3787	3792	3797	3796	3792	3791	3791
50th%	3789	3789	3787	3785	3784	3782	3780	3785	3797	3796	3791	3790	3788
80th%	3786	3786	3785	3782	3779	3774	3773	3778	3796	3791	3787	3786	3784
90th%	3774	3773	3773	3772	3770	3771	3765	3773	3788	3783	3778	3774	3774

Table 9

Canyon Ferry Reservoir Water Surface Elevation Changes Under EIS Alternatives

<u>Elevation Change (feet)</u>

Consumptive Use Alternative

Flow	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep
50	0	0	0	0	0	-2	0	0	0	-1	-1	0
80	-4	-2	-2	-3	-1	0	-2	0	-3	-1	-3	-4
90	-4	-4	-4	-4	-4	-2	+1	0	-4	-5	-6	-4
Avg.	-2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-1

Combination Alternative

Flow	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep
50	0	0	0	0	0	0	0	0	0	0	0	0
80	-1	-1	0	-1	0	-1	-1	0	0	0	-1	-1
90	-2	-2	-2	-1	-1	-1	0	0	-1	-1	-2	-1
Avg.	-1	-1	0	0	0	0	-1	-1	0	0	-1	0

Instream Alternative

Flow	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep
50	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	-1	0	-1	0	0	0	0	-1	0
90	0	-1	0	0	0	0	0	0	0	-1	-1	0
Avg.	-1	0	0	0	0	0	-1	0	0	0	0	0

17.44

737. Table 8 summarizes the reservoir elevations under baseline conditions and for the three alternatives that are found in Table C-4 of the DEIS (Bd. Exh. 40).

738. Table 9 compares the differences in water surface elevations of Canyon Ferry Reservoir between baseline conditions and conditions which would occur under each of the three alternatives. These calculations were made from information in Table C-4 of the DEIS.

739. The most significant impacts to reservoir levels will occur if all proposed projects are developed. During the recreation season (June through September), water surface elevations will, on the average, be one to two feet lower than under existing conditions. During the driest one year in ten, the reservoir will be four to six feet lower than now occurs and, in the driest two years in ten, reservoir levels will be from one to four feet lower than currently exist.

740. By maintaining minimum reservoir releases from Canyon Ferry Reservoir the same for each of the alternatives, the reservoir, under the Consumptive Use Alternative will be drafted from four to six feet below baseline conditions to meet the minimum flows in the Missouri River during the recreation season, whereas under the Combination and Instream alternatives it is not necessary to draft the reservoir as much to provide downstream flows because fewer new water uses would occur upstream.

741. The flows released from Canyon Ferry Reservoir are utilized in the water availability model for predicting flows in

lower reaches of the Missouri River. (Bd. Exh. 40, DEIS, pp. C-3 and C-4).

742. It appears Canyon Ferry Reservoir was drafted to provide a minimum 2,900-3,000 cfs in the Missouri River below Canyon Ferry Reservoir. Any problems which may occur because of drops in reservoir levels (such as effects on recreational facilities, public docks and private marinas) could cause these minimum releases to be less than 2,900-3,000 cfs. If this should occur, predictions of streamflows in the Missouri River downstream from Canyon Ferry Dam, as presented in the DEIS, would be overly optimistic and impacts to the Missouri River fishery would be more severe than presented in the Draft and Final EIS and in DFWP's testimony.

(b) Water Quality

743. Arsenic that originates in Yellowstone National Park is present in high concentrations in the Madison and Missouri Rivers. (Bd. Exh. 40, DEIS, p. 182.)

744. Arsenic concentrations exceed federal and state instream standards in the Madison and Missouri Rivers in Montana. These concentrations also exceed the federal drinking water standards in the Madison River and the portion of the Missouri River upstream from Toston Dam. (Bd. Exh. 41, FEIS, p. S-4).

745. Arsenic is a known carcinogen. (Bd. Exh. 41, FEIS, p. S-4; Tr. Day 13, Horpestad Cross, p. 207).

746. Reservations that lead to new consumptive water uses in the Missouri River Basin will increase the concentration of arsenic

in the Missouri River and adjacent ground water systems. (Bd. Exh. 41, FEIS, p. S-4; Tr. Day 14, Horpestad Cross, p. 10).

747. Arsenic can be removed from a water source through a number of ways. However, treating this water and returning it to the Madison or Missouri River channels for subsequent downstream use is impractical and cost prohibitive. (Bd. Exh. 41, FEIS, p. 74).

748. Treating surface flow to reduce basin-wide arsenic concentrations is impractical because of the relatively large volume of flow, even near the source of arsenic. In addition to costing several hundred million dollars, the most effective treatment methods would remove other nutrients and chemical constituents and alter downstream water quality, which are critical for maintaining aquatic habitat and the fisheries resources in the Madison River. (Bd. Exh. 41, FEIS, p. 78; Tr. Day 14, Horpestad Cross, p. 127).

749. High arsenic concentrations in the Missouri River present a substantial health risk which would be aggravated by further consumptive depletions. (Bd. Exh. 41, FEIS, p. 75).

750. Since depletions will cause an increase in the arsenic concentrations in the Madison and Missouri Rivers and will result in an increase in the expectant number of cancers in the population that are dependent upon these rivers for its drinking water supply, any such depletions will violate state law. (Bd. Exh. 41, FEIS, p.76; Tr. Day 14, Horpestad Cross, p. 19).

751. Maintenance of dilution flows appears to be the only cost effective method to control arsenic levels and is required to

comply with recent changes in state and federal water quality standards for arsenic. (Bd. Exh. 41, FEIS, p. 77).

752. Reservoirs in the Missouri River Basin could not be effectively managed for arsenic reduction in downstream water supplies. (Bd. Exh. 41, FEIS, p. 78; Tr. Day 14, Horpestad Cross, p. 57).

753. Because fertilizer and pesticides are commonly used on agricultural crops, many of the proposed irrigation projects have the potential to contribute nutrients and pesticides to shallow groundwater and nearby streams (Table 10). (Bd. Exh. 40, DEIS, p. 183 and Table 6-9, p. 184).

754. Dissolved oxygen levels can be reduced when nutrients are added to a stream or other water body. Greatest effects occur on streams where water temperatures are high and stream flows and dissolved oxygen levels are already low. Dissolved oxygen levels are reduced as water temperature increases. (Bd. Exh. 40, DEIS, pp. 183, 184).

755. Many streams already have low flow problems and proposed new consumptive use permits could increase water temperatures and decrease oxygen (Table 11). (Bd. Exh. 40, DEIS, p. 184 and Table 6-10, pp. 185, 186).

<u>(6) Other Factors [ARM 36.16.107B(4)(f)]</u>

756. The development of irrigation projects would not significantly increase total employment and income in the Missouri River Basin. (Bd. Exh. 40, DEIS, p. 233; MPC Exh. 5, Polzin Dir., Attach. B).

Table 10

Table 6-9. Projects with potential to cause nutrient and pesticide contamination

	Gallatin	Jefferson/ Boulder rivers	Missouri River - Three Forks to Holter Dam	Missouri River - Holter Dam to Belt Creek	Smith River	Sun River	Belt Creek	Marias River	Teton River	Missouri River - Belt Creek to Fort Peck Reservoir	Judith River
Consumptive Use Alternative	GA-13 GA-14 GA-35 GA-79 GA-81 GA-44 GA-46 GA-124 GA-143	JV-201 JV-202 JV-203 JV-95 JV-17 JV-18 BR-101	BR-38 BR-34 BR-104 BR-103 LC-11	CS-541 CSI-103 CSI-12 CSI-41 LC-210 CSI-82 CSI-83 CSI-92 CSI-91	CSI-111 CSI-120 CS-68	CS-31 CS-51 CS-32 CSI-81 TEI-80 TEI-100 TEI-571	CS-42 CS-44	LI-161 LI-162 LI-263 TO-221 CHI-52 LI- 262 LI- 261 LI-91 GL-201	TE-321 TEI-40 TE-411 TE-281 TE-282	CHS-3 CHS-5 CHS-6 CH-541	FEI-50 FEI-40 FE-671 FE-672 FE-673
Instream Alternative	None	None	BR-38 BR-34	CS-541 CSI-103 CSI-12 CSI-41 CSI-82 CSI-83 CSI-92	CSI-11	CSI-81 TEI-571	None	LI-161 LI-162	TE-321	None	FE-671 FE-672 FE-673
Combination Alternative	GA-79 GA-46 FA-143 GA-44 GA-124	BR-101	None	CS-541 CSI-103 CSI-12 CSI-41 CSI-82 CSI-83 CSI-92 CSI-91	CSI-111 CSI-120 CS-63	CSI-81 TEI-571	CS-42 CS-47	LI-161 LI-162 LI-268 TO-221 CHI-52 LI-262 LI-261 LI-91 GL-201	TE-321	CHS-3 CHS-5 CHS-6	FEI-40 FE-671 FE-572 FE-673

Table 11

Table 6-10. Requested consumptive use reservations that might damage aquatic life by increasing water temperatures and decreasing dissolved oxygen under the different alternatives

Subbasin/Streams	Consumptive Use Alternative	Instream Alternative	Combination Alternative
Headwaters Subbasin			
East Gallatin River	GA-40 GA-41 GA-79 GA-24 GA-46 GA-13 GA-143 GA-44 GA-151 GA-124 GA-110 GA-14 GA-92	None	GA-41 GA-79 GA-46 GA-143 GA-44 GA-151 GA-124 GA-14 GA-35 GA-92
Madison River	GA-201	None	GA-201
Jefferson River	BR-52 BR-101 GA-102 JV-203 JV-55 JV-95 JV-204 JV-202 JV-25	None	BR-52 BR-101 GA-102 JB-55
Boulder River	JV-18 JV-80 JV-17 JV-81 JV-63	None	JV-18 JV-80 JV-17 JV-81 JV- 63
Upper Missouri Subbasin			
Deep Creek	BR-28 BR-29	BR-28	BR-28
Crow Creek	BR-35	BR-35	BR-35
Warm Springs Creek	BR-44 BR-40 BR-41 BR-42	BR-44 BR-40 BR-41 BR-42	BR-35 BR-40 BR-41 BR-42
Smith River	CS-61 GS-71 CSI-120 CS-251 CS-252 CS-271 CS-331 CSI-102	CS-61 CSI-102 CS-251 CS-271 CS-331	CS-61 CS-71 CSE-102 CS-251 CS-252 CS-271 CS-331 CSI-120

Subbasin/Streams	Consumptive Use Alternative	Instream Alternative	Combination Alternative
Sun River	TEI-80 CS-241 CSI-83 CSI-81 CSI-82 CSI-71 TEI-100 CS-171 CS-471 CSI-92 TEI-90 CSI-91 CS-31 CS-51 CS-32 CSS-200 CS-231 TE-181 TE-183 CS-21 LC-131 TE-571 LC-251	CS-241 CSI-83 CSI-81 CSI-82 CSI-92 TE-571	CSI-83 CSI-81 CSI-82 CSI-92 CSI-91 TE-181 TE-183 LC-131 TE-571
Belt Creek	CS-43 CS-42 CS-44 CS-159 CHS-1 JB-281 JB-61	CS-43 JB-281	CS-43 CS-42 CS-44 CS-159 JB-281 JB-61
Marias/Teton Subbasin			
Cut Bank Creek	GL-221 GL-11	GL-221 GL-11	GL-221 GL-11
Unnamed tributary of Bullhead Creek	PO-411 PO-271	None	PO-411 PO-271
Timber Coulee	TO-421	None	TO-421
Laughlin Coulee	PO-91		
Spring Coulee	TE-361	None	None
Gamble Coulee	TE-581 TE-591	TE-591	TE-591
Unnamed tributary of Teton River	TE-401	None	None

Subbasin/Streams	Consumptive Use Alternative	Instream Alternative	Combination Alternative
Teton River main stem	CHI-61 TE-321 CHI-72 TEI-40 TEI-30 CHI-74 TEI-10 TEI-50 TE-411 TEI-60 CHI-80 TEI-20 TE-281 TE-282 TEI-70 CH-381 CH-641 TE-101 TE-81 TE-581 TE-591 TE-401 TE-361 CH-381	TE-321 CH-641 TE-101 TE-591	TE-321 CH-641 TE-101 TE-101
Middle Missouri Subbasin			
Unnamed tributary of Big Sag Creek	CH-551	CH-551	CH-551
Shonkin Creek	CH-201	CH-201	CH-201
Unnamed tributary of Campbell Coulee	FE-42	None	None
Wolverine Creek	FE-141	FE-141	FE-141
Running Wolf Creek	JBS-3	JB-261	JBS-3
Wolf Creek	FE-81	None	None
Little Casino Creek	FE-431	FE-431	FE-431
Olsen Creek	FE-671	FE-671	FE-671
Louse Creek	JB-21 JB-231 JB-232	JB-231 JB-232	JB-21 JB-231 JB-232
McCarthy Creek	JB-111	None	JB-111

757. Increased tax receipts as a result of new irrigation would not be significant in the Missouri River Basin. (Bd. Exh. 40, DEIS, p. 233; Bd. Exh. 41, FEIS, p. 108).

758. Little additional permanent employment would result from the development of new irrigation projects. (Bd. Exh. 40, DEIS, p. 236).

759. Since the value of water used for irrigation is less than the value of the water for instream uses, any projects granted a reservation in this proceeding should be junior in priority to instream flow reservations. This will insure that minimum instream flows are maintained or that presently dewatered streams are not further dewatered below the levels needed to maintain aquatic habitat.

(7) Summary -- Public Interest Criteria

760. Project GA-201 would have greater costs than benefits, substantial adverse impacts on existing instream flows and flow rights in the Madison River as well as significant adverse water quality impacts in the Madison, Missouri and Gallatin River Basins. (Finding 608).

761. For these reasons, a reservation for GA-201 is not in the public interest.

762. Projects THE-321, CHI-61, THE-591, THE-101, THE-581, TEI-40, CHI-80, CHI-72 and CHI-74, in the Teton River basin, would adversely impact existing water rights, severely deplete and worsen an already seriously dewatered stream, and cause significant water

quality problems. (Finding 609). For these reasons, a reservation for these projects is not in the public interest.

763. The following projects, all of which are above Canyon Ferry Dam, would adversely affect existing instream and storage water rights, worsen existing seriously dewatered stream conditions, adversely affect water quality and aquatic life in the Gallatin, Jefferson, Boulder and Missouri River basins, and adversely impact water levels in Canyon Ferry Reservoir:

Jefferson River Basin

BR-52	JV-201
BR-101	JV-202
JV-25	JA-203
JV-55	JA-204
JV-95	GA-102

Boulder River Basin

JV-17	JV-80
JV-18	JV-81
JV-63	

Missouri River Basin

BR-34	BR-50
BR-38	BR-111
BR-28	BR-35
BR-40	BR-41
BR-42	

Gallatin River Basin

GA-13	GA-79
GA-14	GA-81
GA-24	GA-92
GA-35	GA-110
GA-40	GA-124
GA-41	GA-130
GA-44	GA-143
GA-46	GA-151

These projects are not in the public interest. (Findings 631-650, 734-742).

764. The following projects do not pass a benefit/cost test but are at least marginally feasible, economically and financially, as determined by DNRC, do not have adverse impacts on instream flows, and are in the public interest. (Bd. Exh. 40, DEIS, pp. 135-152). Since the consumptive values of water for these projects are less than the instream values, these reservations should be junior in priority to the instream flow reservations requested by DFWP.

BR-5	CS-61	CSI-21	GL-11	FEI-10
BR-11	CS-251	CSI-22	GL-221	FE-431
BR-12	CS-271	CSI-41	CHI-51	FE-671
BR-14	CS-331	CSI-51	CHI-53	FE-673
BR-106	CS-101	CSI-52	CH-21	FE-672
BR-107	CS-102	CSI-101	CHI-10	FE-141
BR-108	CS-111	CSI-103	CHI-21	JB-281
BR-109	CS-351	CSI-102	CHI-22	JB-231
BR-110	CS-541	CSI-11	CHI-30	JB-232
LCI-10	CS-43	CSI-82	CHI-40	JBS-3
LC-210	CS-241	CSI-83	CH-201	TE-571
LC-11	CSI-12	CSI-92	LI-161	VAS-1
			LI-162	

765. BUREC's Virgelle project is economically feasible, and should be granted if conditioned to protect the instream flow rights of BLM for the Wild and Scenic portion of the Missouri River, and was second in priority to DFWP's reservation requests for reaches 4, 5, and 6 of the Missouri River. (Tr. Day 5, Mercer Cross, p. 115, D. Nelson Cross, p. 191).

766. The remaining projects do not pass the benefit/cost analysis, are not economically or financially feasible or will have adverse impacts on senior water rights or instream uses, and are not in the public interest.

E. <u>Management Plan (Financial Feasibility) [ARM 36.16.107B(7)]</u>

767. For the board to adopt an order reserving water, it must find the applicant has shown its capability to exercise reasonable diligence toward feasibly financing projects contemplated in the application and applying reserved water to beneficial use in accordance with a management plan.

768. The applications for the 18 conservation districts contain discussion of a management plan and financial feasibility of the various projects. (CD Exh. 2, p. 33).

769. However, none of the applications demonstrate with specificity how the applicants will finance the projects contemplated in the applications and apply the water with reasonable diligence to a beneficial use. (Tr. Day 3, Perkins, p. 106; Tr. Day 3, Tubbs, p.257).

770. DNRC analyzed the financial feasibility of each project. Financial feasibility is based on the percentage of 300 scenarios of future crop prices for each project in which the direct net returns from the project could repay a loan to finance all or half the project costs within 15 years. (Bd. Exh. 23-C, Final EA, Gallatin CD, pp. 13-14).

771. Projects rated "financially feasible" are those that are likely to produce enough revenue to repay a 15-year loan covering from half to all of the project's costs. Projects rated "marginally feasible" financially pose a moderate risk that the project will not produce enough new revenue to repay such a loan. (Bd. Exh. 23-C, Final EA, Gallatin CD, pp. 13-14).

772. Projects identified in Finding of Fact No. 764 above are at least marginally feasible financially.

F. <u>Affects on Existing Water Rights [MCA § 85-2-316(9)(e); ARM 36.16.107B(8)]</u>

773. While water may be physically available for a reservation at the point of diversion, it may already be subject to

appropriation by a water user downstream. Existing water users in the Missouri River Basin, such as irrigators, Montana Power Company (MPC), BUREC, Bureau of Land Management (BLM), Indian Tribes, and the Corp of Engineers already claim most of the flow in the Missouri River and its tributaries. (Bd. Exh. 41, FEIS, p. S-3).

774. MPC's largest claimed water right is for 10,000 cfs at Cochrane Dam. (MPC Exh. 3, Gruel Direct, p. 9).

775. If this water right is adjudicated as claimed, water available for future consumptive uses would be severely limited. Upstream from Cochrane Dam, water would not be available from August through March, and would be available in only about one year in ten during April through July and about five years in ten during May and June. (Bd. Exh. 41, DEIS, pp. 57-59; MPC Exh. 3, Gruel Direct, Att. C & D).

776. The United States, through BUREC, has substantial claimed water rights at Canyon Ferry. (Bd. Exh. 40, DEIS, p. 59).

777. If MPC's and BUREC's water rights are adjudicated as claimed, new consumptive users above Cochrane Dam and Canyon Ferry Dam could divert water only during times of spill over the dams. (MPC Exh. 3, Gruel Dir., p. 12; Tr. Day 4, D. Nelson Cross, p. 158).

778. Water is proposed to be diverted by irrigation projects during times when water is not spilling at Canyon Ferry Dam or Cochrane Dam. (Tr. Day 4, D. Nelson Cross, p. 158; Tr. Day 4, Gruel Cross, p. 175).

779. The Jefferson Valley, Gallatin County and Broadwater County conservation districts have failed to show there will be no

adverse impacts from development of projects on the senior water rights of MPC and BUREC.

780. DFWP has an instream "Murphy Right" in the Madison River from Ennis Lake to the mouth as follows:

1/1 to 5/31	1,200 cfs
6/1 to 6/30	1,500 cfs
7/1 to 7/15	1,423 cfs
7/16 to 12/31	1,300 cfs

(DFWP Exh. 3, Nelson Obj., p. 6).

781. Project GA-201 would divert 118 cfs for the project from the Madison River below Ennis Lake. There are no return flows to the Madison River from this project. (Bd. Exh. 23-C, Final EA, Gallatin CD, p. 1).

782. To satisfy DFWP's August instream flow right of 1,300 cfs and supply 118 cfs for the project, a minimum of 1,418 cfs must flow at the proposed diversion point. (DFWP Exh. 3, Nelson Obj., p. 7).

783. At times, summer streamflows in the Madison River below Ennis Lake are already lower than DFWP's Murphy Right claim. (Bd. Exh. 40, DEIS, p. 179).

784. Under present levels of irrigation development and reservoir operations, 1,418 cfs equals about the 40 percentile flow, meaning that it is available only in about four years out of ten. (DFWP Exh. 3, Nelson Obj., p. 7).

785. Water cannot be diverted from the Madison River for project GA-201 for all years without adversely affecting DFWP's instream right. (DFWP Exh. 3, Nelson Obj., p. 8).

786. Water legally available for new consumptive use reservations will not be known until the statewide adjudication process is completed. (Bd. Exh. 40, DEIS, pg. S-3).

787. At times, summer streamflows are already lower than DFWP's Murphy Right claims on the following streams where reservations for new consumptive uses are proposed; Gallatin River from East Gallatin to mouth, Missouri River from Toston to Canyon Ferry Reservoir, and the Smith River from the Fort Logan Bridge to the confluence with Hound Creek. Projects on these streams will adversely impact DFWP's senior instream right. (Bd. Exh. 40, DEIS, p. 180).

788. The United States, through BLM, has a reserved water right claim for the Wild and Scenic portion of the Missouri River as follows:

STREAM REACH	TIME PERIOD	RECOMMENDED STREAMFLOW (cfs)
Fort Benton to Confluence of the Marias River	3/15-5/14	4,887
	5/15-5/18	6,390
	5/19-7/5	12,622
	7/6-7/15	6,390
	7/16-8/31	4,500
	9/1-11/15	4,480
	11/16-3/14	4,887
	16 days between 3/15 and 7/15 (channel stability flows)	21,200
Confluence of the Marias River to Confluence of the Judith River	3/15/-5/14	5,571
	5/15/-5/18	7,470
	5/19-7/5	14,000
	7/6-7/15	7,470
	7/16-8/31	5,400
	9/1-11/15	5,150
	11/16-3/14	4,305
	16 days between 3/15 and 7/15 (channel stability flows)	22,600

Confluence of Judith River to Fred Robinson Bridge	3/15-5/14	7,100
	5/15-5/18	8,300
	5/19-7/5	15,187
	7/6-7/15	7,470
	7/16-8/31	5,400
	9/1-11/15	5,150
	11/16-3/14	4,305
	16 days between 3/15 and 7/15 (channel stability flows)	22,600

(Bd. Exh. 40, DEIS, p. 66).

789. The Bureau of Reclamation's Virgelle project will adversely affect BLM's claimed reserved rights in the Wild and Scenic portion of the Missouri River unless the flows are supplemented by releases from Tiber Reservoir. (Bd. Exh. 36-C, BUREC Final EA, p. 2).

790. DFWP has requested instream reservations for fisheries and goose nesting in Missouri River reaches 4, 5 and 6 which are based on the same criteria as the BLM reserved claims. (Tr. Day 11, Gardner Cross, p. 105).

791. A reservation for the Virgelle project should be conditioned on maintenance of instream flows for the Wild and Scenic portion of the Missouri River. (Tr. Day 5, D. Nelson Cross, p. 188).

792. BUREC has acknowledged that any reservation granted to BUREC will be junior in priority to the instream flows in the Wild and Scenic portion of the Missouri River, and that BUREC will not violate BLM's claim. (BUREC Exh. 16, D. Nelson Reb., p. 1; Tr. Day 5, D. Nelson Cross, p. 188).

793. For these reasons, any reservation granted to BUREC should be junior in priority to a reservation to DFWP for reaches

4, 5, and 6 of the Missouri River. (BUREC Exh. 16, D. Nelson Dir., p. 1; Tr. Day 5, D. Nelson Cross, p. 191).

V. FINDINGS OF FACT: DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES

794. DFWP does not propose any findings of fact for DHES's instream flow reservation requests. DHES's reservation is not in conflict with DFWP's reservation requests. To the extent they do not conflict with DFWP's proposed findings of fact, DFWP adopts DHES's Findings of Fact in support of its application.

VI. FINDINGS OF FACT: BUREAU OF LAND MANAGEMENT (BLM)

795. DFWP does not propose any findings of fact for BLM instream flow reservation requestS. BLM's reservation is not in conflict with DFWP's reservation requests. To the extent they do not conflict with DFWP's proposed Findings of Fact, DFWP adopts BLM;s Findings of Fact in support of its application.

VII. CONCLUSIONS OF LAW

1. The DFWP is a state agency eligible under Section 85-2-316(1), MCA to reserve waters to maintain a minimum flow of water throughout the year or specified period of each year for the purpose of protecting fish, wildlife, and recreational resources.

2. The applications for reserved water for minimum instream flows made by DFWP on 281 stream or river segments, Bean Lake and Antelope Butte Swamp meet the statutory criteria of Section 85-2-316(4)(a), MCA for water reservations granted by the Board of

Natural Resources and Conservation (Board). DFWP has established the purpose of the reservation, the need for the reservation, the amount necessary for the purpose of the reservation, and that the reservation is in the public interest for the minimum instream reservations on all of the 281 stream reaches, one lake and one swamp applied for by DFWP. The reservation requests meet the statutory criteria as implemented in ARM 36.16.107B.

3. The DFWP has shown the capability to measure and protect instream uses in accordance with the management plan in DFWP's application.

4. The reservations requested by DFWP for minimum instream flows are for a nonconsumptive use of the water without a diversion or withdrawal from the stream or river segment. It is not physically possible for these requested reservations to adversely affect any existing water rights or beneficial water use permits, whether the rights are consumptive or nonconsumptive uses of water upstream or downstream from the stream or river segment. Therefore, the nonconsumptive, minimum instream flow reservations requested by DFWP do not adversely affect any water rights in existence as required by. Section 85-2-316(9)(e), MCA and ARM 36.16.107B(8).

5. The reservations applied for by DFWP should be granted in their entirety and should be given priority over any other reservations granted, except for any reservations for municipal purposes for which DFWP has withdrawn its objections and except for the instream flows requested by the Department of Health and Environmental Sciences (DHES) and by the United States Bureau of

Land Management (BLM), which are complementary with DFWP's instream requests.

6. The instream reservations applied for by DFWP, DHES and BLM are by their nature complementary and will use the same water where they overlap. These instream requests do not compete with each other for water.

7. The statutory limit of Section 85-2-316(6), MCA restricting instream flow reservations to 50% of the average annual flow of record on gauged streams is applied to the whole year rather than by month or calendar date.

8. Except as noted below, the reservations applied for by 18 conservation districts for new and supplemental irrigation projects do not meet the statutory criteria of Section 85-2-316(4), MCA and the implementing rule, ARM 36.16.107B. Specifically, the conservation districts have not shown that the reservations are in the public interest.

9. Except as noted below, the reservations applied for by the 18 conservation districts are for consumptive uses of water that will adversely affect claimed existing consumptive and nonconsumptive water rights, including water rights for hydropower generation, and beneficial water use permits. Therefore, the Board cannot grant reservations as applied for by the conservation districts because Section 85-2-316(9)(e), MCA and ARM 36.16.10B(8) require that reservations adopted by the Board must not adversely affect any water rights in existence at the time of adoption.

10. Except as noted below, the conservation districts have not shown, as required by ARM 36.16.107B(7), the capability to

exercise reasonable diligence toward feasibly financing any of the projects for which water reservations have been requested or toward applying the water to beneficial use in accordance with a management plan.

11. The requested reservations by 18 conservation districts should be denied or, if granted, should be given priorities subsequent to the minimum instream flow reservations granted to DFWP. Only those proposed irrigation projects that are at least marginally feasible, and whose potential competition with the instream flow reservations of DFWP and DHES is not substantial, can be granted as in the public interest, provided they are junior to instream flow reservations.

12. The city of Bozeman, in its application for a municipal reservation, has not shown the need for the reservation, or the amount of water necessary for the reservation, as required by Section 85-2-316(4)(a), MCA or ARM 36.16.107B(2) and (3). Therefore, the reservation should be conditioned to meet these criteria.

13. The United States Bureau of Reclamation (BUREC), in its application to divert water from the Missouri near Virgelle for irrigation purposes in the Milk River basin, has not shown that the reservation is in the public interest as required by Section 85-2-316(4)(a), MCA or ARM 36.16.107B(4). The BUREC has not shown, as required by ARM 36.16.107B(7), its capability to exercise reasonable diligence toward feasibly financing this project or toward applying reserved water to beneficial use in accordance with a management plan. Therefore, the reservation should be given a

priority subsequent to the minimum instream flow reservations granted to DFWP and conditioned subject to water quality standards to these requirements.

14. The expected benefits of reserving and applying to immediate use the minimum instream flows applied for by DFWP exceed the expected costs, where the benefits and costs, including non-market benefits and costs, have been quantified and valued as required by ARM 36.16.107B(4)(a) and the benefits and costs that are not reasonably quantifiable have been considered.

15. The net benefits of granting minimum instream flow reservations to DFWP exceed the net benefits of not granting minimum instream flow reservations to DFWP.

16. There are no reasonable alternatives to the proposed instream reservations of DFWP with greater net benefits.

17. If water is not reserved for the minimum instream flows requested by DFWP, an irretrievable loss of natural resources is likely to incrementally occur.

18. The expected benefits of granting the reservations requested by the conservation districts and BUREC exceed the expected costs, where the benefits and costs, including non-market benefits and costs, have been quantified and valued as required by ARM 36.16.107B(4)(a) and the benefits and costs that are not reasonably quantifiable have been considered.

19. The net benefits of reservations requested by the conservation districts and BUREC are not greater than the net benefits of not granting these reservations.

20. There are reasonable alternatives to the proposed reservations by the conservation districts, BUREC, and the city of Bozeman with greater net benefits.

21. If water is not reserved for the purposes applied for by the conservation districts, BUREC and the city of Bozeman, there will not be any irretrievable loss of a resource development opportunity.

22. The reservation requested by teh city of Bozeman may be granted if it is conditioned to require a future showing of the need for the amount requested and mitigation for resource losses.

23. DFWP has provided an analysis of the physical availability of flows as required by ARM 36.16.105B(2).

24. DFWP has shown that its reservation requests are needed, considering that DFWP may not be eligible to apply for a water use permit, by demonstrating that the water resource values of fisheries, wildlife and recreation warrant reserving the minimum instream flows requested by DFWP. The instream flows meet the requirement of Section 85-2-316(4)(a)(ii), MCA and ARM 36.16.107B(2)(b).

25. The conservation districts, the BUREC and the city of Bozeman have not demonstrated either that there is a reasonable likelihood that future instate or out-of-state competing water uses, except competing reservation applications, will consume, degrade, or otherwise affect the water available for their proposed projects or that there are constraints restricting the conservation districts, the BUREC or the City of Bozeman from perfecting water permits for the purposes of their proposed

reservations, as required by Section 85-2-316(4)(a)(ii), MCA and ARM 36.16.107B(2)(a) and (c).

26. The methodologies and assumptions used by DFWP to determine the amounts needed for minimum instream flows are accurate and suitable, as required by Section 85-2-316(4)(a)(iii), MCA and ARM 36.16.107B(3)(a).

27. The amounts requested by DFWP on gauged streams do not exceed the limit of 50% of the average annual flow of record provided by Section 85-2-316(6), MCA.

28. DFWP has shown reasonable diligence will be applied, as required by ARM 36.16.107B(7), toward protecting instream uses in accordance with a management plan.

29. The projects proposed by the conservation districts and BUREC for the consumptive use of water will adversely affect claimed existing water rights, including downstream rights for hydropower generation, in contravention of Section 85-2-316(9)(e), MCA and ARM 36.16.107B(8).

VIII. ORDER

The Board, having made the foregoing Findings of Fact and Conclusions of Law, hereby makes its Order granting, denying or conditioning reservations in the Missouri River basin above Fort Peck Dam:

Municipal Reservations:

1. The following municipalities, pursuant to their respective applications, are granted reservations of water allowing the

appropriation of not more than the volume of water per year, in acre feet, and with an average flow rate, in cubic feet per second, from the named water source, as indicated for each municipality:

		cfs	acre-feet/year
Belgrade	Wells (2)	3.56	645
Chester	Marias River	1.00	435
Conrad	Lake Frances	5.45	1,322
Cut Bank	Cut Bank Cr.	3.37	890
Dillon	Well	1.11	202
East Helena	McClellan Cr. and wells	0.93	258
Fairfield	Wells (2)	0.34	100
Fort Benton			
Municipal	Missouri River	0.76	89
Parks Irrigation	Missouri River	0.67	35
Great Falls			
Municipal	Missouri River	28.16	10,642
Parks Irrigation	Missouri River	4.45	233.5
Parks Irrigation	Sun River	4.45	233.5
Helena	Wells (6-8)	16.4	7,071
Lewistown	Big Spring Cr.	3.57	2,966
Power	Muddy Cr.	0.27	62
Shelby	Wells (4-8)	1.83	302
Three Forks	Wells (2)	0.45	81
W. Yellowstone	Whiskey Spring	3.53	2,550
Winifred	Well	0.26	60

2. The city of Choteau has withdrawn its application for a reservation of water, and its application is therefor denied.

3. The applicant, city of Bozeman, pursuant to its application, is granted a reservation of water allowing the appropriation of not more than 6,000 acre-feet per year, with a flow rate of 327 cfs, from Sourdough (Bozeman) Creek, to be used for municipal water supply, but subject to the following conditions:

a. The city of Bozeman shall attain a per capita consumption rate of 250 gallons per day prior to undertaking the construction of a storage facility on Sourdough (Bozeman) Creek and storing water for beneficial use.

b. The city of Bozeman shall accept and have firm plans to use all water available to it from the enlargement of Hyalite Reservoir, which is expected to provide an addition of 2.9 cfs (2,097 acre-feet per year) to the water supplies of the city, prior to beneficially using water reserved to it in this Order.

c. The city of Bozeman in its operation of the storage facility on Sourdough (Bozeman) Creek shall regulate flow releases to provide minimum fishery maintenance flows in Sourdough Creek downstream from the city's diversion point.

d. The city of Bozeman must demonstrate to the satisfaction of the Board, after a hearing, that the city has met conditions "a" and "b" and will meet condition "c".

4. The reservations for the above-named municipalities shall have priority over any other reservations granted by the Board in this Order.

<u>DFWP Instream Reservations</u>

5. The Applicant, Montana Department of Fish, Wildlife and Parks, is granted instream flow reservations in the streams and in the amounts and for the time periods set forth in Table 12 attached hereto and incorporated herein by this reference.

6. The reservations for DFWP shall be second in priority to the municipal reservations granted in the Order, shall be equal in priority to the instream flow reservations granted to the Montana Department of Health and Environmental Sciences (MDHES) and United States Department of Interior, Bureau of Land Management (BLM) and

from DEIS, Table 3-2, Page 23

Table 3-2. DFWP instream flow requests

HEADWATERS SUBBASIN

BIG HOLE RIVER DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af/yr)
American Creek	Headwaters to mouth	Jan 1 - Dec 31	2.8	2,027
Bear Creek	Headwaters to mouth	Jan 1 - Dec 31	2.8	2,027
Big Hole River #1	Warm Springs Creek to Pintlar Creek	Jan 1 - Dec 31	160	115,835
Big Hole River #2	Pintlar Creek to the old Divide Dam	Jan 1 - Dec 31	800	579,173
Big Hole River #3	Old Divide Dam to mouth	Jan 1 - Dec 31	650	470,578
Big Lake Creek	Twin Lakes outlet to mouth	Jan 1 - Dec 31	4.7	3,403
Birch Creek	Mule Creek to mouth	Jan 1 - Dec 31	10	7,240
Bryant Creek	Headwaters to mouth	Jan 1 - Dec 31	1.4	1,014
California Creek	Headwaters to mouth	Jan 1 - Dec 31	14	10,136
Camp Creek	Headwaters to mouth	Jan 1 - Dec 31	5	3,620
Canyon Creek	Canyon Lake to mouth	Jan 1 - Dec 31	5	3,620
Corral Creek	Headwaters to mouth	Jan 1 - Dec 31	1	724
Deep Creek	Sevenmile and Tenmile to mouth	Jan 1 - Dec 31	18	13,031
Delano Creek	Headwaters to mouth	Jan 1 - Dec 31	0.3	217
Divide Creek	North and East forks to mouth	Jan 1 - Dec 31	3	2,172
Fishtrap Creek	West and Middle forks to mouth	Jan 1 - Dec 31	10	7,240
Francis Creek	Sand Creek to mouth	Jan 1 - Dec 31	4	2,896
French Creek	Headwaters to mouth	Jan 1 - Dec 31	6	4,344
Governor Creek	Headwaters to mouth	Jan 1 - Dec 31	4	2,896
Jacobsen Creek	Tahepia Lake to mouth	Jan 1 - Dec 31	14	10,136
Jerry Creek	Headwaters to mouth	Jan 1 - Dec 31	7	5,068
Johnson Creek	Schultz Creek to Forest Service boundary	Jan 1 - Dec 31	13	9,412
Joseph Creek	Anderson Creek to mouth	Jan 1 - Dec 31	5	3,620
LaMarche Creek	West and Middle forks to mouth	Jan 1 - Dec 31	11	7,964
Miner Creek	Upper Miner Lakes to mouth	Jan 1 - Dec 31	9	6,516
Moose Creek	Headwaters to mouth	Jan 1 - Dec 31	9	6,516
Mussigbrod Creek	Hell Roaring Creek to Forest Service boundary	Jan 1 - Dec 31	10	7,240
NF Big Hole River	Ruby and Trail creeks to mouth	Jan 1 - Dec 31	30	21,719
Oregon Creek	Headwaters to mouth	Jan 1 - Dec 31	0.3	217
Pattengail Creek	Sand Lake to mouth	Jan 1 - Dec 31	12	8,688
Pintlar Creek	Oreamnos Lake to mouth	Jan 1 - Dec 31	10	7,240
Rock Creek	Beaverhead National Forest boundary to mouth	Jan 1 - Dec 31	5	3,620
Ruby Creek	Pioneer and WF Ruby creeks to mouth	Jan 1 - Dec 31	4	2,896
Sevenmile Creek	Headwaters to mouth	Jan 1 - Dec 31	1.8	1,303
Seymour Creek	Upper Seymour Lake to mouth	Jan 1 - Dec 31	13	9,412
Sixmile Creek	Headwaters to mouth	Jan 1 - Dec 31	1.6	1,158
SF Big Hole River	Skinner Lake to mouth	Jan 1 - Dec 31	22	15,927
Steel Creek	Headwaters to mouth	Jan 1 - Dec 31	6	4,344
Sullivan Creek	Headwaters to mouth	Jan 1 - Dec 31	4	2,896
Swamp Creek	Yank Swamp to mouth	Jan 1 - Dec 31	8	5,792
Tenmile Creek	Tenmile Lakes to mouth	Jan 1 - Dec 31	3.8	2,751
Trail Creek	Headwaters to mouth	Jan 1 - Dec 31	14	10,136
Trapper Creek	Trapper Lake to mouth	Jan 1 - Dec 31	3.2	2,317
Twelvemile Creek	Headwaters to mouth	Jan 1 - Dec 31	1.2	869
Warm Springs Creek	West and East forks to mouth	Jan 1 - Dec 31	20	14,479
Willow Creek	Tendoy Lake to mouth	Jan 1 - Dec 31	16	11,583
Wise River	Mono and Jacobson creeks to mouth	Jan 1 - Dec 31	35	25,339
Wyman Creek	Headwaters to mouth	Jan 1 - Dec 31	7	5,068

GALLATIN RIVER DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af/yr)
Baker Creek	Heeb Lane Bridge to mouth	Jan 1 - Dec 31	14	10,136
Ben Hart Creek	Headwaters to mouth	Jan 1 - Dec 31	29	20,995
Big Bear Creek	Headwaters to mouth	Jan 1 - Dec 31	2	1,448
Bridger Creek	Headwaters to mouth	Jan 1 - Dec 31	36.6	26,497
Cache Creek	Headwaters to mouth	Jan 1 - Dec 31	2.6	1,882
EF Hyalite Creek	Heather Lake to Hyalite Reservoir	Jan 1 - Dec 31	7	5,068
East Gallatin River #1	Rocky and Sourdough cks to Bozeman STP outlet	Jan 1 - Dec 31	121.3	87,817
East Gallatin River #2	Bozeman STP outlet to Thompson Spring Creek	Jan 1 - Dec 31	90	65,157
East Gallatin River #3	Thompson Spring Creek to mouth	Jan 1 - Dec 31	170	123,074

Ck - Creek   EF - East Fork   R - River   SF - South Fork   STP - sewage treatment plant   WF - West Fork

Gallatin River Drainage (continued)

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	AMOUNT REQUESTED (af/yr)
Gallatin River #1	Yellowstone NP boundary to WF Gallatin River	Jan 1 - Dec 31	170	123,074
Gallatin River #2	WF Gallatin River to East Gallatin River	Jan 1 - Dec 31	400	289,587
Gallatin River #3	East Gallatin River to mouth	Jan 1 - Dec 31	1,000	723,967
Hell Roaring Creek	NF Hell Roaring Creek to mouth	Jan 1 - Dec 31	16	11,583
Hyalite (Middle) Creek #1	Middle Creek Dam to Middle Creek Ditch intake	Jan 1 - Dec 31	28	20,271
Hyalite (Middle) Creek #2	I-90 bridge near Belgrade to mouth	Jan 1 - Dec 31	16	11,583
MF of the WF Gallatin R.	Headwaters to NF of the WF Gallatin River	Jan 1 - Dec 31	3	2,172
Porcupine Creek	NF Porcupine Creek to mouth	Jan 1 - Dec 31	4.5	3,258
Reese Creek	Bill Smith Creek to mouth	Jan 1 - Dec 31	5	3,620
Rocky Creek	Jackson Creek to Sourdough Creek	Jan 1 - Dec 31	51	36,922
Sourdough (Bozeman) Ck.	Mystic Reservoir to mouth	Jan 1 - Dec 31	35.9	25,990
South Cottonwood Creek	Jim Creek to Hart Ditch headgate	Jan 1 - Dec 31	14	10,136
SF Spanish Creek	Falls Creek to mouth	Jan 1 - Dec 31	15	10,859
SF of the WF Gallatin R.	Headwaters to mouth	Jan 1 - Dec 31	5	3,620
Spanish Creek	North and South forks to mouth	Jan 1 - Dec 31	70	50,678
Squaw Creek	Headwaters to mouth	Jan 1 - Dec 31	12	8,688
Taylor Fork	Tumbledown Creek to mouth ~~of Gallatin River~~	Jan 1 - Dec 31	36	26,063
Thompson Spring Creek	County road crossing in T1N R5E Sec 30 to mouth	Jan 1 - Dec 31	29	20,995
WF Gallatin River	Middle and North forks to mouth	Jan 1 - Dec 31	26	18,823
WF Hyalite Creek	Hyalite Lake to Hyalite Reservoir	Jan 1 - Dec 31	12	8,688

JEFFERSON AND BOULDER RIVER DRAINAGES

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	AMOUNT REQUESTED (af/yr)
Boulder River #1	West and South forks to High Ore Creek	Jan 1 - Dec 31	20	14,479
Boulder River #2	High Ore Creek to Cold Spring	Jan 1 - Dec 31	24	17,375
Boulder River #3	Cold Spring to mouth	Jan 1 - Dec 31	47	34,026
Halfway Creek	Headwaters to canyon	Jan 1 - Dec 31	1.9	1,376
Hells Canyon Creek	Headwaters to mouth	Jan 1 - Dec 31	3.6	2,606
Jefferson River	Headwaters to Madison River	Jan 1 - Dec 31	1,100	796,363
Little Boulder River	Moose Creek to mouth	Jan 1 - Dec 31	7	5,068
North Willow Creek	top Hollow ~~Top~~ Lake to mouth	Jan 1 - Dec 31	7	5,068
South Boulder River	Curly Creek to mouth	Jan 1 - Dec 31	12	8,688
South Willow Creek	Granite Lake to mouth	Jan 1 - Dec 31	14	10,136
Whitetail Creek	Whitetail Reservoir to mouth	Jan 1 - Dec 31	3	2,172
Willow Creek	North and South Willow creeks to mouth	Jan 1 - Dec 31	14	10,136
Willow Spring Creek	Headwaters to mouth	Jan 1 - Dec 31	9.2	6,660

MADISON RIVER DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	AMOUNT REQUESTED (af/yr)
Antelope Creek	Headwaters to mouth	Jan 1 - Dec 31	14	10,136
Beaver Creek	Wyethia Creek to Earthquake Lake	Jan 1 - Dec 31	937	42,280
Black Sand Spring Creek	Black Sand Spring to SF Madison River	Jan 1 - Dec 31	18.7	13,538
Blaine Spring Creek	Ennis National Fish Hatchery to mouth	Jan 1 - Dec 31	23	16,651
Cabin Creek	Gully Creek to Madison River	Jan 1 - Dec 31	585	28,741
Cherry Creek	Headwaters to mouth	Jan 1 - Dec 31	15	10,859
Cougar Creek	Yellowstone NP boundary to mouth	Jan 1 - Dec 31	24	17,375
Duck Creek	Yellowstone NP boundary to Hebgen Reservoir	Jan 1 - Dec 31	23	16,651
Elk River	Headwaters to mouth	Jan 1 - Dec 31	28	20,271
Grayling Creek	Yellowstone NP boundary to Hebgen Reservoir	Jan 1 - Dec 31	34	24,615
Hot Springs Creek	North and Middle forks to mouth	Jan 1 - Dec 31	5.5	3,982
Indian Creek	Raw Liver Creek to mouth	Jan 1 - Dec 31	48	34,750
Jack Creek	Lone Creek to mouth	Jan 1 - Dec 31	28	20,271
Madison River #1	Yellowstone NP boundary to Hebgen Reservoir	Jan 1 - Dec 31	500	361,983
Madison River #2	Hebgen Dam to West Fork	Jan 1 - Dec 31	800	579,173
Madison River #3	West Fork to Ennis Reservoir	Jan 1 - Dec 31	1,000	723,967
Madison River #4	Ennis Dam to mouth	Jan 1 - Dec 31	1,300	941,157
Moore Creek	Fletcher Creek to mouth	Jan 1 - Dec 31	1.4	1,014
North Meadow Creek	Headwaters to mouth	Jan 1 - Dec 31	18	13,031
O'Dell Creek	Headwaters to mouth	Jan 1 - Dec 31	98	70,949
Red Canyon Creek	Headwaters to Hebgen Reservoir	Jan 1 - Dec 31	2.9	2,100
Ruby Creek	Beartrap Canyon to mouth	Jan 1 - Dec 31	18	13,031
SF Madison River	Dry Canyon to Hebgen Reservoir	Jan 1 - Dec 31	92	66,605
Squaw Creek	North Fork to mouth	Jan 1 - Dec 31	14	10,136
Standard Creek	Headwaters to mouth	Jan 1 - Dec 31	10	7,240
Trapper Creek	Headwaters to Hebgen Reservoir	Jan 1 - Dec 31	3.2	2,317
Watkins Creek	Coffin Creek to Hebgen Reservoir	Jan 1 - Dec 31	5.5	3,982
WF Madison River	Fox Creek to mouth	Jan 1 - Dec 31	957	66,533

Ck - Creek MF - Middle Fork NF - North Fork NP - National Park R - River SF - South Fork WF - West Fork

RED ROCK-BEAVERHEAD DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af/yr)
Bear Creek	Headwaters to BLM boundary	Jan 1 - Dec 31	6.5	4,706
Beaverhead River #1	Clark Canyon to East Bench Div Dam at Barretts	Jan 1 - Dec 31	200	144,793
Beaverhead River #2	East Bench Diversion Dam at Barretts to mouth	Jan 1 - Dec 31	200	144,793
Big Sheep Creek	Cabin and Nicholia creeks to mouth	Jan 1 - Dec 31	48	34,750
Black Canyon Creek	Headwaters to mouth	Jan 1 - Dec 31	2.5	1,810
Blacktail Deer Creek	MF and WF to County Rd @ T8S R8W Secs 20 & 29	Jan 1 - Dec 31	42	30,407
Bloody Dick Creek	Swift Lake outlet to mouth	Jan 1 - Dec 31	20	14,479
Browns Canyon Creek	Headwaters to mouth	Jan 1 - Dec 31	2.3	1,665
Cabin Creek	Headwaters to mouth	Jan 1 - Dec 31	0.4	290
Corral Creek	Headwaters to mouth	Jan 1 - Dec 31	6	4,344
Deadman Creek	Deadman Lake to mouth	Jan 1 - Dec 31	4.5	3,258
EF Blacktail Deer Creek	Headwaters to mouth	Jan 1 - Dec 31	18	13,031
EF Clover Creek	Headwaters to mouth	Jan 1 - Dec 31	4.4	3,185
EF Dyce Creek	Headwaters to mouth	Jan 1 - Dec 31	1.4	1,014
Frying Pan Creek	Headwaters to mouth	Jan 1 - Dec 31	1.6	1,158
Grasshopper Creek	Blue Creek to mouth	Jan 1 - Dec 31	30	21,719
Hell Roaring Creek	Headwaters to mouth	Jan 1 - Dec 31	15	10,859
Horse Prairie Creek	Headwaters to mouth	Jan 1 - Dec 31	36	26,063
Indian Creek	Headwaters to mouth	Jan 1 - Dec 31	0.2	145
Jones Creek	Headwaters to Lakeview Road crossing	Jan 1 - Dec 31	1.9	1,376
Long Creek	Jones Creek to mouth	Jan 1 - Dec 31	3.4	2,461
Medicine Lodge Creek	Bear Canyon to mouth	Jan 1 - Dec 31	10	7,240
Narrows Creek	Spring in T13S R1E Sec18A to Elk Lake	May 1 - July 15	1.2	869
		July 16 - April 30	0.5	362
Odell Creek	Headwaters to Lower Red Rock Lake	Jan 1 - Dec 31	11	7,964
Peet Creek	Headwaters to reservoir in T14S R4W Sec34A	Jan 1 - Dec 31	0.9	652
Poindexter Slough	Springs & canal T8S R9W Sec3,SW to Beaverhead	Jan 1 - Dec 31	57.9	41,918
Rape Creek	Headwaters to reservoir in T10S R13W Sec4	Jan 1 - Dec 31	0.4	290
Red Rock Creek	Headwaters to Upper Red Rock Lake	Jan 1 - Dec 31	15	10,859
Red Rock River #1	Dam at Lower Red Rock Lake to Lima Reservoir	Jan 1 - Dec 31	55	39,818
Red Rock River #2	Lima Dam to Clark Canyon Reservoir	Jan 1 - Dec 31	60	43,438
Reservoir Creek	Headwaters to mouth	Jan 1 - Dec 31	1.5	1,086
Shenon Creek	Headwaters to BLM boundary in T10S R14W Sec25	Jan 1 - Dec 31	0.4	290
Simpson Creek	Headwaters to mouth	Jan 1 - Dec 31	0.7	507
Tom Creek	Headwaters to Upper Red Rock Lake	Jan 1 - Dec 31	1.4	1,014
Trapper Creek	Headwaters to mouth	Jan 1 - Dec 31	0.7	507
WF Blacktail Deer Creek	Grays and South forks to mouth	Jan 1 - Dec 31	3	2,172
WF Dyce Creek	Headwaters to mouth	Jan 1 - Dec 31	0.7	507

RUBY RIVER DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af/yr)
Coal Creek	Headwaters to mouth	Jan 1 - Dec 31	3.6	2,606
Cottonwood Creek	Geyser Creek to mouth	Jan 1 - Dec 31	4	2,896
EF Ruby River	Headwaters to mouth	Jan 1 - Dec 31	3	2,172
MF Ruby River	Divide Creek to mouth	Jan 1 - Dec 31	5	3,620
Mill Creek	Outlet of Branham Lake to mouth	Jan 1 - Dec 31	10	7,240
NF Greenhorn Creek	Headwaters to mouth	Jan 1 - Dec 31	3.5	2,534
Ruby River #1	East, Middle, and West forks to Ruby Reservoir	Jan 1 - Dec 31	102	73,845
Ruby River #2	Ruby Dam to mouth	Jan 1 - Dec 31	40	28,959
Warm Springs Creek	Romy ~~[illegible]~~ Lake outlet to mouth	Jan 1 - Dec 31	48.5	35,112
WF Ruby River	Headwaters to mouth	Jan 1 - Dec 31	3.0	2,172
Wisconsin Creek	Crystal Lake outlet to mouth	Jan 1 - Dec 31	12	8,688

UPPER MISSOURI SUBBASIN

UPPER MISSOURI RIVER AND TRIBUTARIES

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af/yr)
Avalanche Creek	Cooney Gulch to Canyon Ferry Reservoir	Jan 1 - Dec 31	5	3,620
Beaver Creek	Headwaters in Elkhorn Mts to Canyon Ferry Reservoir	Jan 1 - Dec 31	2.8	2,027
Beaver Creek	Headwaters in Big Belt Mts to mouth	Jan 1 - Dec 31	10.0	7,240
Canyon Creek	Headwaters to mouth	Jan 1 - Dec 31	10.0	7,240
Confederate Gulch	Debauch Gulch to mouth	Jan 1 - Dec 31	5	3,620
Cottonwood Creek	Headwaters to mouth	Jan 1 - Dec 31	1.0	724
Crow Creek	Tizer and Wilson Creeks to Williams Ditch intake	Jan 1 - Dec 31	11	7,964
Deep Creek	Castle Fork to Missouri River	Jan 1 - Dec 31	9	6,516

EF - East Fork MF - Middle Fork NF - North Fork WF - West Fork

Upper Missouri River and Tributaries (continued)

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af)	(af/yr)
Dry Creek	Headwaters to Broadwater Missouri Canal	Jan 1 - Dec 31	1.8	1,303	
Duck Creek	Headwaters to Canyon Ferry Res.	Jan 1 - Dec 31	8	5,792	
Little Prickly Pear Ck. #1	Canyon Creek to Clark Creek	Jan 1 - Dec 31	22	15,927	15,927
Little Prickly Pear Ck. #2	Clark Creek to mouth	Jan 1 - Dec 31	70	50,678	50,678
Lyons Creek	Headwaters to mouth	Jan 1 - Dec 31	10.0	7,240	7,240
McGuire Creek	Headwaters to mouth	May 1 - Nov 30	8.3	3,523	
		Dec 1 - Apr 30	4.7	1,408	4,931
Missouri River #1	Jefferson and Madison rivers to Canyon Ferry Res.	Jan 1 - Dec 31	2,400	1,737,520	1,737,520
Missouri River #2	Hauser Dam to Holter Reservoir	Oct 15 - Dec 15	4,878	599,873	
		Dec 16 - Mar 15	3,000	535,537	
		Mar 16 - Apr 30	5,316	485,030	
		May 1 - June 30	7,890	954,624	
		July 1 - Oct 14	3,500	735,867	3,310,931
Missouri River #3	Holter Dam to Great Falls	May 19 - July 5	6,398	609,132	
		July 6 - May 18	4,100	2,577,916	3,187,048
Prickly Pear Creek #1	Rabbit Gulch to Hwy 12 bridge in East Helena	Jan 1 - Dec 31	22	15,927	15,927
Prickly Pear Creek #2	Hwy 12 bridge in East Helena to Lake Helena	Jan 1 - Dec 31	30	21,719	21,719
Sevenmile Creek	Greenhorn Creek and Skelly Gulch to mouth	Jan 1 - Dec 31	1.0	724	724
Silver Creek	Helena Valley Irrigation Canal to mouth	May 1 - Nov 30	13.0	5,518	
		Dec 1 - Apr 30	5.4	1,617	7,135
Sixteenmile Creek	Billy Creek to mouth	Jan 1 - Dec 31	20	14,479	14,479
Spokane Creek	Helena Valley Irr. Canal to mouth	May 1 - Nov 30	4.0	1,698	
		Dec 1 - Apr 30	3.0	898	2,596
Stickney Creek	North and South forks to mouth	Apr 1 - Apr 30	7	417	
		May 1 - May 31	34	2,091	
		June 1 - June 30	35	2,083	
		July 1 - July 31	7	430	5,021
Tenmile Creek	Headwaters to mouth	Jan 1 - Dec 31	12.0	8,688	8,688
Trout Creek	Springs near Vigilante Campground to mouth	Jan 1 - Dec 31	15.0	10,860	10,860
Virginia Creek	Headwaters to mouth	Jan 1 - Dec 31	6.0	4,344	4,344
Wegner Creek	Headwaters to mouth	Apr 1 - Apr 30	8	476	
		May 1 - May 31	41	2,521	
		June 1 - June 30	38	2,261	
		July 1 - July 31	8	492	5,750
Willow Creek	Headwaters to mouth	Jan 1 - Dec 31	3.5	2,534	2,534
Wolf Creek	Headwaters to mouth	Jan 1 - Dec 31	7.0	5,068	5,068

DEARBORN RIVER DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af)	(af/yr)
Dearborn River	Headwaters to mouth	Jan 1 - Dec 31	110	79,636	79,636
Flat Creek	Headwaters to mouth	Jan 1 - Dec 31	7.5	5,430	5,430
MF Dearborn River	Headwaters to mouth	Jan 1 - Dec 31	9.5	6,878	6,878
Sheep Creek	Headwaters of South Fork to mouth	Jan 1 - Dec 31	22	15,927	15,927
SF Dearborn River	Headwaters to mouth	Jan 1 - Dec 31	11.5	8,326	8,326

SMITH RIVER DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af)	(af/yr)
Big Birch Creek	Headwaters to mouth	Jan 1 - Dec 31	11	7,964	7,964
Eagle Creek	Headwaters to mouth	Jan 1 - Dec 31	2.5	1,810	1,810
Hound Creek	EF Hound Creek and Middle Creek to mouth	Jan 1 - Dec 31	35	25,339	25,339
Newlan Creek	Headwaters to mouth	Jan 1 - Dec 31	3.8	2,751	2,751
NF Deep Creek	Headwaters to rock cascades	Jan 1 - Dec 31	1.0	724	724
NF Smith River	Headwaters to mouth	Jan 1 - Dec 31	9	6,516	6,516
Rock Creek	Headwaters to mouth	Jan 1 - Dec 31	11	7,964	7,964
Sheep Creek	Headwaters to mouth	Jan 1 - Dec 31	35	25,339	25,339
Smith River #1	North and South Forks to Sheep Creek	Jan 1 - Dec 31	90	65,157	65,157

EF - East Fork   Irr. - Irrigation   MF - Middle Fork   Res. - Reservoir   SF - South Fork

STREAM	REACH DESCRIPTION	DATES REQUESTED	(cfs)	(af)	(af/yr)
Smith River Drainage (continued)					
Smith River #2	Sheep Creek to Hound Creek	Jan 1 - Dec 31	150	108,595	108,595
Smith River #3	Hound Creek to mouth	Jan 1 - Dec 31	80	57,917	57,917
SF Smith River	Headwaters to mouth	Jan 1 - Dec 31	7	5,068	5,068
Tenderfoot Creek	Headwaters to mouth	Jan 1 - Dec 31	15	10,859	10,859

SUN RIVER DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af)	(af/yr)
Elk Creek	Headwaters to mouth	Jan 1 - Dec 31	16	11,583	11,583
Ford Creek	Headwaters to mouth	Jan 1 - Dec 31	12	8,688	8,688
NF Willow Creek	Headwaters to mouth	Jan 1 - Dec 31	3.0	2,172	2,172
Sun River #1	Diversion Dam to Elk Creek	Jan 1 - Dec 31	100	72,397	72,397
Sun River #2	Elk Creek to mouth	Jan 1 - Dec 31	130	94,116	94,116
Willow Creek	Headwaters to mouth	Jan 1 - Dec 31	3	2,172	2,172

BELT CREEK DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af)	(af/yr)
Belt Creek #1	Headwaters to Big Otter Creek	Jan 1 - Dec 31	90	65,157	65,157
Belt Creek #2	Big Otter Creek to Missouri River	Jan 1 - Dec 31	35	25,339	25,339
Big Otter Creek	Whiskey Spring Coulee to Belt Creek	Jan 1 - Dec 31	5	3,620	3,620
Dry Fork Belt Creek	Galena and Old Park Creek to Belt Creek	Jan 1 - Dec 31	7	5,068	5,068
Logging Creek	Headwaters to Belt Creek	Jan 1 - Dec 31	6	4,344	4,344
Pilgrim Creek	Headwaters to Belt Creek	Jan 1 - Dec 31	8	5,792	5,792
Tillinghast Creek	Headwaters to Belt Creek	Jan 1 - Dec 31	5.5	3,982	3,982

MIDDLE MISSOURI SUBBASIN

MIDDLE MISSOURI RIVER AND TRIBUTARIES

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af)	(af/yr)
Cow Creek	NF and SF to County bridge	Jan 1 - Dec 31	4.5	3,258	3,258
Highwood Creek	Headwaters to Hwy 228 Bridge at Highwood	Jan 1 - Dec 31	10	7,240	7,240
Missouri River #4	Great Falls to Marias River	Mar 15 - May 18	4,887	630,059	
		May 19 - July 5	11,284	1,074,311	
		July 6 - Aug 31	4,500	508,760	
		Sep 1 - Mar 14	3,700	1,431,075	3,644,205
Missouri River #5	Marias River to Judith River	Mar 15 - May 18	5,571	718,244	
		May 19 - July 5	14,000	1,332,892	
		July 6 - Aug 31	5,400	610,512	
		Sep 1 - Mar 14	4,300	1,663,140	4,324,788
Missouri River #6	Judith River to upper end of Fort Peck Reservoir	Mar 15 - May 18	7,100	915,371	
		May 19 - July 5	15,302	1,456,851	
		July 6 - Aug 31	5,800	655,735	
		Sep 1 - Mar 14	4,700	1,817,850	4,845,807
Shonkin Creek	Forest boundary to town of Shonkin	Jan 1 - Dec 31	7	5,068	5,068
FORT PECK RESERVOIR TRIBUTARIES					
Big Dry Creek	Hwy 200 bridge to mouth	Mar 15 - Mar 31	300	9,521	
		Apr 1 - Apr 30	100	5,950	
		May 1 - May 31	35	2,152	
		June 1 - Oct 31	5.5	1,669	19,292
Little Dry Creek	Whiteside ranch house to Big Dry Creek	Mar 15 - Mar 31	110	3,491	
		Apr 1 - Apr 30	42	2,499	
		May 1 - May 31	17	1,045	
		June 1 - Oct 31	3.5	1,062	8,097

JUDITH RIVER DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af)	(af/yr)
Beaver Creek	West Fork to Cottonwood Creek	Jan 1 - Dec 31	5	3,620	3,620
Big Spring Creek #1	Fish hatchery to Cottonwood Creek	Jan 1 - Dec 31	110	79,636	79,636
Big Spring Creek #2	Cottonwood Creek to mouth	Jan 1 - Dec 31	100	72,397	72,397
Cottonwood Creek	Spring Branch of Cottonwood Ck. to Big Spring Ck.	Jan 1 - Dec 31	4.5	3,258	3,258

Hwy - Highway NF - North Fork SF - South Fork

Judith River Drainage (continued)

East Fork Big Spring Ck.	Headwaters to Big Spring Creek	Jan 1 - Dec 31	7.5	5,430	5,430
Judith River #1	SF and MF to Big Spring Creek	Jan 1 - Dec 31	25	18,099	18,099
Judith River #2	Big Spring Creek to Missouri River	Jan 1 - Dec 31	160	115,835	115,835
Lost Fork Judith River	SF and WF to MF Judith River	Jan 1 - Dec 31	14	10,136	10,136
Middle Fork Judith River	Headwaters to South Fork	Jan 1 - Dec 31	22	15,928	15,928
South Fork Judith River	Headwaters to Middle Fork	Jan 1 - Dec 31	3.5	2,534	2,534
Warm Spring Creek	Springs to Judith River	Jan 1 - Dec 31	110	79,636	79,636
Yogo Creek	Headwaters to MF Judith River	Jan 1 - Dec 31	3	2,172	2,172

MUSSELSHELL RIVER DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af)	(af/yr)
Alabaugh Creek	Headwaters to mouth	Jan 1 - Dec 31	12	8,688	8,688
American Fork Creek	South Fork to mouth	Jan 1 - Dec 31	5.5	3,982	3,982
Big Elk Creek	at Origin ~~of~~ Lebo Fork to mouth	Jan 1 - Dec 31	9.5	6,878	6,878
Careless Creek	Headwaters to Roberts Creek	Jan 1 - Dec 31	2	1,448	1,448
Checkerboard Creek	East and West Forks to mouth	Jan 1 - Dec 31	6	4,344	4,344
Collar Gulch Creek	Headwaters to mouth	Jan 1 - Dec 31	0.6	434	434
Cottonwood Creek	WF, MF, and Loco Creek to mouth	Jan 1 - Dec 31	16	11,583	11,583
Flatwillow Creek	NF and SF to Petrolia Reservoir	Jan 1 - Dec 31	18	13,031	13,031
Musselshell River #1	NF and SF to Deadmans Basin Div	Jan 1 - Dec 31	80	57,917	57,917
Musselshell River #2	Deadmans Basin Div to Musselshell Div	Jan 1 - Dec 31	80	57,917	57,917
Musselshell River #3	Musselshell Diversion Dam at town of Musselshell to mouth	Jan 1 - Dec 31	70	50,678	50,678
NF Musselshell #1	Headwaters to Bair Reservoir	Jan 1 - Dec 31	3	2,172	2,172
NF Musselshell #2	Bair Reservoir to SF Musselshell R.	Jan 1 - Dec 31	16	11,583	11,583
SF Musselshell	Headwaters to North Fork	Jan 1 - Dec 31	30	21,719	21,719
Spring Creek	Headwaters to mouth	Jan 1 - Dec 31	8	5,792	5,792
Swimming Woman Ck.	Headwaters to Cty road crossing 8 linear miles upstream from mouth	Jan 1 - Dec 31	2.5	1,810	1,810

MARIAS/TETON SUBBASIN

MARIAS RIVER DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af)	(af/yr)
Badger Creek	N and S Badger creeks to Forest/ Blackfeet Reservation Boundary	Jan 1 - Dec 31	60	43,438	43,438
Birch Creek	Swift Reservoir to Hwy 358	Jan 1 - Dec 31	64	46,334	46,334
Cut Bank Creek	Blackfeet Reservation boundary to mouth	Jan 1 - Dec 31	75	54,297	54,297
Dupuyer Creek	Headwaters to mouth	Jan 1 - Dec 31	12	8,688	8,688
Marias River #1	Two Medicine River and Cut Bank Creek to head of Tiber Reservoir	Jan 1 - Dec 31	200	144,793	144,793
Marias River #2	Tiber Dam to Circle Bridge (Hwy 223)	Jan 1 - Dec 31	500	361,983	361,983
Marias River #3	Circle Bridge (Hwy 223) to mouth	Jan 1 - Dec 31	560	405,421	405,421
North Badger Creek	Headwaters to mouth	Jan 1 - Dec 31	14	10,136	10,136
NF Dupuyer Creek	Headwaters to mouth	Jan 1 - Dec 31	12	8,688	8,688
South Badger Creek	Headwaters to mouth	Jan 1 - Dec 31	40	28,959	28,959
SF Dupuyer Creek	Headwaters to mouth	Jan 1 - Dec 31	6	4,344	4,344
SF Two Medicine River	Headwaters to Forest/ Blackfeet Reservation Boundary	Jan 1 - Dec 31	16	11,583	11,583

TETON RIVER DRAINAGE

STREAM	REACH DESCRIPTION	DATES REQUESTED	AMOUNT REQUESTED (cfs)	(af)	(af/yr)
Deep Creek	Headwaters to mouth	Jan 1 - Dec 31	18	13,031	13,031
McDonald Creek	Headwaters to mouth	Jan 1 - Dec 31	10	7,240	7,240
NF Deep Creek	Headwaters to mouth	Jan 1 - Dec 31	7.2	5,212	5,212
SF Deep Creek	Headwaters to mouth	Jan 1 - Dec 31	6.9	4,995	4,995
Spring Creek	Headwaters to mouth	Jan 1 - Dec 31	4.5	3,258	3,258
Teton River	Headwaters to discharge from Priest Butte Lake	Jan 1 - Dec 31	35	25,339	25,339

LAKES AND SWAMPS

Bean Lake	Sec. 18C and 19B, T18N, R6W, Sec. 13D and 24A, T18N, R7W	Jan 1 - Dec 31	—	2648.6 ~~2,649~~	2648.6 ~~2,649~~
Antelope Butte Swamp	North 1/2 Sec. 28, T26N, R8W	Jan 1 - Dec 31	—	460	460

Ck. - Creek Cty - County Div - Diversion Hwy - Highway MF - Middle Fork NF - North Fork R - River SF - South Fork WF - West Fork shall have priority over any other reservations granted by the Board in this Order.

7. For those streams where the instream flow reservations of DFWP overlap with reservations for DHES and BLM; the reservants shall jointly hold such reservations.

8. The reservations for DFWP granted in this Order shall be concurrent with, rather than cummulative to, any other instream water rights DFWP held prior to July 1, 1985.

DHES Reservation

9. The Applicant, Montana Department of Health and Environmental Sciences, is granted an instream flow reservation throughout the year as follows:

	Amount	
	cfs	acre-feet/year
Missouri River at Toston	2596	1,879,504
Missouri River at Ulm	3204	2,319,696
Missouri River at Virgelle	4390	3,178,360
Missouri River at Landusky	4815	3,486,060

10. The reservation for MDHES shall be second in priority to the municipal reservations granted in the Order, shall be equal in priority to the instream flow reservations granted to the MDFWP and BLM and shall have priority over any other reservations granted by the Board in this Order.

11. For those streams where the instream flow reservations of DHES overlap with reservations for DFWP and BLM, the reservants shall jointly hold such reservations.

BLM Reservations

12. The Applicant, United States Department of Interior, Bureau of Land Management (BLM), is granted instream flow reservations in streams in the amounts and for the time periods set forth in Table 13 attached hereto and incorporated herein by this reference.

13. The reservations for BLM shall be second in priority to the municipal reservations granted in the Order, shall be equal in priority to the instream flow reservations granted to the MDHES and DFWP and shall have priority over any other reservations granted by the Board in this Order.

14. For those certain streams where the instream flow reservations of BLM overlap with reservations for DHES and DFWP, the reservants shall jointly hold such reservations.

Conservation District Reservations

15. Applicant Broadwater County Conservation District, pursuant to its application, is granted a reservation of water to be used in irrigation for the following projects, as described in the application:

Project No.	Peak Flows (cfs)	Annual Diversion (af)	Water Source
BR-5	2.98	362	Canyon Ferry Lake
BR-11	0.98	119	Canyon Ferry Lake
BR-12	1.31	159	Canyon Ferry Lake
BR-14	5.64	746	Canyon Ferry Lake
BR-106	5.58	676	Canyon Ferry Lake
BR-107	2.30	278	Canyon Ferry Lake
BR-108	1.89	229	Canyon Ferry Lake
BR-109	2.13	258	Canyon Ferry Lake
BR-110	3.85	467	Canyon Ferry Lake

Table 1-5. Reservations requested by BLM for maintenance of aquatic habitat and stream channels

Stream	Amount: Year-round for aquatic habitat maintenance cfs	Amount: Year-round for aquatic habitat maintenance acre feet/year	Amount: Peak discharge every other year for channel maintenance cfs
Bear Creek near Grant	6	4,344	50
Bear Creek near Wise River	2.5	1,810	50
Big Sheep Creek near Dell	40	28,960	300
Black Canyon Creek near Grant	2.5	1,810	35
Bloody Dick Creek near Grant	20	14,500	270
Cabin Creek near Dell	1	724	4
Canyon Creek near Divide	5	3,620	110
Camp Creek near Melrose	5	3,600	50
Corral Creek near Lakeview	2.5	1,810	20
Deadman Creek near Dell	4.5	3,258	50
Deep Creek near Wise River	30	21,720	500
East Fork Blacktail Deer Creek near Dillon	18	13,032	215
East Fork Dyce Creek near Dillon	1.5	1,086	9
Frying Pan Creek near Grant	1.5	1,086	35
Hell Roaring Creek	15	10,860	250
Indian Creek near Dell	1	724	5
Jones Creek near Lakeview	2	1,428	20
Long Creek near Lakeview	5	3,620	110
Medicine Lodge Creek near Grant	9	6,516	50
Moose Creek near Divide	8	5,800	70
North Fork Greenhorn Creek near Alder	3.5	2,534	35
Odell Creek near Lakeview	11	7,964	225
Peet Creek near Lakeview	1.5	1,090	30
Rape Creek near Grant	1	724	5
Shenon Creek near Grant	1	724	13
Simpson Creek near Dell	1	724	5
Tom Creek near Lakeview	2	1,448	25
Trapper Creek near Grant	1	724	10
West Fork Blacktail Deer Creek near Dillon	3	2,172	25
West Fork Dyce Creek near Dillon	1	724	5
Willow Creek near Glen	12	8,900	130

16. Applicant Cascade County Conservation District, pursuant to its application, is granted a reservation of water to be used in irrigation for the following projects, as described in the application:

Project No.	Peak Flows (cfs)	Annual Diversion (af)	Water Source
CS-43	3.98	599	Belt Creek
CS-61	1.15	163	Smith River
CS-101	2.15	304	Missouri River
CS-102	1.39	186	Missouri River
CS-111	6.58	799	Missouri River
CS-351	2.73	369	Missouri River
CS-541	.54	69	Missouri River
CS-251	1.65	245	Smith River
CS-271	.93	134	Smith River
CS-331	.41	57	Smith River
CS-241	1.48	190	Sun River
CSI-11	2.23	287	Missouri River
CSI-12	.90	110	Missouri River
CSI-21	1.50	157	Missouri River
CSI-22	1.19	163	Missouri River
CSI-41	1.44	180	Missouri River
CSI-51	1.78	250	Missouri River
CSI-52	4.65	700	Missouri River
CSI-82	1.03	137	Sun River
CSI-83	.49	99	Sun River
CSI-92	.50	72	Sun River
CSI-101	1.57	223	Missouri River
CSI-103	3.71	557	Missouri River
CSI-102	1.28	171	Smith River

17. Applicant Choteau County Conservation District, pursuant to Application No. 72307-41QJ, is granted a reservation of water to be used in irrigation for the following projects, as described in the application:

Project No.	Peak Flows (cfs)	Annual Diversion (af)	Water Source
CH-21	2.64	406	Missouri River
CH-201	.54	77	Shonkin Creek
CHI-10	2.36	314	Missouri River
CHI-21	5.29	752	Missouri River
CHI-22	3.06	389	Missouri River
CHI-30	4.19	643	Missouri River
CHI-40	1.89	290	Missouri River
CHI-51	1.63	244	Marias River
CHI-53	1.88	289	Marias River

18. Applicant Fergus County Conservation District, pursuant to it application, is granted a reservation of water to be used in irrigation for the following projects, as described in the application:

Project No.	Peak Flows (cfs)	Annual Diversion (af)	Water Source
FE-141	3.23	375	Wolverine Creek
FE-431	1.06	107	Little Casino Cr.
FE-671	6.43	748	Olsen Creek
FE-672	3.82	444	UT Olsen Creek
FE-673	1.13	131	UT Ross Fork Creek
FEI-10	1.59	192	Missouri River

19. Applicant Judith Basin County Conservation District, pursuant to it application, is granted a reservation of water to be used in irrigation for the following projects, as described in the application:

Project No.	Peak Flows (cfs)	Annual Diversion (af)	Water Source
JB-231	.75	92	Well
JB-232	.75	92	Well
JB-281	3.26	401	Wolf Creek
JBS-3	.44	28	Otter Creek

20. Applicant Lewis and Clark County Conservation District, pursuant to its application, is granted a reservation of water to be used in irrigation for the following projects, as described in the application:

Project No.	Peak Flows (cfs)	Annual Diversion (af)	Water Source
LC-11	.60	80	UT Tenmile Cr.
LC-210	1.25	148	Missouri River
LCI-10	1,22	185	Upper Holter Lake

21. Applicant Glacier County Conservation District, pursuant to its application, is granted a reservation of water to be used in irrigation for the following projects, as described in the application:

Project No.	Peak Flows (cfs)	Annual Diversion (af)	Water Source
GL-11	3.72	472	Cut Bank Creek
GL-221	4.37	579	Cut Bank Creek

22. Applicant Liberty County Conservation District, pursuant to its application, is granted a reservation of water to be used in irrigation for the following projects, as described in the application:

Project No.	Peak Flows (cfs)	Annual Diversion (af)	Water Source
LI-161	6.77	1043	Marias River
LI-162	4.65	690	Marias River

23. Applicant Teton County Conservation District, pursuant to its application, is granted a reservation of water to be used in irrigation for the following projects, as described in the application:

Project No.	Peak Flows (cfs)	Annual Diversion (af)	Water Source
TE-571	10.52	1593	Muddy Cr. (Sun R.)

24. Applicant Valley County Conservation District, pursuant to its application, is granted a reservation of water to be used in irrigation for the following projects, as described in the application:

Project No.	Peak Flows (cfs)	Annual Diversion (af)	Water Source
VAS-1	499.11	92,000	Fort Peck Reservoir

25. The reservations for the foregoing conservation districts shall be third in priority to the municipalities and instream flow reservants granted reservations in this Order, and shall have equal priority among themselves.

26. All other reservation requests by conservation districts are denied.

BUREC Reservation

27. The applicant, United States Department of Interior, Bureau of Reclamation (BUREC), pursuant to its application, is granted a reservation of water in the amount of 280 cfs from Arpil 1 to October 30 for a total volume of 89,000 acre-feet a year.

28. The reservation for the BUREC shall be third in priority to the municipalities and instream flow reservants granted reservations in this Order, and shall have equal priority with the conservation district reservations granted above.

General Conditions

29. All reservations granted in this Order shall have a priority date and time of July 1, 1985, at 12:01 a.m., with the relative priorities among them as set forth in this Order.

Peter T. Stanley
% Department of Natural Resources and Conservation
1520 East Sixth
Helena, MT 59620

and by depositing true and accurate copies, postage prepaid, in the United States Post Office at Helena, Montana, to the following locations:

Loren Tucker
P.O. Box 36
Virgnia City, MT 59755

J. B. Anderson
112 S. Washington
Dillon, MT 59725

Gary Spaeth
111 N. Broadway Ave.
Red Lodge, MT 59068

Holly J. Franz
Gough, Shanahan, et. al.
P.O. Box 1715
Helen, MT 59624-1715

Monte J. Boettger
507 Montana Bldg.
Lewistown, MT 59457

Cindy Younkin
P.O. Box 1288
Bozeman, MT 59715

Ted J. Doney
P.O. Box 1185
Helena, MT 59601

W.G. Gilbert III
P.O. Box 235
Dillon, MT 59725

John Bloomquist
P.O. Box 1302
Dillon, MT 59725

Steve Brown
1313 11th Avenue
Helena, MT 59601

Paul B. Smith
P.O. Box 565
Boulder, MT 59632

James Hubble
P.O. Box 556
Standford, MT 59479

Mona Jamison
P.O. Box 1698
Helena, MT 59601

Dale Schwanke
P.O. Box 2269
Great Falls, MT 59403

Keith Strong
P.O. Box 1566
Great Falls, MT 59403

Carl Davis
P.O. Box 187
Dillon, MT 59725

John Chaffin
P.O. Box 31394
Billings, MT 59107

Curtis E. Larsen
Agency Legal Counsel