RECLAMATION
Managing Water in the West

Final Environmental Assessment
and
Finding Of No Significant Impact

Conversion of Long-Term Water Service Contracts to Repayment Contracts

- Clark Canyon Water Supply Company
- East Bench Irrigation District

Pick-Sloan Missouri Basin Program
East Bench Unit

Clark Canyon Reservoir, Montana

U.S. Department of the Interior
Bureau of Reclamation
Great Plains Region
Montana Area Office

November 2006

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

FINDING OF NO SIGNIFICANT IMPACT

CONVERSION OF LONG-TERM WATER SERVICE CONTRACTS TO REPAYMENT CONTRACTS

- CLARK CANYON WATER SUPPLY COMPANY
- EAST BENCH IRRIGATION DISTRICT

FONSI Reference Number: MT231-07-01F

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
GREAT PLAINS REGION
MONTANA AREA OFFICE

2006

Finding Of No Significant Impact

FONSI Reference Number: MT231-07-01F

Finding

Based on the analysis of the environmental impacts as described in the final Environmental Assessment (EA), the Bureau of Reclamation finds that all potentially significant issues and resource impacts have been identified, evaluated, addressed and resolved. In accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, and the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR Parts 1500-1508), Reclamation has determined that the proposed action will not have a significant impact on the quality of the human environment and that an Environmental Impact Statement is not required.

Decision and Agency Selected Alternative

Reclamation has decided to implement the Preferred Alternative as described in the final EA. Under this alternative, the purpose and need of this Federal action will be met and conversion of long term water service contracts to repayment contracts will be implemented. Implementation of this alternative may take place following approval of this environmental document and completion of required contracting actions.

Summary of Environmental Effects

Reclamation has analyzed the effects of the Preferred Alternative and compared them to the effects of the No Action Alternative in Chapter 4 of the final EA. The effects of the Preferred Alternative are summarized below:

1. Water Supply – Under the Preferred Alternative, reservoir releases of stored water and diversions of irrigation water would continue similar to the No Action Alternative and existing conditions. The main difference between the expiring water service contracts and the new repayment contracts is the inclusion of the expiring contracts' 3rd priority acreage [7,711 acres for Clark Canyon Water Supply Company (CCWSC) and 4,448 acres for East Bench Irrigation District (EBID)] in the new repayment contracts' 1st priority and 2nd priority. However, both CCWSC and EBID would be allowed to divert no more irrigation water from storage than they are currently allowed under their expiring contracts. EBID has proposed to include an additional 918 acres within the 2nd priority. Whether or not this district boundary change is approved in the future, no additional water will be diverted as part of the Preferred Alternative compared to the No Action Alternative. Fluctuations in water levels in the reservoir would continue to depend upon volume, inflow, storage, and downstream needs and demands. Reservoir storage would have a minimum target pool of 60,000 af, but could be drawn down to a minimum of 10,000 af during low water or drought years. Hydrology models predict that March end-of-month reservoir levels with the Preferred Alternative would average 151,000 af compared to 147,600 af with the No Action Alternative. During low water or drought years, March end-of-month reservoir levels would average 66,500 AF with the Preferred Alternative compared to 58,640 af for the No Action Alternative. The Preferred Alternative would have no significant impacts on water supply.

2. Water Quality – The Preferred Alternative would have no impact on water quality and would not change water quality trends and conditions in Clark Canyon Reservoir, the Beaverhead River, or the Jefferson River from existing conditions. The additional acreage (918 acres) proposed to be included in EBID has been farmed in the past and no major change in farming practices are being proposed. Therefore, nitrogen levels in return flows would remain similar to conditions in the No Action Alternative. Reclamation will continue to work cooperatively on water quality issues as described in the Environmental Measures section. The Preferred Alternative would have no significant impacts on water quality.

3. Fisheries – The Preferred Alternative would continue existing reservoir operations and deliveries of the stored irrigation water. Reservoir fisheries and fish conditions would likely improve during drought periods with this alternative because of the reduced allotments and increased reservoir storage as part of the drought management plan. The river fishery in the upper Beaverhead River will continue to see variation in flows throughout the year and range from high flows during the irrigation season to lower flows during the non-irrigation season months. Minimum reservoir releases of 25 cfs would be implemented during drought conditions. These minimum releases will protect the river fishery during drought conditions. The Preferred Alternative would have no significant impact to fisheries.

4. Wetlands – Conveyance systems, head gates, and management of the conveyance facilities would remain unchanged. Wetlands associated with irrigation acreage along canals, laterals, drains, and areas of return flows would receive similar volumes of water as in the No Action Alternative. Therefore, the conversion to repayment contracts would have no significant impacts on wetlands.

5. Wildlife – Water deliveries would remain similar to the No Action Alternative, and no habitat is proposed to be altered. Existing wildlife habitat would be similar to the No Action Alternative. The Preferred Alternative would have no significant effect to wildlife or their habitat.

6. Threatened and Endangered Species – Reclamation informally consulted with the United States Fish and Wildlife Service under section 7 of the Endangered Species Act. There is no construction activities related to the Preferred Alternative and water deliveries would continue similar to existing conditions. Reclamation evaluated the effect of the Preferred Alternative and determined that it would have no effect on the five threatened species in the action area. Bald eagle nests and prey will not be affected, Ute ladies' tresses or habitat will not be lost or converted to farmland, and there are no indirect impacts to bald eagle or Ute ladies' tresses. In addition, there is no potential to effect the other 3 species; grizzly bear, Canada lynx, or gray wolf. The Preferred Alternative would have no significant effects to threatened or endangered species.

7. Social and Economic Conditions – The Preferred Alternative, which includes elements such as the Drought Management Plan would help maintain the economic viability of the project. Water deliveries to contract water users for irrigation would continue similar to the No Action Alternative. Other uses of the reservoir and river by sportsmen, guides, outfitters, and other recreation users would also continue at levels similar to the No Action Alternative. The Preferred Alternative would result in no significant changes to social and economic conditions or unemployment rates in the area.

8. Recreation – Recreational opportunities would remain unchanged under the Preferred Alternative. Clark Canyon Reservoir and Barretts Diversion Dam recreation facilities and operations would not change as a result of the conversion of the long term water service contracts to repayment contracts. Fluctuations in water levels in the reservoir would continue in the future and would

depend upon volume, inflow, storage, and downstream needs and demands. The Preferred Alternative would have no significant impacts to recreation or recreation opportunities in the project area.

9. Other Resources – The Preferred Alternative would not have a significant impact on any of the following resources also considered in the EA:
   - Environmental justice – The Preferred Alternative would not result in disproportionate adverse effects on low-income or minority populations.
   - Indian trust assets (ITA) – There are no ITAs located in the project area; therefore, there is no potential to affect ITAs.
   - Water conservation – Both the CCWSC and the EBID will be required to develop water conservation plans in accordance with existing Federal law and Reclamation policy. Water conservation measures are also one of the components that will be evaluated as part of the agreement between Reclamation and Montana Department of Fish, Wildlife and Parks (MDFWP). Further NEPA compliance will be completed if there is conservation measures implemented associated with the agreement or their contractual requirements. There is no effect to water conservation.
   - Cultural resources – The area has been farmed or irrigated for the past 50+ years and the 918 acres proposed to be included in EBID boundaries has also been previously farmed. Reclamation has determined that the Preferred Alternative is a type of activity which does not have the potential to cause effects on historic properties because there will be no change in land use, no change to Reclamation-built facilities and no new ground disturbance. Therefore, the Preferred Alternative would have no potential to affect cultural resources.
   - Noxious weeds – This alternative would not increase the infestation of noxious weeds and noxious weed management would continue.
   - Prime and unique farmlands – There would be no adverse impacts to prime farmland. The 918 acres proposed to be included in the EBID boundaries could constitute a positive effect if they are classified as prime and/or unique farmlands.

10. Cumulative Effects – Cumulative impacts resulting from conversion of long-term water service contracts to repayment contracts were evaluated and described in the final EA. When the impacts of implementing this Federal action are added to other actions referred to in the final EA, the cumulative impacts would not be significant.

ENVIRONMENTAL MEASURES

Reclamation, CCWSC, and EBID have agreed to implement Beaverhead River minimum releases, include a Drought Management Plan, and implement Clark Canyon Reservoir minimum pools as part of the new repayment contracts. These measures are part of the Preferred Alternative and will help ensure the economic viability of the contract water users, as well as aid in improving the environmental health of the Beaverhead River basin. These measures are described in more detail below:

- Beaverhead River Minimum Releases – reservoir releases will not drop below 25 cfs, with the exception of required maintenance activities (i.e. inspections) for the dam and associated works. The Joint Board will make recommendations for winter reservoir releases to the Contracting Officer (Area Manager – Reclamation's Montana Area Office) for concurrence. The Joint Board will utilize the best available forecasting data and will also give due consideration to applicable, credible, scientific data in making the recommendations. In addition, guidelines have been developed (Table 2.1 of the final EA) to assist the Joint Board in recommending the minimum winter release.

- Drought Management Plan – the plan would be would be triggered at specific reservoir levels based on Reclamation's August EOM forecasts. The Joint Board would determine before the irrigation season if August EOM forecasts were lower than predetermined reservoir level triggers. In such a situation, they would then set reduced water allotments for the upcoming irrigation season. The various reservoir triggers and water allotment reductions are shown Table 2.2 of the final EA. These water allotment reductions will be measured at the individual points of diversion.
- Clark Canyon Reservoir Minimum Levels – reservoir pool levels will not drop below 10,000 af. This minimum pool level will be implemented for the protection of aquatic resources and to minimize the possibility of flushing silt from the reservoir.

In addition to the above mention environmental measures, Reclamation has committed to working on the following activities:

- Reclamation and the MDFWP have developed a partnership agreement to work cooperatively on issues; such as fisheries, water quality, and flow alteration that affect the Beaverhead River basin. This agreement will foster communication between the two agencies. Through this cooperation and coordination; Reclamation will also encourage other interested entities to participate—including (but are not limited to) CCWSC, EBID, the Beaverhead River Watershed Committee, special interest groups, and any others that would like to contribute to the well being of the Beaverhead River.
- Continue data collection through Montana State University-Bozeman and Montana Tech to fill data gaps in existing water quality information. Additional studies would be initiated as needed.
- Work cooperatively with Montana Department of Environmental Quality during the Total Maximum Daily Load planning and implementation process to work toward improving water quality on a watershed scale.
- Work cooperatively with the Beaverhead Watershed Group and other interested parties to collaboratively work toward improved water quality conditions within the watershed.

Approved: [signature] Date: 07 NOVEMBER 2006

Dan Jewell
Area Manager
Montana Area Office
Bureau of Reclamation

FINAL ENVIRONMENTAL ASSESSMENT

CONVERSION OF LONG-TERM WATER SERVICE CONTRACTS TO REPAYMENT CONTRACTS

- CLARK CANYON WATER SUPPLY COMPANY
- EAST BENCH IRRIGATION DISTRICT

UNITED STATES DEPARTMENT OF THE INTERIOR
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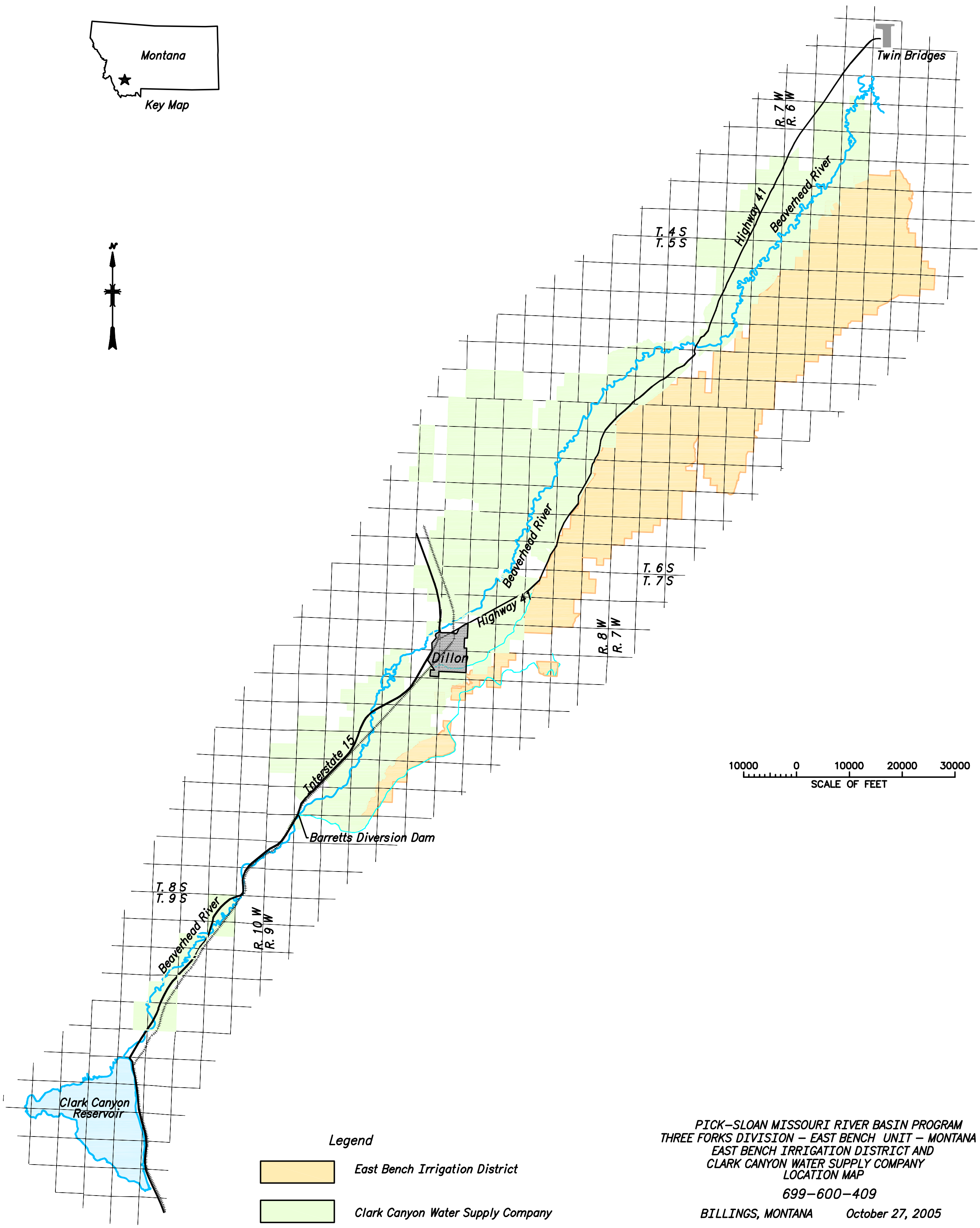

PICK–SLOAN MISSOURI RIVER BASIN PROGRAM
THREE FORKS DIVISION – EAST BENCH UNIT – MONTANA
EAST BENCH IRRIGATION DISTRICT AND
CLARK CANYON WATER SUPPLY COMPANY
LOCATION MAP

699–600–409

BILLINGS, MONTANA October 27, 2005

C O N T E N T S

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ALTERNATIVES: Chapter 2

AFFECTED ENVIRONMENT: Chapter 3

ENVIRONMENTAL CONSEQUENCES: Chapter 4

CONSULTATION, COORDINATION, AND PUBLIC INVOLVEMENT: Chapter 5

I N T R O D U C T I O N
CHAPTER 1

Proposed Action

The Bureau of Reclamation (Reclamation) proposes to renew long-term water service contracts or to convert them to repayment contracts with the Clark Canyon Water Supply Company (CCWSC) and East Bench Irrigation District (EBID). Both water users receive stored irrigation water by contract from Reclamation's Clark Canyon Reservoir in southwestern Montana (see the "Location Map" at the front of this report).

Renewed long-term water service contracts would have a negotiated water rate. The new contracts would have a term of up to 40 years, at which time new contracts would have to be negotiated.

A repayment contract would have a negotiated capital repayment obligation, usually an amount higher than that negotiated for a water service contract. It establishes a repayment schedule of up to 40 years to repay a negotiated amount of the project's costs allocated to irrigation (amortization period). In other words, a repayment contract provides for finality of payment by the contractor: after the repayment period is completed, no further debt is owed. A repayment contract has no contract term or expiration date.

This EA (environmental assessment) analyzes the environmental, social, and economic effects of renewing the contracts. Prepared to comply with the National Environmental Policy Act, the EA could lead either to a Finding of No Significant Impacts (FONSI) if effects were found to be insignificant or to an Environmental Impact Statement (EIS) if effects were found to be significant.

In the chapters to follow, purpose and need for action are discussed (Chapter 1), alternative plans detailed (Chapter 2), environmental aspects discussed (Chapter 3), and effects of the alternatives described (Chapter 4). This EA concludes with the consultation and coordination done with the public, interest groups, and with other agencies during the study.

Purpose and Need

The purpose of this Federal action is to provide for continued beneficial use of a Federally developed water project. The Reclamation Act of 1956 requires Reclamation to provide water users holding contracts a first right of renewal to a stated share of a project's available water supply, as well as the right to convert from a water service contract to a repayment contract.

The action being considered will continue to supply irrigation water to CCWSC and EBID from Clark Canyon Reservoir.

This Federal action is needed to:

- Renew the present long-term water service contracts before they expire at the end of 2006,
- Renew the operations and maintenance (O&M) transfer agreement with EBID before it expires at the end of 2006,
- Provide water stored in Clark Canyon Reservoir to CCWSC and EBID for irrigated crops, and
- Repay the Federal government allocated costs associated with the construction of Clark Canyon Dam, Barretts Diversion Dam, and associated water conveyance facilities.

Decisions to Be Made

This EA will assist decision-makers in answering the following questions:

- What are the environmental, social, and economic effects of renewing the existing long-term water service contracts with CCWSC and EBID under the original terms?
- What are the environmental, social, and economic effects of entering into new long-term water service contracts with CCWSC and EBID that include changes from the existing contracts; such as changes in water allocation priorities, inclusion of a drought management plan, and inclusion of winter release guidelines to name a few?
- Should Reclamation convert the long-term water service contracts with CCWSC and EBID to repayment contracts?
- Would a new contract constitute a major Federal action significantly affecting the quality of the human environment, thereby requiring an EIS?

Background

Clark Canyon Reservoir is part of Reclamation's East Bench Unit, which also includes Barretts Diversion Dam, the East Bench Canal, and other facilities (Location Map). The unit provides irrigation water to CCWSC and EBID, as well as indirect recreation and fish and wildlife benefits.

The Beaverhead River drainage basin in southwestern Montana begins at the confluence of Horse Prairie Creek and Red Rock River. The southern limit of the drainage basin is bounded by the Continental Divide (Centennial Mountains and the Gravelly Range).

The western limit of the drainage basin is bounded by the Beaverhead Mountains, including the Tendoy Mountains. Downstream, the Ruby Range and the Pioneer Mountains confine the basin.
The Beaverhead Valley is made up of bottomlands coupled with bench lands along the borders.

East Bench Unit, P-S MBP

Clark Canyon Reservoir

Clark Canyon Reservoir, located in Beaverhead County about 20 miles south of Dillon, Montana, is the primary storage facility for the East Bench Irrigation Unit, Pick-Sloan Missouri Basin Project (P-SMBP). It impounds the Red Rock River and Horse Prairie Creek, forming the headwaters of the Beaverhead River.

The reservoir has a total capacity of 253,442 acre-feet (AF), with an active capacity of 124,160 AF, a joint use capacity of 50,207 AF, and exclusive flood control capacity of 79,075 AF. Reservoir surface area is 5,903 acres. Irrigation and flood control are the primary project purposes authorized by Congress. Recreation, fish, and wildlife are incidental benefits provided by the Federal government.

Barretts Diversion Dam

Barretts Diversion Dam, about 11 miles downstream of Clark Canyon Reservoir on the Beaverhead River, directs water into the East Bench Canal. This canal runs in a northeasterly direction for about 44 miles, with about 60 miles of laterals supplying district lands. Headworks capacity is 440 cubic-feet/second (cfs).

Pivot in operation in the Beaverhead Valley (Steve Cottom photo).

Barretts Diversion Dam also directs stored irrigation water into Canyon Ditch, a private ditch supplying private lands on the west side of the Beaverhead River (Location Map). Headworks capacity is 200 cfs. The ditch conveys water to irrigate about 3,000 acres in Beaverhead County. Excess water from the ditch and irrigation return flows eventually returns to the Beaverhead River.

East Bench Irrigation District

The EBID, organized and officially decreed by a District court on November 1, 1957, is governed by a five member board elected by members of the EBID. The EBID irrigates bench lands on the east side of the Beaverhead River, with principal crops of alfalfa and small grains.

Clark Canyon Water Supply Company

The company is comprised of many individual shareholders as well as several individual ditch companies, each with natural flow water rights from the Beaverhead River. These individual ditch companies include (but not limited to) the West Side Canal Company, Co-Op Ditch, and the Smith-Rebich Ditch. The shareholders of the CCWSC primarily irrigate bottom lands of the Beaverhead River with principal crops of alfalfa and small grains. Although a private company, CCWSC receives a supplemental water supply from Clark Canyon Reservoir.

Project Development History

Pre-Project Development

The East Bench Unit was developed under authority of the Flood Control Act of 1944 (P.L. 78-534). The 1944 Flood Control Act , commonly know as the Pick-Sloan Act, authorized a general Missouri River basin development program. Section 9 of that Act states “the general comprehensive plan set forth in House Document 475 and Senate Document 191 as revised and coordinated by Senate Document 247, Seventy-eighth Congress, second session, are hereby approved and the initial stages recommended are hereby authorized and shall be prosecuted by the War Department and the Department of the Interior as speedily as may be consistent with requirements.”.

Senate Document No. 191 entitled “Missouri River Basin–Conservation, Control, and Use of Water Resources of the Missouri River in Montana, Wyoming, Colorado, North Dakota, South Dakota, Nebraska, Kansas, Iowa, and Missouri,” dated April 1944, considered a full irrigation water supply for 32,400 acres of new irrigation and a supplemental irrigation water supply for 34,100 acres in the Beaverhead River Basin, including tributaries.

Reclamation’s “Board of Review” recommended in its report to the Commissioner, (included in Senate Document No. 191): “(a) That the general plan for the development of the basin as contained in the report be approved subject to such modifications and changes as may be indicated, from time to time, as the plan is effectuated.” Page 17 of Senate Document No. 191 under “Summary Forward” further supported the “general nature” of the estimates with the statement: “The plan is based on specific information with respect to the character and needs of different sections of the basin, and on experience in designing, building, and operating works of the kinds that will be required in the Missouri River Basin. It is adapted to development in stages and to such modifications as changes in physical and economic conditions make necessary.” The general nature of Senate Document No. 191 allows for changes in irrigation acreages that were estimated to be developed as the Missouri River Basin Project was developed.

House Document No. 475 presented the U.S. Army Corps of Engineers’ plan for the Missouri River Basin development, which in many respects was similar to the plan presented by Reclamation in Senate Document No. 191. Senate Document No. 247 reconciled the differences between the two plans. Section 5 of Senate Document No. 247 discussing the Upper Missouri River Basin determined: “there was no conflict in the proposed plans of the two agencies for the Upper Missouri River Basin subdivision.”

Project Contract Development

Reclamation entered into water service contracts with CCWSC and EBID in October 1958. The 1958 contracts specified the terms and conditions for the partial repayment of costs incurred by the United States to construct Clark Canyon Dam. The 1958 contracts did not specify the number of irrigated acres in either contract. The EBID contract refers to the "irrigable lands" of the district, which are approximately 38,000 acres as approved by a state district court. The water service contract with CCWSC refers to supplying water "for each acre of land now irrigated by shareholders of the CCWSC and for such additional acres with valid water rights on the date of execution of this contract as may be owned by persons now or hereafter shareholders of the Company," and later in the contract, describing water with a priority junior to the EBID, states "such water in excess of 4 acre-feet per acre as can be beneficially used during the irrigation season under subsisting water rights on lands of the Company's shareholders to the extent it is available." The Company refers to the CCWSC. A brief review of the water right claims filed by water users in the Beaverhead River Basin pursuant to the ongoing general water right adjudication process indicates that water users are claiming historical irrigated acres in excess of the acres proposed under the new contracts. Water right claims from the Beaverhead River and several interconnected sloughs identify approximately 53,000 acres of historical irrigation. All but two of the approximately 310 claims identify priority dates earlier than the 1958 contracts.

When the contracts with CCWSC and EBID were executed in 1958, the primary means of applying water to crops was through various flood irrigation techniques. Over the years, advances of technology and changes in economics have allowed individual producers to make improvements to their irrigation operations to improve their individual economic situations. One of those changes is the conversion from flood irrigation application methodologies which are labor intensive and less efficient to sprinkler type water applications which are less labor intensive and generally more efficient.

Over the period of the 1958 contracts, the total number of acres provided supplemental water under CCWSC's contract and full service water under EBID's contract has increased. The increase in irrigated acres may be attributed to changes in irrigation technology, general changes in farming practices and farm size, and agricultural economics.

Reclamation's 1960 *Definite Plan Report* (1960 DPR) identified 28,004 acres of valley land considered to be eligible in 1958 to receive a supplemental supply from Clark Canyon Reservoir. Of the 28,004 acres considered eligible to be part of the project, the landowners of approximately 3,156 acres elected not to join the project and instead to rely on their natural flow water rights from the Beaverhead River or other sources. This resulted in 24,848 acres of the original planned acres to be provided a supplemental supply under CCWSC's contract. Shortly before the CCWSC's first payment under their contract was due to Reclamation, it became concerned about their ability to make their first payment, so additional shares of stock in the Company were sold, bringing the total number of acres covered by subscription agreements to 25,995. The irrigated lands of CCWSC have increased from the 25,995 acres in 1965 to the approximately 33,706 acres of today. This increased acreage of CCWSC does not cause the total of the "supplemental water supply" acres developed within the Beaverhead River Basin to exceed the 34,100 acre figure contained in Senate Document No. 191.

The 1960 DPR identified the irrigated lands of EBID as 21,800 acres. Initial development of the project included 22,689 acres as less land than anticipated was needed for construction of canals, laterals, and drains making more land available for production. Since initial development, the irrigated acres have increased to approximately 28,055 acres that have been historically received irrigation water through EBID's conveyance system over the term of the contract. Of the 28,055 acres, approximately 918 acres lie outside the legally defined irrigation district boundary as approved by the district court. The 918 acres were classified by Reclamation during the initial investigations of the Unit; however, they were not included in the original irrigation district boundary. EBID proposes to have the boundary amended to include the 918 acres within the legal boundary of EBID. The remaining 27,137 acres are within the boundary of EBID. The current total acreage of EBID does not cause the total of the “full water supply” acres developed within the Beaverhead River Basin to exceed the 32,400 acre figure contained in Senate Document No. 191.

The 1958 contract with CCWSC is for a supplemental supply from conservation storage in Clark Canyon Reservoir. The shareholders of CCWSC retained their underlying natural flow water rights, most of which had been decreed by the district court. The underlying natural flow water rights of the shareholders of CCWSC are used to fulfill most of their water allotments defined in the contract. The remainder of CCWSC irrigation allotment is provided by supplemental water from Clark Canyon Reservoir. The 1958 contract with EBID is for a full supply consisting of a direct flow diversion from the Beaverhead River supplemented with storage water impounded in Clark Canyon Reservoir.

Water Rights

The water rights for the East Bench Unit, comprising the CCWSC and the EBID, are a combination of natural flow and storage rights owned by private entities, the EBID, and Reclamation. The shareholders of the CCWSC hold natural flow rights, EBID and Reclamation jointly hold the diversion right for the East Bench Canal and Reclamation holds the water right for storage in Clark Canyon Reservoir.

Reclamation filed a notice of appropriation of water and construction of a dam with the State of Montana, County of Beaverhead, on February 21, 1961. The place of intended consumptive use of the water appropriated and claimed for domestic, livestock raising, irrigation, mining, industrial, municipal and other miscellaneous purposes is generally within the Beaverhead Valley in Beaverhead and Madison Counties, Montana, in the general vicinity of Dillon, Montana.

Reclamation filed water right claims as part of the general statewide water rights adjudication process. The general statewide adjudication process is to adjudicate the water rights for pre-June 30, 1973, use. Reclamation filed a direct diversion water right from the Beaverhead for natural flow for the East Bench Canal, with a claim of 30,459 acres (Statement of Claim no. 41B 40850 00) and a claim for the impoundment of water in Clark Canyon Reservoir for use on 83,219 acres (Statement of Claim no. 41A 40854 00) in the Beaverhead River Basin. The Clark Canyon Reservoir claim identifies the place of use on both the lands of CCWSC and EBID. Until such time as the final decree is issued by the Montana Water Court, the statements of claim are considered prima facie evidence of a valid water right. The number of irrigated acres associated with Reclamation’s final adjudicated water rights may be different than the claimed amount. That process is under the jurisdiction of the state.

The shareholders of CCWSC have the responsibility to ensure their individual water rights are in compliance with the Montana Water Use Act, as amended. This includes filing claims as part of the general statewide water rights adjudication process and to ensure existing use is in compliance with state law.

Incidental Project Benefits

The primary project purposes authorized by Congress are irrigation and flood control. However, recreation, fish, and wildlife are incidental benefits provided by the Federal government. A portion of Reclamation’s annual appropriations are allocated to recreation, and fish and wildlife benefits. These funds are used to provide minimum and basic recreation facilities for public health and safety at

Reclamation's facilities where recreation is not an authorized project purpose. The Federal Water Project Recreation Act (Act of July 9, 1965, Public Law 89-72) limits recreation development at Reclamation facilities where recreation is not an authorized project purpose.

Boat ramp at Beaverhead Campground.

Contract Information

The existing water service contracts with CCWSC (Contract No. 14-06-600-3592), EBID (Contract No. 14-06-600-3593), and Reclamation each contain an article that provide them a right to renew their contracts or to convert their water service contracts to repayment contracts. This is in accordance with the Administration of Contracts under Section 9, Reclamation Project Act of 1939 Act which became law July 2, 1956 (P.L. 84-643) (1956 Act). This Act directs that the Secretary of the Interior "shall…include in any long-term contract hereafter entered into under subsection (e) with a contracting organization provision, if the organization so requests, for (1) renewal of the contract as a water service (9(e) of the 1939 Act) contract and (2) conversion of said contract, to a repayment (9(d) of the 1939 Act) contract." The right to renew and the right to convert are both subject to terms and conditions mutually agreeable to both parties.

The 1958 water service contracts with CCWSC and EBID were entered into under Section 9 (e) of the Reclamation Projects Act of 1939 (P.L. 260) (1939 Act). Section 9(e) of that Act states that "…Each such contract shall be for a period, not to exceed forty years, and at such rates as in the Secretary's judgment will produce revenues at least sufficient to cover an appropriate share of the annual operation and maintenance cost and an appropriate share of such fixed charges as the Secretary deems proper…." At the time the 1958 contracts were negotiated, an annual payment to fulfill the fixed charges as deemed proper by the Secretary was negotiated. Both CCWSC and EBID have made their annual payments to Reclamation to cover both their appropriate share of the annual operation and maintenance costs and their appropriate share of the fixed charges related to the construction of Clark Canyon Dam during the term of the existing contracts.

Clark Canyon Reservoir was constructed under the authority of the 1944 Flood Control Act, commonly referred to as the Pick-Sloan Act. The Pick-Sloan Act allowed for a portion of the construction costs for the facilities constructed as part of the Missouri River Basin Program to be reimbursed to the Federal Government through "aid to irrigation." Repayment of the costs assigned to aid to irrigation is primarily accomplished through the sale of power generated at Federal hydroelectric dams in the Missouri River Basin. A portion of the construction costs associated with Clark Canyon Dam and the East Bench Irrigation District canal conveyance system are assigned to aid to irrigation. A portion of the cost for the construction of the Clark Canyon Dam is also allocated to flood control, recreation, fish & wildlife, which are all non-reimbursable by the irrigation entities. The primary purpose of the proposed contracts is for the collection of the allocated cost to irrigation for the construction of the water supply and conveyance facilities.

The majority of the O&M costs for Clark Canyon Dam and Reservoir are allocated to irrigation and are paid by East Bench Irrigation District and Clark Canyon Water Supply Company. A portion of the O&M cost is also allocated to flood control for the benefits derived from this project purpose. An allocation of O&M cost is assigned to the incidental benefits associated with recreation and fish and wildlife. Reclamation requests annual appropriations from Congress for the portion of O&M costs allocated to flood control, recreation, and fish and wildlife benefits.

As per the terms of their contracts and consistent with the 1956 Act, both CCWSC and EBID are provided the opportunity to renew their contracts under section 1(1) of the 1956 Act or convert their contracts to repayment contracts under section 1(2) of the 1956 Act. Renewal of their contracts under Section 1(1) would be another water service contract, subject to renewal at the end of the contractual term, which can be up to 40 years. Section 1(2) of the 1956 Act allows the conversion of their existing water service contracts to repayment contracts. Repayment contracts have no term and are not subject to renewal. Both CCWSC and EBID have indicted their interest to enter into repayment contracts as specified by section 9(d) of the 1939 Act.

If repayment contracts are negotiated, both entities will be required to make 40 years of payments to repay to the federal government the negotiated amount of their allocated cost of the construction of the water supply facilities. At the end of the 40 years, they will have fulfilled their financial obligations related to the repayment of construction costs of the water supply works and the remainder of the contract will remain in effect.

Both types of contracts—repayment or water service—will require both CCWSC and EBID to pay their appropriate share of the annual O&M costs as determined appropriate by the Secretary.

Other Actions Occurring in the Beaverhead River Basin

- "Shoulder" season irrigation is irrigation that occurs before and after stored irrigation water is released from Clark Canyon Reservoir. The typical irrigation season is April 15-October 15. CCWSC irrigates during the shoulder season, but does not use stored water from Clark Canyon Reservoir and thus is not subject to Reclamation's approval or authorization. Therefore, it is not part of this Federal action, but CCWSC would like the shoulder season irrigation to be acknowledged by the proposed new contracts. The CCWSC would divert natural flow water from the Beaverhead River in priority and according to Montana water laws, ending once stored irrigation water was released from Clark Canyon Reservoir in the spring. The fall shoulder season would begin once reservoir releases were set at their winter level and the contract water users will be a part of setting that date (sometime after Labor Day). Any shoulder season irrigation by EBID would be included as part of this Federal action and will further described in Chapter 2.

- Reclamation has completed the *Final Clark Canyon Reservoir and Barretts Diversion Dam Resource Management Plan* (RMP) and EA/FONSI for the RMP. A planning document, the RMP recommends the best uses of recreation and land resources, while the EA analyzes environmental effects of these recommendations. Some baseline information from that EA has been used in this EA.

- Reclamation completed a water quality study of the reservoir in 2003, including a section of the Beaverhead River. This study was in addition to the water quality study of EBID. Findings of these studies also were used in this EA.

- Reclamation entered into a cooperative agreement with Montana State University in 2004 to initiate a study of water distribution amount the various entities withdrawing water from the Beaverhead River. In order to address the issues of water allocation, MSU identified major diversions along with major tributaries and areas of return flow. Data loggers were then installed to quantify the volume of water associated with each diversion, tributary, and area of return flow to establish a water budget for the basin. Additional data were gathered in 2005 and collection will continue in 2006, with a final report to be issued following all data collection.

- Reclamation entered into a cooperative agreement with Montana Tech in 2006 to assist with a continuing groundwater study which began in 2003. This study provides an opportunity to evaluate the groundwater system contributing to the Beaverhead River, tributaries, underlying aquifers, and area wetlands. This will evaluate the nature and extent of supplemental well irrigation in the area, and the effects of pumping on surface water, and provide a numerical modeling tool for the evaluation of additional development to make best management decisions.

- The Montana Department of Environmental Quality (DEQ) is in the process of completing the Total Maximum Daily Load (TMDL) for the Beaverhead watershed. The earliest the DEQ plans to complete the TMDL is 2008. Reclamation will provide all available data from these and other studies for inclusion in the TMDL planning and implementation phases.

- The Bureau of Land Management prepared an RMP/EIS and completed the documents in February 2006.

- The Forest Service is revising the Beaverhead-Deerlodge Forest Management Plan and preparing an EIS associated with that Federal action. These documents are currently scheduled to be completed in spring 2007.

- Irrigation use by the non-signers (irrigators who typically have senior water rights and did not sign up with CCWSC when the East Bench Unit was first established) will continue regardless of this Federal action. This continued irrigation use will be in accordance with the prior appropriation doctrine and state water law, and would be subject to water availability.

- The development of new housing subdivisions continues to occur throughout the Beaverhead Valley. The approval of wells and additional use of groundwater associated with these subdivisions will be administered through the Montana Department of Natural Resources and Conservation (DNRC).

Concerns

The concerns below were expressed by the public at scoping meetings, or by the Reclamation study team in the process of writing this EA.

- Water Supply and River Flows—flushing flows, minimum flows, return flows,
- Water Quality—sedimentation, nutrients, low river flows,
- Fisheries—arctic grayling, low river flows, low reservoir levels
- Wetlands—irrigation effects, loss,
- Wildlife—effects on species dependent on wetlands and riparian area,
- Economics—benefits and effects to agriculture, fisheries, recreation, and tourism,
- Threatened and Endangered Species—effects on sensitive species that may use the area,
- Recreation—effects on visitors' experiences.

ALTERNATIVES
CHAPTER 2

Reclamation developed several alternatives for this EA using information from the study team; public scoping meetings; technical meetings with CCWSC and EBID; and consultation with state and Federal agencies. The alternatives were required (and constrained) in part by laws and regulations, existing contracts, and physical or economical limitations. They were designed to provide stored irrigation water supply to CCWSC and EBID, meet other contractual obligations, provide opportunities for environmental and resource benefits, and ensure repayment to the Federal government for a share of the East Bench Unit's construction and O&M costs.

Reclamation examined several alternatives for this EA: a No Action Alternative, a Negotiated Alternative, a Beaverhead River 200 cfs minimum (environmental priority) Alternative, a Beaverhead River 50 cfs minimum Alternative, a Split Reservoir Alternative, two Adjusted Water Allotment Alternatives, and a No Contracts (total environmental) Alternative. Through preliminary analysis, meetings with various groups, and information from the 1st comment period; several alternatives were dropped from further analysis and are explained further in the "Alternatives Considered but Eliminated from Detailed Study" section at the end of this chapter.

Reclamation examined in detail two alternatives for this EA: the No Action Alternative and the Proposed Action/Negotiated Alternative (Reclamation's Preferred Alternative). Both alternatives examined in detail would divert roughly the same volume of water and would irrigate approximately the same number of acres. However, the Proposed Action/Negotiated Alternative contained additional components that were not included in the No Action Alternative. Many of these components were added to this alternative to protect various environmental interests in the Beaverhead Valley during times of extreme drought while continuing to supply stored irrigation water. Some of these components included minimum river releases, minimum reservoir levels, and a drought management plan. Complete discussion of both alternatives and components are discussed below.

No Action Alternative

In this alternative, Reclamation would renew existing long-term water service contracts with CCWSC and EBID for another 40 years. These renewed water service contracts would be identical to the expiring contracts, with the exception of updating minor administrative and/or legal language in the new contracts. This is consistent with the definition of No Action for contract renewal recommended by the Council on Environmental Quality (Federal Register, Vol. 54, No. 128, Thurs. July 6, 1989, pp.28477-78). The environmental effects of implementing this alternative will be analyzed in Chapter 4 and those effects will be compared to the effects of the Preferred Alternative. These contracts represent Reclamation's contractual obligations to provide a supplemental water supply to CCWSC and a full water supply to EBID according to water delivery priorities.

The renewal of the O&M transfer agreement between Reclamation and EBID for O&M of Clark Canyon Reservoir, Barretts Diversion Dam, and the irrigation delivery system would also be included as part of this alternative.

The nearly 4,350 acres around Clark Canyon Reservoir and the 38 acres at Barretts Diversion Dam would continue to be managed by Reclamation primarily for recreation and wildlife. The various recreation facilities would also continue to be managed as they have in the past, with recreation opportunities being fishing, boating, camping, and hiking.

Irrigation Demands

Stored irrigation water from the reservoir would be delivered according to the following priority system:

1. ***1st priority*** would provide supplemental irrigation water to CCWSC at their original water diversion rate of 4.0 AF/ac for 25,995 contract acres,

2. ***2nd priority*** would provide primary irrigation water to EBID at their original water diversion rate of 3.1 AF/ac for 22,689 contract acres,

3. After the 1st and 2nd priorities were filled, the ***3rd priority*** would provide additional water for irrigation based on "beneficial use" (what crops could beneficially consume) and water availability. This would be equal to 7,711 acres for CCWSC and 4,448 acres (not including 918 added acres) for EBID.

Shoulder Season

As described in the "Other Actions Occurring in the Beaverhead River Basin" of Chapter 1, "shoulder" season irrigation occurs before and after stored irrigation water is released from Clark Canyon Reservoir. CCWSC shareholders exercised their natural flow rights for shoulder season irrigation during the term of the expiring contracts. However, the CCWSC expiring contracts did not authorize the use of shoulder season irrigation water, because such authorization was not required. The No Action Alternative would continue to not authorize the use of shoulder season water.

The EBID utilized shoulder season irrigation water during the term of the expiring contracts by using the natural flow water right held jointly by Reclamation and EBID in accordance with Montana water laws. Shoulder season irrigation by EBID will be included as part of the No Action Alternative. EBID will continue to use Federal facilities to divert and convey water during both the spring and fall shoulder seasons for irrigation and to charge up the canal conveyance system.

Other Project Benefits

Indirect project benefits, such as recreation and fish and wildlife habitat would continue to be provided as part of this alternative. As indicated previously, the recreation facilities and lands around Clark Canyon Reservoir, including recreation facilities associated with Barretts Diversion Dam would continue to be operated as they have in the past. Water surface elevations and releases from the reservoir would remain similar to what has occurred under the existing water service contracts.

It should be noted that non signers also irrigate out of the Beaverhead River. Non signers are irrigators who typically have senior water rights and did not sign up with CCWSC when the East Bench Unit was first established. Their estimated 6,620 acres would not be included in this alternative as delivering water to them is not part of the Federal action. However, since non signers divert irrigation water directly from the Beaverhead River, their diversions were included as part of the hydrology model (explained later) in order to get an accurate reflection of water availability and impacts to the Beaverhead River.

Proposed Action/Negotiated Alternative (Preferred Alternative)

The Beaverhead watershed has experienced a severe drought for more than 6 years, with inflows into the reservoir about 40% of normal (U.S. Bureau of Reclamation, 2005b). Reclamation—concerned about continued economic viability of the East Bench Unit—developed this alternative in an attempt to deliver available water to all project users even during drought conditions while maintaining basic environmental health of the aquatic resources.

This alternative is Reclamation's Preferred Alternative. It would execute new long-term (40-year) water service contracts or allow CCWSC and EBID to convert to repayment contracts (no term). The new contracts would be based on a priority system similar to No Action Alternative. In addition, the Preferred Alternative would establish a Joint Board made up of representatives from Reclamation and the two contract water user groups, implement winter release guidelines, set minimum reservoir levels, implement a Drought Management Plan, establish reserve funds, establish an agreement between Reclamation and the Montana Department of Fish, Wildlife and Parks (MDFWP), and the Preferred Alternative would renew the O&M transfer agreement. The transfer agreement would be between Reclamation and the EBID for O&M of Clark Canyon Reservoir, Barretts Diversion Dam, and the East Bench Unit irrigation delivery system.

Irrigation Demands

Stored irrigation water from Clark Canyon Reservoir would be delivered according to the following priority system similar to the No Action Alternative.

1. ***1st priority*** would provide CCWSC irrigation water equal to diverting 4.0 AF/ac measured at the point of diversion for 25,995 acres (consistent with the 1st priority contract acres in the expiring contract). CCWSC would be authorized to use that volume of water to irrigate the 25,995 acres and up to 7,711 acres (formally 3rd priority acres in the expiring contract) identified for irrigation.

2. ***2nd priority*** would provide EBID irrigation water equal to diverting 3.1 AF/ac measured at the point of diversion for 22,689 acres (consistent with the 2nd priority contract acres in the expiring contract). EBID would be authorized to use that volume to irrigate the 22,689 acres and up to 4,448 acres (formally 3rd priority acres in the expiring contract) identified for irrigation. Approximately 918 acres that currently lie outside of the district's boundaries are proposed to be included in this 2nd priority. The landowners would need to petition the local district court to have these acres included within the EBID according to Montana statute. Reclamation would need to approve the inclusion before EBID could irrigate these acres.

3. ***3rd priority*** would provide irrigation water for beneficial use (what crops could beneficially consume) on the CCWSC and EBID acreage described above. The 3rd priority would only be implemented when the 1st and 2nd priority full allotments had been met and subject to availability. The increased water allotment would be determined by the Joint Board.

Beaverhead River Flows

The Joint Board would make a recommendation about winter releases from Clark Canyon Reservoir to the Contracting Officer (Area Manager – Reclamation's Montana Area Office) for concurrence. The Joint Board will utilize the best available forecasting data and will also give due consideration to applicable, credible, scientific data in making the recommendations. In addition, Table 2.1 presents a guideline to assist the Joint Board in recommending a minimum winter release. The guideline consists of the September 1 physical storage in the reservoir and the actual inflow during July-August to establish the recommend winter releases.

Table 2.1: Clark Canyon Reservoir Winter Release Guidelines

Sept. 1 Storage plus July-August Inflow (AF)	Minimum Release (cfs)
Less than 80,000	25
80,000 – 130,000	50
130,000- 160,000	100
160,000 or greater	200

The minimum release of 25 cfs from the reservoir was designed for periods of extreme drought. During the same period, irrigators would be implementing their Drought Management Plan, thereby establishing reduced allotments. Both Reclamation and the irrigators agree that a higher minimum flow could be established in the future if improvements to the water distribution systems, such as canal lining projects, were implemented. A partnership of water users, Federal, state, and private entities is anticipated in order for this to be achieved.

Reservoir Levels

The Preferred Alternative would include a target minimum pool of 60,000 AF in Clark Canyon Reservoir that would likely be achieved in most years. During severe drought years, this alternative would provide for a minimum reservoir pool of 10,000 AF for protection of aquatic resources. The Drought Management Plan would be triggered when August end-of-month (EOM) forecasts were 50,000 AF or less.

Drought Management Plan

The Drought Management Plan in the new contracts would be triggered at specific reservoir levels based on Reclamation's August EOM forecasts. In the last 74 years of record, Clark Canyon Reservoir was below 50,000 af in 18 of those 74 years. Therefore, approximately 25% of the time, the drought management plan would be triggered if similar hydraulic conditions are repeated. The Joint Board would determine before the irrigation season if August EOM forecasts were lower than predetermined reservoir level triggers. In such a situation, they would then set reduced water allotments for the upcoming irrigation season. The various reservoir triggers and water allotment reductions are shown in Table 2.2. These water allotment reductions will be measured at the individual points of diversion.

Table 2.2: Reservoir Triggers and Resultant Water Allotments

August EOM Forecasted Levels	CCWSC Allotments	EBID Allotments
50,000-40,000 AF storage	3.5 AF/ac	2.7 AF/ac
40,000-30,000 AF storage	3.25 AF/ac	2.25 AF/ac
30,000-10,000 AF storage	3.0 AF/ac	2.0 AF/ac
10,000 AF minimum storage	3.0 AF/ac	<2.0 AF/ac or bank*

*bank is defined as carrying over irrigation water saved from one irrigation season to the next irrigation season

In the event of unforeseen circumstances, the Joint Board would have authority to take emergency measures to meet its drought management objectives.

Shoulder Season

As described in the "Other Actions Occurring in the Beaverhead River Basin" of Chapter 1, "shoulder" season irrigation is irrigation that occurs before and after stored irrigation water is released from Clark Canyon Reservoir. CCWSC will utilize shoulder season water as part of their natural flow water rights. CCWSC shoulder season water use will not be part of this preferred alternative as stored water will not be used and no Federal action is needed for CCWSC to exercise their natural flow water right. The EBID will utilize shoulder season irrigation as part of this Preferred Alternative because EBID will use the natural flow water right that is jointly held by Reclamation and EBID and use Federal conveyance facilities. The EBID will divert water during both the spring and fall shoulder seasons for irrigation and to charge up the canal conveyance system through exercise of the natural flow right in accordance with Montana water laws.

Reserve Funds

Both CCWSC and EBID would be required to establish reserve funds that would provide funding to cover emergencies, such as a canal breach repair, and to fund future project enhancements and modernization. Future project enhancements and modernization could cover such items that increased canal efficiencies and provided tools to manage the available water supply more effectively.

Environmental Measures

Reclamation have agreed to the following measures as part of this Preferred Alternative.

- Reclamation and the MDFWP have developed a partnership agreement (a copy is in the Appendix) to work cooperatively on issues; such as fisheries, water quality, and flow alteration that affect the Beaverhead River basin. This agreement will foster communication between the two agencies. Through this cooperation and coordination; Reclamation will also encourage other interested entities to participate—including (but are not limited to) CCWSC, EBID, the Beaverhead River Watershed Committee, special interest groups, and any others that would like to contribute to the well being of the Beaverhead River.

- Continue data collection through MSU-Bozeman and Montana Tech to fill data gaps in existing water quality information. Additional studies would be initiated as needed.

- Work cooperatively with MDEQ during the TMDL planning and implementation process to work toward improving water quality on a watershed scale.

- Work cooperatively with the Beaverhead Watershed Group and other interested parties to collaboratively work toward improved water quality conditions within the watershed.

Other Project Benefits

Indirect project benefits, such as recreation and fish and wildlife habitat, would continue to be provided as part of this alternative. As indicated previously, the recreation facilities and lands around Clark Canyon Reservoir, including recreation facilities associated with Barretts Diversion Dam, would continue to be operated as they have in the past.

As with the No Action Alternative, non signers and their estimated 6,620 acres would not be included as part of this alternative. As explained in the No Action Alternative, non signer diversions were included in the hydrology model.

Alternatives Considered but Eliminated from Further Study

Six alternatives were considered but eliminated during the study. The following paragraphs explain the alternatives and why they were not carried forward for further analysis.

Beaverhead River Alternative with a 200 cfs Minimum Release from Clark Canyon Reservoir

This alternative would have provided stored water in Clark Canyon Reservoir to be primarily used for environmental considerations in the Beaverhead River. As part of this alternative, the Beaverhead River would have minimum releases of 200 cfs (as recommended by MDFWP) from Clark Canyon Reservoir, would try to provide full irrigation demands, and the reservoir would have had a minimum storage of 60,000 AF as recommended by MDFWP. In this alternative, no stored water would have been released for irrigation if the minimum flows set for the Beaverhead River could not be met. Under this event, it would have been likely that storage levels in the reservoir would fall below the set minimum level in order to satisfy the minimum 200 cfs in-stream flow.

The renewed contracts with this alternative would have been the same priority system as the No Action Alternative; however, the irrigation season would likely be shorter than the typical irrigation season of April 15-October 15. Irrigation deliveries from stored water would have been reduced at any time during the irrigation season if the reservoir levels were forecasted to be too low to provide water for the 200 cfs minimum in-stream flow requirement. Once stored water releases were discontinued for the irrigation season, the minimum release of 200 cfs at the outlet works would be maintained in the Beaverhead River. As indicated earlier, the 200 cfs minimum releases would have taken priority over the minimum 60,000 AF reservoir levels; that is, there would likely have been times when the reservoir dropped below 60,000 AF in order to satisfy the 200 cfs minimum releases. Irrigation deliveries would also have taken priority over the 60,000 AF minimum reservoir levels. This alternative would not have included a Drought Management Plan associated with it.

This alternative would have provided more flows in the Beaverhead River while trying to achieve a minimum storage pool that would have provided habitat for a diversity of fish and other aquatic organisms. Increased flows in the Beaverhead River would have provided a better riparian corridor and adequate water for brown trout spawning. Reservoir populations of trout, burbot, and whitefish, the primary game fishes, would have been stable at the minimum reservoir storage level and any level above that would have created optimal conditions; however, levels below that would have resulted in decreased fish survival.

Reclamation conducted hydrology models with 200 cfs as the minimum in stream flow releases, while trying to deliver irrigation water. The results of the model indicated that storage levels in Clark Canyon Reservoir would have been at 60,000 AF the majority of the time (50th percentile – median) and would have been 60,000 AF for 2 months out of the year (80th percentile) even in wet years (Figure 2.1). Reservoir EOM contents would have been 10,000 AF 28% of the time. The model also indicated that by maintaining the 200 cfs in-stream minimum: stored irrigation water deliveries for CCWSC would have been short 20% of the time for 1st priority acres and 65% of the time for 3rd priority acres, and; stored irrigation water for EBID would have been short 41% of the time for 2nd priority acres and 66% of the time for 3rd priority acres (Figure 2.2). EBID would also have received no water 28% of the time, causing a severe financial hardship on the district and its members.

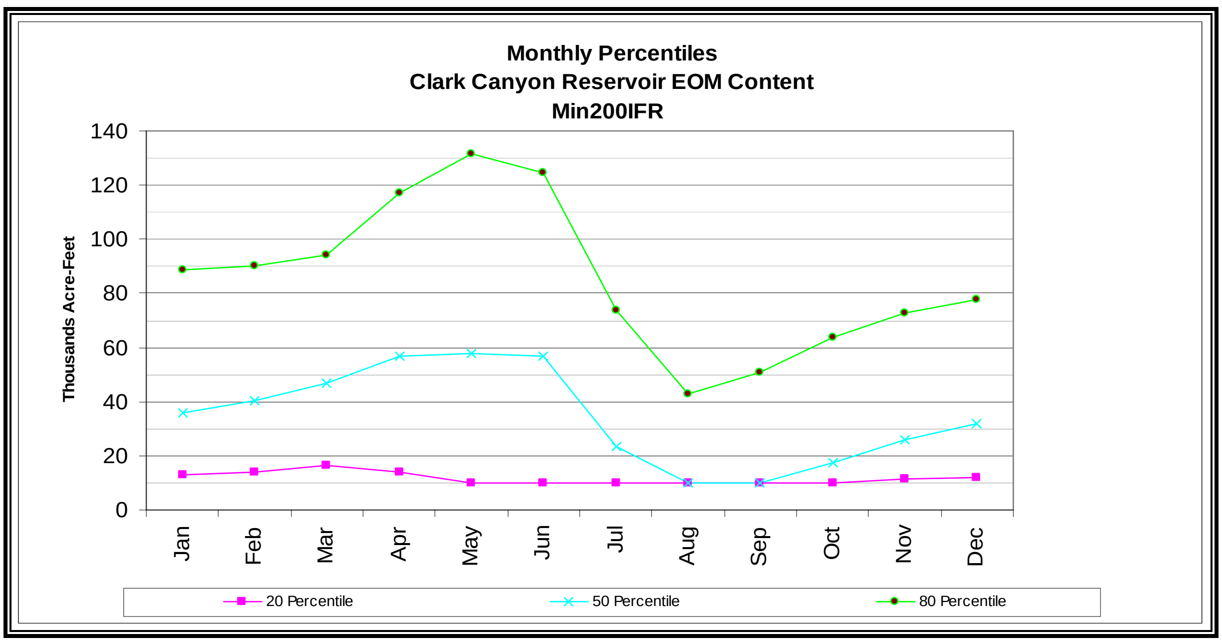


Figure 2.1: Reservoir EOM Levels with Minimum 200 cfs In-stream Flows

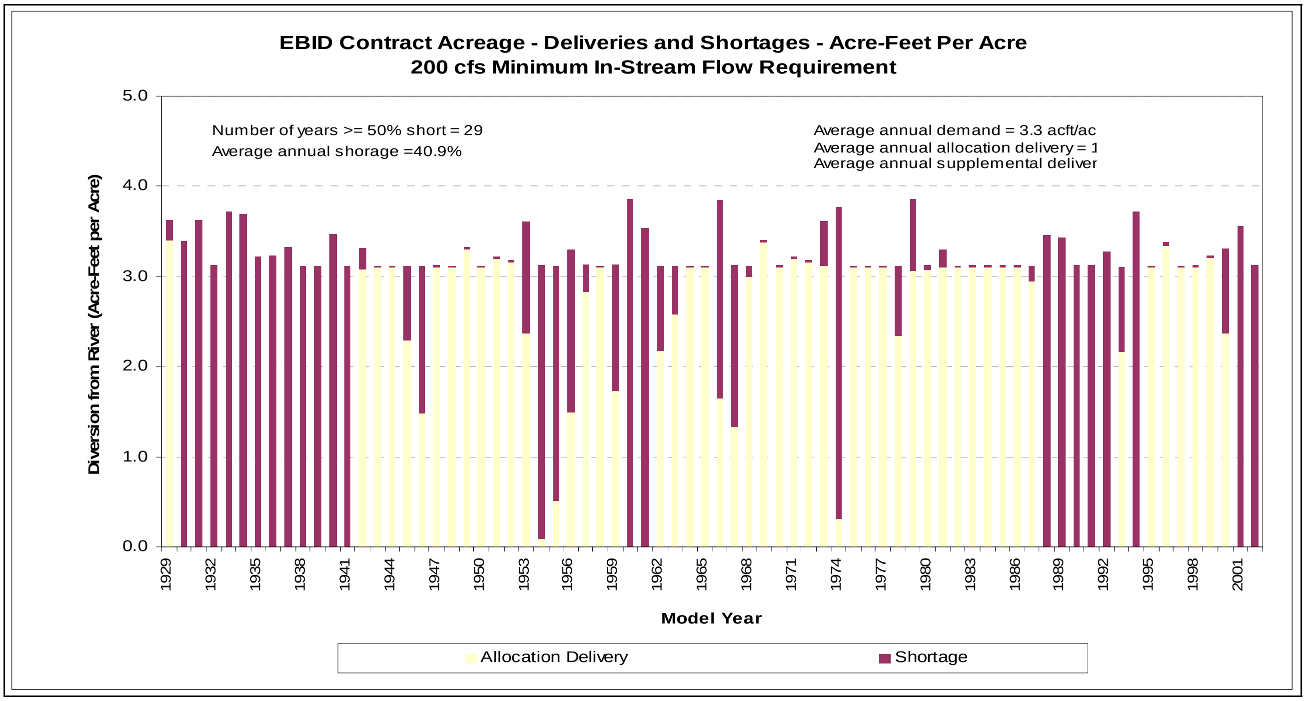


Figure 2.2: EBID Deliveries and Shortages (AF/acre) with 200 cfs Minimum

This alternative was eliminated primarily because of the shortage of water deliveries for irrigation and the severe financial impacts to the contract water users. This alternative would have jeopardized the financial viability of the East Bench Unit. Other reasons for eliminating this alternative included the decreased reservoir levels and the severe financial impacts to the recreation/outfitting community and because it would not meet the purpose and need of the Federal action. In addition, the Reclamation Act of 1956 requires Reclamation to provide water users holding contracts a first right of renewal to a stated share of a project's available water supply. Lastly, this alternative would not have ensured the economic viability of the East Bench Unit and repayment to the Federal government would not be achieved.

Environmental Alternative with a 50 cfs Minimum Release from Clark Canyon Reservoir and the Drought Management Plan for Reduced Irrigation Allotments

This alternative would have been similar to the Preferred Alternative with one key exception: instead of a bottom line minimum release of 25 cfs from the reservoir during periods of extreme drought, the minimum release would be 50 cfs. The same number of acres would be irrigated with similar water allotment priorities as the Preferred Alternative.

This alternative would have increased the frequency that EBID would not have a sufficient water allotment to divert water into their irrigation main canal from 5% to 11% of the time. Figure 2.3 demonstrates the number of years EBID would have shortages if a 50 cfs minimum is maintained.

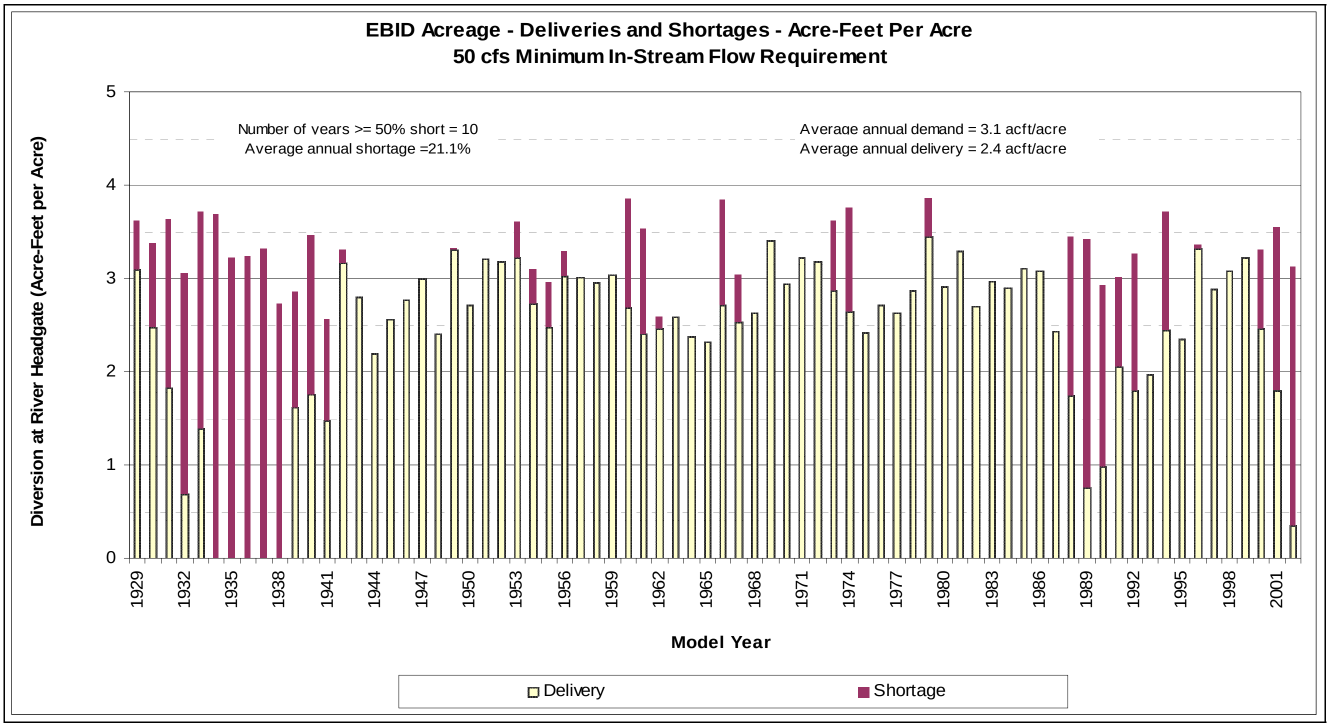


Figure 2.3: EBID Deliveries and Shortages (AF/acre) with 50 cfs Minimum

In addition, there would have been 5 successive years where EBID could not divert any water into their canal for irrigation. Five successive years without irrigation water would likely have bankrupted many of the individual producers and jeopardized the financial viability of EBID.

The impacts to the CCWSC would have been less severe. The 50 cfs minimum flow would have increased the time they would have been under reduced allotments by invoking the Drought Management Plan by 2.5%.

In addition to impacts to the irrigation community, there would also have been impacts to reservoir storage, which could impact both the aquatic community and the recreating public. The 50 cfs minimum release would have increased the number of months the reservoir would reach the 10,000 AF minimum storage content, from 1.6% in the Preferred Alternative to 2.4% of the time in this alternative during the period of study. The 50 cfs minimum release would also have increased the number of months the reservoir would be below the 60,000 AF minimum storage content recommend by MDFWP from 19.9% in the Preferred Alternative to 25.2% of the time in this alternative during the period of study (Figure 2.4).

The main reason this alternative was eliminated was due to the projected impacts to EBID. This alternative would have jeopardized the financial viability of the Unit. Other reasons included increased impacts to Clark Canyon Reservoir aquatic resources and recreation.

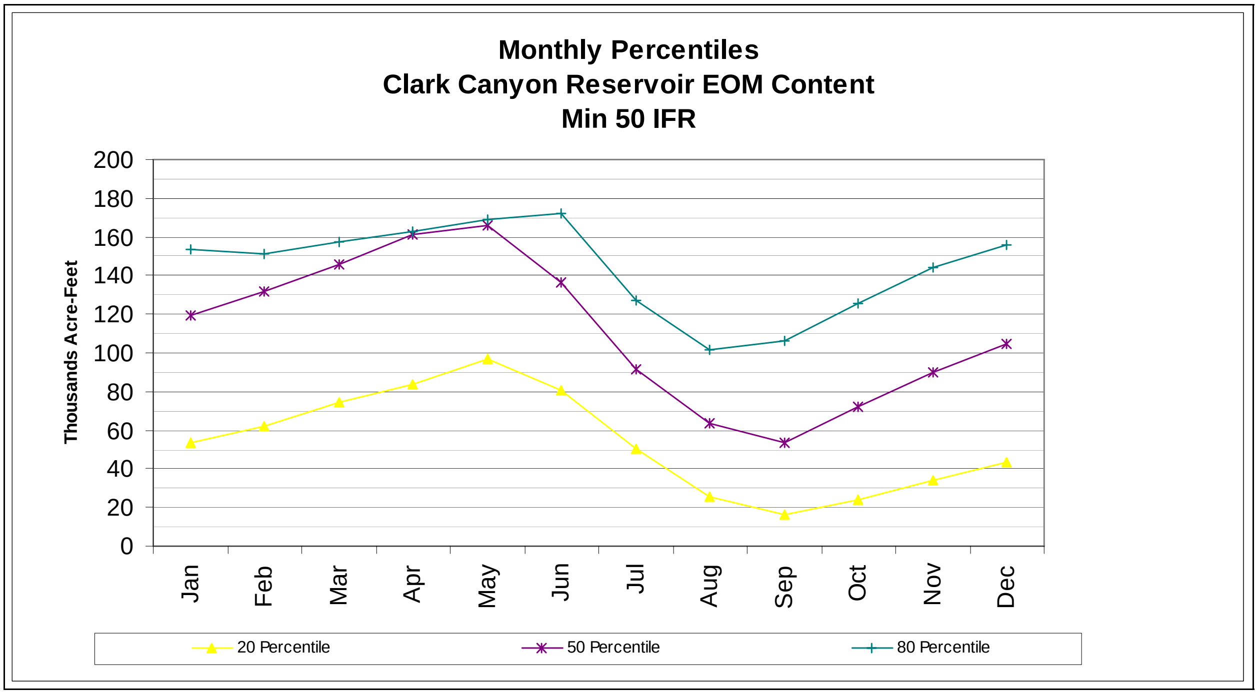


Figure 2.4: Reservoir EOM Levels with Minimum 50 cfs In-stream Flows

Split Reservoir Alternative

This alternative would have split the reservoir pool allocated to irrigation between CCWSC and EBID. Once senior water rights/demands were met according to Montana water laws, monthly reservoir inflows would have been split into separate reservoir storage accounts as explained below.

CCWSC

CCWSC would have received between 36-69% of reservoir inflow, the final percentage to be determined during contract negotiation. CCWSC would then have been responsible for allocating water from their reservoir storage to provide supplemental irrigation for beneficial use by irrigators. They would have been limited to irrigation of 33,706 acres.

EBID

EBID would have received between 31-64% of reservoir inflows, the final percentage to be determined during contract negotiation. Like CCWSC, they would have been responsible for allocating water from their reservoir storage to provide full irrigation for beneficial use by irrigators. EBID would have been limited to irrigation of 28,055 acres. Legal changes would have been necessary before EBID could irrigate the 918 acres currently outside district boundaries.

This alternative would have executed new 40-year water service contracts or allowed CCWSC and EBID to switch to repayment contracts. Other elements of this alternative would have been similar to the No Action Alternative. In addition, this alternative did not include a Drought Management Plan, the establishment of a Joint Board, or any mitigation measures.

This alternative was not feasible or agreeable to the CCWSC board or membership because it potentially restricted their 4.0 af/acre allotment in more years than the current and proposed priority system. Due to the disagreement of implementing this alternative, there was a high likelihood that a new contract between Reclamation and CCWSC would not be negotiated. Therefore, this alternative was eliminated from further analysis because it did not meet the purpose and need of the Federal action and would have jeopardized the financial viability of the project.

Adjusted Water Allotment for 1st and 2nd Priority Acres Alternative

Similar to the No Action Alternative, this alternative too was based on a water delivery priority system. However, it would have reduced water allotments to both CCWSC and EBID based on the current 1st and 2nd priority acres. The allotment reduction would have ranged from 3.0-3.5 AF/ac for CCWSC's 1st priority acres, and from 2.3- 2.7 AF/ac for EBID's 2nd priority acres. Once those full allotments were met, additional water could have been applied to 3rd priority acres in a stair-step approach between CCWSC and EBID. It would have executed new 40-year water service contracts or allowed CCWSC and EBID to switch to repayment contracts. Other project benefits would have been as described for the No Action Alternative. In addition, this alternative did not include a Drought Management Plan, the establishment of a Joint Board, or any mitigation measures.

This alternative was not feasible or agreeable to the two contract water users because it restricted their allotted share on the 1st and 2nd priority acres. Due to the allotment reduction with implementing this alternative, there was a high likelihood that a new contract between Reclamation and CCWSC would not be negotiated. Therefore, this alternative was eliminated from further analysis because it did not meet the purpose and need of the Federal action and would have jeopardized the financial viability of the project.

Adjusted Water Allotment for All Acres Alternative

This alternative was also based on a priority system similar to No Action Alternative. It would have reduced the water allotment to both CCWSC and EBID for all 1st, 2nd, and 3rd priority acres. The reduction would have ranged from 2.0-3.0 AF/ac for all CCWSC's 1st and 3rd priority acres and from 1.55-2.33 AF/ac for all EBID's 2nd priority acres. Once those full allotments were met, additional water could have been applied to all acres in a stair-step approach between the CCWSC and EBID. It would have executed new 40-year water service contracts or allowed CCWSC and EBID to switch to repayment contracts. Other aspects of this alternative would have been as described for the No Action Alternative. In addition, this alternative did not include a Drought Management Plan, the establishment of a Joint Board, or any mitigation measures.

This alternative was not feasible or agreeable to the two contract water users because it restricted their allotted share on the 1st, 2nd, and 3rd priority acres. Due to the allotment reduction with implementing this alternative, there was a high likelihood that a new contract between Reclamation and CCWSC would not be negotiated. Therefore, this alternative was eliminated from further analysis because it did not meet the purpose and need of the Federal action and would have jeopardized the financial viability of the project.

No Contracts Alternative

This alternative would not have renewed the existing water service contracts. The stored water would not be used for irrigated agriculture. The reservoir would remain at a higher level because consumptive use of the stored water would decrease. Water rights held jointly by EBID and Reclamation would not be exercised for irrigation purposes. The majority of water would be passed through the reservoir and go down the river and used to support aquatic habitat, recreation, and other beneficial uses. It was eliminated because it would not have met the purpose and need of the Federal action. This alternative would not ensure the economic viability of the East Bench Unit and repayment to the Federal government would not be achieved.

Summary of Alternatives

Table 2.3 summarizes environmental effects of the two alternatives detailed in this EA, the No Action Alternative and the Preferred Alternative.

Table 2.3: Effects of the Alternatives

Description	No Action Alternative	Preferred Alternative
Federal Action	Water would continue to be delivered by these priorities: ***1st***—CCWSC would receive a supplemental irrigation water supply of 4.0 AF/ac diverted for 25,995 acres; ***2nd***—EBID would receive a primary irrigation water supply of 3.1 AF/ac diverted for 22,689 acres; ***3rd***—After 1st and 2nd priorities filled, water would be supplied to 7,711 ac for CCWSC and 4,448 ac for EBID.	Water would continue to be delivered by priorities: ***1st***—CCWSC would receive a supplemental irrigation water supply of 4.0 AF/ac diverted for 25,995 acres, to be used on the entire 33,706 acres; ***2nd***—EBID would receive a primary irrigation water supply of 3.1 AF/ac diverted for 22,689 acres, to be used on the entire 28,055 acres (including 918 irrigated acres currently outside EBID's boundary); ***3rd***—After 1st and 2nd priorities filled, additional irrigation water for the 1st and 2nd priority acres would be supplied.
	No Clark Canyon Reservoir winter release guidelines are included in this alternative.	Clark Canyon Reservoir winter release guidelines would be based on storage plus July-August inflows.
	No contractual minimum reservoir levels.	Target minimum pool of 60,000 AF, bottom-line pool of 10,000 AF in reservoir.
	No contractual minimum in-stream flows.	Target minimum in-stream flows in Beaverhead River of 200 cfs at the dam, bottom-line in-stream flows of 25 cfs.
	Water elevations and releases would remain as at present.	A Drought Management Plan would require water delivery reductions if forecasted August reservoir EOM contents were 50,000 AF or below.
	Shoulder season water in priority would be used by EBID.	Shoulder season water in priority would be used by EBID.

Description	No Action Alternative	Preferred Alternative
Federal Action (con't.)	No environmental measures are included with this alternative.	Mitigation measures including development of partnerships and agreements with MDFWP, MSU-Bozeman, MT Tech, MDEQ, and the Beaverhead Watershed Group.
Water Supply	Reservoir storage could be drawn down to 10,000 AF to supply irrigation water; March EOM reservoir contents would average 147,600 AF and average 58,600 AF during droughts periods; Return flows would average 87,900 AF in the Beaverhead near Twin Bridges during droughts.	Reservoir storage would have a target minimum pool of 60,000 AF, but could be drawn down to 10,000 AF during drought years to supply irrigation water; March EOM reservoir contents would average 151,000 AF and average 66,500 AF during drought periods because of delivery reductions; Return flows would average 86,200 AF in the Beaverhead near Twin Bridges during droughts due to delivery reductions.
Water Quality	Water quality trends and conditions in Clark Canyon Reservoir, the Beaverhead River, and the Jefferson River would remain similar to conditions present during the previous contract period. High nitrogen levels in Spring and Stone creeks would remain high as they have in the past.	Effects to water quality would be similar to that described in the No Action Alternative.
Fisheries	September EOM contents, reservoir fisheries would be “optimal” or “good” 46% of the time, “fair” or “declining” 54% of the time.	Based on the September EOM contents, reservoir fisheries would be “optimal” or “good” 50% of the time, “fair” or “declining” 50% of the time.

Description	No Action Alternative	Preferred Alternative
Fisheries (con't.)	The upper Beaverhead River would be "optimal" or "good" 33% of the time, "fair" or "declining" 67% of the time, based on October-March average flows. The lower Beaverhead River dropped below the target levels of 200 cfs in 48 of the 74 years modeled.	The upper Beaverhead River would be "optimal" or "good" 32% of the time, "fair" or "declining" 68% of the time, based on October-March average flows. The lower Beaverhead River dropped below the target levels of 200 cfs in 47 of the 74 years modeled.
Wetlands	Wetlands associated with the irrigated acreage along canals, laterals, drains, and areas of return flow would continue to receive similar volumes of water as present since water deliveries and management would be unchanged.	Effects to wetlands would be similar to what was described in the No Action Alternative.
Wildlife	Since water deliveries would remain similar to what is presently being delivered; there would be no effects to wildlife in this alternative.	The effects to wildlife would be negligible under this alternative, very similar to the effects described for the No Action Alternative.
Threatened and Endangered Species	There would be no effect to the five threatened species found within the action area.	There would be no effect to the five threatened species found within the action area.
Social and Economic Conditions	CCWSC would receive an average of 1.45 AF/ac delivered to the crop root zone for all of its shareholder's irrigated land. EBID would receive an average of 1.04 AF/ac delivered to the crop root zone for all of the District's irrigated land.	CCWSC would receive an average of 1.36 AF/ac delivered to the crop root zone for all of its shareholder's irrigated land. EBID would receive an average of 1.05 AF/ac delivered to the crop root zone for all of the District's irrigated land.
Recreation	Clark Canyon Reservoir would be operated similar to present conditions, so recreation at both the reservoir and at Barretts Diversion Dam would not be affected in this alternative.	The effects to recreation would be similar to the effects of the No Action Alternative.

Description	No Action Alternative	Preferred Alternative
Recreation (con't.)	The management of the 8 campgrounds, 6 day-use areas, and the marina at Clark Canyon Reservoir and Barretts Diversion Dam would remain as it has in the past.	
Other Effects	Water conservation; cultural resources; noxious weeds; and prime and unique farmlands would be similar to present conditions in this alternative.	Effects to water conservation; cultural resources; noxious weeds; and prime and unique farmlands would be similar to those described for No Action.

A F F E C T E D   E N V I R O N M E N T
CHAPTER 3

Chapter 3 describes the present condition of the environment of the Clark Canyon area that could be affected by the No Action and Preferred Alternatives. Effects of the alternatives are discussed in the next chapter.

Water Supply

The Beaverhead River joins the Big Hole and Ruby rivers near Twin Bridges to form the Jefferson River. Major tributaries of the Beaverhead include Grasshopper Creek, Blacktail Deer Creek, and Rattlesnake Creek. In all, the Beaverhead drains 3,619 square miles and had a 1935-2004 average flow at the mouth of 293,600 AF. Average annual flow for 1935-1963, before Clark Canyon Dam, was 281,600 AF. Average annual flow for 1964-2003 was 302,100 AF.

Clark Canyon Reservoir is the major reservoir on the Beaverhead River. It serves as the headwaters source of the Beaverhead, receiving inflows from the Red Rock River and Horse Prairie Creek. Storage allocations are listed in Table 3.1.

Table 3.1: Clark Canyon Storage Allocations

Allocation Pool	Top of Pool Elevation (feet msl)	Capacity (AF)
Dead Pool	5455	4
Inactive Pool	5470.6	1,057
Active Conservation	5535.7	123,099
Joint Use	5546.1	50,207
Replacement	5556.5	56,455[1]
Exclusive Flood Control	5560.4	79,075

[1] Replacement storage is a part of the Exclusive Flood Pool

Lima Reservoir, a state-owned structure on Red Rock River near Lima, is a major storage facility that influences inflow to Clark Canyon Reservoir. It was originally constructed in 1890 and most recently rehabilitated in 1992. Its primary purpose is to supply irrigation water to the Red Rock Water Users Association. The reservoir has a storage capacity of 75,180 AF at elevation 6581.3 feet msl.

Water Quality

Water quality in the Beaverhead River and Jefferson River basins is affected by many factors, including development of Clark Canyon Reservoir which altered the natural flows of the river. Other factors include:

- Mining
- Agriculture
- Silviculture

- Highway, road and bridge construction and maintenance
- Domestic wastewater lagoons
- Unpaved road runoff
- Land development and urbanization

The Beaverhead River flows from the reservoir to its confluence with the Big Hole River, forming the Jefferson River, approximately 71 miles downstream. The watershed is principally agricultural with livestock and forage production being the dominant land uses. Since water quality in the Beaverhead varies, the river has been divided into the following three reaches for this EA, as well as the Jefferson River:

Clark Canyon Reservoir and Tributaries

Clark Canyon Reservoir is at the confluence of Horse Prairie Creek with the Red Rock River (Location Map). Water from the reservoir is released into the Beaverhead River. The total drainage area of the reservoir is 2,260 square miles, with the two principal inflows being the Red Rock River and Horse Prairie Creek. The Red Rock River drains 1,580 square miles from primarily igneous and sedimentary mountains, while Horse Prairie drains 680 square miles. Principal land use in the drainages is agriculture, and there are many irrigation diversions.

Reclamation sampled water quality in 2001-2003 at five sites in the reservoir—including both sources of inflows and the tailrace (U.S. Bureau of Reclamation, 2003a). The sites are listed in Figure 3.1. Physical limnology, plankton analysis, nutrients, metals, organics, and hydro-acoustic fisheries data were collected. Water column profiles recorded from surface to bottom for temperature, dissolved oxygen, specific conductance, and pH. Zero to five meter (m) samples was collected for chlorophyll analysis. Integrated samples of phytoplankton (0-5 m) and zooplankton (0-15m) were collected at each reservoir site to identify species and density. Nutrient grab samples were collected from the top and bottom of the lake and analyzed for ortho-phosphate, nitrate, ammonia, and nitrogen.

Quality is affected by several factors, including tributary input, reservoir water levels, and contributing factors from land uses surrounding the lake. Most inflow to the reservoir is from Red Rock River and the water chemistry of the reservoir reflects this fact. Inflow from Horse Prairie Creek was often immeasurable due to upstream agricultural diversions.

Tributary Total Maximum Daily Load Status

The Red Rock River from Lima Dam to Clark Canyon reservoir is on Montana's 303(d) list (Montana Department of Environmental Quality (MDEQ), 2004) of impaired water bodies. Bank erosion, dewatering, fish habitat degradation, flow alteration, lead, zinc, metals, habitat alterations, and siltation are probable causes for concern about this reach's ability to support aquatic life and cold water fisheries, and to supply drinking water. Probable sources are agriculture, crop-related, grazing related, resource extraction, abandoned mining, habitat modification, and removal of riparian vegetation.

Figure 3.1: Map showing inflow, tailrace, and reservoir sampling locations (CC1-5).

Horse Prairie Creek from the headwaters to the reservoir is also listed as not supporting aquatic life and cold water fishery, and a drinking water supply. Probable causes are dewatering, flow alteration, and metals. Probable sources are crop-related and abandoned mining.

Beaverhead River (Clark Canyon to Barretts Diversion)

The first comprehensive water quality study of the basin was done to study effects of the reservoir on the Beaverhead (Smith, 1973). This study compared flows in the Beaverhead pre- and post-impoundment. Downstream of the reservoir, the river has higher flows in May-August compared to pre-impoundment conditions. This fact is also borne out when comparing reservoir inflows and discharges. Later summer months tend to have higher discharge than inflow due to irrigation demands, whereas during spring runoff and early summer, inflows generally exceed discharge. Similarly reservoir operations have had the effect of limiting daily temperature fluctuations for several miles downstream of the reservoir.

Data collected in 2001-2003 compared to that collected in 1973 indicated the overall reservoir conditions have changed little over the 30-year period. Data from the tailrace closely reflected the deep water pool in the reservoir, with the exception of dissolved oxygen. Dissolved oxygen levels in the tailrace were at higher levels than indicated by reservoir sampling due to substantial mixing in the outflow zone bringing dissolved oxygen levels to near saturation and within accepted levels.

According to Montana's 303(d) list (MDEQ, 2004), the Beaverhead River between Clark Canyon Dam and Grasshopper Creek is listed as not supporting aquatic life and cold water fishery, and a drinking water supply. Probable causes are bank erosion, dewatering, flow alteration, lead, metals, and habitat alterations. Probable sources are agriculture and abandoned mining.

Beaverhead River (Barretts Diversion to Confluence)

Barretts Diversion dam diverts water into the EBID canal, while the CCWSC has many diversion points directly from the Beaverhead River. A system of drains and wasteways conveys excess water from irrigated lands back to the Beaverhead River.

Reclamation sampled water quality within EBID (Figure 3.2) and the Beaverhead River in 2002-2003 (U.S. Bureau of Reclamation, 2003b). Six sites were sampled, three on the river affected by EBID (Barretts Diversion, Anderson Lane Bridge, and Geim Bridge) and three on return flow areas within the EBID (Stone Creek, Spring Creek, and the wasteway at the end of the East Bench Canal). These parameters were sampled (data are shown in Methods of Analysis):

- discharge,
- temperature,
- pH,
- conductivity,
- dissolved oxygen,
- total Kjehdahl nitrogen,
- total organic carbon,
- nitrate-nitrogen,
- ammonia-nitrogen,
- total phosphorous,
- ortho-phosphorous,
- major anions and cations,
- a quantitative ICP scan for trace metals, and
- herbicides, pesticides, and semi-volatiles.

Figure 3.2: Map showing sampling locations (in tan) for EBID.

In general, the study showed dissolved oxygen (milligrams/liter – mg/L), total dissolved solids (mg/L), temperature (degrees centigrade – ^{o}C), and conductivity (micromho/centimeter – µmhos) increase moving from Barretts Diversion Dam down the Beaverhead River. Most samples for ions and trace metals were below limits of detection. Nitrogen samples in return flows (sampled at Spring and Stone Creeks) were relatively high. Nitrogen levels in Spring and Stone Creeks were higher than expected and contribute to an increase in nitrogen in the Beaverhead River as water moves through the system (Table 3.2) Data results from the study (U.S. Bureau of Reclamation, 2003b) are included in Methods of Analysis.

According to Montana's 303(d) list (MDEQ, 2004), the 63-mile stretch of the Beaverhead from Grasshopper Creek to the mouth is listed as not supporting the beneficial uses of aquatic life, cold water fishery, and primary contact. Probable causes are bank erosion, dewatering, fish habitat degradation, flow alteration, mercury, metals, habitat alterations, and siltation. Probable sources are crop-related, grazing-related, land development, habitat modification, removal of riparian vegetation, and abandoned mines.

Table 3.2: Nitrogen Levels in the Beaverhead River

	Minimum	Maximum	Average	Notes
Barretts Diversion	0.00	0.00	0.00	Uppermost Beaverhead site. All samples below detection.
Anderson Lane	0.14	0.72	0.39	Middle Beaverhead Site. 6 samples above detection.
Stone Creek	2.68	7.27	4.78	Drains EBID lands. 8 samples above detection.
Spring Creek	0.50	2.91	1.41	Drains EBID lands. 8 sites above detection.
Giem Bridge	0.12	0.67	0.40	Lower Beaverhead Site. 8 samples above detection.
Terminal Wasteway	0.00	0.00	0.00	Returns unused water to river. All samples below detection.

Jefferson River (headwaters to mouth)

The Jefferson River is formed near Twin Bridges by the convergence of the Beaverhead and Big Hole Rivers. According to Montana's 303(d) list (MDEQ, 2004), the 83.6 miles stretch of river is listed as not supporting the beneficial uses of aquatic life support, cold water fishery, and drinking water supply and only partially supporting primary contact and industrial uses. Probable causes are dewatering, fish habitat degredation, flow alteration, lead, metals, other habitat alterations, siltation, suspended solids, and thermal modifications. Probable sources are agriculture, crop-related sources, resource extraction, abandoned mining, hydromodification, dam construction, flow regulation/modification, habitat modification, removal of riparian vegetation, and bank/shoreline modification/destabilization.

Ongoing Water Quality Studies and Other Considerations

Reclamation entered into a cooperative agreement with Montana State University beginning in 2004 to initiate a study of water distribution among the various entities withdrawing water from the Beaverhead River. In order to address the issues of water allocation, MSU identified major diversions from the river, identified major tributaries, and return flows. Data loggers were then installed to quantify the volume of water associated with each diversion, tributary, and area of return flow to establish a water budget for the basin. Additional data were gathered in 2005 and will be gathered in 2006, with a final report being issued at that time.

Reclamation entered into a cooperative agreement with Montana Tech in 2006 to assist with the finalization of an ongoing groundwater study which began in 2003. This study provides an opportunity to evaluate the groundwater system contributing to the Beaverhead River, inflowing tributaries, underlying aquifers, and area wetlands with little influence of surface water flowing in the East Bench Canal. This will allow evaluation of the nature and extent of recent supplemental well irrigation in the area, evaluation of the effects of pumping on the surface water, and will provide a numerical modeling tool for the evaluation of additional development which will provide opportunities to make the best management decisions.

MDEQ is in the process of completing the Total Maximum Daily Load for the Beaverhead River watershed. The earliest the MDEQ plans to complete the total maximum daily load (TMDL) is 2008. Reclamation will provide all available data from the above studies to MDEQ for inclusion into the TMDL planning and implementation phases.

Fisheries

Clark Canyon Reservoir, the Beaverhead River, and the Jefferson River provide fishery habitat for the native and introduced fish listed in Table 3.3. Fisheries in the reservoir and rivers are managed by MDFWP. Other creeks, streams, and rivers near the area—Red Rock River, Horse Prairie Creek, Grasshopper Creek, and Blacktail Deer Creek—would not be affected by the alternatives.

Clark Canyon Reservoir

The reservoir provides a diversity of habitat, with the lake environment and the two streams flowing into it. Heavy fishing pressure occurs on the reservoir, likely due to trout populations, unique species composition, easy accessibility by vehicle, and boat launch facilities.

The reservoir provides fisheries for introduced rainbow and brown trout, as well as native burbot, and mountain whitefish (Table 3.3). Westslope cutthroat trout and brook trout have also been found in the reservoir. Non-game species include white sucker, longnose sucker, common carp, and redside shiner. Hatchery rainbow trout are added annually, while the other species are wild and self-sustaining.

Rainbow stocking is generally done in early June to take advantage of a favorable thermal regime and the growth phase of the cladoceran zooplankton community. In the past, young-of-year fish were stocked, but management has shifted in recent years to stocking over-wintered yearling fish because they have a distinct survival advantage during stressful low water conditions (Oswald, 2004).

Fish populations and conditions in general depend on storage and surface area of the reservoir. Trout depend on adequate production of aquatic organisms to survive and grow. Oswald (1993) linked poor (declining) rainbow trout stocking survival and poor (declining) rainbow and brown trout condition factors to low reservoir surface acreage. Fisheries typically remain healthy in years where storage has remained over 60,000 AF at the end of the irrigation season, with optimum fishery conditions existing with pools over 100,000 AF. The threshold of 60,000 AF results in about 3,000 surface acres of lake available for primary production and is the suggested minimum pool for healthy fisheries by Oswald (1993) and Oswald (2005). Surface acreage drops as lake content decreases below 60,000 AF. Survival and growth of stocked and wild fish typically decline in years where storage drops below this level.

The reservoir Eagle Lake rainbow trout population became an effective wild brood source of fertilized eggs for rearing as over-wintered yearlings in 1995. Adult fish make spawning runs up Red Rock River and have been monitored by electro-fishing since 1986 (Oswald, 2004). Eggs are collected during monitoring, taken to a hatchery, reared, and planted in the reservoir and other locations. Since the program began, Clark Canyon has provided from 300,000-500,000 fertilized eggs annually (Oswald, 2002).

Table 3.3: Fish Species in the Reservoir and Rivers

Common Name	Scientific Name	Native or Introduced	Reservoir	Beaver -head	Jeffer- son
Rainbow trout	*Oncorhynchus mykiss*	I	X	X	X
Brown trout	*Salmo trutta*	I	X	X	X
Burbot	*Lota lota*	N	X	X	X
Mountain whitefish	*Prosopium williamsoni*	N	X	X	X
Westslope cutthroat trout	*Oncorhynchus clarki lewisi*	N	X		
Brook trout	*Salvelinus fontinalis*	I	X		
White sucker	*Catostomus commersoni*	N	X	X	X
Longnose sucker	*Catostomus catostomus*	N	X	X	X
Common carp	*Cyprinus carpio*	I	X	X	X
Redside shiner	*Richardsonius balteatus*	I	X		X
Longnose dace	*Rhynichthys cataractai*	N		X	X
Mottled sculpin	*Cottus bairdi*	N		X	X
Mountain sucker	*Catostomus platyrhynchus*	N		X	X
Fluvial arctic grayling	*Thymallus arcticus montanus*	N		X	X
Flathead chub	*Platygobio gracilis*	N			X

Observations of Red Rock River during low-water in 2002-2004 found stream conditions too low to even sustain a spawning migration, so fish generally attempted to spawn in the very limited fluvial reach near the confluence with the reservoir. Without spawning conditions in Red Rock River, egg collection could not have taken place. Monitoring and egg collection will resume when drought conditions improve.

Like the rainbows, the wild and self-sustaining brown trout population is high during times of ample water in Red Rock River and the reservoir. Populations are lower and conditions are declining during drought years.

Native burbot reside in the lake, but very little is known about their life history requirements or population trends. They appear occasionally during creel surveys and are targeted by some anglers.

Beaverhead River

Before completion of Clark Canyon Dam in 1964, the confluence of Red Rock River and Horse Prairie Creek constituted the beginning of the Beaverhead River. Now, the river begins at the Clark Canyon Dam outlet works. For fishery evaluation purposes, the river in the affected area can be roughly divided into two sections based on flow regime. The upper reach includes from the outlet works downstream to Dillon. The lower reach is from Dillon downstream to the confluence of the Big Hole River.

Main game fish in the Beaverhead are brown trout, mountain whitefish, and rainbow trout (Table 3.3). Other river species are burbot, common carp, longnose dace, longnose sucker, mottled sculpin, mountain sucker, and white sucker. Fluvial Arctic grayling have been stocked unsuccessfully in the river. Stocking success has declined primarily due to drought conditions and low flows. As mentioned earlier, drought conditions have even halted trout egg collection in the Red Rock River.

Upper Beaverhead

The river between Clark Canyon Dam and Barretts Diversion Dam is generally a productive tailwater fishery dependent on reservoir releases. The river between Barretts Diversion Dam and Dillon is not as productive as the tailwater fishery. Summer flows are typically ample for fishery habitat, but winter flows can often be critically low. Habitat is characterized by a tight channel meandering through densely covered willow banks. Fish cover mainly consists of submerged and overhanging bank vegetation, undercuts, and long, deep pools (Montana Department of Fish, Wildlife, and Parks, 2005). This area, a Blue Ribbon Trout Stream, receives heavy use between May-November. Some years the fishing season is shortened because of low water levels in the river. Angler use has been concentrated in this reach of the river, with many anglers being out-of-region or out-of-state.

The Upper Beaverhead supports populations of brown and rainbow trout, with brown trout being the dominant species. Limited rainbow populations are supported, and trout populations are wild and self-sustaining. Brown trout spawn in the fall and the eggs incubate throughout the winter. They depend on ample, stable winter flows in the river for successful reproduction as well as overwinter survival of adults. According to Oswald (2003), fish sampling of the Hildreth section of the Beaverhead in 2002 indicated populations ranging from 399 18-inch or larger brown trout per mile in lower winter flow regimes (mean flow of ~50 cfs or less) compared to 832 18-inch or larger brown trout per mile following ample winter flow regimes (mean flow of ~350 cfs or more) in 1999 sampling. The same reach also supports populations of rainbow trout ranging from 150 to about 350 18-inch or larger fish per mile annually (Oswald, 2003).

Fish health and populations have been affected in the past by outbreaks of bacterial furunculosis and gas bubble disease during times of stress. More recently, fish health may be affected by the recent arrival of the exotic nuisance New Zealand mud snail, as well as whirling disease.

Lower Beaverhead

The Beaverhead below Dillon is downstream of diversions which divert the majority of storage water released from Clark Canyon Dam. This section typically has an altered hydrograph from natural conditions, with low spring/summer flows (decreased from upstream diversions) and then a rising hydrograph in the fall and winter months. Accordingly, fisheries in this reach tend to experience difficulties in summer months due to warm water temperatures caused by low flows coupled with warm ambient air temperatures.

According to MDFWP, brown trout and mountain whitefish populations in the lower river typically vary from 200-400 fish per mile, which are the lowest populations of the Red Rock, Beaverhead, Ruby, and Bighole study sections. (See MDFWP's comment in the Comments/Responses section of this report)

The upper Missouri River drainage is historical habitat for fluvial Arctic grayling, and they have been stocked in this reach of the Beaverhead several times. Although sampling crews have collected a few wild individuals over the past two decades, a population has not been successfully established. (MDFWP's comment in the Comments/Responses section).

Jefferson River

The Jefferson River is formed at the confluence of the Beaverhead and the Big Hole rivers near Twin Bridges. The Ruby River also contributes to Jefferson flows, entering the Beaverhead just south of where the Jefferson is formed. From Twin Bridges to Whitehall, the Jefferson River meanders widely through a grassy valley between the Continental Divide and the Tobacco Root Mountains.

The main game fish in the Jefferson are brown trout, mountain whitefish, and rainbow trout. Other fish species that occur in the river include burbot, common carp, flathead chub, longnose dace, longnose sucker, mottled sculpin, mountain sucker, redside shiner, and white sucker (Table 3.3). Fluvial Arctic grayling have been stocked in the Jefferson River twice, once in 2002 and once in 2003 (Montana Department of Fish, Wildlife and Parks, 2005). Prior to stocking, a few native fluvial arctic grayling have been observed in the Jefferson (MDFWP comment in the Comments/Responses).

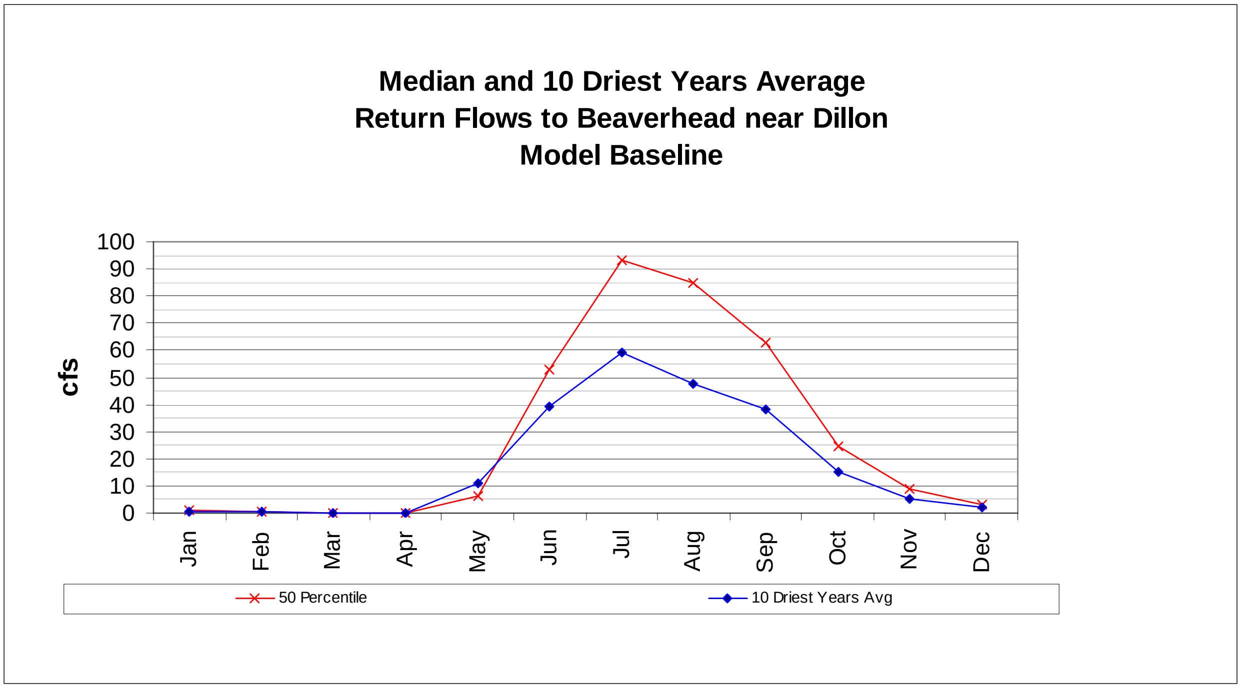
The Jefferson is extensively used for irrigation and is subject to dewatering in low-water years (Montana Department of Fish, Wildlife, and Parks, 2005). Fisheries in the Jefferson River typically experience the same issues with low summer flows and high temperatures as the lower Beaverhead.

Wetlands

Combination of shallow water, high nutrient levels, and primary productivity in wetlands is ideal for development of organisms forming the base of the food web. Wetlands attract an immense variety of insects, amphibians, reptiles, birds, fish, and mammals. More than a third of Threatened and Endangered Species, for instance, live only in wetlands, with nearly half using wetlands at some point in their lives. Wetlands improve water quality, offer flood protection, and control erosion. They are also important for hunting, bird watching, and photographing wildlife.

Wetlands associated with canals, laterals, and drains can be found throughout CCWSC and EBID. Most are palustrine, frequently referred to as marshes, swamps, bogs, or prairie potholes. They can also include ponds, lake shores, and areas surrounding streams or conduits. Water seeping from the canal prism flows underground to provide a supply during and after the irrigation season. Palustrine wetlands are the most common in the Clark Canyon Reservoir area, including areas with unconsolidated or aquatic bed bottoms, scrub/shrub-dominated wetlands, and forested wetlands like the riparian galleries found along the Beaverhead River.

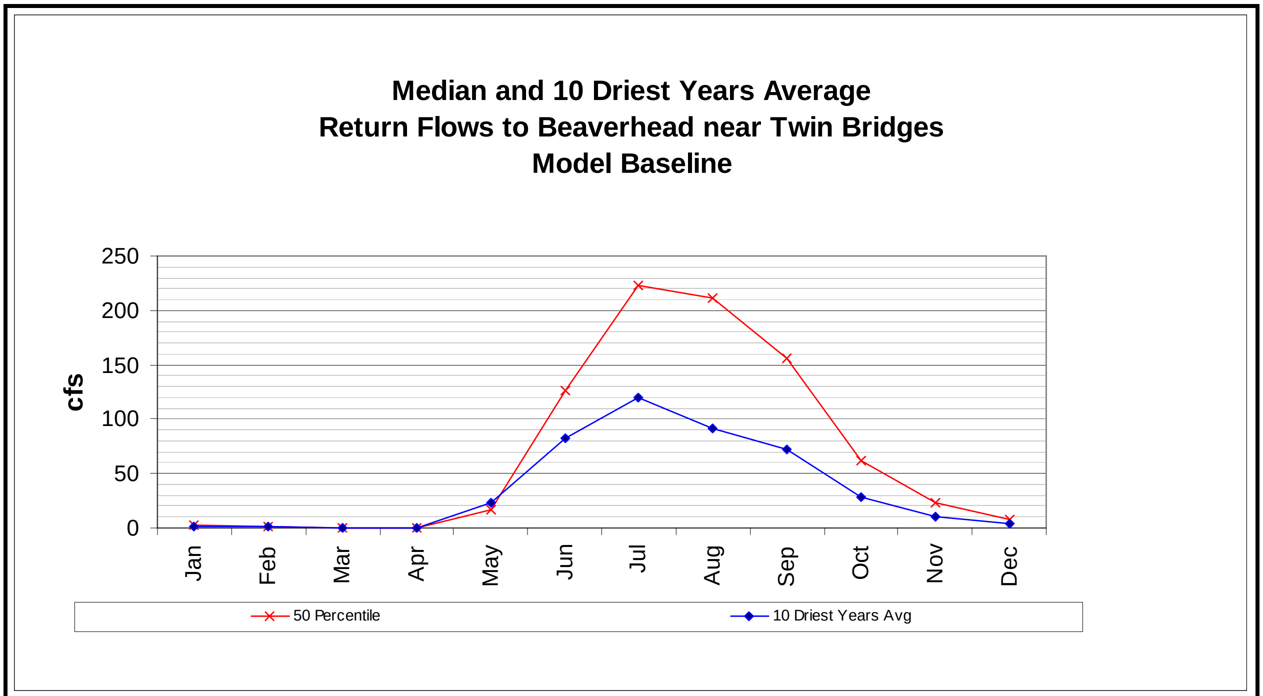
Return flows provide water to wetlands in the Beaverhead valley along the periphery of drains and in wetland areas located down slope of irrigation facilities. Figure 3.3 shows the median (mid-point) and the 10 driest years for return flows to the Beaverhead River near Dillon.



[1] **This graph represents return flows to the model "node" entering the river and does not represent the total discharge of the river at this station.**

Figure 3.3[1]: Return Flows to the Beaverhead near Dillion

Figure 3.4 shows median and the driest return flow years expected at Twin Bridges, Montana. As in the previous figure, return flows typically increase with the irrigation season, peak in July, and slowly decline.



[1] **This graph represents return flows to the model "node" entering the river and does not represent the total discharge of the river at this station.**

Figure 3.4[1]: Return Flows to the Beaverhead near Twin Bridges

Wetlands beyond those associated with irrigation facilities also occur in the region. Riverine wetlands are those associated with streams or conduits that convey running water exclusive of surrounding areas dominated by trees, shrubs, persistent emergents, or mosses. These wetlands can be found along all stream and river drainages in CCWSC and EBID. Lacustrine wetlands are deepwater habitats and shorelines associated with a topographic depression or dammed river channel. Clark Canyon Reservoir supports lacustrine, limnetic wetlands in generally deep water with an unconsolidated bottom. Lacustrine, littoral wetlands occur in water shallower than 1 meter (3 feet). These wetlands are found around the periphery of the reservoir and include deepwater habitat in CCWSC and EBID like natural wetlands and canals. They rely on high reservoir water levels to provide a period of inundation. Table 3.4 lists EOM (end-of month) return flows for median and the 10 driest years.

National Wetlands Inventory (NWI) mapping has not been completed for the Clark Canyon Reservoir area.

Table 3.4: Return Flows for the Beaverhead Stations

	Beaverhead near Dillon (cfs)	Beaverhead at Twin Bridges (cfs)
January	1.1	2.9
February	0.5	1.4
March	0.2	0.5
April	0.1	0.2
May	6.3	16.3
June	52.7	126.8
July	93.4	223.0
August	84.9	211.5
September	62.6	156.1
October	24.6	61.6
November	9.0	22.6
December	3.1	7.8

Wildlife

The intermontane valley of the Clark Canyon Reservoir area ranges from about two miles wide at the reservoir to less than a half-mile wide from the from the reservoir to Barretts Diversion Dam, at which point it widens to an average of 12 miles.

Lands surrounding Clark Canyon Reservoir are primarily short grass prairie with intermittent sagebrush habitat. Three riparian areas can be found around the reservoir, with willow and cottonwood habitat, cattail marshes, wet and semi-wet meadows, and exposed mud flats during drawdown. These habitats support a diverse variety of bird and animal species such as golden eagle, ferruginous hawk, chestnut-collared longspur, pygmy rabbit, red fox, antelope, and white-tailed deer. The wet and semi-wet cattail and willow dominated areas near reservoir inflows provide forage and nesting habitat for a myriad of wildlife species, including migratory birds.

Clark Canyon Reservoir is in the Beaverhead/Red Rock flyway for migratory birds. Exposed mudflats and shallow water provide a wealth of macro-invertebrates, a food source for migrating shorebirds. Shorebird and water bird species found during spring and fall migrations include the killdeer, spotted sandpiper, long-billed curlew, and common loon.

The Beaverhead River immediately below the dam is a “Montana Wildlife Viewing Area” in the Montana Watchable Wildlife Program.

Sandhill cranes in the Beaverhead Valley (Steve Cottom photo).

The river valley surrounding CCWSC and EBID are primarily used for agriculture, including irrigated pasture, crops, and fallow. Streams, reservoirs and wetlands are abundant throughout the valley, supporting a deciduous riparian forest primarily of willow species. Native and tame grasslands are found throughout the valley, also. This diversity of habitats supports both game and non-game species: white-tailed and mule deer are common. Predators include red fox, coyote, and cougar. Smaller mammals — beaver, muskrat, cottontail rabbit, jackrabbit, badger, mink, weasel, raccoon, porcupine, striped skunk, and several bat species—are also abundant.

Reptiles in the Clark Canyon Reservoir area include the short-horned lizard, painted turtle, racer snake, gopher snake, western rattlesnake, common garter snake, and western terrestrial garter snake. Amphibians in the abundant wetlands and riparian areas include western toad, northern leopard frog, and spotted frog.

The Beaverhead River valley is on the westernmost boundary of the central flyway and the easternmost boundary of the Pacific flyway. Over 150 species of migratory birds can be seen in the area over the course of the year. Common upland species include the long-billed curlew, horned lark, western meadowlark, cedar waxwing, gray catbird, mountain bluebird, and house wren. Waterfowl in the area include Canada goose, snow goose, mallard duck, pintail, American widgeon, green-winged teal, common merganser, and barrows goldeneye. Birds of prey include the bald eagle, golden eagle, northern harrier, sharp-shinned hawk, osprey, red-tailed hawk, and American kestrel.

Threatened and Endangered Species

The Endangered Species Act seeks to recover and conserve listed species and the ecosystems on which they depend. Section 7 (a)(2) of the act requires Federal agencies to consult with the U.S. Fish and Wildlife Service (Service) to ensure that Federal actions do not jeopardize listed species. The species described below include those provided by the Service that may be found in the action area. The action area defined for the threatened and endangered species section of this Federal action is defined as the Beaverhead Valley corridor, including portions of Red Rock River and Horse Prairie Creek, Clark Canyon Reservoir, the Beaverhead River, Beaverhead River Valley, and portions of the Jefferson River.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is a threatened species. In Montana, it primarily inhabits forested areas along rivers and lakes, especially during the breeding season. Important year-round habitat includes wetlands, major water bodies, spring spawning streams, ungulate winter ranges, and open water areas. Wintering habitat may include upland sites. Nesting sites are generally within larger forested areas near large lakes and rivers where nests are usually built in the tallest, oldest, large diameter trees. Nest selection depends on maximum local food availability and minimum disturbance from human activity (Montana Bald Eagle Working Group, 1994).

Most nesting bald eagles nesting are found in the western third of Montana, although breeding pairs also may be found along many of the major rivers and lakes in the central part of the state and along the Yellowstone and Missouri Rivers in the east. They may be somewhat more seasonally dependent east of the Continental Divide than in the western part of Montana, for migrants from the north travel through Montana to reach their wintering grounds further south.

On May 24, 2005, (updated February 8, 2006), the Montana Natural Heritage Program provided Reclamation with a list of all known bald eagle nests in the vicinity (Table 3.5).

There are no known bald eagle nests at Clark Canyon Reservoir or the rock outcrops at Barrets Diversion Dam. Cottonwood forests along the periphery of the Beaverhead provide suitable nest sites. The rivers and reservoir provide foraging habitat. Clark Canyon Reservoir even provides winter foraging habitat during mild winters. The Beaverhead River provides additional forage species (fish and waterfowl) and may result in reduced prey abundance during extreme drought periods when winter releases from the reservoir are reduced.

Table 3.5: Eagle Nests

Territory Number	Nest Number	Township	Range	Section
038009	1	5S	7W	31
038025	1	8S	9W	9
038029	2	6S	8W	33
038009	3	5S	7W	20
038033	1	1S	5W	15
038005	1	9S	10W	21
038005	2	9S	10W	21
038005	3	9S	10W	21
038003	1	4S	7W	15
038022	1	3S	6W	22
038026	1	4S	7W	28
038026	2	4S	7W	29

Ute Ladies' Tresses

The Ute ladies' tresses (*Spiranthes divuvialis*) is a threatened species. This plant is a perennial orchid that arises from tuberous roots and flowers in August-September. It is known to grow in wetlands and swales in broad valleys, and at habitat margins with calcerous carbonate accumulation.

On February 8, 2006, the Montana Natural Heritage Program provided Reclamation with a list of all known Ute Ladies' Tresses in the vicinity (Table 3.6).

Table 3.6: Ute Ladies' Tresses

Survey Site	Number of plants counted	Last observation	Latitude	Longitude
Beaverhead River	1	Aug 1996	452414N	1122530W
Beaverhead River Valley	55	Aug 1997	452919N	1122219W
Albers Slough	277	Aug 1997	451823N	1123510W

These three sites are either located on private land or state trust land. According to the site description from the Montana Natural Heritage Program, these sites are not adjacent to the Beaverhead River or within the boundaries of Albers Slough; these survey site names are used as the closest identifying feature. Other potential habitat can be found throughout the Beaverhead Valley.

Canada Lynx

The Canada lynx (*Felis lynx*) is a threatened species found in the mountains of western Montana. Home range sizes vary between 10-243 square acres. Lynx are non-migratory, but movements of 90-125 miles have been recorded in Montana. Canada lynx east of the Continental Divide generally occur in subalpine forests between elevations 5,413-7,874 feet. Throughout their range, shrub-steppe habitats may provide important linkage habitat between the primary habitat types. Within these habitat types, disturbances that create early successional stages—fire, insect infestations, or timber harvest--provide foraging habitat (Montana Natural Heritage Program, 2005).

The lynx is not known to inhabit the area of potential effect but has been documented in Beaverhead County. The montane habitat in the mountains surrounding Clark Canyon Reservoir provides suitable habitat and forage.

Grizzly Bear

The grizzly bear (*Ursus arctos horribilis*) is a threatened species found in the mountainous regions of western Montana. Grizzlies in Montana primarily use meadows, riparian areas, mixed shrub fields, timbered areas, sidehill parks, and alpine slabrock habitats. Although no true migration occurs, grizzlies often exhibit discrete elevational movements from spring-fall following food availability (Montana Natural Heritage Program, 2005). Grizzlies are generally found at lower elevations in spring and higher elevations during mid-summer and winter. The grizzly was primarily a plains species in the past occurring throughout most of eastern Montana.

The grizzly is not known to inhabit the action area but has been documented in Beaverhead County. The montane habitat in the mountains surrounding Clark Canyon Reservoir provides suitable habitat and forage.

Gray Wolf

The gray wolf (*Canis lupus*) is a threatened species found in experimental populations in western Montana. It exhibits no particular habitat preference but typically establishes territories where prey is abundant (Montana Natural Heritage Program, 2005). Wolves are opportunistic carnivores that predominantly prey on large ungulates including mule deer, elk, and moose. This species is not migratory but may move seasonally within their territory and disperse widely. Male wolves in northwestern Montana can move an average of 70 miles from their natal territory and females 48 miles before establishing a new territory or joining an existing pack (Montana Natural Heritage Program, 2005).

The gray wolf is not known to inhabit the action area but has been documented in Beaverhead County. A forage base for the wolves exists in the area around Clark Canyon Reservoir and much of Beaverhead County.

Social and Economic Conditions

Social and economic conditions studied in this EA include population, income, employment, recreation, and agriculture in Beaverhead and Madison counties, the two counties that constitute the region that could be affected by the alternatives.

Overall population has steadily grown in the region, except for the decrease Madison County experienced from 1950-1970 (U.S. Bureau of Census, 1995). From 1970-2000, however, both counties grew consistently: Beaverhead County's population increased 37.94% and Madison County's increased 14.22% On average, Beaverhead County increased .76% annually, while Madison County increased .28% annually (U.S. Bureau of Census, 2000). Compared to the State of Montana the counties have grown slower than the State average. The State of Montana's population increased 1.05% annually. The following table (Table 3.7) shows the population of the counties and the state from 1950-2000.

Table 3.7 Population

	1950	1960	1970	1980	1990	2000
Beaverhead	6,671	7,194	8,187	8,186	8,424	9,202
Madison	5,998	5,211	5,014	5,448	5,989	6,851
Montana	**591,024**	**674,767**	**694,409**	**786,690**	**799,065**	**902,195**

Source: U.S. Bureau of Census, 1995 and 2000.

Income

The 1998 total combined personal income of $299,836,000 in the two counties increased to $368,192,000 in 2002 (Table 3.8). The total average combined personal income for 1998-2002 was $333,670,000 (U.S. Bureau of Economic Analysis, 2005). Average total personal income for the state of Montana for the years 1998-2002 was $20,665,370,000 (U.S. Bureau of Economic Analysis, 2005). Madison and Beaverhead counties accounted for 1.615% of the total income for the state.

Table 3.8 Personal Income ($1,000's)

	1998	1999	2000	2001	2002	Average
Beaverhead	$180,867	$185,184	$197,005	$204,348	$211,342	$195,749
Madison	$118,969	$126,409	$135,390	$151,988	$156,850	$137,921
Total	**$299,836**	**$311,593**	**$332,395**	**$356,336**	**$368,192**	**$333,670**

Table 3.9 shows total personal income and income per person (per capita income) for 1998-2002. Average per capita income for the two counties for the period was $20,778. The Montana average per capita income was $23,077 which is more than the per capita income for the two counties.

Table 3.9: Per Capita Income

	1998	1999	2000	2001	2002	Average
Beaverhead	$19,804	$20,164	$21,416	$22,500	$23,524	$21,482
Madison	$17,602	$18,587	$19,707	$22,040	$22,533	$20,094
Average	**$18,703**	**$19,376**	**$20,562**	**$22,270**	**$23,029**	**$20,778**

Employment

The civilian labor force is considered to be people 16 years of age or older either employed or actively seeking employment, excluding those not seeking employment or those in the armed forces. Beaverhead County had 7,338 people in the civilian labor force in 2000, while Madison County had 5,516 (U.S. Bureau of Census, 2005). Table 3.10 from the U.S. Census Bureau shows a breakdown of area employment by industry. Agriculture, forestry, fishing, hunting, and mining accounted for 19.3% of the earnings in Beaverhead County and 20.7% of the earnings in Madison County. Beaverhead County had an unemployment rate of 3.8%, while Madison County's unemployment rate was 5.2 %.

Table 3.10: Major Industries by % of Total Earnings

	Beaverhead	Madison	Average
Agriculture, forestry, fishing and hunting, and mining	19.34%	20.67%	20.01%
Construction	7.03%	13.16%	10.10%
Manufacturing	4.49%	5.21%	4.85%
Wholesale trade	2.14%	0.92%	1.53%
Retail trade	9.22%	10.22%	9.72%
Transportation and warehousing, and utilities	4.47%	4.29%	4.38%
Information	1.94%	1.39%	1.67%
Finance, insurance, real estate, and rental and leasing	3.86%	4.00%	3.93%
Professional, scientific, management, administrative, and waste management services	3.60%	4.29%	3.95%
Education, health and social services	25.99%	16.25%	21.12%
Art, entertainment, recreation, accommodation, and food services	10.25%	10.30%	10.28%
Other services (except public administration)	2.52%	4.30%	3.41%
Public administration	5.15%	5.00%	5.08%
	100.00%	100.00%	100.00%

Source: U.S Bureau of Census, 2005

Recreation

Recreational Activities

Recreation activities in the area (Clark Canyon Reservoir and Beaverhead River) consists of land and water-based activities that take place primarily from May 1-Labor Day weekend in early September (see the "Recreation Section" following). In winter, there is also ice fishing when conditions are appropriate.

Clark Canyon Reservoir and Barretts Diversion Dam provide regional camping and water based recreation opportunities for the communities surrounding the dam and reservoir, as well as for other Montanans or out-of staters. According to the Institute for Tourism and Recreation Research (2004), about 50% of the visitors were Montana residents, followed by Idaho (9%), Utah (8%), and California (5%).

The Benefits Transfer approach was used to determine recreation values for specific recreational activities. This methodology for calculating recreation benefit values is based on using values from previous economic research which have similar types of recreation and locations. The values were based on publications by the Institute for Tourism and Recreation Research (2005); U.S. Forest Service; and J.C. Bergstrom and Ken Cordell. The recreation values were indexed to 2005 using the Consumer Price Index to adjust for inflation.

Recreation activities participation percentages were based on Institute for Tourism and Recreation Research (2004). The top five recreational activities were fishing, scenic viewing, camping, power boating, and walking/hiking. Hunting is also an important recreational activity for the area, but was not listed in Table 3.11 because it typically falls outside of the peak recreation season of May1 to Labor Day. Table 3.11 lists the percentages for these activities. They were used to allocate the total recreation visitation to activities which have an established recreation benefit value. For those activities without a specific benefit value or classified as “other activities,” a general recreation benefit value was assigned.

Table 3.11: Recreation Activity Percentages

Recreation Activities	**Percentage of Total Recreation**
Fishing	19.41%
Camping	10.47%
Power boating	7.37%
Picnicking	4.71%
Swimming	2.57%
Sunbathing	2.15%
Scenic viewing	18.19%
Walking/hiking	9.47%
Visit historic sites	6.90%
Photography	5.61%
Other activities	13.15%
Total	**100.00%**

Recreation visitor days were obtained from Recreation Specialists at the recreation site. Total average recreation visitor days for Clark Canyon Reservoir (including the river access directly below the dam) based on a five-year average are 59,112 annual visits.

Recreational Benefits Results

Recreation benefits were determined by taking the annual total visitation estimates per recreation use and multiplying this number by the benefits received each day from each recreation use. Table 3.12 shows the results. It should be noted that values in the EA were for reservoir based recreation only and used net economic measures for the daily values and they only relate to the historical operation of the reservoir. Tail-water fishery values were not included. Reclamation recognizes that flows below the dam in the river and the associated fishery have economic value above and beyond that in the reservoir.

There are a number of economic net value estimates for Montana for trout fishing. A survey of those estimates can be found in the “Economic Valuation Studies of Fish and Wildlife Resources in Montana by John Duffield, University of Montana, 2003. While not specific to the Beaverhead, they can be expected to be good approximations of the values to be found in western Montana trout waters. In 2005 dollars these would range from $34 per day for resident and $203 for nonresident (USFWS -Net Economic Values for Wildlife-Related Recreation in 2001) to $82 per day for resident and $303 nonresident (Upper Missouri River 1997 values). Using these values and the 1989 to 2003 average of usage statistics from the Beaverhead and Big Hole River Recreation Rules EA (Sperry, 2005), the river usage has a value between $3.3 million and $5.2 million annually.

Table 3.12: Recreation Benefits

Recreation Activities	Annual Recreation Visits	2005 Values	Total Benefit Value ($)
Reservoir Fishing	11,474	$52.66	$604,221
Camping	6,189	$47.26	$292,492
Power boating (includes waterskiing and jet skiing)	4,357	$35.53	$154,804
Picnicking	2,784	$31.61	$88,002
Swimming	1,519	$39.55	$60,076
Sunbathing	1,271	$35.88	$45,603
Scenic viewing	10,752	$23.73	$255,145
Walking/hiking	5,598	$49.84	$279,004
Photography	3,316	$76.26	$252,878
Visit historic sites	4,079	$72.89	$297,318
Other activities	7,773	$35.88	$278,895
Total	**59,112**		$2,608,440

Agricultural Economy

Agriculture is extremely important to the economy in both Beaverhead and Madison counties. Cattle were first raised commercially in 1857 in the Beaverhead Valley, and agricultural settlement began as early as 1862. Primary crops grown in the region include alfalfa and small grains (wheat, barley, and oats) to feed livestock. Livestock cattle ranching is the predominant agricultural operation in both counties.

In order to accurately display the benefit that irrigated agriculture brings to the Beaverhead Valley, a farm budget method of analysis was used for estimating irrigation benefits for CCWSC and EBID. The two contract water users operate very similarly and thus it was determined that one set of budgets and results would be done for both of them.

With this method of analysis, two budgets are completed: one with irrigation as it currently exists and one with irrigation removed. The method depicts two representative farms, one that reflects the typical full time irrigated farm in the area, one that reflects the typical full time dryland farm. The irrigated farm should be large enough to fully employ the farmer. The dryland farm is the same size farm with cropping patterns changed to dryland patterns. In the dryland budget, it was assumed the land investment would stay the same but that most irrigation-related equipment was sold and the land returned to dryland farming. The difference between these two budgets was the benefit (or lack of benefit) that existed because of irrigation.

Budget returns of the farm “with irrigation” were estimated at $120.67/acre. Budget returns of the farm “without irrigation” were $75.29/acre, a difference of $45.38. That was the annual per- acre irrigation benefit. The total irrigated agricultural annual benefit for CCWSC and EBID would be $2,802,714 [(28,055 + 33,706) X $45.38].

Recreation

Recreation opportunities in southwestern Montana and the Beaverhead Valley are abundant. Local and area residents are provided several types of recreation opportunities, including (but not limited to) fishing (flat water and stream), camping, power boating, picnicking, swimming, hiking, and wildlife viewing. Out-of-area visitors may visit southwestern Montana as they pass through the area. They may also intentionally come to the Dillon area to recreate or fish the upper Beaverhead River, a tailwater fishery created by Clark Canyon Dam that has been classified as a blue ribbon trout stream. Fishing in this stretch of the Beaverhead River gets heavy use, due to easy access, as well as good fishing that can be experienced.

Clark Canyon Reservoir and Barretts Diversion Dam are part of the East Bench Unit and provide recreational opportunities with campgrounds and recreation sites maintained and operated by Reclamation. Other Federal recreation sites and private campgrounds are also located nearby. The Bureau of Land Management manages land near Clark Canyon Reservoir and the Beaverhead River.

Commercial opportunities also exist in the project area with outfitters and guides taking clients on fishing outings on Clark Canyon Reservoir and fishing float trips down the upper Beaverhead River. Many of these outfitters use Reclamation lands and facilities to access the water and launch watercraft. All commercial activities on Federal lands need to be permitted in order for the Federal government to receive fair market value for the use of these Federal lands and facilities.

Clark Canyon Reservoir

Clark Canyon Reservoir provides recreational opportunities for a wide region. The area also attracts people from out-of-state to fish or who are just passing through.

Recreation facilities surrounding the reservoir include a total of eight developed and primitive campgrounds, a marina (currently closed), two day-use areas, three fishing access sites, an interpretive site, seven boat ramps (one low-water, two normal, three small craft, and one currently unusable), and a wildlife trail. The campgrounds range from well defined campsites with camping pads, parking spurs, campfire rings, and wind breaks, to primitive camping sites with few facilities and few or no defined parking spaces.

Barretts Diversion Dam

Barretts Diversion Dam includes 38 acres primarily used for recreation. The site is suitable for day use and camping with recreational vehicles or tents. There are about 22 undefined campsites, a group shelter, a boat ramp, and 4 toilets. The day use area is very popular with Dillon residents who often come in groups by reserving the shelter or pavilion. The area is also very popular with fishermen. The boat ramp serves as the last take out facility for anglers drifting the Beaverhead River before reaching the diversion dam.

Other Resources Potentially Affected

Water conservation, cultural resources, noxious weeds, and prime and unique farmlands were also studied for possible effects from the alternatives.

Water Losses/Conservation

The water use efficiency of the East Bench Unit can be broken into two components: the water conveyance or delivery efficiency and on-farm efficiency components.

The water conveyance system of CCWSC consists of earthen ditches that convey water from the Beaverhead River to the irrigated croplands of its shareholders. The majority of the conveyance facilities were constructed in the mid to late-1800s. The conveyance ditches are of earthen construction that traverse the lighter soils (loam, silt loam, fine sandy loam) of the Beaverhead Valley. Ditch losses, estimated to be approximately 45% of the water diverted, are typical of earth constructed water conveyance ditches.

The EBID's conveyance system consists of a main canal and a series of laterals to provide irrigation water to serviceable lands. The canal, constructed in the 1960s, is primarily of earth construction. Between the 1996-2005 irrigation seasons, it was estimated that EBID delivered an average of 53% of all water diverted from the Beaverhead to the lands of its members. Table 3.13 displays the volume of water diverted from the Beaverhead River, the volume delivered to the farm turnouts of the EBID conveyance system, and the delivery efficiency.

Table 3.13: Water Diverted from the Beaverhead River

Year	Diverted (AF)	Delivered (AF)	Delivery Efficiency (%)
1996	90,617	50,606	56%
1997	78,476	41,312	53%
1998	79,668	43,304	54%
1999	89,151	48,571	54%
2000	90,944	49,675	55%
2001	65,204	35,452	54%
2002	49,742	25,993	52%
2003	26,858	14,739	55%
2004	0	0	
2005	34,688	12,994	37%

The inefficiency of EBID conveyance system consists of two major components, operational spills and seepage losses. Operation spills occur for two primary reasons: the first is that sufficient water surface level is required in the canal system to make farm deliveries, with excess water returned to the river. The second is that length of the canal requires some excess water to be in the system to meet the demands of the irrigators. EBID attempts to coordinate between irrigators who want to stop irrigating and those who want to start irrigating. At times, this leads to some excess water in the conveyance system that is spilled into the system's wasteways.

The second major component, seepage loss, occurs because the canal is of earthen construction. Water seeps from the canal into the ground and raises the groundwater table in the vicinity of the conveyance system. Typically the conveyance system is less efficient at the beginning of the irrigation season, improving as the irrigation season progresses and as the local groundwater table rises to intercept the canal and laterals.

The on-farm efficiency of CCWSC shareholders is estimated to vary from 40% efficient for flood irrigation applications to 75% efficient for sprinkler irrigation applications. At present, approximately 22% of CCWSC's shareholders lands are irrigated with flood irrigation, 78% irrigated with sprinkler irrigation.

The on-farm efficiency of EBID members is estimated to vary from 40% efficient for flood irrigation to 75% efficient for sprinkler irrigation. At the time of this report, approximately 1% of EBID member's lands are irrigated with flood irrigation and 99% with sprinkler irrigation.

Both the CCWSC and EBID have conducted water conservation measures on their delivery systems in the past. This includes such things as canal lining and piping laterals. These water conservation measures will continue and will be outlined in water conservation plans. In accordance with Section 210 of the Reclamation Reform Act of 1982 (P.L. 97-293), both CCWSC and EBID are legally required to draft water conservation plans. Section 210 states that "each district that has entered into a repayment contract or water service contract pursuant to Federal reclamation law or the Water Supply Act of 1958, as amended (43 U.S.C. 390b), shall develop a water conservation plan which shall contain definite goals, appropriate water conservation measures, and a time schedule for meeting their water conservation objectives." The negotiated contracts with both entities will contain an article that requires them to be in compliance with Section 210(b) of the Reclamation Reform Act of 1982.

The EBID submitted an updated water conservation plan for review and comment on May 3, 2001, in accordance with the Reclamation Reform Act of 1982 and Reclamation policy. Their water conservation plan contained definite goals, appropriate water conservation measures, and a time schedule for meeting their water conservation measures. EBID will be required to update and submit their water conservation plan to Reclamation in 2006 with updated water conservation goals and a schedule.

The CCWSC submitted an updated water conservation plan in 2004 in accordance with the Reclamation Reform Act of 1982 and Reclamation policy. Their water conservation plan contained definite goals, appropriate water conservation measures, and a time schedule for meeting their water conservation measures. CCWSC will be required to update and submit their water conservation plan to Reclamation in 2009 with updated water conservation goals and a schedule.

Federal assistance is available although limited, to help implement water conservation plans. Entities required to develop water conservation plans are encouraged to seek funding from other sources as well, such as state grants, to supplement their own funds to implement the specific measures identified in their plans.

Both CCWSC and the EBID will be contractually required to establish reserve funds and annually contribute to them until a negotiated ceiling is achieved throughout the term of their contracts. The reserve funds are intended to provide the entities with a source of funding to cover emergency situations and to provide a source of funds to modernize and improve the efficiencies of their systems. Once sufficient balances are achieved, CCWSC and the EBID's reserve funds could be used to help implement their water conservation plans or make other improvements. Reclamation's permission is required before the reserved funds may be tapped to help fund system improvements.

Cultural Resources

Cultural resource describes both archaeological sites and the “built environment” such as dams, roadways, and buildings. The National Historic Preservation Act (NHPA) and other Federal laws and regulations protect and promote scientific study of cultural resources, specifically historic properties. Historic properties are any prehistoric or historic district, site, building, structure, or object which meet certain criteria outlined in the NHPA. Examples are archaeological sites such as tipi-rings, bison kills, or camp sites, and historic sites such as homesteads, irrigation canals and structures, and bridges.

Section 106 of the NHPA requires Federal agencies to: 1) consider the affects of an undertaking (for example, issuing water service contracts) on historic properties, and 2) consult with the State Historic Preservation Office, tribes, interested parties, and the public regarding these affects. Before conducting Section 106, the Area of Potential Effect (APE) must first be identified. Reclamation has determined the APE includes lands irrigated by CCWSC and EBID.

Noxious Weeds

The Soil and Moisture Conservation Act and the Federal Noxious Weed Act require Federal agencies develop a program to control undesirable plants on lands under its jurisdiction. Noxious weeds can be a serious environmental problem to natural resources and are capable of rapid spread and can potentially render lands unfit for beneficial uses.

Noxious weeds targeted for containment and suppression around Clark Canyon Reservoir are: whitetop (*Cardaria draba*), Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), and spotted knapweed (*Centaurea maculosa*). All are defined by Montana’s State Noxious Weed List as “currently established and generally widespread in many counties of the State.”

Reclamation has a cooperative agreement with Beaverhead County to control noxious weeds on its lands and occasionally hires a private herbicide applicator for particularly troublesome areas. In CCWSC, individual ditch riders control noxious weeds on the delivery system, or CCWSC hires weed management from a private herbicide applicator. EBID uses their staff to control noxious weeds on the irrigation delivery system. Routine O&M activities also reduce noxious weed infestations in CCWSC and EBID.

Prime and Unique Farmlands

“Prime farmland” has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other crops with minimum need for fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion as determined by the U.S. Secretary of Agriculture. Prime farmland also has an adequate and dependable water supply from precipitation or irrigation.

“Unique farmland” is land other than prime farmland that is used for production of specific high-value food and fiber crops such as citrus, tree nuts, olives, cranberries, fruits, and vegetables (Natural Resources Conservation Service, 2002). Generally, additional farmland of statewide importance includes soils that are nearly prime, producing high yields of crops when treated and managed according to acceptable farming practices.

Population growth, demographic changes, preferences for larger lots, expansion of transportation systems, and economic prosperity have contributed to increases in agricultural land being converted to non-agricultural use (Natural Resources Conservation Service, 2002). The Farmland Protection Program has made it possible for the Federal government to purchase conservation easements of prime, unique, or other productive soil farmlands from willing land owners.

Many irrigated lands in the Beaverhead River valley or on the East Bench—including lands served by CCWSC and EBID—are categorized as prime farmlands or locally important farmlands (Kris Berg, Personal Communication, 2005). In many instances, these lands would not meet the criteria if they were not irrigated.

ENVIRONMENTAL CONSEQUENCES CHAPTER 4

Chapter 4 analyzes direct and indirect effects of the Preferred Alternative (Proposed Action/Negotiated Alternative) compared to the No Action Alternative. Effects on the Clark Canyon Reservoir water supply; water quality; fisheries, wetlands; wildlife; Threatened and Endangered species; social and economic conditions; and recreation are included in the analysis. Cumulative effects—the combination of the effects of the alternatives in this EA with other actions in the past, present, or the reasonably foreseeable future—are also included (other actions are listed in Chapter 1, "Relationship of This Action to Other Actions.").

Chapter 4 evaluates what would happen if the new contracts were based on a negotiated priority system along with implementing the other components of the Preferred Alternative compared to the No Action Alternative. Effects of the No Action Alternative are presented first, followed by those of the Preferred Alternative. As a reminder, the No Action Alternative would be based on the following priority system.

1. ***1st priority*** would provide supplemental irrigation water to CCWSC at their original water diversion rate of 4.0 AF/ac for 25,995 contract acres,

2. ***2nd priority*** would provide primary irrigation water to EBID at their original water diversion rate of 3.1 AF/ac for 22,689 contract acres,

3. After 1st and 2nd priorities were filled, the ***3rd priority*** would provide additional water for irrigation based on "beneficial use" (what crops could beneficially consume) and subject to water availability, equivalent to 7,711 acres for CCWSC and 4,448 (not including 918 added acres) acres for EBID.

The Preferred Alternative or the Proposed Action Alternative would be based on this priority system.

1. ***1st priority*** would provide CCWSC irrigation water equal to diverting 4.0 AF/ac measured at the point of diversion for 25,995 acres (consistent with the 1st priority contract acres in the expiring contract). CCWSC would be authorized to use that volume of water to irrigate the 25,995 acres and up to 7,711 acres (formally 3rd priority acres in the expiring contract) identified for irrigation.

2. ***2nd priority*** would provide EBID irrigation water equal to diverting 3.1 AF/ac measured at the point of diversion for 22,689 acres (consistent with the 2nd priority contract acres in the expiring contract). EBID would be authorized to use that volume to irrigate the 22,689 acres and up to 4,448 acres (formally 3rd priority acres in the expiring contract) identified for irrigation. Approximately 918 acres that currently lie outside of the district's boundaries are proposed to be included in this 2nd priority. The landowners of the 918 acres would need to petition the local district court to have these acres included within the EBID according to Montana statute. Reclamation would need to approve the inclusion before EBID could irrigate these acres.

3. ***3rd priority*** would provide irrigation water for beneficial use (what crops could beneficially consume) on the CCWSC and EBID acreage described above. The 3rd priority would only be

implemented when the 1st and 2nd priority full allotments had been met and subject to availability. The increased water allotment would be determined by the Joint Board.

A Drought Management Plan would be included, triggered at specific reservoir levels based on August EOM (end-of-month) forecasts. In addition, EBID shoulder season, winter release guidelines, target reservoir minimum pool levels, establishment of reserve funds, EBID shoulder season, and establishment of a memorandum of agreement between MDFWP and Reclamation will also be included as part of the Preferred Alternative.

Lastly, it should be noted that renewal of the O&M transfer agreement between Reclamation and EBID would be part of the Preferred Alternative. O&M actions that have been routinely carried out in past over long periods of time and do not constitute a change in O&M activities do not require additional NEPA compliance. This O&M transfer agreement includes routine O&M actions; including, but not limited to maintenance of the canal, removing unwanted vegetation from the face of the dam and canal, treating weeds, maintaining roads, and routine maintenance of the irrigation infrastructure. Extraordinary maintenance or other non-routine activities require NEPA compliance and the EBID will annually submit an O&M work plan to Reclamation listing these extraordinary activities. Reclamation will ensure environmental and cultural compliance are completed on these extraordinary activities prior to the work being initiated. The renewal of the O&M transfer agreement will not be discussed further in this EA.

Environmental Justice and Indian Trust Assets

Reclamation determined there would be no potential for the Preferred Alternative to have disproportionately high or adverse effects on low-income or minority populations. In addition, several Tribes (Shoshone Bannack Tribe, Lemhi Shoshone Tribe, Federated Salish and Kootenai Tribes, and the Crow Tribe) were contacted in the past for other projects regarding Indian Trust Assets surrounding Clark Canyon Reservoir. There are no Indian Trust Assets found in the Clark Canyon Reservoir area; therefore, it was determined that Indian Trust Assets would not be affected.

Water Supply

Reclamation used its HYDROSS computer model to estimate effects to the water supply from the alternatives. **(A full description of the model, the assumptions, and criteria used in development of the model can be found in the Methods of Analysis section at the end of this report.)** This model was the basis on which the effects of the Preferred Alternative are compared to the No Action Alternative. The HYDROSS model did not take into account the potential climatic change on future water supplies. This is because there are no generally accepted regional climate models for the Beaverhead River basin. Any consideration of climate change and adjustment of model results would be speculative.

Both the No Action Alternative and Preferred Alternatives would continue to supply water from Clark Canyon Reservoir and from irrigation return flows. Continued sedimentation of the reservoir would decrease storage. Based on the projected 100-year sedimentation rate, the reservoir's joint-use pool would decrease about 2,000 AF (or 1%) from the present.

Inflows to the reservoir and water gains in river reaches would not be anticipated to change much between the alternatives. Conversion to higher efficiency irrigation systems could reduce return flows, but this would be offset by reduced demands for water from reservoir storage and river flows.

Small differences in the water supply for each alternative would result from return flow differences. These differences would be caused by changes in water distribution from the priorities of a particular alternative.

No Action Alternative

The No Action Alternative would maintain deliveries for CCWSC and EBID at current water delivery rates and priorities. At times, reservoir storage could be drawn down to 10,000 AF (minimum pool) or less to meet water demands. During drought years, EBID's allocation would be reduced first to provide CCWSC their allocation if at all possible. Reduced water diversions to EBID would lessen return flows to downstream lands. Authorization for EBID shoulder season irrigation would be a part of this alternative.

Preferred Alternative

This alternative would provide a water allocation based on the total number of original contract acres, but water could be distributed to all irrigable lands of CCWSC and EBID. This alternative would also allow for distribution of water to 918 acres currently outside EBID boundaries once EBID boundaries were petitioned for change and approval by the District Court. During normal water years, this could result in greater 3rd priority demands and consequently less reservoir storage for the following irrigation season when compared to the No Action Alternative.

This alternative would also differ from No Action because it would include a Drought Management Plan. The plan would go into effect when the August EOM reservoir contents were forecast to be less than 50,000 AF. Stepped allocations for both contract water users based on these forecasts would have the effect of allowing more carryover storage when compared to No Action. Less water would be diverted during a drought to carry more water over to the following year in anticipation of a continued drought. Using simulated median March EOM reservoir contents, storage in the Preferred Alternative would be 151,000 AF in comparison to 147,600 AF for No Action, or 2% more.

Reduced diversions during droughts would lessen return flows available for irrigation of downstream lands. Based on simulated average annual cumulative return flows, the Preferred Alternative would result in 86,200 AF of return flows at the Beaverhead River near Twin Bridges stream flow gauge (USGS Station 06018500), compared to 87,900 AF for No Action, or 2% less. Shoulder season for EBID would continue during both spring and fall for irrigation and to charge up the canal conveyance system through exercise of the natural flow right in accordance with Montana water laws.

Cumulative Impacts

This EA identifies several past, present, and reasonably foreseeable future actions in the "Other Actions Occurring in the Beaverhead River Basin" section of Chapter 1. The stored water supply in the reservoir would be used for irrigation and would be replenished dependent on precipitation and inflows. The Beaverhead River conditions would be dependent on releases from the dam, precipitation, temperatures, and depletions from other water users in the Beaverhead Valley and tributaries. When the impacts of implementing this Federal action are added to these other actions, the conversion to repayment contracts would not cumulatively impact the water supply of Clark Canyon Reservoir or the Beaverhead River.

Water Quality

Effects to water quality from the alternatives would be similar to present since they result from about the same supply of water. The Methods of Analysis section describes how effects of the alternatives were estimated.

No Action Alternative

This alternative, which would maintain deliveries for both districts at current water application rates, would not result in any change to water quality. Likewise, continued operation of the diversions, canals, laterals and related water conveyance and distribution facilities would not degrade water quality. Figure 4.1 shows total diversions in median (mid-point) and low flow years that would occur in this alternative.

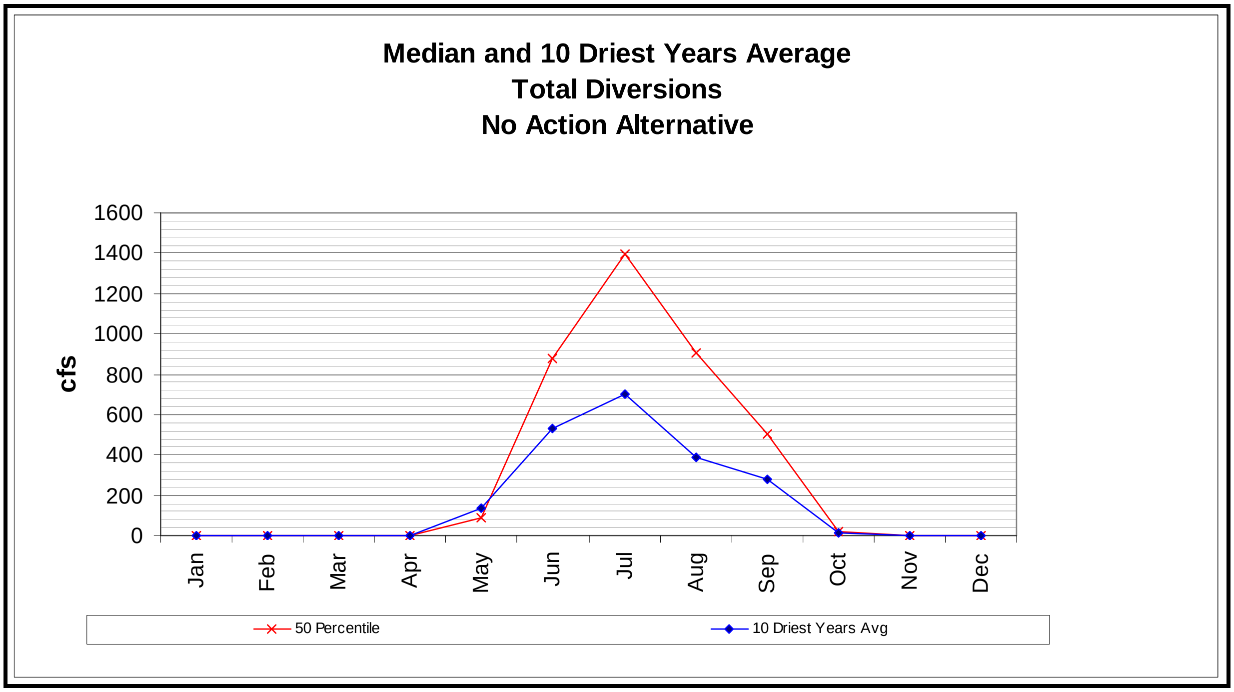


Figure 4.1: Total Diversion from the Beaverhead River

Nitrogen in Stone and Spring Creeks would remain at high levels as they have in the past.

Preferred Alternative

The alternative would not change water quality in the Beaverhead River Basin compared to No Action, and continued operation of system facilities would not change water quality. Likewise, continued operation of the diversions, canals, laterals and related water conveyance and distribution facilities would not degrade water quality. As Figure 4.2 shows, total diversions in the Preferred Alternative closely follow total diversions in No Action, both in timing and degree.

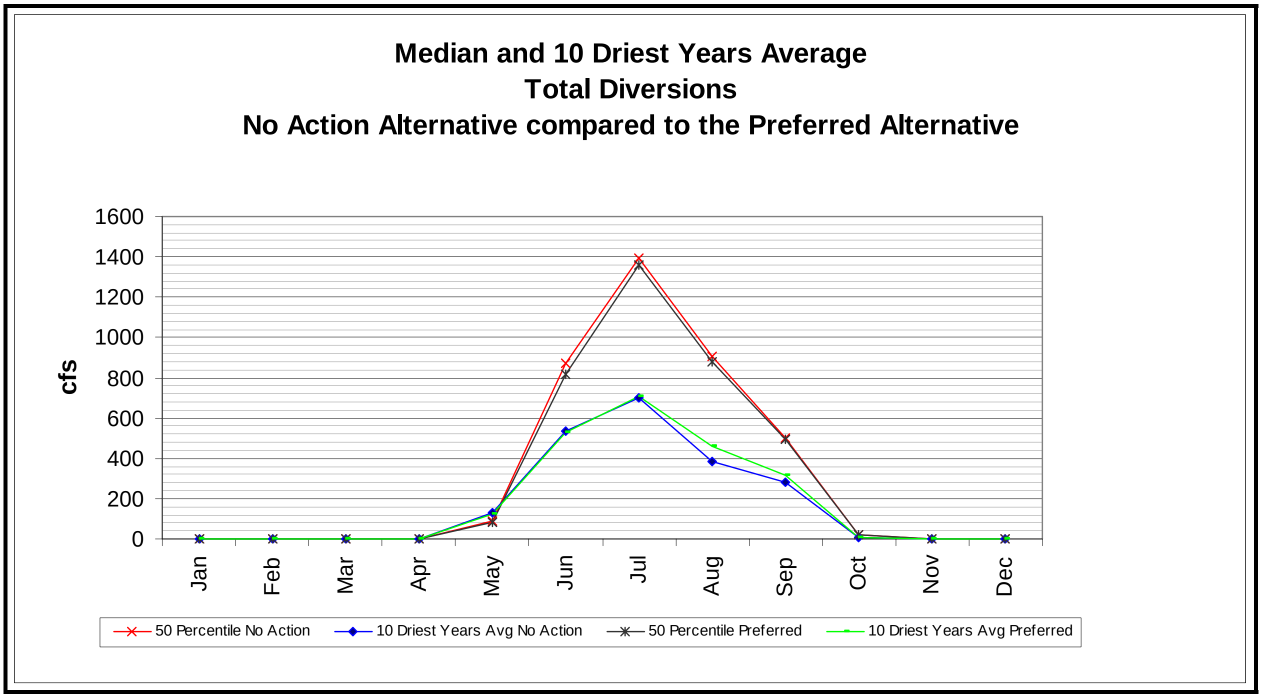


Figure 4.2: Total Diversion Comparison of No Action and Preferred

Table 4.1 shows the difference between the No Action Alternative and the Preferred Alternative in the median and driest 10 years. In all months in median flow years, the hydrograph closely follows that of No Action. However, less total diversions would be made in all months. This reduction in diversions would result in slightly more water in the river during the irrigation season. During the 10 driest years, the hydrograph closely follows that of No Action. Slightly less water would be diverted in May, June, and September, and slightly more in April, July, and August.

Table 4.1: Total Diversions (cfs) Comparison in Median and 10 Driest Years

	Median Flow Years			Driest 10 Years		
	No Action	Preferred	Difference	No Action	Preferred	Difference
April	0	0	0	0.6	0.9	0.3
May	87.5	84.7	-2.8	133.8	123.3	-10.5
June	875.3	813.8	-61.5	533.9	529.4	-4.5
July	906.5	876.7	-29.8	387.4	462.8	75.4
August	503.7	493.3	-10.4	282.2	312.8	30.6
September	19.8	19.6	-0.2	10.3	9.7	-0.6

Nitrogen levels in Stone and Spring Creeks would remain high as they have in the past, similar to the No Action Alternative.

Implementation of the Drought Management Plan and the minimum requirements to alleviate drought effects would not change water quality in the Beaverhead River basin or Clark Canyon Reservoir.

Cumulative Impacts

The proposed action would have no effect on water quality. Therefore, analysis of potential cumulative effects on water quality is not required.

Fisheries

Effects are divided between those for reservoir fisheries and those for river fisheries in the upper Beaverhead River, lower Beaverhead, and the Jefferson River. The analysis was based on fish conditions and used the HYDROSS hydrology model developed for this EA. The intent of the model was not to duplicate historic conditions, but rather to forecast hydrologic conditions to be used as a tool to compare the two alternatives. Fishery conditions in the various sections were compared and the fish species listed in Table 3.3 were analyzed as a group. Fishery conditions included populations, size, biomass, and condition (health) as factors for determining the various categories. Additional information on how the analysis was done can be found in Methods of Analysis. Shoulder season for EBID would continue during both spring and fall for irrigation and to charge up the canal conveyance system through exercise of the natural flow right in accordance with Montana water laws.

No Action Alternative

Clark Canyon Reservoir

Clark Canyon Reservoir would be operated as it has been in the past in this alternative. Fish populations and conditions would continue to depend on the surface area—thus on storage—of the reservoir. Conditions similar to the past would be expected, but for comparison purposes, modeled results were used. It should be noted that many of these declining years were predicted from the extremely low inflows of the 1930s and early 1950s before the reservoir was constructed. Also, the model delivers water to all demands regardless of conditions, where in reality, river flows and/or reservoir levels would be held higher by management actions in response to forecasted conditions. For comparison, modeling results indicate fishery conditions would be either “optimum” or “good” in 46% of the years, while 54% would have “fair” or “declining” fishery conditions under the No Action (Table 4.2). (Criteria and descriptions for the four categories for overall fisheries conditions can be found in Methods of Analysis.)

Table 4.2: Reservoir Fishery Conditions in No Action

Conditions	Criteria	Years	% of Record
Optimum	Sept EOM 100,000 AF or more	20	27%
Good	Sept EOM 60,000-99,000 AF	14	19%
Fair	Sept EOM 30,000-59,000 AF	7	9%
Declining	Sept EOM less than 30,000 AF	32	45%

For perspective, historical records since the dam was built in 1964-2002 show the reservoir at optimum conditions for 25 years (66% of the time), good conditions for 8 years (21%), fair for 4 years (11%) and declining only one year (3%), 2002. That year (2002), the reservoir dipped below the "declining" threshold after several years of low inflows, due to drought. These conditions are expected to be similar under the No Action Alternative. Additionally, the reservoir has been at low levels due to drought in the past three years that are not included in the model.

Upper Beaverhead River

The upper Beaverhead River reach runs from Clark Canyon Dam outlet works downstream to Barretts Diversion Dam. As with the reservoir, water conditions in the upper Beaverhead River would be similar to the past, with winter flows set to reflect reservoir conditions and forecasted inflows. Low-water years would continue to be characterized by minimum flows, with better conditions for fisheries in better water years. Again, the model does not account for management actions to provide better flows, so the worst-case scenario in the model is depicted. Modeling indicated upper river fishery conditions would be either optimal or good about 33% of the time, fair or declining about 67% of the time (Table 4.3). (Criteria and descriptions of the four categories for overall fisheries conditions can be found in Methods of Analysis.)

Table 4.3: Upper Beaverhead Fishery Conditions in No Action

Conditions	Criteria	Years	% of Record
Optimum	Oct-March Mean more than 200 cfs	16	22%
Good	Oct-March Mean 125-199 cfs	8	11%
Fair	Oct-March Mean 65-124 cfs	10	13%
Declining	Oct-March Mean less than 65 cfs	40	54%

Fishery conditions, fish abundance, size, and health would be expected to be similar to what has occurred in the past, since this alternative would continue similar reservoir operations for the next 40 years. Higher releases would be expected when adequate reservoir levels were present and lower releases during drought years.

Lower Beaverhead River
The lower Beaverhead River reach runs from Barretts Diversion Dam downstream to the confluence of the Big Hole River. This fishery also depends on ample in-stream flows, but summertime flows tend to be the limiting factor for fisheries. MDFWP was granted an in-stream flow reservation of 200 cfs for the Beaverhead River from Clark Canyon Dam to its mouth. The priority date of the reservation is July 1, 1985 (Montana Department of Fish, Wildlife and Parks, 1989). Again, modeling was used to predict future flows; conditions near the town of Twin Bridges were used for this analysis.

Another issue in this section of the river is the altered hydrograph characterized by low summer flows and rising hydrograph in the fall. The overall hydrograph of the river was graphed to visualize any changes due to the Preferred Alternative as compared to No Action. Two lines were plotted on the graph to represent median water years (the 50th percentile) and the ten driest years on record.

In this alternative, median flows in the Beaverhead near Twin Bridges would remain above 200 cfs for most of the year, dipping below this figure during May and September (Figure 4.3). The average of the 10 driest years would be well below 200 cfs for most of the year. In this alternative, 48 out of 74 years were characterized by the model as falling below 200 cfs in September, typically the lowest point of the water year.

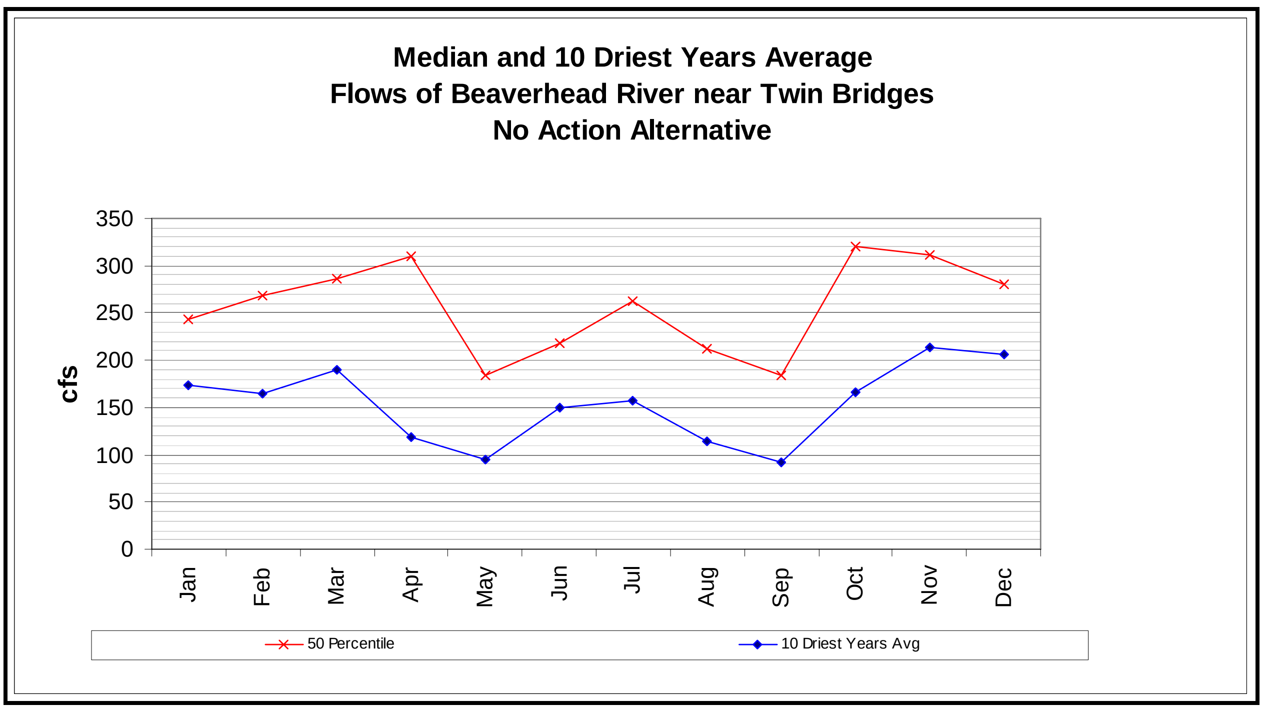


Figure 4.3: No Action Flows in the Lower Beaverhead River

River fishery conditions, fish abundance, size, and health would be expected to be similar to what has occurred in the past, since this alternative would continue similar reservoir operations and the same irrigation diversions would occur. This reach of the river would continue to have low flows and higher temperatures during the summer months. Higher flows would be expected when adequate reservoir levels were present and lower flows during drought years.

Jefferson River
Median flows in the Jefferson River at Twin Bridges would remain above 700 cfs for the entire year (Figure 4.4). The average 10 driest years would range from 446 cfs in September to 3,123 cfs in June. September would be the only month in which flows dropped below 500 cfs. The model predicted flows in the Jefferson to drop below 500 cfs in 14 out of 74 years of record in September.

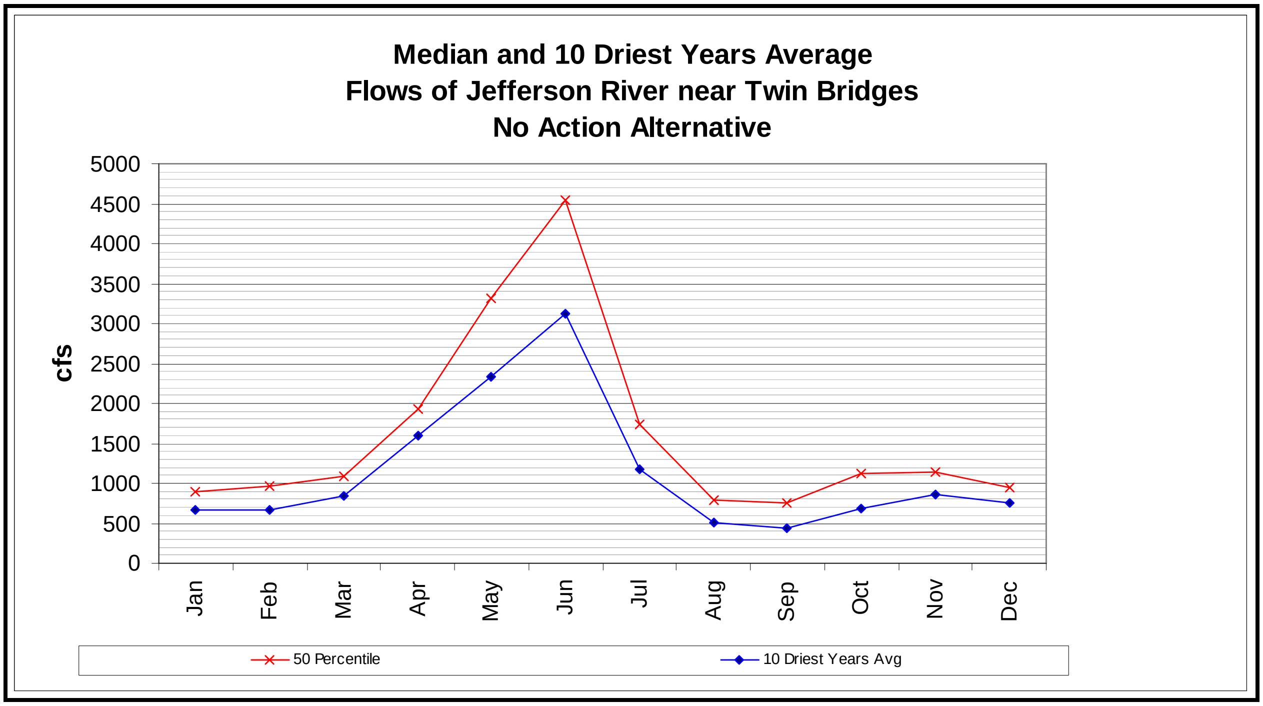


Figure 4.4: No Action Flows in the Jefferson River

Preferred Alternative

Fish condition, habitat, reservoir levels, and river flows will be very similar in the Preferred Alternative as compared to the No Action Alternative. However, the Preferred Alternative does include a drought management plan, minimum river flow releases, minimum reservoir levels, and the development of the MOU between Reclamation and the MDFWP. Fisheries would likely benefit from these additional measures included in this alternative. The development of the MOU between MDFWP and Reclamation will concentrate on the environmental health of the Beaverhead River. If the environmental health of the Beaverhead River is improved, the fishery would potentially improve. However, since improvement measures have not been identified, it's difficult to determine the extent of the fishery benefit. Therefore, the following analysis does not include any potential fishery benefit that is anticipated through cooperative effort.

Clark Canyon Reservoir
Effects to fisheries were considered adverse if they resulted in a substantial ($\geq$ 5 years) increase of incidence in declining years for fishery survival and production for the Preferred Action as compared to the No Action. Modeling indicated this alternative would result in better conditions for reservoir fisheries than the No Action Alternative (Table 4.4). This is because the Drought Management Plan would help conserve water when low water exists or a drought is forecasted. The Preferred Alternative would result

in three more years in the optimum or good categories compared to the No Action Alternative and three fewer years in fair or declining categories.

Table 4.4: Reservoir Fishery Conditions between the Two Alternatives

Conditions	Criteria	No Action		Preferred		Difference
		Years	%	Years	%	
Optimum	Sept EOM more than 100,000 AF	20	27%	19	26%	-1
Good	Sept. EOM 60,000-99,000 AF	14	19%	18	24%	+4
Fair	Sept EOM 30,000-59,000 AF	7	9%	21	28%	+14
Declining	Sept EOM less than 30,000 AF	33	43%	16	22%	-17

The Drought Management Plan benefits reservoir fisheries by improving 14 years of declining condition in No Action Alternative to the fair condition. Closer analysis reveals that 16 fair years were counted that had less than three months with pools less than 60,000 AF which would typically not drop below 50,000 AF, the trigger point for the Drought Management Plan. Although, this is still less than the threshold for the good category, these pools would provide better conditions than the No Action Alternative. The increased reservoir levels would provide increased opportunities for better fish condition, fish abundance, size, and health.

Upper Beaverhead River

Effects to fisheries were considered adverse if they resulted in a substantial (≥ 5 years) increase of incidence in declining years for fishery survival and production for the Preferred Action as compared to the No Action. Modeling shows very similar upper Beaverhead River flows in the Preferred Alternative compared to No Action Alternative (Table 4.5). The alternative did show one more year in the optimum category and one year fewer in the good category. Two years moved from fair to the declining category in this alternative.

Table 4.5: Upper Beaverhead Fishery Conditions between the Two Alternatives

Conditions	Criteria	No Action		Preferred		Difference
		Years	%	Years	%	
Optimum	Oct-March Mean more than 200 cfs	16	22%	17	23%	+1
Good	Oct-March Mean 125-199 cfs	8	11%	7	9%	-1
Fair	Oct-March Mean 65-124 cfs	10	13%	8	11%	-2
Declining	Oct-March Mean less than 65 cfs	40	54%	42	57%	+2

As indicated in the previous paragraph, fish conditions would be expected to remain essentially the same between the two alternatives. Fish abundance, size, and health would be similar to the No Action Alternative. This alternative has a minimum winter flow associated with it and a drought management plan. These two components of the alternative were included to protect fish during extreme drought periods. Considering the modeling limitations, future conditions for fisheries in the upper Beaverhead River in the Preferred Alternative would be expected to be similar, if not improved, to historical conditions.

Lower Beaverhead River

These results were analyzed to compare the number of years during the period of record in which flows would be expected to drop below the 200 cfs level. A decrease in such years would have a positive fishery effect, while an increase would have a negative effect. Modeling indicates the Preferred Alternative would result in 47 out of 74 years where the river would drop below 200 cfs in September, one fewer year than in No Action Alternative. The hydrograph of the river is shown in Figure 4.5 for the median and the average 10 driest water years. Analysis shows there would be very little effect on the hydrograph in the Preferred Alternative. No effects to the fishery in this part of the river would be expected as part of implementing the Preferred Alternative when compared to the No Action Alternative. Low summer flows and altered hydrograph would continue, but the MOU to improve environmental health of the river will look into measures that will improve this section of the river. Improvement of this section of the Beaverhead River would benefit many fish species including the arctic grayling, a species petitioned to be listed as threatened or endangered by the Service. However, a fine balance will need to be determined; improving the river flows and temperature will likely improve the general fishery which includes non-native salmonids. These non-native fish easily out-compete grayling and prey on juvenile grayling that inhibits population growth.

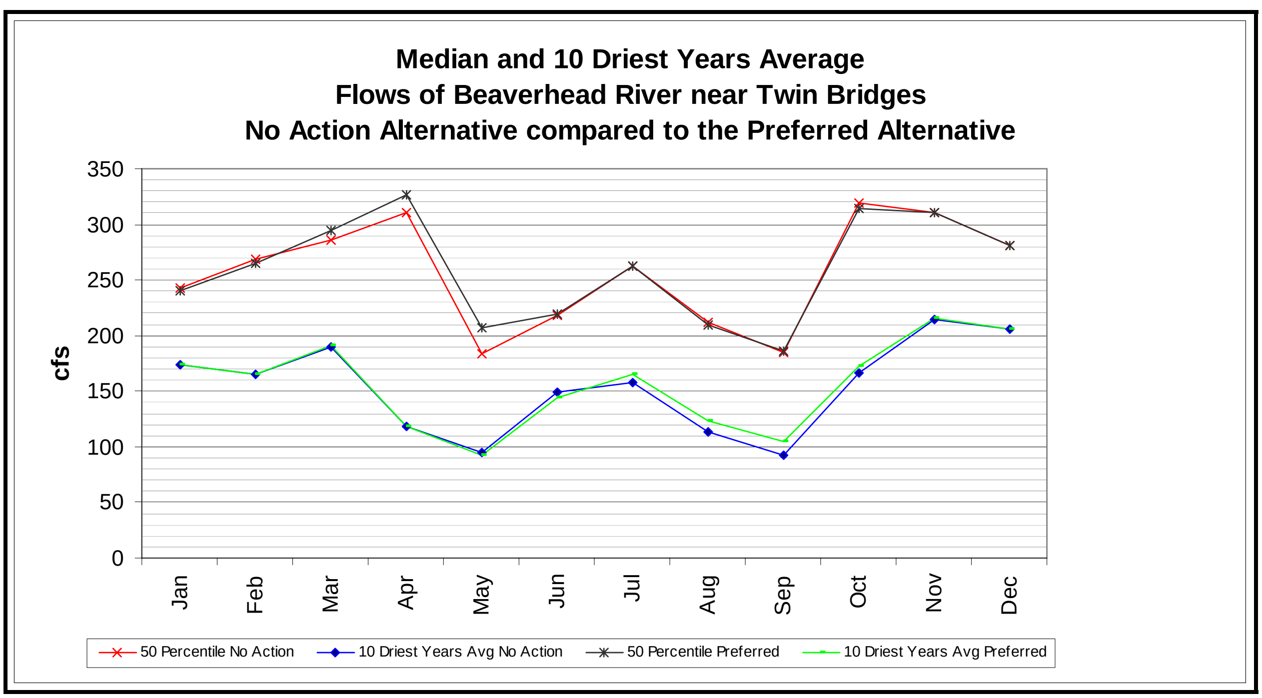


Figure 4.5: Lower Beaverhead Flows between the No Action and the Preferred Alternative

Jefferson River

The Jefferson River at Twin Bridges was also modeled to compare effects of the No Action Alternative to the Preferred Alternative. The overall hydrograph of this river was graphed to visualize any changes. The hydrograph of the various water year types under the Preferred Action alternative are shown superimposed over the No Action alternative graph in Figure 4.6. There appears to be no impact to any of the hydrographs as a result of implementing the Preferred Alternative and no effects to that fishery or any other parameters that affect the fishery would be expected.

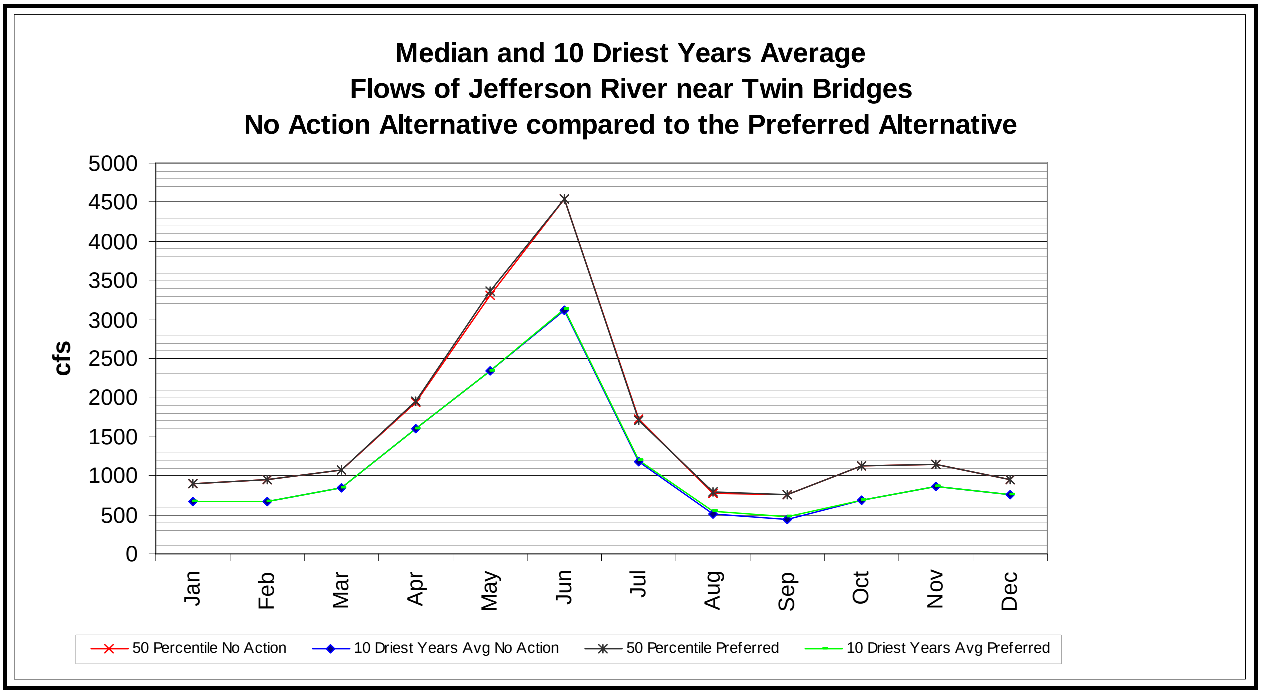


Figure 4.6: Jefferson River Flows in the No Action and Preferred

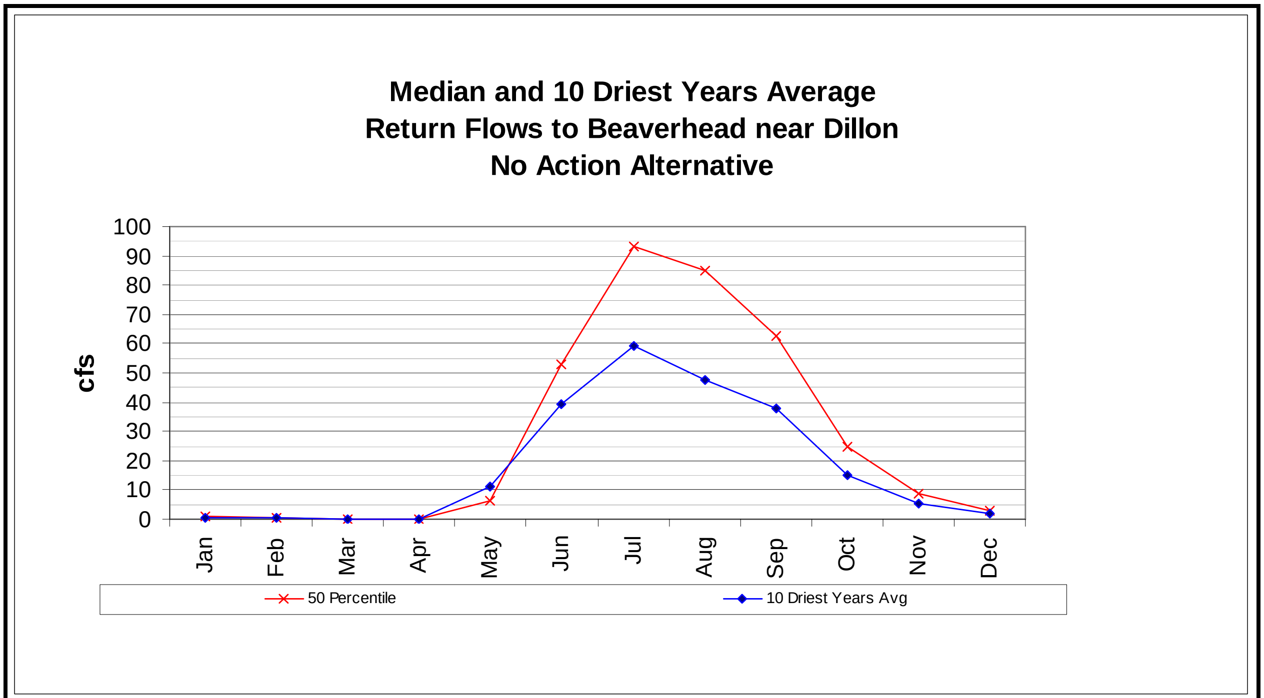
Cumulative Impacts

This EA identifies several past, present, and reasonably foreseeable future actions in the "Other Actions Occurring in the Beaverhead River Basin" section of Chapter 1. When the impacts of implementing this Federal action are added to these other actions, the conversion to repayment contracts would not cumulatively impact fisheries in either Clark Canyon Reservoir or the Beaverhead River.

Wetlands

No Action Alternative

Return flows provide a water source for wetlands along the periphery of irrigation drains and in areas down slope of irrigation facilities. Irrigation return flows are an essential water source for palustrine wetlands in the valley, so a large reduction could adversely affect them. Return flows were modeled at two points on the Beaverhead River to assess effects on wetlands recharged by irrigation seepage and runoff. Figure 4.7 shows median return flow years and the 10 driest years for No Action expected near Dillon for the period of record. As the figure shows, return flows typically increase as the irrigation season begins, peak at the end of July, and then slowly decline until the beginning of the next irrigation season.

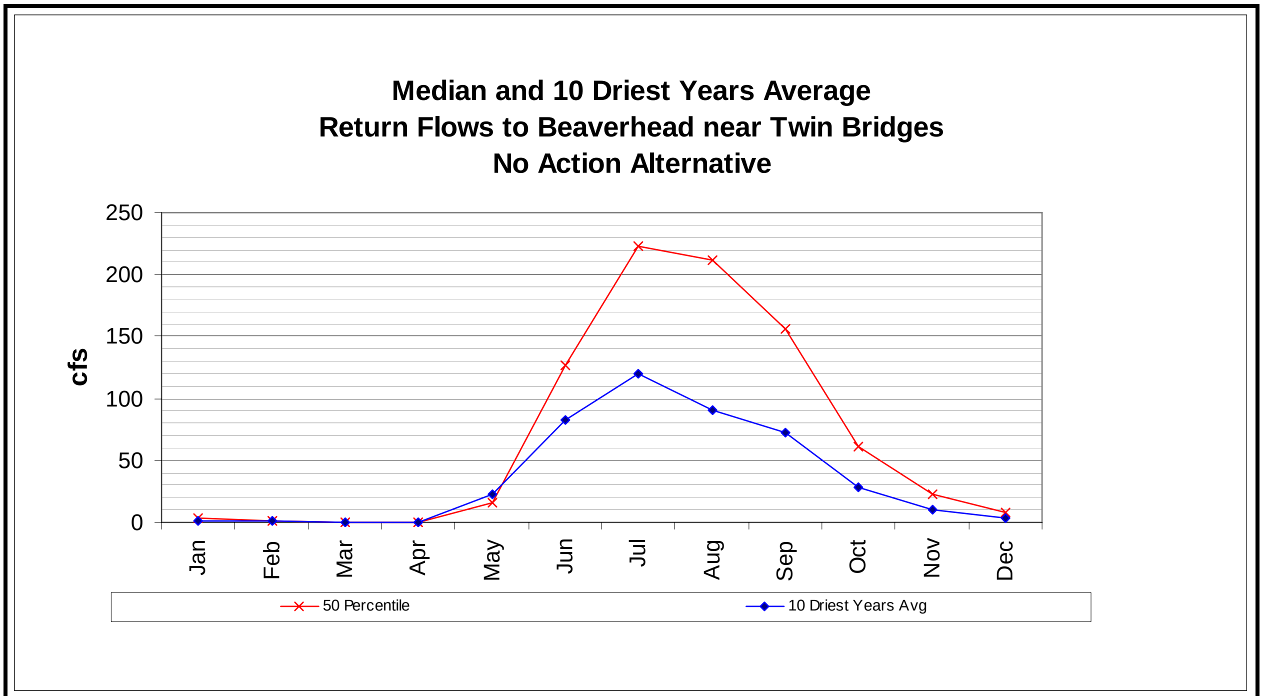


[1] **This graph represents return flows from the model "node" entering the river and does not represent the total discharge of the river at this station.**

Figure 4.7[1]: Return Flows to the Beaverhead near Dillon

Figure 4.8 shows median and driest return flow years expected at Twin Bridges. As in the previous figure, return flows typically increase with the irrigation season, peak at the end of July, and slowly decline.

The No Action Alternative would maintain current water deliveries to CCWSC and EBID. Wetlands associated with the districts along canals, laterals, and drains and all those supplied by general seepage would continue to receive similar volumes of water. The quantity and quality of wetlands and associated habitat, therefore, would remain unchanged from current conditions.



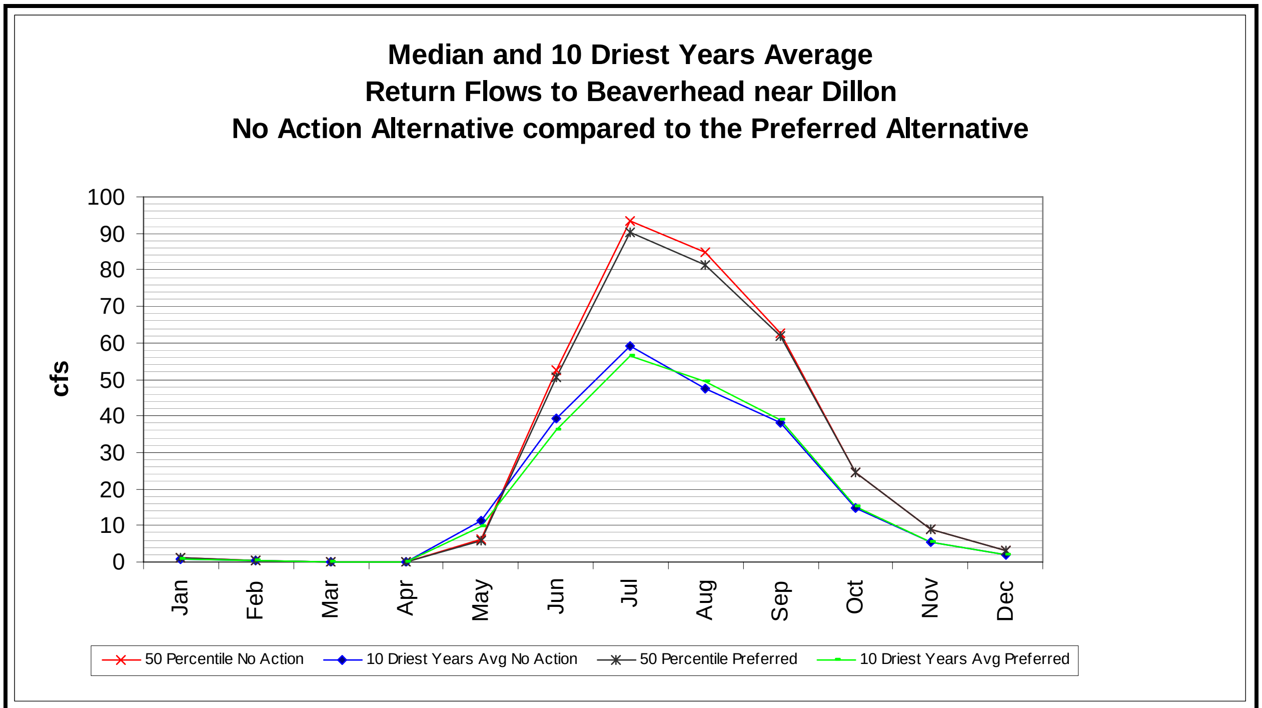
[1] **This graph represents return flows from the model "node" entering the river and does not represent the total discharge of the river at this station.**

Figure 4.8[1]: Return Flows to the Beaverhead near Twin Bridges

Preferred Alternative

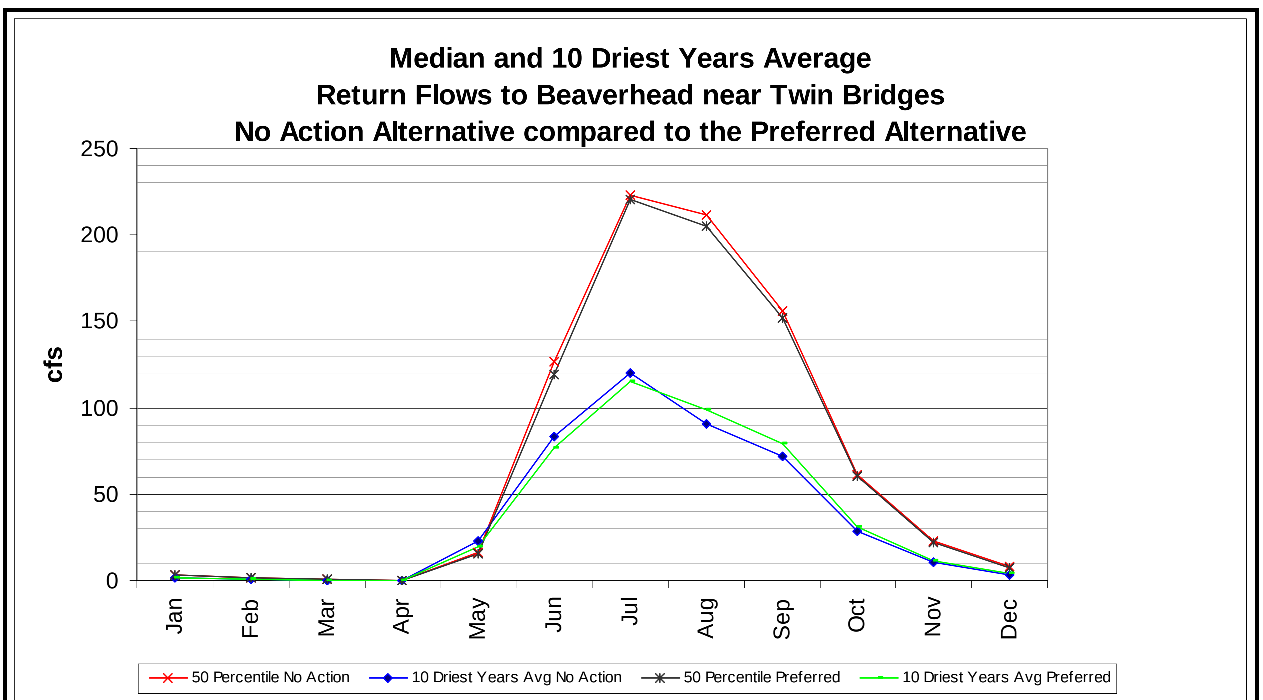
Irrigation return flows provide an essential water source for palustrine wetlands throughout the irrigation districts and a large reduction in return flows could negatively affect them. Figure 4.9 compares condition in No Action and the Preferred Alternatives in median return flow years and the 10 driest years expected near Dillon. As the figure shows, return flows in the Preferred would closely follow return flows in No Action both in time and volume of water returned to the river.

Figure 4.10 compares median and driest return flow years expected at Twin Bridges under the No Action and Preferred Alternatives. As shown in the previous figure, return flows in the Preferred Alternative would closely follow return flows in No Action both in time and volume of water returned to the river.



[1] **This graph represents return flows from the model "node" entering the river and does not represent the total discharge of the river at this station.**

Figure 4.9[1]: Return Flows to the Beaverhead near Dillon



[1] **This graph represents return flows from the model "node" entering the river and does not represent the total discharge of the river at this station.**

Figure 4.10[1]: Return Flows to the Beaverhead near Twin Bridges

The alternative would not result in the loss or degradation of wetlands in the Beaverhead River Basin when compared to No Action. Continued operation of diversions, canals, laterals and related water conveyance and distribution facilities would not lead to loss or degradation of wetlands areas. Wetlands associated with the irrigation districts—both through seepage and directly along canals, laterals, and drains—would continue to receive similar volumes of water. Timing of water deliveries would remain similar to No Action. Effects to wetlands would be negligible in this alternative and minimum impacts would be expected.

Drought conditions affect surface water (including wetlands) and available irrigation water. The Preferred Alternative would include a Drought Management Plan. Maintaining minimum water levels in the reservoir and river would benefit wetlands located on the periphery of these systems.

Cumulative Impacts

This EA identifies several past, present, and reasonably foreseeable future actions in the "Other Actions Occurring in the Beaverhead River Basin" section of Chapter 1. When the impacts of implementing this Federal action are added to these other actions, there are no cumulative impacts to wetlands identified as part of the conversion to repayment contracts.

Wildlife

No Action Alternative

Wildlife habitat trends in the Beaverhead River basin including Clark Canyon Reservoir are expected to be similar as they have in the past. Operations of the reservoir and river releases from the dam will not change with the renewal of the water service contracts with CCWSC and EBID.

Clark Canyon Reservoir lands would continue to provide short grass prairie habitat with intermittent sagebrush, riparian areas, and exposed mud flats during drawdown. Water levels would continue to fluctuate; however, reservoir levels would typically be the highest during the late winter to spring and then would start to decline once irrigation water is requested. This declining water level would not present a problem with nesting birds and would provide shorebirds with habitat during both spring and fall migrations. The wet and semi-wet cattail and willow dominated areas near Red Rock River and Horse Prairie Creek inflows would continue to provide forage and nesting habitat. There would be no impacts to migratory birds, as habitat would continue to be available.

The No Action Alternative would continue to provide suitable habitat for wildlife below the dam, and no change would be expected for the Wildlife Viewing Area on the Beaverhead River.

Preferred Alternative

Since the contracts with CCWSC and EBID would continue similar operations as in No Action Alternative, it would be expected that current wildlife habitat trends in the Beaverhead River basin would also continue. Clark Canyon Reservoir lands would continue to provide short grass prairie habitat with intermittent sagebrush, riparian areas, and exposed mud flats during drawdown. Water levels would continue to fluctuate, providing shorebirds with habitat during both spring and fall migrations. The wet and semi-wet cattail and willow dominated areas near Red Rock River and Horse Prairie Creek inflows would continue to provide forage and nesting habitat. Similar to the No Action Alternative, there would be no impacts to migratory birds, as habitat would continue to be available.

As stated previously, the Preferred Alternative includes a Drought Management Plan, minimum reservoir levels, and minimum river releases. Neither the Drought Management Plan nor the minimum requirements would affect wildlife in the Beaverhead River basin or on lands surrounding the reservoir. Therefore, no effects to wildlife are expected under this alternative.

Cumulative Impacts

The proposed action would have no effect on wildlife. Therefore, analysis of potential cumulative effects on wildlife is not required.

Threatened and Endangered Species

No Action Alternative

The effects of this alternative on Federally-listed species would be similar to current conditions. Following is the effects analysis on the species that might be present in the action area. There is no critical habitat designation surrounding Clark Canyon Reservoir or the Beaverhead River.

Bald Eagle

On May 24, 2005 and updated on February 8, 2006, the Montana Natural Heritage Program provided Reclamation with a list of all known bald eagle nests in the vicinity (see Table 3.5). Reclamation determined that none of these nests are located on or immediately surrounding Clark Canyon Reservoir. Some of the nests listed in Table 3.5 are adjacent to the Beaverhead River and no nests would be disturbed as part of the No Action Alternative.

This alternative would maintain current water deliveries, current trends, operations, and human disturbance levels. Minimum releases would be set at the 25 cfs level, but this alternative does not contain a mandatory minimum release. Therefore, there may be times of extreme drought conditions that these minimum releases fall below the 25 cfs value. If this occurs, it is highly dependent on the length of the drought, but this alternative is expected to have no effect on bald eagles because future operating conditions will be similar to past conditions.

Ute Ladies' Tresses

On February 8, 2006, the Montana Natural Heritage Program provided Reclamation with a list of all known Ute Ladies' Tresses locations in the vicinity of the project area (Table 3.6).

There would be little change in the current reservoir operations associated with this alternative. Current wetlands would be maintained since this alternative would maintain current water deliveries. There is no ground disturbing activities proposed under this alternative. Because of no change in reservoir operations, no change in wetlands, and no ground disturbance activities in the No Action Alternative, there would be no effect to the Ute ladies' tresses.

Canada Lynx
Suitable habitat is located outside the area of potential effects, but there is the possibility of the Canada lynx traveling through the area. Current trends, populations, and human disturbance levels would continue as at present. As a result, there would be no effects to the Canada lynx in No Action.

Grizzly Bear
Suitable habitat is located outside the area of potential effects, but there is the possibility of the grizzly bear frequenting the Clark Canyon Reservoir area. Current trends, populations, and human disturbance levels would continue as present in this alternative. Therefore, there would be no effect to the grizzly bear.

Gray Wolf
Wolves could disperse through the area of potential effects. Current trends, populations, and human disturbance levels would continue as at present. Therefore, there would be no effect to gray wolves in the No Action Alternative.

Preferred Alternative

The Preferred Alternative would incorporate new contracts based on a priority system similar to No Action Alternative. Therefore, effects on Federally listed species that occur in the area or that may migrate through the area would be similar to the No Action Alternative.

Bald Eagle
As indicated in the No Action Alternative, the Montana Natural Heritage Program reported nest sites in the Beaverhead Valley (Table 3.5). Reclamation determined that none of these nests are located on or immediately surrounding Clark Canyon Reservoir. Some of these nests are located adjacent to the Beaverhead River. There would be no construction associated with the alternative and no nests would be disturbed as part of the Preferred Alternative.

This alternative would continue water deliveries, trends, operations, and human disturbance levels similar to what is expected to occur in the No Action Alternative. However, implementation of a drought management plan and minimum releases guidelines of 25 cfs are a part of this alternative. During extreme drought periods, the drought management plan and minimum releases would be expected to protect fish and bald eagle prey in the Beaverhead River. Implementation of the Preferred Alternative would have no effect on bald eagles.

Ute Ladies' Tresses
As indicated in the No Action Alternative, the Montana Natural Heritage Program reported the presence of Ute ladies' tresses at three locations in the Beaverhead Valley (Table 3.6). The Preferred Alternative would maintain current water deliveries and there would be little change in reservoir operations. This alternative would only provide irrigation water to existing farmlands, and there would be no conversion of wetlands to farmlands. Stored irrigation water would continue to indirectly provide water to wetlands and marsh areas. Given the fact that it would maintain similar water deliveries and no new farmlands would be created, Reclamation determined that the Preferred Alternative would have no effect on the Ute ladies' tresses.

Canada Lynx
Suitable habitat is located outside the area of potential effects, but there is the possibility of the Canada lynx dispersing through the area. Current trends, populations, and human disturbance levels would continue as at present. Thus, there would be no effect to Canada lynx in the Preferred Alternative.

Grizzly Bear
Suitable habitat is located outside the area of potential effects, but there is the possibility of the grizzly bear dispersing through the area. Current trends, populations, and human disturbance levels would continue as present in the Preferred, so there would be no effect to the grizzly bear.

Gray Wolf
Gray wolves could disperse through the area of potential effects. Since current trends, populations, and human disturbance levels are expected to continue, there would be no effect to gray wolves in the Preferred Alternative.

Cumulative Impacts

The conversion to repayment contracts as outlined in the Preferred Alternative would have no effect on threatened or endangered species. Therefore, analysis of potential cumulative effects on threatened or endangered species is not required.

Social and Economic Conditions

Hydrology models for the study predicted changes in the average annual water supply to farms for the different alternatives. The model results, accounting for conveyance system losses and on-farm efficiencies, were used to evaluate the potential impacts to the irrigators. The indicator used in the analysis is the amount of water available for beneficial use by the crop, as measured at the crop root zone.

The two primary methods of applying irrigation water to crops utilized by irrigators in the both the CCWSC and the EBID are flood and sprinkler application techniques. Due to the difference in efficiencies in the two methods, the amount of water diverted at the river headgate to the crop root zone is different for the two irrigation methods.

No Action Alternative

Table 4.7 displays the water delivered to the crops, at the crop root zone, for the No Action Alternative. For the CCWSC, an average of 1.47 AF/ac would be delivered to their sprinkler-irrigated crops and an average of 1.36 AF/ac would be delivered to the flood irrigated crops. Water delivered to all crops would average 1.45 AF/ac for the 33,706 acres of the CCWSC.

For EBID, 1.04 AF/ac would be delivered to their sprinkler-irrigated crops and 1.01 AF/ac to the flood-irrigated crops. Water delivery would average 1.04 AF/ac to the crops grown on the 27,137 acres of the EBID.

Table 4.7: Water Deliveries to the crop root zones in the No Action Alternative

		AF/ac (33,706 ac)
CCWSC	Sprinkler Crops	1.47
	Flood Crops	1.36
	Average to the Crops	1.45
		AF/ac (27,137 ac)
EBID	Sprinkler Crops	1.04
	Flood Crops	1.01
	Average to the Crops	1.04

Agriculture, forestry, fishing and hunting, and mining (as a group) are the 2nd leading industry influencing the regional economy (see Table 3.10). Irrigated agriculture economy and recreation economy (primarily fishing) is dependent on water available in Clark Canyon Reservoir and the Beaverhead River. The No Action Alternative would not change the amount of water delivered through the system; therefore, it would have similar economic influences and impacts to what has occurred in the past.

Preferred Alternative

Table 4.8 shows the water delivered to the crop root zones for the Preferred Alternative. For the CCWSC, an average of 1.38 AF/ac would be delivered to sprinkler-irrigated crops and an average of 1.29 AF/ac to the flood-irrigated crops. Water delivery would thus average 1.36 AF/ac to the 33,706 acres of the CCWSC.

For EBID, an average of 1.05 AF/ac would be delivered to sprinkler-irrigated crops and an average of 1.01 AF/ac to flood-irrigated crops. Water delivery would thus average 1.05 AF/ac for the 28,055 acres of the EBID.

Table 4.8: Water Deliveries to the crop root zones in the Preferred Alternative

		AF/ac (33,706 ac)
CCWSC	Sprinkler Crops	1.38
	Flood Crops	1.29
	Average to the Crops	1.36
		AF/ac (28,055 ac)
EBID	Sprinkler Crops	1.05
	Flood Crops	1.01
	Average to the Crops	1.05

Water users in the CCWSC would receive on average slightly less water in the Preferred Alternative when compared to No Action Alternative due to the implementation of the DMP. With the addition of the 918 acres to the EBID, little change is discernable to their crops when comparing the No Action Alternative to the Preferred Alternative, based on average conditions. There are benefits to the EBID due to implementation of the DMP in below average water years.

As mentioned in the No Action Alternative, irrigated agriculture economy and recreation economy (primarily fishing) is dependent on water available in Clark Canyon Reservoir and the Beaverhead River. This alternative would not change the volume of water delivered through the system and the economic influences and impacts would be similar to the No Action Alternative. On the basis of the regional irrigated agricultural economy, the Preferred Alternative would allow more irrigated acreage, the extra water to be distributed between the CCWSC and EBID in a more equitable manner. The decrease in water delivered to CCWSC in the Preferred Alternative would be minimal that no financial burden would be placed on CCWSC shareholders. This alternative would also allow EBID to receive some water in water-short years, which would not happen under the No Action Alternative. The Preferred Alternative would have similar economic influences and impacts to what would occur with implementation of the No Action Alternative.

Cumulative Impacts

As stated above, the Preferred Alternative would have similar economic influences and no impacts to what will occur with implementation of the No Action Alternative. Therefore, there are no cumulative impacts to economics identified as part of the conversion to repayment contracts.

Recreation

The Methods of Analysis section provides information on how effects of the alternatives were estimated.

No Action Alternative

This alternative would continue to deliver water for irrigation similar to what occurs presently. Recreational opportunities would not change and facilities would not be altered. Recreational angling and commercial angling would continue. The number of visitors utilizing the facilities would be dependent on reservoir water levels and fishing success. Reservoir water levels would be dependent on irrigation demands, drought conditions, and inflows. Implementation of this alternative would not impact other Federal lands managed by other Federal agencies.

Clark Canyon Reservoir

Operation of the reservoir would continue as present. As indicated previously, no change in recreation facilities would occur, and any future proposed land and recreation facility changes are beyond the scope of contract renewal.

Use of boat ramps would depend on water levels and locations. In dry years, several boat ramps do not reach the water's edge at present. Beaverhead Campground north boat ramp provides low-water boat launch capabilities. Boat launching would be restricted to this single ramp in dry years, but boating and other water-based recreational activities would continue.

Median reservoir elevation is 5,533 feet msl, with the 20th percentile elevation at 5,512 feet msl, in comparison to the boat ramp elevations listed in Table 4.9.

Table 4.9: Boat Ramp Elevations in the No Action Alternative (feet msl)

Ramp	Top of Ramp (ft)	End of Ramp (ft)	Current Status
Beaverhead Campground North	5535	5496	Open
Beaverhead Campground South	5540	5525 (est)	Open
Beaverhead Marina	5540	5525 (est)	Marina closed
Horse Prairie Campground	5540	5525 (est)	Ramp closed as unstable
Lone Tree Campground	5538	5533	Open

Beaverhead River access below the dam would not change in this alternative. Visitation at the reservoir would remain constant or increase slightly in the future due to increases in the general population. Commercial users would continue to use Reclamation lands and facilities to access Clark Canyon Reservoir and the upper Beaverhead River. Reclamation will continue to identify commercial uses of Reclamation facilities and lands and permit accordingly.

Barretts Diversion Dam

Fluctuations in the Beaverhead River would continue in this alternative as they do at present. Most water-based recreational activities occur during the April-September irrigation season, when river flows at Barretts Diversion Dam are the highest.

Preferred Alternative

This alternative would continue to deliver water for irrigation similar to the No Action Alternative. Recreational opportunities would not change and facilities would not be altered. Recreational angling and commercial angling would continue. The number of visitors utilizing the facilities would be dependent on reservoir water levels and fishing success. Reservoir water levels would be dependent on irrigation demands, drought conditions, and inflows. Implementation of this alternative would not impact other Federal lands managed by other Federal agencies. When compared to the No Action Alternative, there would be no change to recreation opportunities or recreation facilities.

Clark Canyon Reservoir

This alternative would not affect recreational facilities or opportunities at Clark Canyon Reservoir.

Recreational facilities would continue to be operated as in the past. Recreational opportunities and annual use levels would not change from current levels with the implementation of the new contracts. Recreational use levels are dependent on fluctuating water levels which would continue as present because of contractual water deliveries and Beaverhead River access below the dam would not change in this alternative. Visitation at the reservoir would remain constant or increase slightly in the future due to increases in the general population. Commercial users would continue to use Reclamation lands and facilities to access Clark Canyon Reservoir and the upper Beaverhead River. Reclamation will continue to identify commercial uses of Reclamation facilities and lands and permit accordingly.

The Preferred Alternative EOM reservoir elevations and Beaverhead River flows measured at Barretts Diversion Dam would be similar to the No Action Alternative as shown in Table 4.10.

Barretts Diversion Dam

The implementation of this alternative would not adversely affect recreation or recreation opportunities at Barretts Diversion Dam. Recreational facilities would continue to be operated as they have in the past. Recreation opportunities and use levels would not change due to the renewal and implementation of the new contracts. Differences in the median Beaverhead River flows between the two alternatives are shown in Table 4.10.

Table 4.10: Median EOM Reservoir Levels (ft) and Median Beaverhead River Flows (cfs) Measured at Barretts Diversion Dam

	No Action		Preferred Alternative	
	EOM Elevations (ft)	Beaverhead River flows (cfs)	EOM Elevations (ft)	Beaverhead River flows (cfs)
January	5536	106	5537	106
February	5538	111	5539	109
March	5541	148	5542	146
April	5543	220	5544	236
May	5545	334	5546	355
June	5540	914	5540	901
July	5530	1139	5530	1093
August	5520	761	5522	677
September	5515	356	5518	375
October	5522	111	5524	112
November	5528	116	5529	116
December	5533	108	5533	108

Only five months would the Beaverhead River flows be less in the Preferred Alternative when compared to the No Action Alternative. However, during those same five months, the median EOM reservoir levels would be remain the same between the two alternatives or slightly higher in the Preferred Alternative (Table 4.10). There is a correlated balance between reservoir levels and in stream flows. These in stream flow differences are primarily attributed to the implementation of a drought management plan. During drought years, releases would be decreased during the prime irrigation season in the attempt to retain more reservoir storage for carry over. The lowest predicted flows during the prime recreation season (June, July, and August) are 677 cfs. Flows near that rate provide ample recreational opportunities.

Therefore, the decreased river flows in the Preferred Alternative would not adversely affect the Beaverhead River recreational opportunities or recreation opportunities at Barretts Diversion Dam.

Cumulative Impacts

This EA identifies several past, present, and reasonably foreseeable future actions in the "Other Actions Occurring in the Beaverhead River Basin" section of Chapter 1. Multiple recreational opportunities exist at Clark Canyon Reservoir and the Beaverhead River. When the impacts of implementing this Federal action are added to these other actions, there are no cumulative impacts to recreation or recreational opportunities identified as part of the conversion to repayment contracts.

Other Resources Potentially Affected

Although no issues with the following resources were identified during scoping meetings or by the study team, consideration is required by Federal regulation.

Water Conservation

No-Action Alternative

The requirement for CCWSC and EBID to comply with Section 210 of the Reclamation Reform Act would remain in effect. Both districts would be required to update their water conservation plans under Section 210 at least every five years. NEPA compliance would be done when specific measures were implemented.

Preferred Alternative

No specific water conservation measures were included, and any measures requiring Federal action would be evaluated as the need arose. Both districts would be required to update their water conservation plans according to Section 210. The Memorandum of Agreement with MDFWP will consider various water conservation measures that can be implemented, but none yet have been identified.

Cultural Resources

Impacts to cultural resources were evaluated to comply with cultural resource statutes and executive orders, effects on cultural resources focused on these questions related to contract renewal:

- How would renewal of the irrigation contract at Clark Canyon Reservoir affect historic and prehistoric cultural resources?

- How would contract renewal affect Indian sacred sites on lands managed by Reclamation?

No Action Alternative

The area has been farmed and irrigated for 50 years, and—in some cases—for over 100 years. These farmed areas will continue to be farmed as they have in the past. Reclamation has determined that many of the canals and laterals of CCWSC meet the definition of a historic property. However, the EBID canals and laterals are not 50 years old and do not meet the exceptional significance criteria definition for a historic property. No change to either CCWSC or EBID's canals and laterals are proposed under this alternative.

This alternative would not affect the function or usefulness of the canals or laterals, there would be no effect on historic properties. Reclamation has determined that renewing water service contracts or converting to repayment contracts do not have the potential to cause effects to cultural resources. Therefore, this alternative will have no potential to effect cultural resources or historic properties.

Preferred Alternative

The additional irrigated acreage that may be added to the EBID under this alternative has been farmed in the past. Establishment of a Drought Management Plan and formation of a Joint Board would be administrative changes. Effects to cultural resources would thus be non-existent.

As described in the No Action Alternative, Reclamation has determined that renewing water service contract or converting to repayment contracts do not have the potential to cause effects to cultural resources. The Preferred Alternative will have no potential to effect cultural resources or historic properties.

Noxious Weeds

The Montana County Noxious Weed Control Law (MCA 7-2101 through 2153), was established to protect Montana from destructive noxious weeds. Noxious weeds can cause lower crop yields, increased maintenance, displace native plant communities, and lower biodiversity. Controlling noxious weeds is good farming practice.

No Action Alternative

The No Action Alternative would continue present noxious weed practices, so no change in noxious weed management on private or Federal land in CCWSC or EBID would be expected.

Preferred Alternative

Like the No Action Alternative, this alternative would continue present noxious weed practices, so there would be no change expected in noxious weed management on private or Federal land in CCWSC or EBID.

Prime and Unique Farmlands

No Action Alternative

Prime farmland acreage serviced by CCWSC and EBID would remain unchanged in this alternative.

Preferred Alternative

Prime farmland acreage served by CCWSC would remain unchanged in this alternative. Prime farmland acreage served by EBID would increase by 918 acres if the EBID boundaries were formally changed. If the 918 acres met the criteria for Prime and Unique Farmlands, the increase would constitute a positive effect.

Cumulative Impacts

The conversion to repayment contracts as outlined in the Preferred Alternative would have no effect on other resources. Therefore, analysis of potential cumulative effects on the various other resources is not required.

Environmental Measures

Reclamation has agreed to the following measures as part of the Preferred Alternative.

- Reclamation and the MDFWP have developed a partnership agreement (a copy is in the Appendix) to work cooperatively on issues; such as fisheries, water quality, and flow alteration that affect the Beaverhead River basin. This agreement will foster communication between the two agencies. Through this cooperation and coordination; Reclamation will also encourage other interested entities to participate—including (but are not limited to) CCWSC, EBID, the Beaverhead River Watershed Committee, special interest groups, and any others that would like to contribute to the well being of the Beaverhead River.

- Continue data collection through MSU-Bozeman and Montana Tech to fill data gaps in existing water quality information. Additional studies would be initiated as needed.

- Work cooperatively with MDEQ during the TMDL planning and implementation process to work toward improving water quality on a watershed scale.

- Work cooperatively with the Beaverhead Watershed Group and other interested parties to collaboratively work toward improved water quality conditions within the watershed.

CONSULATION COORDINATION AND PUBLIC INVOLVEMENT CHAPTER 5

Chapter 5 describes Reclamation's public involvement, consultation, and coordination with state and other Federal agencies and interest groups during development of this EA.

Consultation

Endangered Species Act

Reclamation informally consulted with the U.S. Fish and Wildlife Service on the Endangered Species Act beginning in January 2005. Reclamation determined that the Federal action would have no effect to the five threatened species found in the action area. This determination was discussed with the Service during the informal consultation.

After the 2nd comment period ended (June 12, 2006), the Service sent Reclamation a memorandum recommending that the appropriate determination for bald eagles is "May Effect [sic] Not Likely to Adversely (Affect)." According to the Service, this determination was based on the possibility of reduced prey abundance in the lower river. Reclamation did not agree with the Service's recommendation because various components of the Preferred Alternative maintain or increase fish and prey abundance for bald eagles. Reclamation remained with their initial determination that this Federal action would have no effect on the bald eagle.

National Historic Preservation Act

The National Historic Preservation Act of 1966 (as amended in 1992) requires Federal agencies to consult with the Advisory Council on Historic Preservation concerning effects of Federal actions on historic properties. Reclamation has determined, as prescribed in 36 CFR 800.3(a)(1), that the proposed contract renewals are a type of undertaking that do not have the potential to cause effects on historic properties, and therefore has not consulted with the Advisory Council on Historic Preservation, the State Historic Preservation Officer, or other interested parties.

Other Federal Requirements

Neither of the alternatives would include development in the flood plain as described in Executive Order 11988, Floodplain Management or would include development that would affect wetlands as described in Executive Order 11990, Protection of Wetlands. The Federal action in this EA would also comply with Executive Order 13286, Protection of Migratory Birds.

Coordination

The following agencies and interest groups were coordinated with during the study:

- **U.S. Fish and Wildlife Service –** As discussed previously, the Endangered Species Act requires consultation between the Service and other Federal agencies if the Federal action is determined to affect listed species. Reclamation began informal consultation with the Service and met with the Service in January 2005 and January 2006 to discuss the proposed action, fish and wildlife resources, and threatened or endangered species. Through discussions with the Service, Reclamation determined there would be no effect to threatened or endangered species. However, after the 2nd comment period ended (June 12, 2006), the Service sent Reclamation a memorandum in regards to EA. The memorandum recommended that Reclamation include additional discussion on fish and wildlife resources and believes the appropriate determination for bald eagles is "May Effect [sic] Not Likely to Adversely (Affect)", based on the possibility of reduced prey abundance. Reclamation discussed this memorandum with the Field Supervisor, Ecological Services, Montana Field Office on June 20, 2006. As discussed in the Consultation Section above, Reclamation remained with their initial determination that this Federal action would have no effect on the bald eagle.
- **U.S. Army Corps of Engineers –** The Corps submitted scoping comments mentioning flood control regulation and capacity curves.
- **U.S. Natural Resources Conservation Service –** This agency assisted with the prime and unique farmlands sections.
- **Montana Fish, Wildlife and Parks –** Reclamation met with MDFWP to discuss past fishery data and effects of new contracts on the fishery, both in the reservoir and the rivers. In addition, MDFWP participated in the development of fishery criteria for analysis. MDFWP has entered into a MOU with Reclamation to improve the environmental health of the Beaverhead River. A copy of the MOU is in the appendix.
- **Montana Department of Natural Resources and Conservation** – This agency participated in some of the contract technical meetings.
- **Clark Canyon Water Supply Company –** CCWSC also participated in the contract technical meetings and reviewed alternative proposals,
- **East Bench Irrigation District** – EBID participated in the contract technical meetings and reviewed alternative proposals.

Public Involvement

Scoping

Internal scoping was conducted by Reclamation to determine concerns that could arise from renewing water service contracts or converting them to repayment contracts. Letters and postcards were sent out to the public announcing the proposed Federal action on December 17, 2004. Reclamation placed paid public notices in local newspapers announcing the scoping process and placed all information on Reclamation's website: www.usbr.gov/gp/mtao. Reclamation received input from the public during the 36 day public scoping process, including public meetings held in Dillon, Montana, January 11, 2005, and Twin Bridges, January 12, 2005. These meetings consisted of a short presentation on contract renewal followed by an open house to allow members of the public to ask questions. There were 27 attendees in Dillon and 18 attendees in Twin Bridges. Reclamation received written comments from 18 entities during the scoping process. The Public Comments and Responses section at the end of this report summarizes these comments.

Public Comment Period

Reclamation conducted two public comment periods during the NEPA process. The first public comment period began November 17, 2005 following the completion of the draft EA. Correspondence was mailed announcing the release of the draft EA. Paid public notices were placed in local newspapers and all notices and documents were placed on Reclamation's website: www.usbr.gov/gp/mtao. Initially, Reclamation had a 20 day comment period, but extended that period an additional 13 days. During the comment period, Reclamation conducted two public comment meetings; November 30, 2005 in Dillon, Montana and December 1, 2005 in Twin Bridges, Montana. These meetings consisted of a short presentation followed by an open house to allow members of the public to ask questions. There were 11 attendees in Dillon and 9 attendees in Twin Bridges. Reclamation received written comments from 77 entities. These comments and responses are listed in the Public Comments and Responses section at the end of this document.

The second public comment period began May 10, 2006 following the completion of the *revised* draft EA. Correspondence was mailed announcing the release of the *revised* draft EA. Paid public notices were placed in local newspapers and all notices and documents were placed on Reclamation's website: www.usbr.gov/gp/mtao. This 32 day comment period included two public comment meetings, the first in Dillon, Montana on May 22, 2006 followed by a meeting in Butte, Montana on May 23, 2006. These meetings were an open house format with Reclamation staff on hand to answer any questions the public may have on the *revised* draft EA. There were 14 attendees in Dillon and 8 attendees in Butte. Reclamation received written comments from 36 entities. These comments and responses are listed in the Public Comments and Responses section at the end of this document.

REFERENCES CITED

Berg, Kris, 2005. Personal Communication. Natural Resources Conservation Service. U.S. Department of Agriculture, Dillion, Montana.

Bergrstrom, J.C. and K. Cordell, 1991. *An Analysis of the Demand for and Value of Outdoor Recreation in the United States*. Journal of Leisure Research, Vol 23, No. 1.

Institute for Tourism and Recreation, 2004. *2003 –'04 Clark Canyon Recreation Survey.* University of Montana, College of Forestry and Conservation.

Montana Bald Eagle Working Group, 1994. *Montana Bald Eagle Management Plan*. U.S. Bureau of Reclamation, Billings, Montana.

Montana Department of Environmental Quality, 2004. *2004 Integrated 305(b)/303(d) Water Quality Report.* http://www.deq.state.mt.us/cwaic/default.aspx?yr=2004.

Montana Department of Fish, Wildlife and Parks, 1989. *Application for Reservations of Water in the Missouri River Basin Above Fort Peck Dam, Vol. 2*. Helena, Montana.

Montana Department of Fish, Wildlife and Parks, 2005. http://fwp.state.mt.us/fishing/guide/.

Montana Natural Heritage Program, 2005. http://nhp.nris.state.mt.us/animalguide .

Oswald, R.A., 1993. *Survey of the Salmonid Populations in Lowland Lakes Within the Drainages of the Red Rock, Ruby, Beaverhead, and Big Holes Rivers*. Montana Department of Fish, Wildlife and Parks, Bozeman, Montana.

Oswald, R.A, 2002. *Inventory and Survey of Fisheries in Lowland Lakes and Reservoirs of the Red Rock, Ruby, Beaverhead, and Big Hole River Drainages in Southwest Montana: 2000-2002.* Montana Department of Fish, Wildlife and Parks, Bozeman, Montana.

Oswald, R.A., 2003. *Inventory and Survey of Selected Stream Fisheries of the Red Rock, Ruby, and Beaverhead River Drainages of Southwest Montana: 2000-2002*. Montana Department of Fish, Wildlife and Parks, Bozeman, Montana.

Oswald, R.A., 2004. *Inventory and Survey of Fisheries in Lowland Lakes and Reservoirs of the Red Rock, Ruby, Beaverhead, and Big Hole River Drainages in Southwest Montana: 2002-2004.* Montana Department of Fish, Wildlife and Parks, Bozeman, Montana.

Oswald, R.A., 2005. Personal Communication. Montana Department of Fish, Wildlife and Parks, Dillon, Montana.

Senate Document No. 191, 1944. *Missouri River Basin. Conservation, Control, and Use of Water Resources.* 78th Congress *2d Session.* United States Government Printing Office, Washington.

Smith, M. K., 1973. *Some Effects of Clark Canyon Reservoir on the Limnology of the Beaverhead river in Montana*. Master's Thesis, Montana State University, Bozeman, Montana.

Sperry, C., 2005. *Beaverhead and Big Hole River Recreation Rules Environmental Assessment*. Montana Department of Fish, Wildlife and Parks, Bozeman, Montana.

University of Montana, 1986. *The Net Economic Value of Recreation on National Forests.* Missoula, Montana.

U.S. Bureau of Census, 1995. http://www.census.gov/population/cencounts/mt190090.txt. Department of Commerce, Washington, D.C.

U.S. Bureau of Census, 2000. Department of Commerce, Washington, D.C.

U.S. Bureau of Census, 2005. *Profile of Selected Economic Characteristics*. http://factfinder.census.gov. Department of Commerce, Washington, D.C.

U.S. Bureau of Economic Analysis, 2005. *Local Area Personal Income,* http://www.bea.doc.gov/bea/regional/reis. Department of Commerce, Washington, D.C.

U.S. Bureau of Reclamation, 1960. *East Bench Unit Definite Plan Report*. Department of the Interior, Billings, Montana.

U.S. Bureau of Reclamation, 2002. *Recreation Management Condition Assessment*. Unpublished Manuscript. Department of the Interior, Billings, Montana.

U.S. Bureau of Reclamation, 2003a. *Technical Memorandum 8220-05-05: The Limnolgical Status of Clark Canyon Reservoir: Report of Findings 2001-2003*. Department of the Interior, Denver, Colorado.

U.S. Bureau of Reclamation, 2003b. *Technical Memorandum 8220-05-04: Reports of Findings for Field Seasons 2002-2003, East Bench Irrigation District, Dillon, Montana*. Department of the Interior, Denver, Colorado.

U.S. Bureau of Reclamation, 2005a. *Clark Canyon Reservoir and Barretts Diversion Dam Resource Management Plan*. Department of the Interior, Billings, Montana.

U.S. Bureau of Reclamation, 2005b. Montana Reservoir Information, Friday, May 20. http://www.waterchat.com/News/State/05/Q2/state_050523-01.htm. Department of the Interior, Billings, Montana.

U.S. Bureau of Reclamation, 2005c. http://www.usbr.gov/gp-bin/arcweb_ccr.pl. Department of the Interior, Billings, Montana.

U.S. Forest Service, 2002. *The Net Economic Value of Recreation on National Forests*. Department of Agriculture, Washington, D.C.

U.S. Natural Resources Conservation Service, 2002. http://www.nrcs.gov/programs/farmbill/2002/fpprfp.hmtl. Department of the Interior, Washington, D. C.

METHODS OF ANALYSIS

Information on how environmental effects of the alternatives were determined is contained in this section, divided by category.

Water Supply

A hydrologic model was developed to simulate the operations of Clark Canyon Reservoir to meet the water supply needs of irrigators below the reservoir and along the Beaverhead River down to its confluence with the Ruby and Big Hole rivers. Various versions of the model were developed to evaluate proposed alternatives. Development of the model was targeted towards assessing impacts to irrigation water supply, water demands, and stream flows. Reclamation's HYDROSS (Hydrologic River Operation Study System) computer modeling program was chosen for creation of the model. HYDROSS has a graphical user interface which allows for the relatively easy creation of different modeling networks for each alternative. In general, the model simulates the operations of Clark Canyon Reservoir for the release of water for irrigation and in-stream flow demands based on relative priorities. It also stores and releases water to meet monthly reservoir storage targets. The model tracks natural and project flows in the river network, and simulates return flows from irrigation deliveries.

For NEPA purposes, the model was designed to represent present reservoir operations and reasonable future water supply conditions. The NEPA model is not intended to duplicate historic conditions. A benchmark version of the model was developed first to represent the No-Action alternative. This benchmark version served as the starting point for development of other versions of the model for alternatives evaluation. The different versions of the model were then used to develop incremental impacts from the benchmark (or No-Action) conditions.

Development of the model for reasonable future water supply conditions involved the following generalized assumptions and model operations criteria:

- ❖ The model operates on a monthly time step for 1929-2002. This period was selected to include the drought period of the 1930's which would be a critical period for evaluating irrigation shortages.
- ❖ Historic inflows to Clark Canyon Reservoir were adjusted to reflect current level of development above the reservoir.
- ❖ Model nodes for calculating inflows, reach gains, points of diversion, points of return flows, etc. were based on existing or discontinued USGS streamflow measurement stations.
- ❖ Missing historic streamflow records at model nodes were filled in with statistically developed data from adjacent sites with measured discharge.
- ❖ Historic streamflow records were adjusted to 'irrigation-undepleted' values based on estimated historic diversions and return flows. This allows the model to deplete streamflows based on the net effects of simulated diversions and return flows.
- ❖ Future storage capacity for Clark Canyon Reservoir is anticipated to decline due to sedimentation. Estimated 100-year sedimentation conditions from the East Bench Unit Definite Plan Report were used to define the future reservoir capacities used by the model. The following maximum capacities were used to set monthly maximum modeling targets for the reservoir based on the 100-year sedimentation capacities:

Values in Kaf (thousands acre-feet)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
153.6	151.0	157.1	163.1	169.2	171.8	169.2	166.6	164.0	161.4	158.8	156.2

The minimum reservoir storage capacity for the benchmark model was set to 10 Kaf.

- ❖ Reservoir evaporation is not presently recorded at the reservoir. For modeling purposes, historic reservoir evaporation rates were estimated by measured and statistically derived evaporation rates measured at other sites.
- ❖ Irrigation demands were based on crop irrigation requirements (CIR) generated by the Jensen-Haise method using Reclamation's CONUSE52 computer program. Districts provided information on percent of irrigated crops by type. They also provided information on planting, cover development, and harvest dates. A weighted crop distribution was used calculate the CIR by irrigation district:

Crop	EBID Percent	CCWSC Percent
Wheat	30	5
Alfalfa	37	42
Other Hay	9	19
Barley	20	15
Pasture	4	19

- ❖ Estimated on-farm and conveyance efficiencies were applied to CIR to develop irrigation demands at the head-gate. The efficiencies selected were based on professional experience, input from the districts, and information from the East Bench Unit Definite Plan Report.
- ❖ Return flows from irrigation were distributed to model nodes based on subjective visual interpretation of the relative position of irrigated lands and canals in basin to model nodes. The distribution of return flows over time was based on an estimated pattern derived from a previous Reclamation study.
- ❖ Irrigation demands applied to model were categorized as to whether they belonged to 'non-signers', CCWSC, or EBID. They were further categorized as 1st, 2nd, or 3rd priority demands. Finally, the demands were grouped according to supply canal and assigned to the appropriate model node.
- ❖ Monthly instream flow requirements (IFR) were established for five nodes in the model. In the benchmark model, the IFRs had priority over the irrigation demands. The model determines whether simulated flow discharge at a specific node (inclusive of irrigation requests, return flows, etc.) meet the IFR. If the flows do not meet the IFR, then additional water is released through Clark Canyon Reservoir if natural flow and/or storage are available. Historic monthly reservoir releases were evaluated to develop a table which approximates target IFR release rates based on September reservoir end-of-month (EOM) contents. The following table was developed:

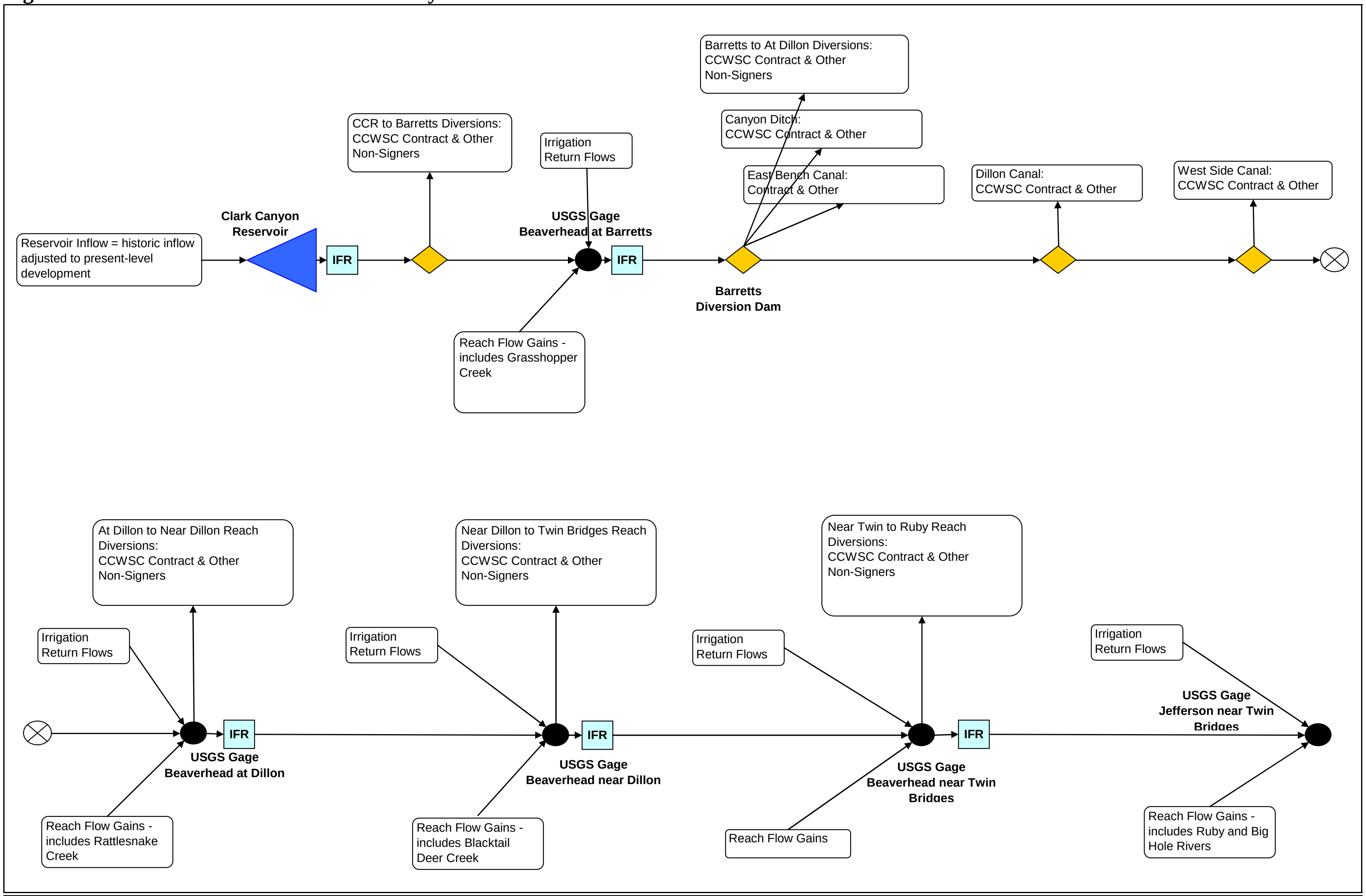
September EOM Content (Kaf)		Oct through March IFR (cfs)
From	to	
0	59.9	25
60	79.9	50
80	119.9	100
120	And greater	200

The IFR for the months of April through September was set to 25 cfs.

Figure 1 illustrates the general configuration of the benchmark version of the Clark Canyon hydrology model.

HYDROSS operates on a monthly time step and cannot perform forecasting and distribution of water supplies on an annual basis. In the real world, the distribution of project water supply to CCWSC and EBID is performed on an annual basis. Historically, project supply is allocated across the irrigation season so that CCWSC will receive its allocation of 4 acre-feet per acre prior to EBID receiving their 3.1 acre-feet per acre. HYDROSS can calculate deliveries based on priorities within a particular month, but cannot look ahead several months at supply and demand, and adjust the current month's deliveries to lower priority demands to protect a higher priority demand at some time in the future. To accommodate this limitation, an iterative modeling procedure was developed which uses interim HYDROSS modeling results and a spreadsheet application to make manual adjustments to monthly demands to more closely simulate how the system is presently operated. This iterative procedure involved running the model and comparing priority-grouped deliveries for each year. Lower priority demands were reduced on a year-by-year case to protect higher priority demands.

Figure 1 - Generalized Network of Clark Canyon Benchmark Model



Water Quality

Reclamation sampled water quality in 2001-2003 at five sites in the reservoir—including both sources of inflows and the tailrace (U.S. Bureau of Reclamation, 2003a). (The sites are listed in Chapter 3, Figure 3.1).

Physical limnology, plankton analysis, nutrients, metals, organics, and hydro-acoustic fisheries data were collected. Water column profiles recorded from surface to bottom for temperature, dissolved oxygen, specific conductance, and pH. Zero to 5 meter (m) samples were collected for chlorophyll analysis. Integrated samples of phytoplankton (0-5 m) and zooplankton (0-15m) were collected at each reservoir site to identify species and density. Nutrient grab samples were collected from the top and bottom of the lake. Samples were analyzed for ortho-phosphate, nitrate, ammonia, and nitrogen also.

Reclamation sampled water quality of EBID (Chapter 3, Figure 3.2) and the Beaverhead River in 2002-2003 (U.S. Bureau of Reclamation, 2003b). Six sites were sampled, three on the river affected by EBID (Barretts Diversion, Anderson Lane Bridge, and Geim Bridge) and three on areas of return flows in EBID (Stone Creek, Spring Creek and the wasteway at the end of the East Bench Canal).

The findings for each of the sites are shown in the following tables.

Anderson Lane

	Units	05/01/02	06/11/02	07/10/02	08/13/02	09/17/02	10/07/02	04/22/03	07/01/03	07/29/03	Mean	Min.	Max.	Median	N
Alkalinity as CaCO3	mg/L	213	99	180	188	186	204	93	133	178	**163.8**	**93**	**213**	**180**	**9**
Lab EC	µS/cm	547	481	531	588	591	622	563	507	606	**559.6**	**481**	**622**	**563**	**9**
Lab pH		8.06	7.9	8.27	7.57	7.87	7.59	7.36	8.01	7.8	**7.826**	**7.36**	**8.27**	**7.87**	**9**
TDS	mg/L	390	338	366			380		400	414	**381.3**	**338**	**414**	**385**	**6**
TSS	mg/L	15.2	41.7	35.35	22.2	37.05		70.3	26.9	17.8	**33.31**	**15.2**	**70.3**	**31.13**	**8**
Ammonia –Nitrogen	mg/L		0.03	0.13	0.04	0.07	0.04	0.09	0.09	0.14	**0.079**	**0.03**	**0.14**	**0.08**	**8**
Nitrate + Nitrate - Nitrogen	mg/L	0.72	0.14			0.64		0.32		0.15	**0.394**	**0.14**	**0.72**	**0.32**	**5**
Total Organic Carbon	mg/L	3.3	1.81	5.13	18.25	5.17		3.52	5.17	5.37	**5.965**	**1.81**	**18.3**	**5.15**	**8**
Total Phosphorus	mg/L	0.05	0.01		0.07	0.11	0.27	0.11	0.03	0.08	**0.091**	**0.01**	**0.27**	**0.075**	**8**
Ag	µg / L	4.02	6.2								**5.11**	**4.02**	**6.2**	**5.11**	**2**
Al	µg / L							33.3			**33.3**	**33.3**	**33.3**	**33.3**	**1**
As	µg / L														
B	µg / L	48	53.3		57.9	52	56.5	55.1	48.5	61.3	**54.08**	**48**	**61.3**	**54.2**	**8**
Ba	µg / L	53.6	35.1		51.6	40.8	43.2	30.4	39.5	37.6	**41.48**	**30.4**	**53.6**	**40.15**	**8**
Be	µg / L								0.66		**0.66**	**0.66**	**0.66**	**0.66**	**1**
Ca	mg/L	74	54.3	64.5	66.9	65.2	52.9	55.8	47.8	64.6	**60.67**	**47.8**	**74**	**64.5**	**9**
Cd	µg / L														
Cl	mg/L	14.9	13.4	13.9	13.2	15.8	14.8	13.8	14.4	14	**14.24**	**13.2**	**15.8**	**14**	**9**
Co	µg / L									3.09	**3.09**	**3.09**	**3.09**	**3.09**	**1**
CO3	mg/L														
Cr	µg / L														
Cu	µg / L														
Fe	µg / L	5.64		4.5	4.09					6.9	**5.283**	**4.09**	**6.9**	**5.07**	**4**
HCO3	mg/L	260	121	220	229	227	249	113	162	217	**199.8**	**113**	**260**	**220**	**9**
K	mg/L	3.67	3.58	4.45	4.52	5.67	4.12	4.25	3.97	5.28	**4.39**	**3.58**	**5.67**	**4.25**	**9**
Li	µg / L	19.1	20.2		21.2	24.9	21.6	20.5	22.3	23.9	**21.71**	**19.1**	**24.9**	**21.4**	**8**
Mg	mg/L	24.4	22.2	25.9	25	24.2	21.9	24.3	26.9	26.2	**24.56**	**21.9**	**26.9**	**24.4**	**9**
Mn	µg / L		4.9		38.9			8.51			**17.44**	**4.9**	**38.9**	**8.51**	**3**
Mo	µg / L	13.4									**13.4**	**13.4**	**13.4**	**13.4**	**1**
Ni	µg / L														
Na	mg/L	22.8	20.5	24.5	22.7	23.8	22.6	24.1	25	24.7	**23.41**	**20.5**	**25**	**23.8**	**9**
Pb	µg / L														
Sb	µg / L														
Se	µg / L		49		35.3					49.5	**44.6**	**35.3**	**49.5**	**49**	**3**
Si	mg/L	9.41	9.25		7.89	9.02	7.55	7.72	5.54	10.8	**8.398**	**5.54**	**10.8**	**8.455**	**8**
SiO2	mg/L	20.14	19.8	15.64	16.88	19.3	16.16	16.52	11.86	23.11	**17.71**	**11.9**	**23.1**	**16.88**	**9**
SO4	mg/L	102	105	114	110	113	113	99	116	129	**111.2**	**99**	**129**	**113**	**9**
Sr	µg / L	665	572		677	615	580	532	608	686	**616.9**	**532**	**686**	**611.5**	**8**
V	µg / L				4.26			6.92			**5.59**	**4.26**	**6.92**	**5.59**	**2**
Zn	µg / L														

Barretts

	Units	05/01/02	06/11/02	07/10/02	08/13/02	09/17/02	10/07/02	04/22/03	07/01/03	07/29/03	Mean	Min.	Max.	Median	N
Alkalinity as CaCO3	mg/L	184	112	201	206	185	196	151	179	211	**180.6**	**112**	**211**	**185**	**9**
Lab EC	µS/cm	512	446	578	680	632	617	507	594	665	**581.2**	**446**	**680**	**594**	**9**
Lab pH		8.1	7.67	8	7.67	7.89	7.54	7.49	8.04	7.94	**7.816**	**7.49**	**8.1**	**7.89**	**9**
TDS	mg/L	350	304	410			254		476	474	**378**	**254**	**476**	**380**	**6**
TSS	mg/L	5	45.6	39.59	13.8	17.88	4.6	8	18.7		**19.15**	**4.6**	**45.6**	**15.84**	**8**
Ammonia -Nitrogen	mg/L		0.03	0.16	0.12	0.05		0.07	0.11	0.08	**0.089**	**0.03**	**0.16**	**0.08**	**7**
Nitrate + Nitrate - Nitrogen	mg/L														
Total Organic Carbon	mg/L	2.64	5.75	4.38	4.21	4.95		3.34	5.42	8.44	**4.891**	**2.64**	**8.44**	**4.665**	**8**
Total Phosphorus	mg/L	0.03	0.03		0.01	0.12		0.06	0.04	0.09	**0.054**	**0.01**	**0.12**	**0.04**	**7**
Ag	µg / L		6.39								**6.39**	**6.39**	**6.39**	**6.39**	**1**
Al	µg / L														
As	µg / L														
B	µg / L	46.4	25.7	53.8	57.9	51.2	56.5	41.2	53.8	52.4	**48.77**	**25.7**	**57.9**	**52.4**	**9**
Ba	µg / L	51.2	39.5	53.5	70.9	49.1	54.8	45.2	43.9	51.1	**51.02**	**39.5**	**70.9**	**51.1**	**9**
Be	µg / L		0.65						0.81		**0.73**	**0.65**	**0.81**	**0.73**	**2**
Ca	mg/L	66.9	51.9	77.2	81.4	70.4	60.2	58.3	69.2	79.8	**68.37**	**51.9**	**81.4**	**69.2**	**9**
Cd	µg / L														
Cl	mg/L	10.9	10.8	12.6	13.4	12.9	12.2	9.4	11.9	12.7	**11.87**	**9.4**	**13.4**	**12.2**	**9**
Co	µg / L														
CO3	mg/L														
Cr	µg / L														
Cu	µg / L														
Fe	µg / L	19.8	6.99		11.4	5.28	8.1	22.1			**12.28**	**5.28**	**22.1**	**9.75**	**6**
HCO3	mg/L	225	136	245	251	226	239	185	218	258	**220.3**	**136**	**258**	**226**	**9**
K	mg/L	3.39	2.82	4.08	4.08	4.83	4.93	2.96	4.14	4.41	**3.96**	**2.82**	**4.93**	**4.08**	**9**
Li	µg / L	21.7	19.5	23.6	24	30.7	27.7	19.4	22.4	22.2	**23.47**	**19.4**	**30.7**	**22.4**	**9**
Mg	mg/L	21.7	19.3	26.9	28.3	25.6	23.6	18.1	27.4	27.4	**24.26**	**18.1**	**28.3**	**25.6**	**9**
Mn	µg / L	12.9	5.11		5.28						**7.763**	**5.11**	**12.9**	**5.28**	**3**
Mo	µg / L				11.6						**11.6**	**11.6**	**11.6**	**11.6**	**1**
Ni	µg / L	11.1									**11.1**	**11.1**	**11.1**	**11.1**	**1**
Na	mg/L	22.3	20	25.1	25.6	26.8	26.4	21.4	24.7	24.4	**24.08**	**20**	**26.8**	**24.7**	**9**
Pb	µg / L														
Sb	µg / L														
Se	µg / L	31.8	38.1	39.6	37.9				80		**45.48**	**31.8**	**80**	**38.1**	**5**
Si	mg/L	9.06	8.47	8.77	4.51	8.16	8.85	8.99	9.17	10.9	**8.542**	**4.51**	**10.9**	**8.85**	**9**
SiO2	mg/L	19.39	18.13	18.77	16.07	17.46	18.94	19.24	19.62	23.33	**18.99**	**16.1**	**23.3**	**18.94**	**9**
SO4	mg/L	109	108	129	140	142	134	95	134	139	**125.6**	**95**	**142**	**134**	**9**
Sr	µg / L	647	539	796	862	736	687	548	761	812	**709.8**	**539**	**862**	**736**	**9**
V	µg / L				4.25						**4.25**	**4.25**	**4.25**	**4.25**	**1**
Zn	µg / L														

Giem Bridge

	Units	05/01/02	06/11/02	07/10/02	08/13/02	09/17/02	10/07/02	04/22/03	07/01/03	07/29/03	Mean	Min.	Max.	Median	N
Alkalinity as CaCO3	mg/L	227	166	238	203	245	222	126	253	204	**209.3**	**126**	**253**	**222**	**9**
Lab EC	µS/cm	645	761	709	686	818	740	761	793	735	**738.7**	**645**	**818**	**740**	**9**
Lab pH		8.19	7.79	8.02	7.7	7.95	7.57	7.33	8.15	7.53	**7.803**	**7.33**	**8.19**	**7.79**	**9**
TDS	mg/L	484	582	500			470		600	503	**523.2**	**470**	**600**	**501.5**	**6**
TSS	mg/L	20	27.4	22.5	33.6	28.19	15.7	52		18.1	**27.19**	**15.7**	**52**	**24.95**	**8**
Ammonia -Nitrogen	mg/L		0.03	0.46	0.21	0.06	0.08	0.04	0.14	0.11	**0.141**	**0.03**	**0.46**	**0.095**	**8**
Nitrate + Nitrate - Nitrogen	mg/L	0.67	0.12	0.27	0.3	0.57		0.43	0.42	0.43	**0.401**	**0.12**	**0.67**	**0.425**	**8**
Total Organic Carbon	mg/L	2.86	5.44	6.5	4.43	6		7.08	6.76	5.41	**5.56**	**2.86**	**7.08**	**5.72**	**8**
Total Phosphorus	mg/L	0.01	0.06	0.07	0.01	0.17	0.24	0.02	0.02	0.04	**0.071**	**0.01**	**0.24**	**0.04**	**9**
Ag	µg / L		4.93								**4.93**	**4.93**	**4.93**	**4.93**	**1**
Al	µg / L														
As	µg / L														
B	µg / L	69.6	88		82.2	86.1	82.7	84.7	99.7	81.3	**84.29**	**69.6**	**99.7**	**83.7**	**8**
Ba	µg / L	42.8	49.7		40.7	49.1	46.2	41.9	57.1	47	**46.81**	**40.7**	**57.1**	**46.6**	**8**
Be	µg / L		0.56						0.79		**0.675**	**0.56**	**0.79**	**0.675**	**2**
Ca	mg/L	70.1	88	83.3	69.7	84	65.6	77.4	83.3	74.4	**77.31**	**65.6**	**88**	**77.4**	**9**
Cd	µg / L														
Cl	mg/L	30.7	27.2	31.2	27.1	35	28	24.7	35.4	26.4	**29.52**	**24.7**	**35.4**	**28**	**9**
Co	µg / L				3.14						**3.14**	**3.14**	**3.14**	**3.14**	**1**
CO3	mg/L														
Cr	µg / L														
Cu	µg / L														
Fe	µg / L				6.47	6.9	6.62			7.26	**6.813**	**6.47**	**7.26**	**6.76**	**4**
HCO3	mg/L	277	202	291	248	299	271	154	309	249	**255.6**	**154**	**309**	**271**	**9**
K	mg/L	5.4	8.39	7.79	7.39	10.2	7.8	6.62	8.98	8.12	**7.854**	**5.4**	**10.2**	**7.8**	**9**
Li	µg / L	20.1	27.9		24.4	29.5	24.7	23.2	27.8	26.4	**25.5**	**20.1**	**29.5**	**25.55**	**8**
Mg	mg/L	32.2	36.8	34.8	30.5	36.7	30.4	32.2	38.5	32.4	**33.83**	**30.4**	**38.5**	**32.4**	**9**
Mn	µg / L	7.9	4.26		23.5	8.07	7.27			12.9	**10.65**	**4.26**	**23.5**	**7.985**	**6**
Mo	µg / L														
Ni	µg / L														
Na	mg/L	31.7	34.5	35.2	30.7	36.6	32.2	34.8	38.6	32	**34.03**	**30.7**	**38.6**	**34.5**	**9**
Pb	µg / L														
Sb	µg / L														
Se	µg / L								50.5		**50.5**	**50.5**	**50.5**	**50.5**	**1**
Si	mg/L	12.6	13.1		11.6	14.4	11.7	11.8	12	12.6	**12.48**	**11.6**	**14.4**	**12.3**	**8**
SiO2	mg/L	26.96	28.03	26.54	24.82	30.82	25.04	25.25	25.68	26.96	**26.68**	**24.8**	**30.8**	**26.54**	**9**
SO4	mg/L	134	136	150	129	158	139	118	159	152	**141.7**	**118**	**159**	**139**	**9**
Sr	µg / L	679	828		668	771	694	698	798	751	**735.9**	**668**	**828**	**724.5**	**8**
V	µg / L		5.73		6.73		5.63	7.61	4.79	5.34	**5.972**	**4.79**	**7.61**	**5.68**	**6**
Zn	µg / L														

Spring Creek

	Units	05/01/02	06/11/02	07/10/02	08/13/02	09/17/02	10/07/02	04/22/03	07/01/03	07/29/03	Mean	Min.	Max.	Median	N
Alkalinity as CaCO3	mg/L	239	242	310	316	281	254	186	293	229	**261.1**	**186**	**316**	**254**	**9**
Lab EC	µS/cm	750	782	951	997	1026	970	829	1058	952	**923.9**	**750**	**1058**	**952**	**9**
Lab pH		8.35	7.74	8.21	7.61	7.84	7.28	7.65	8.21	7.82	**7.857**	**7.28**	**8.35**	**7.82**	**9**
TDS	mg/L	602	642	782			650		420	724	**636.7**	**420**	**782**	**646**	**6**
TSS	mg/L	0	84.7	86.44	106	71.19	68.2	70.3	20.6	38.2	**60.63**	**0**	**106**	**70.3**	**9**
Ammonia -Nitrogen	mg/L		0.05	0.2	0.4	0.13	0.13	0.06	0.17	0.14	**0.16**	**0.05**	**0.4**	**0.135**	**8**
Nitrate + Nitrate - Nitrogen	mg/L	2.91	1.73	2.06	0.5	1.62		0.91	0.77	0.79	**1.411**	**0.5**	**2.91**	**1.265**	**8**
Total Organic Carbon	mg/L	3.44	5.79	7.97	7.02	9.14		3.97	8.23	6.5	**6.508**	**3.44**	**9.14**	**6.76**	**8**
Total Phosphorus	mg/L		0.01	0.03	0.03	0.14	0.17	0.03	0.06	0.03	**0.063**	**0.01**	**0.17**	**0.03**	**8**
Ag	µg / L		5.47								**5.47**	**5.47**	**5.47**	**5.47**	**1**
Al	µg / L														
As	µg / L														
B	µg / L	74.7	106		115	99.2	110	79.1	116	105	**100.6**	**74.7**	**116**	**105.5**	**8**
Ba	µg / L	79	69.4		74.3	71.2	68.2	66.4	103	63	**74.31**	**63**	**103**	**70.3**	**8**
Be	µg / L								0.69		**0.69**	**0.69**	**0.69**	**0.69**	**1**
Ca	mg/L	75.1	67	102	75.7	77.9	65.5	70.9	93.2	66.3	**77.07**	**65.5**	**102**	**75.1**	**9**
Cd	µg / L														
Cl	mg/L	65	70.4	86.3	79.5	59.4	82.9	46.3	92.4	89.1	**74.59**	**46.3**	**92.4**	**79.5**	**9**
Co	µg / L														
CO3	mg/L	3.9									**3.9**	**3.9**	**3.9**	**3.9**	**1**
Cr	µg / L														
Cu	µg / L	4.03									**4.03**	**4.03**	**4.03**	**4.03**	**1**
Fe	µg / L		5.88	5.3	5.71						**5.63**	**5.3**	**5.88**	**5.71**	**3**
HCO3	mg/L	284	295	378	386	343	310	227	358	279	**317.8**	**227**	**386**	**310**	**9**
K	mg/L	8.19	13.7	17	18.5	20.7	18.8	8.63	19.2	22.7	**16.38**	**8.19**	**22.7**	**18.5**	**9**
Li	µg / L	6.81	13.7		15.5	21.5	16.2	9.13	17.5	16.9	**14.66**	**6.81**	**21.5**	**15.85**	**8**
Mg	mg/L	46.5	47.9	59	61.4	59.4	48.7	44.3	64.7	55.7	**54.18**	**44.3**	**64.7**	**55.7**	**9**
Mn	µg / L		8.31								**8.31**	**8.31**	**8.31**	**8.31**	**1**
Mo	µg / L														
Ni	µg / L														
Na	mg/L	33.9	31.5	40.7	41.5	40.1	36.8	32.7	43.9	37.7	**37.64**	**31.5**	**43.9**	**37.7**	**9**
Pb	µg / L														
Sb	µg / L														
Se	µg / L								49.7		**49.7**	**49.7**	**49.7**	**49.7**	**1**
Si	mg/L	18.8	14.8		15.5	20.6	19.3	16.7	22	19.9	**18.45**	**14.8**	**22**	**19.05**	**8**
SiO2	mg/L	40.23	31.67	46.44	33.17	44.08	41.3	35.74	47.08	42.59	**40.26**	**31.7**	**47.1**	**41.3**	**9**
SO4	mg/L	126	131	148	145	156	149	89	162	150	**139.6**	**89**	**162**	**148**	**9**
Sr	µg / L	317	359		403	380	390	295	479	383	**375.8**	**295**	**479**	**381.5**	**8**
V	µg / L	4	11.5		8.84	8.12	11.6	5.18	10.2	15.4	**9.355**	**4**	**15.4**	**9.52**	**8**
Zn	µg / L														

Stone Creek

	Units	05/01/02	06/11/02	07/10/02	08/13/02	09/17/02	10/07/02	04/22/03	07/01/03	07/29/03	Mean	Min.	Max.	Median	N
Alkalinity as CaCO3	mg/L	148	98	193	204	199	159	182	196	194	**174.8**	**98**	**204**	**193**	**9**
Lab EC	µS/cm	788	727	861	988	983	976	916	963	981	**909.2**	**727**	**988**	**963**	**9**
Lab pH		8.26	7.72	7.89	7.68	7.33	7.6	7.63	7.83	7.63	**7.73**	**7.33**	**8.26**	**7.68**	**9**
TDS	mg/L	606	552	686			630		636	682	**632**	**552**	**686**	**633**	**6**
TSS	mg/L	103	43.1	32.58		7.64	15.6		7.9	10.5	**31.47**	**7.64**	**103**	**15.6**	**7**
Ammonia -Nitrogen	mg/L		0.02	0.31	0.19	0.06	0.14	0.03	0.1	0.12	**0.121**	**0.02**	**0.31**	**0.11**	**8**
Nitrate + Nitrate - Nitrogen	mg/L	4.7	4.81	4.51	5.32	7.27		3.69	2.68	5.28	**4.783**	**2.68**	**7.27**	**4.755**	**8**
Total Organic Carbon	mg/L	2.93	2.89	5.67	6.58	5.28		13.31	4.33	4.61	**5.7**	**2.89**	**13.3**	**4.945**	**8**
Total Phosphorus	mg/L	0.06	0.01	0.07	0.02	0.12	0.2	0.03		0.08	**0.074**	**0.01**	**0.2**	**0.065**	**8**
Ag	µg / L		5.11								**5.11**	**5.11**	**5.11**	**5.11**	**1**
Al	µg / L							31		31.8	**31.4**	**31**	**31.8**	**31.4**	**2**
As	µg / L														
B	µg / L	79.1	89.89		108	86.5	106	92.6	107	102	**96.39**	**79.1**	**108**	**97.3**	**8**
Ba	µg / L	43.4	29.6		43.2	34.5	32.3	36.4	39.4	30	**36.1**	**29.6**	**43.4**	**35.45**	**8**
Be	µg / L		0.6						0.93		**0.765**	**0.6**	**0.93**	**0.765**	**2**
Ca	mg/L	96.8	82.9	105	108	99	85	94.7	102	103	**97.38**	**82.9**	**108**	**99**	**9**
Cd	µg / L														
Cl	mg/L	63.6	67.5	69.1	71	64.6	75	55.3	70.05	78.1	**68.25**	**55.3**	**78.1**	**69.1**	**9**
Co	µg / L				5.35			4.07			**4.71**	**4.07**	**5.35**	**4.71**	**2**
CO3	mg/L														
Cr	µg / L				4.39						**4.39**	**4.39**	**4.39**	**4.39**	**1**
Cu	µg / L														
Fe	µg / L	6.73		0		6.91					**4.547**	**0**	**6.91**	**6.73**	**3**
HCO3	mg/L	181	119	236	249	243	194	222	239	236	**213.2**	**119**	**249**	**236**	**9**
K	mg/L	4.82	4.22	6.47	6.63	8.39	6.52	4.99	6.35	7.72	**6.234**	**4.22**	**8.39**	**6.47**	**9**
Li	µg / L	6.48	8.66		12.3	17.8	12.6	9.32	11.4	14.5	**11.63**	**6.48**	**17.8**	**11.85**	**8**
Mg	mg/L	32.8	26.4	32.6	32.9	30.3	32	31.1	33.2	31.6	**31.43**	**26.4**	**33.2**	**32**	**9**
Mn	µg / L	5.51									**5.51**	**5.51**	**5.51**	**5.51**	**1**
Mo	µg / L														
Ni	µg / L														
Na	mg/L	51.8	41.5	56.7	57.2	54.2	57.8	52.6	57.2	58.3	**54.14**	**41.5**	**58.3**	**56.7**	**9**
Pb	µg / L				30.1						**30.1**	**30.1**	**30.1**	**30.1**	**1**
Sb	µg / L														
Se	µg / L	67	62.4		52.6	40.9					**55.73**	**40.9**	**67**	**57.5**	**4**
Si	mg/L	14.2	11.9		15.3	14.4	15.3	12.8	14.1	15.5	**14.19**	**11.9**	**15.5**	**14.3**	**8**
SiO2	mg/L	30.39	25.47	30.39	32.74	30.82	32.74	27.39	30.17	33.17	**30.36**	**25.5**	**33.2**	**30.39**	**9**
SO4	mg/L	188	197	198	198	185	198	175	196	195	**192.2**	**175**	**198**	**196**	**9**
Sr	µg / L	262	229		269	241	249	247	256	239	**249**	**229**	**269**	**248**	**8**
V	µg / L		5.41		6.04		6.31	4.51	5.74	6.35	**5.727**	**4.51**	**6.35**	**5.89**	**6**
Zn	µg / L														

Terminal

	Units	05/01/02	06/11/02	07/10/02	08/13/02	09/17/02	10/07/02	04/22/03	07/01/03	07/29/03	Mean	Min.	Max.	Median	N
Alkalinity as CaCO3	mg/L		114	163	140				183		**150**	**114**	**183**	**151.5**	**4**
Lab EC	µS/cm		536	556	5.87				612		**427.5**	**5.87**	**612**	**546**	**4**
Lab pH			7.54	7.99	7.72				8.17		**7.855**	**7.54**	**8.17**	**7.855**	**4**
TDS	mg/L		374	354					476		**401.3**	**354**	**476**	**374**	**3**
TSS	mg/L		17.4	14.25	5.6						**12.42**	**5.6**	**17.4**	**14.25**	**3**
Ammonia -Nitrogen	mg/L			0.11	0.09				0.11		**0.103**	**0.09**	**0.11**	**0.11**	**3**
Nitrate + Nitrate - Nitrogen	mg/L														
Total Organic Carbon	mg/L		2.57	5.61	4.98				5.98		**4.785**	**2.57**	**5.98**	**5.295**	**4**
Total Phosphorus	mg/L		0.04	0.03	0.03				0.04		**0.035**	**0.03**	**0.04**	**0.035**	**4**
Ag	µg / L		6.39								**6.39**	**6.39**	**6.39**	**6.39**	**1**
Al	µg / L														
As	µg / L														
B	µg / L		55.2		56				52.8		**54.67**	**52.8**	**56**	**55.2**	**3**
Ba	µg / L		39.5		50.8				49.6		**46.63**	**39.5**	**50.8**	**49.6**	**3**
Be	µg / L		0.57						0.74		**0.655**	**0.57**	**0.74**	**0.655**	**2**
Ca	mg/L		63.4	60.4	55.1				67.9		**61.7**	**55.1**	**67.9**	**61.9**	**4**
Cd	µg / L														
Cl	mg/L		12.9	12.8	13.3				11.7		**12.68**	**11.7**	**13.3**	**12.85**	**4**
Co	µg / L		3.64								**3.64**	**3.64**	**3.64**	**3.64**	**1**
CO3	mg/L														
Cr	µg / L														
Cu	µg / L														
Fe	µg / L			0							**0**	**0**	**0**	**0**	**1**
HCO3	mg/L		140	199	170				223		**183**	**140**	**223**	**184.5**	**4**
K	mg/L		3.47	3.64	3.67				4.7		**3.87**	**3.47**	**4.7**	**3.655**	**4**
Li	µg / L		22.1		23.9				22.8		**22.93**	**22.1**	**23.9**	**22.8**	**3**
Mg	mg/L		25	26.8	28.3				27.3		**26.85**	**25**	**28.3**	**27.05**	**4**
Mn	µg / L														
Mo	µg / L														
Ni	µg / L														
Na	mg/L		22.5	25.2	26.1				24.5		**24.58**	**22.5**	**26.1**	**24.85**	**4**
Pb	µg / L														
Sb	µg / L														
Se	µg / L		50.7						46.9		**48.8**	**46.9**	**50.7**	**48.8**	**2**
Si	mg/L		8.71		7.02				9.23		**8.32**	**7.02**	**9.23**	**8.71**	**3**
SiO2	mg/L		18.64	18.45	15.02				19.75		**17.97**	**15**	**19.8**	**18.55**	**4**
SO4	mg/L		132	130	144				131		**134.3**	**130**	**144**	**131.5**	**4**
Sr	µg / L		704		774				748		**742**	**704**	**774**	**748**	**3**
V	µg / L														
Zn	µg / L														

Fisheries

Effects to fisheries were considered adverse if they resulted in a substantial increased incidence of declining years for fishery survival and production. The HYDROSS hydrology model was developed to predict reservoir and river conditions. It is important to remember that the intent of the hydrology model is not to duplicate historic flows, but rather to predict reasonable future conditions as a comparison between the two alternatives.

The model tried to fulfill the full crop irrigation requirement and did not take into consideration any management actions to conserve water during droughts. Also, the model incorporated the entire period of record inflows (1929-2002), which included years before construction of the East Bench Unit. Past reservoir levels were only available from 1965 to present. Many of these were extreme drought years, and—with several drought years in a row—resulted in several "declining" years predicted if conditions in the 1930's were to occur again. For these reasons, the modeled results varied considerably from actual past conditions, with poorer conditions predicted. Thus, the model represented the worst-case scenario but still provided a basis on which to compare the alternatives.

Clark Canyon

In general, rainbow and brown trout populations and condition factors would be expected to trend with reservoir storage and primary production in the reservoir.

Fisheries would be expected to remain healthy in years where storage remained over 60,000 AF at the end of the irrigation season, with optimum fishery conditions expected with pools over 100,000 AF. The threshold of 60,000 AF would result in about 3,000 surface acres of lake available for primary production and is the suggested minimum pool for healthy fisheries by Oswald (1993) and Oswald (2005). Surface acreage drops drastically as lake content decreases below 60,000 AF. Survival and growth of stocked and wild fish would be expected to decline in years where storage drops below this level. In drought years where the reservoir reaches the minimum pool of less than 30,000 AF, it was assumed the Eagle Lake strain rainbow trout egg collection would not take place. This would result in loss of eggs to the hatchery system for that year. It would also result in declining growth and survival of any rainbow trout stocked in the reservoir, and could cause the management decision to not stock fish that particular year.

There is not enough information about other species in the reservoir to determine specific effects, but it was assumed they would generally trend with effects to trout species as all are dependent upon primary production of the food chain.

Hydrology modeling used the period of record 1929-2002 inflows to predict EOM reservoir content for those years if the reservoir and irrigation project had been in place for each alternative. This was used to represent reservoir content in the future under the different scenarios. Conditions for fisheries in the reservoir for each year were analyzed using specific criteria to place them in one of four categories, as described below.

Category 1: Optimum

Optimum fishery conditions are based on numbers of wild brown trout and large rainbow trout in the spawning population, as well as condition factors of individual fish and plant survival (Oswald, 2005). This type of year would be characterized by adequate inflows to keep the reservoir over the set EOM level for the entire year. With optimum forecasts, rainbow trout would be expected to be stocked as young-of-year fish in the reservoir by MDFWP. MDFWP may also collect Eagle Lake strain eggs for the hatchery system if these conditions occurred.

Category 2: Good
Good fishery conditions are based on fish populations and health thriving, although at less than optimum conditions. Rainbow and brown trout populations would probably still be considered healthy though slightly lower in numbers and condition factors. With forecasted reservoir levels in this range, MDFWP would still likely stock young-of-year rainbows with anticipation of good survival and growth. Hatchery egg collection would likely be attempted and be expected to be successful if Red Rock River inflows were sufficient to trigger a spawning run.

Category 3: Fair
Fair fishery conditions are based on general fish populations and conditions sustaining, but lower numbers than under good conditions. MDFWP may decide to stock over-wintered yearling rainbows rather than young-of-year fish due to their survival advantage under stressful conditions (Oswald, 2004). MDFWP would likely decide not to collect hatchery eggs and more restrictive fishing limits might be expected to protect the fishery during these conditions.

Category 4: Declining
Declining fishery conditions are based on declining fish survival and condition factors. Even though fish populations would decline, the entire fishery would not be lost. MDFWP might choose to either suspend stocking efforts entirely or plant over-wintered fish. Fishing restrictions would be expected to protect the fishery. Hatchery egg collection would not be attempted.

Results from the hydrology model were used to analyze each year in the period of record according to the above criteria and each year was designated as one of the four categories.
The number of years falling into each category was then counted for each alternative, and the number was divided by 74 (the total years in the record) to show what percentage of years each of the fishery conditions could be expected for each alternative.

To determine effects of each alternative, the information gathered through the above method was used to compare each alternative to the No Action Alternative (the benchmark). If an alternative resulted in more years in the “optimum” or “good” categories than benchmark, or in fewer years in the “declining” category, it would be considered a positive effect. If an alternative resulted in a substantial ($\geq$ 5 years) increase of years in the “declining” category, it would be considered a negative effect.

Upper Beaverhead River

The upper Beaverhead River typically has ample spring/summer flows, but low flows in the winter can limit fishery production in this reach. As this general statement would be expected to apply to future conditions of the river in any of the alternatives, winter flows were used to predict fisheries effects. The MDFWP (1989) recommended a minimum in-stream flow of 200 cfs released from Clark Canyon Dam to support an optimal fishery. These releases were based on wetted perimeter studies evaluating available habitat.

Flows below the 200 cfs recommendation by MDFWP result in side channels and other habitats become unavailable to fish for spawning and rearing. While 200 cfs releases from the dam would be optimal, winter flows in the range of about 125-200 cfs would appear to maintain the fishery at an acceptable level, while flows less than 65 cfs would result in a poor (declining) fishery (Oswald, 2005). Brown trout spawn in the fall and the eggs over-winter, so consistent flows throughout the non-irrigation season are important to avoid either dewatering or flushing of eggs.

Hydrology modeling used the 1929-2002 period of record to predict Clark Canyon Reservoir releases to the Beaverhead River for those years if the reservoir and irrigation project had been in place for each alternative. This was used to represent reservoir outflows in the future under the different scenarios. Oswald (2003) discussed winter flows using the mean of non-irrigation season (October-March) flows, so the same method was used in this analysis. Each year was evaluated using average of October-December flows of the previous year, along with January-March of the current year to predict fishery conditions for that year. Conditions for upper river fisheries for each year were analyzed using specific criteria to place them in one of four categories, as described below.

Category 1: Optimum

Optimum fishery conditions are based on 18" or larger brown trout numbers per mile (> 500 fish per mile) and quality of fish for the following spring and summer fishing season. Increased biomass of fish in the river, condition factors, and size of fish were all found to be optimal under these conditions by Oswald (2003).

Category 2: Good

Good fishery conditions are based on 18" or larger brown trout numbers per mile (range of 350 to 500 fish per mile) and health thriving, although less than optimum conditions. Oswald (2005) stated that winter flows in this range—though not optimal—would probably be able to sustain a healthy fishery.

Category 3: Fair

Fair fishery conditions are based on 18"or larger brown trout numbers per mile (range of 200 to 350 fish per mile) and health of the fish. Under these conditions, fish numbers and health would decline slightly.

Category 4: Declining

Declining fishery conditions are based on 18" or larger brown trout numbers per mile (< 200 fish per mile) and health of the fish. Under these conditions, fish numbers and health would decline, but the entire fishery would not be lost. Oswald (2003) found sharp declines in brown trout populations and condition factors in years following these drought condition events.

As with reservoir fisheries, results from the hydrology model were used to analyze each year in the period of record according to the above criteria, and each year was designated as one of the four categories. The number of years falling into each category was then counted for each alternative, and the number was divided by 74 to show what percentage of years each of the fishery conditions could be expected for each alternative.

To determine effects, the information gathered through the above method was used to compare the Preferred Alternative to No Action (the benchmark). If an alternative resulted in more years in the "optimum" or "good" categories than benchmark, or in fewer years in the "declining" category, it would be considered a positive effect. If an alternative resulted in a substantial (≥ 5 years) increase in years in the "declining" category, it would be considered a negative effect.

Lower Beaverhead River

The lower Beaverhead River fishery also depends on ample in-stream flows. The 1985 in-stream flow right for fisheries in this section of the river is 200 cfs (Montana Department of Fish, Wildlife and Parks, 1989). Again, modeling was used to predict flows in the Beaverhead.

For the lower Beaverhead, flows near the town of Twin Bridges, Montana, were used. These flows were analyzed to compare the number of years during the period of record in which flows would be expected to drop below the optimal 200 cfs level. A decrease in such years would have a positive fishery effect, while an increase would have a negative effect.

Another issue in this section of the river is the suspected effect of return flows contributing to an inverted hydrograph. The overall hydrograph of the river was graphed to visualize any changes due to the Preferred Alternative as compared to No Action. Two lines were plotted on the graph to represent median water years (the 50^{th} percentile) and the ten driest years on record.

Jefferson River

The Jefferson River at Twin Bridges was also modeled to compare effects of the Preferred Alternative to No Action. The overall hydrograph of this river was graphed to visualize any changes.

Social and Economic Conditions

Reclamation's East Bench Unit consists of the East Bench Irrigation District and the Clark Canyon Water Supply Company. Major irrigated crops produced by the unit are alfalfa and small grains (wheat and barley).

Table MA-1 shows crop census information supplied by the districts for 1999-2001. These are the latest years for which information is available.

Acreage for hay and irrigated pasture, combined in this analysis, is represented by *alfalfa hay* in the table. According to interviews with local farmers within the East Bench Unit, irrigated pasture is no longer a significant part of the total crop mix, an average of only 13.6 percent of district acreage from 1999-2001. Instead, farmers lease land in the mountains to pasture their cattle.

Reclamation developed a multi-crop farm budget in November 2004 to accurately reflect agriculture in the districts. Table MA-2 shows the crop mix used for the representative farm to determine *payment capacity*. Payment capacity determines the ability of the districts to pay for irrigation water, current maintenance costs, project pumping power, debt repayment, a reserve fund, and other expenses.

Table MA-1: Crop Census Data (acres)

	2001	2000	1999	Avg.	Percentage
Alfalfa Hay	17,360	18,245	17,385	17,663	38.78
Other Hay	10,170	10,536	10,276	10,327	22.68
Wheat	5,227	6,671	7,139	6,346	13.93
Barley	1,433	5,614	3,211	3,419	7.51
Irrigated Pasture	4,785	5,664	8,068	6,172	13.55
Seed Potatoes	1,184	1,147	1,232	1,188	2.61
Other	50		803	427	0.94
Total	**40,209**	**47,877**	**48,114**	**45,542**	**100**

Table MA-2: Crop Mix for the Districts

Crops	Establishment Alfalfa	Alfalfa	Wheat	Barley	Total Irrigated Acreage
Acres	60	240	80	60	440
Percentage	13.64	54.55	18.18	13.64	100

Hydrology models for the study predicted changes in the average annual water supply to farms for the different alternatives. The model results, accounting for conveyance system losses and on-farm efficiencies, were used to evaluate the potential impacts to the irrigators. The indicator used in the analysis is the amount of water available for beneficial use by the crop, as measured at the crop root zone.

The two primary methods of applying irrigation water to crops utilized by irrigators in the both the CCWSC and the EBID are flood and sprinkler application techniques. Due to the difference in efficiencies in the two methods, the amount of water diverted at the river headgate to the crop root zone is different for the two irrigation methods.

The water available at the crop root zones for both the CCWSC and the EBID to the No-Action and Preferred Alternatives is displayed in Table MA-3. The information in the table displays the average values and percentile values for all the irrigated acres (composite total) of each entity and is also provided for the two irrigation methodologies (flood and sprinkler application) utilized by the producers for the study period .

Table MA-3: Water Deliveries to the Crop Root Zones

		No Action Alternative			Preferred Alternative		
Entity	Statistical Indicator	Composite Total (AF/ac)	Sprinkler Delivery (AF/ac)	Flood Delivery (AF/ac)	Composite Total (AF/ac)	Sprinkler Delivery (AF/ac)	Flood Delivery (AF/ac)
CCWSC							
	Average	1.45	1.47	1.36	1.36	1.38	1.29
	10th Percentile	1.15	1.24	0.84	0.92	0.96	0.80
	25th Percentile	1.26	1.32	1.12	1.14	1.19	1.08
	50th Percentile	1.45	1.45	1.42	1.40	1.40	1.37
	75th Percentile	1.61	1.61	1.60	1.56	1.57	1.53
	90th Percentile	1.76	1.76	1.75	1.68	1.72	1.65
EBID							
	Average	1.04	1.04	1.01	1.05	1.05	1.01
	10th Percentile	0.32	0.32	0.37	0.62	0.63	0.60
	25th Percentile	1.01	1.01	0.90	0.94	0.94	0.90
	50th Percentile	1.17	1.17	1.14	1.12	1.12	1.09
	75th Percentile	1.30	1.30	1.29	1.29	1.29	1.21
	90th Percentile	1.41	1.41	1.40	1.38	1.38	1.31

Recreation

Effects of the alternatives on recreation were considered adverse if they resulted in a decline in the quality or quantity of recreational facilities or services, or if they involved installation of new facilities that could adversely affect the recreational environment.

Barretts Diversion Dam Flows

Median flows (1929-2002) at Barretts Diversion Dam range from a low of 106 cfs in January to a high of 1139 cfs in July. The Beaverhead River has higher flows during the irrigation season, which is also the prime recreation season for fishermen and floaters.

APPENDIX

Section 208 of Title II of P.L. 108-447

SEC. 208. MONTANA WATER CONTRACTS EXTENSION. (a) AUTHORITY TO EXTEND- The Secretary of the Interior may extend each of the water contract listed in subsection (b) until the earlier of--

(1) the expiration of the 2-year period beginning on the date on which the contract would expire but for this section; or

(2) the date on which a new long-term water contract is executed by the parties to the contract listed in subsection (b).

(b) EXTENDED CONTRACTS - The water contracts referred to in subsection (a) are the following:

(1) Contract Number 14-06-600-2078, as amended, for purchase of water between the United States of America and the City of Helena, Montana.

(2) Contract Number 14-06-600-2079, as amended, between the United States of America and the Helena Valley Irrigation District for water service.

(3) Contract Number 14-06-600-8734, as amended, between the United States of America and the Toston Irrigation District for water service.

(4) Contract Number 14-06-600-3592, as amended, between the United States and the Clark Canyon Water Supply Company, Inc., for water service and for a supplemental supply.

(5) Contract Number 14-06-600-3593, as amended, between the United States and the East Bench Irrigation District for service.

MEMORANDUM OF UNDERSTANDING

No. 06-AG-60-2158

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
GREAT PLAINS REGION
MONTANA AREA OFFICE

and

STATE OF MONTANA
DEPARTMENT OF FISH, WILDLIFE AND PARKS

This Memorandum of Understanding (MOU) is between the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) and the State of Montana, Department of Fish, Wildlife and Parks (Department). The purpose of the MOU is to define the roles and responsibilities of Reclamation and the Department to examine the opportunities to improve the environmental health of Clark Canyon Reservoir and the Beaverhead River while continuing to provide water to entities holding contracts with Reclamation; including irrigation, municipal, and industrial needs.

Bureau of Reclamation
Montana Area Office

D. Jewell
Signature

Dan Jewell
Name

Area Manager
Title

02 AUGUST 2006
Date

State of Montana
Department of Fish, Wildlife and Parks

M. Jeff Hagener
Signature

M. Jeff Hagener
Name

Director
Title

8/1/06
Date

Memorandum of Understanding
Bureau of Reclamation
and the
State of Montana
Department of Fish, Wildlife and Parks
for the
Betterment of the Beaverhead River and Valley

I. BACKGROUND AND OBJECTIVES

The purpose of the MOU is to define the roles and responsibilities of Reclamation and the Department to examine the opportunities to improve the environmental health of Clark Canyon Reservoir and the Beaverhead River while continuing to provide water to entities holding contracts with Reclamation; including irrigation, municipal, and industrial needs.

Clark Canyon Dam and Reservoir and Barretts Diversion Dam are part of the East Bench Unit of the Pick-Sloan Missouri Basin Program. The East Bench Unit is a Federally-owned facility developed under the authority of the Flood Control Act of 1944. The dam and reservoir are located near the headwaters of the Beaverhead River in Southwestern Montana. Reclamation has a right under Montana statute to impound and store water behind Clark Canyon Dam. This stored water is released from the dam and flows through the Beaverhead River Valley supplying irrigation, municipal, and industrial water to entities holding water contracts with Reclamation; including but not limited to the East Bench Irrigation District and Clark Canyon Water Supply Company. In addition to Reclamation's contract holders, other water right holders exist who have natural flow water rights from the Beaverhead River and divert water at various locations on the river. Reclamation has no contractual relationship with this group of water users.

Clark Canyon Dam has altered the hydrology of the Beaverhead River from its natural state. This altered condition has provided enhanced fish habitat and maintained minimum flows in certain reaches, but has also potentially contributed to environmental degradations in other reaches.

The Reclamation Act of 1956 requires Reclamation to provide water users holding existing contracts a right to renew their contracts for the project's available water supply, as well as the right to convert from a water service contract to a repayment contract subject to agreeable terms and conditions. As part of the 2005-2006 contract renewal process, Reclamation and the Department engaged in discussions to explore working cooperatively and collaboratively on the various environmental issues on the Beaverhead River.

II. SCOPE OF WORK

<u>A. Reclamation and the Department agree to:</u>

1. Identify environmental degradation issues of the Beaverhead River, including but not limited to;
    a. the Beaverhead River basin hydrology, including;
        1. the inverted hydrograph, which means the unnaturally high late season flows in the Beaverhead River
    b. Beaverhead River water quality, including but not limited to;
        1. nutrient and sediment loading
        2. water temperatures.

2. Investigate possible solutions to correct the Beaverhead River environmental degradation issues as identified in Item #1.

3. Review Clark Canyon Reservoir operations with the goal of improving increased river and reservoir environmental health while continuing to supply water to entities holding water contracts with Reclamation. Areas of consideration may include:
    a. studying different minimum winter flow releases from the dam depending on the water year (drought conditions, average year, wet year);
    b. studying the potential of a dedicated reservoir storage in order to accomplish higher river flows during naturally low-flow months in all years, and especially in average and drought years;
    c. studying different minimum threshold reservoir pool levels, depending on the water year (drought conditions, average year, wet year);
    d. studying the potential of a dedicated reservoir storage in order to accomplish short-term, bank-full events in average and wet years;
    e. working with water users to dedicate reservoir storage to river flows that result from the investment in efficiency in the management and delivery of irrigation water.

4. Explore water conservation projects; such as irrigation delivery system water efficiency (reducing ditch loss) and improving irrigation management with the understanding that an appropriate share of water saved through conservation projects could be made available for environmental enhancement opportunities. Water saved will be returned to the river when that is the expressed purpose of the implemented conservation measure.

5. Describe the fishery goals and fish management objectives for Clark Canyon Reservoir and the Beaverhead River. These goals and objectives will also describe what water body (the reservoir, the upper Beaverhead River, and the lower Beaverhead River) is the Department's priority in regards to fish management. These priorities will be a key component to fish management and evaluating reservoir operations during times of lower

precipitation patterns and drought conditions. Goals and objectives should also include target species (by water body), target size, and target species abundance.

6. Work through a collaborative process with interested groups to develop resource management strategies resulting from the analyses and/or pilot projects described in sub-sections (1) through (5), above for the improvement of environmental health of Clark Canyon Reservoir and the Beaverhead River.

B. Reclamation and the Department further agree that:

There will be no additional acres brought under irrigation that use Reclamation stored water unless further environmental analysis has been completed and such environmental analysis demonstrates that consumptive use by the crops under irrigation either remains the same or decreases. Extraordinary circumstances, such as a new variety of crop that requires less water to produce than existing crops may allow additional acreage and also provide an opportunity for conservation of water for instream flow purposes.

This Agreement is referenced by and is a part of the Clark Canyon Contract Renewal Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) completed as part of the renewal or conversion to repayment contracts for the Clark Canyon Water Supply Company (contract no. 14-06-600-3592) and the East Bench Irrigation District (contract no. 14-06-600-3593) water service contracts.

III. TERMS OF AGREEMENT

This MOU shall remain in effect for 15 years from the date of the last signature. This agreement may be modified or terminated at any time by mutual agreement of both parties. As described in the previous section, this MOU will be part of the final EA and FONSI. In the event that implementation of this Federal action is delayed as part some type of legal action, the terms of this MOU will become null and void. New terms will be re-negotiated between the 2 parties that better reflect the outcome of the legal action.

IV. REQUIRED CLAUSES

During the performance of this MOU, the participants agree to abide by the terms of Executive Order 11246 on non-discrimination, and will not discriminate against any person because of race, color, religion, sex, national origin, age, or being handicapped. The participants will take affirmative action to ensure that applicants are employed without regard to their race, color, religion, sex, national origin, age, or being handicapped.

No member or delegate to Congress, or resident Commissioner, shall be admitted to any share or part of this MOU, or to any benefit, or to any benefit that may arise there from, but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

V. TECHNICAL REPRESENTATIVES

The following representatives will be responsible for monitoring the work activities included in this MOU:

Reclamation:
Bureau of Reclamation
Montana Area Office
Attn: Lead Environmental Specialist
PO Box 30137
Billings, MT 59107-0137
(406) 247-7330

Department:
State of Montana
Department of Fish, Wildlife and Parks
Attn: In-Stream Flow Specialist
PO Box 200701
Helena, MT 59620-0701
(406) 444-4952