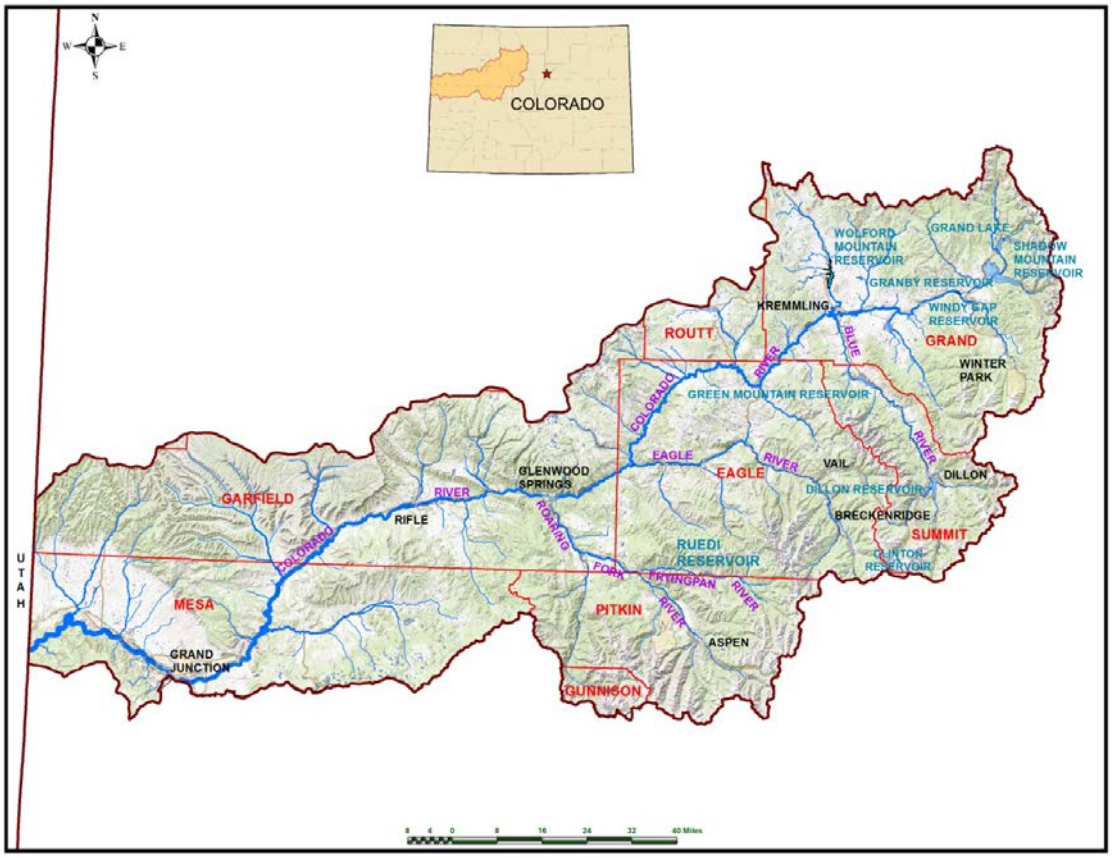
RECLAMATION

Managing Water in the West

EA No. EC-1300-13-003

Ruedi Reservoir Round II Water Marketing Program – Repayment Contracts for 19,585.5 Acre-Feet, Ruedi Dam and Reservoir, Fryingpan-Arkansas Project, Colorado

Final Environmental Assessment



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

July 25, 2013

ACRONYMS AND DEFINITIONS

15-Mile Reach	The portion of the Colorado River that extends from the confluence of the Gunnison River upstream 15 miles to the Grand Valley Irrigation Company diversion dam near Palisade, Colorado
ac-ft	acre-feet
anchor ice	results when a river is allowed to freeze over entirely or in large part
APE	Area of potential effect
augmentation plan	A court-approved plan that allows a junior water user to divert water out of priority so long as adequate replacement is made to affected stream system preventing injury to the water rights of senior users.
call	The request by an appropriator for water which the person is entitled to under his decree; such a call will force those users with junior decrees to cease or diminish their diversions and pass the requested amount of water to the downstream senior making the call.
cfs	cubic feet per second
contract	Ruedi Reservoir Round II Water Marketing Program Repayment Contract
CROS	Coordinated Reservoir Operations
CRWCD	Colorado River Water Conservation District
CWCB	Colorado Water Conservation Board
exchange	A process by which water, under certain conditions, may be diverted out of priority at one point by replacing it with a like amount of water at another point.
EA	Environmental Assessment
Fry-Ark Project	Fryingpan-Arkansas Project
mi^2	square miles
NEPA	National Environmental Policy Act
Operating Principles	Operating Principles for the Fryingpan-Arkansas Project as described in House Document Number 130
PBO	Programmatic Biological Opinion regarding endangered fish species in the Upper Colorado River Basin issued by the Denver Office of the U.S. Fish and Wildlife Service in 1999
Reclamation	Bureau of Reclamation
Recovery Program	Recovery Implementation Program for Endangered Fishes in the Upper Colorado River
RICD	Recreational In-channel Diversion Right: a water right held by a local governmental entity for structures that control the flow of water for boating and kayaking
Ruedi	Ruedi Reservoir
third party	entity who subcontracts Ruedi Reservoir Round II Water Marketing Program Repayment Contract water from a water conservation district
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
Repayment Contract	A contract between a water user's organization and Reclamation by which the organization obligates itself to repay a share of the reimbursable construction and other costs (not all construction costs are reimbursed by water users) of a Reclamation project in installments determined in accordance with Reclamation law in exchange for delivery of water.
RRII FSES	Ruedi Reservoir Round II Water Marketing Program Final Supplement to the Environmental Statement
Wolford Mountain	Wolford Mountain Reservoir

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CHAPTER 1 – PURPOSE OF AND NEED FOR PROPOSED ACTION

1.1 INTRODUCTION

Ruedi Reservoir (Ruedi), a feature of the Fryingpan-Arkansas Project (Fry-Ark Project), was primarily constructed to provide storage capacity for replacement water for senior downstream diversion rights in western Colorado at times when the Fry-Ark Project diverts Fryingpan River Basin flows to the Arkansas River Basin in eastern Colorado. The reservoir was oversized under the authority of the Water Supply Act of 1958 to provide storage space for the marketable pool. This pool allows water to be marketed for municipal and industrial use on the west slope, and fulfills obligations under Colorado's Compensatory Storage Act (see Operating Principles, paragraph 7). Revenue from marketable pool contracts is used to repay the United States for the cost of Ruedi construction; operation, maintenance, and replacement costs (OM&R); and accrued interest per the authorizing legislations.

This Final Environmental Assessment (EA) was prepared by Reclamation in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508), and Reclamation's NEPA Handbook (USDI 2012a).

As required by the Final Record of Decision for Ruedi Reservoir Round II Water Marketing Program Final Supplement to the Environmental Statement (RRII FSES; USDI 1990), Reclamation has conducted site-specific NEPA compliance for the proposed contract requests with this Final EA. This Final EA tiers to the RRII FSES. It is not a decision document, but rather it is a disclosure of the environmental consequences of the No Action and Proposed Action alternatives.

1.2 PROPOSED ACTION

The Bureau of Reclamation (Reclamation) proposes to enter into repayment contracts (contracts) with seventeen (17) West Slope water users (contractors) seeking individual contracts for 19,585.5 acre-feet (ac-ft) of water from Ruedi (see Section 2.3 for a list of the contractors). The water would be used primarily within the watershed of the mainstem of the Upper Colorado River to the confluence with the Gunnison River, and along the Colorado River to the state line (Figure 1).

In addition, Reclamation proposes to complete an administrative action to amend 31 existing Ruedi Round I and II contracts which allow for the delivery of water from Ruedi Reservoir by removing the expiration date to confirm their status as perpetual repayment contracts. (See Appendix A for a list of these contractors.) These contracts were included in all modeling for both the No Action and Proposed Action alternatives. There would be no change in effects from this administrative action. Therefore, this action will not be analyzed further in this EA.

1.3 PURPOSE AND NEED

1.3.1 CONTRACTOR PURPOSE AND NEED

The contractors propose to contract for the remaining Ruedi marketable pool to meet their long-range water planning needs. See Appendix B for each contractor's individual purpose and need description.

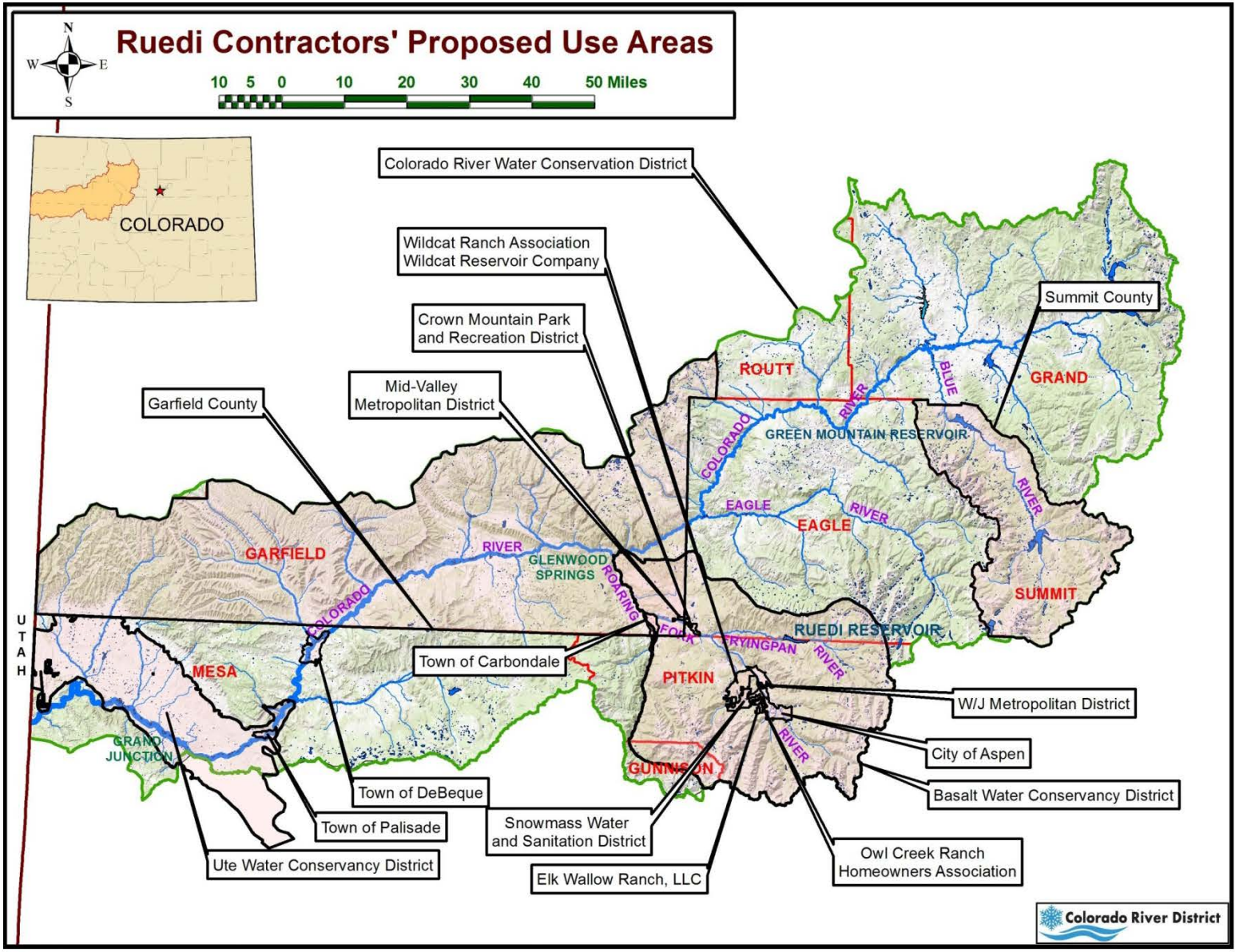


FIGURE 1. RUEDI CONTRACTORS' PROPOSED USE AREAS

1.3.2 Reclamation Repayment Purpose and Need

Reclamation, in compliance with the authority for construction of Ruedi, seeks to recover the cost of constructing the reservoir, associated OM&R charges, and interest accrued on these obligations.

Issuance of the proposed contracts would meet several objectives of the Operating Principles for the Fryingpan-Arkansas (Fry-Ark) Project as described in House Document Number 130 (Operating Principles; US Govt 1961). The primary purpose of Ruedi is to furnish water required for the protection of western Colorado water users, including present water rights and prospective uses of water. Receipts from the sale of water from Ruedi are required to pay for operation and maintenance costs and to reimburse construction costs in excess of $7.6 million.

1.4 BACKGROUND

Reclamation, an agency of the Department of the Interior, owns and operates the Fry-Ark Project, which is a multipurpose transmountain diversion development in southeastern Colorado. It makes possible an average annual diversion not to exceed 120,000 ac-ft in any year or 2,352,800 ac-ft of water in any 34 consecutive years from the Roaring Fork basin on the West Slope to the Arkansas River on the East Slope of the Rocky Mountains. The average annual diversion to date has been approximately 52,400 ac-ft. In 1968, Ruedi Dam and Reservoir were constructed in order to capture the runoff from approximately a 226 mi^2 area, provide storage for replacement of out-of-priority diversions to the East Slope, and to provide water for development of the West Slope. The primary source of runoff is the spring melt of accumulated winter snow pack, which is stored in Ruedi during the runoff period and then released later in the year.

Ruedi is an important source of supplemental and augmentation water for municipal, industrial, and commercial irrigation uses for Colorado River Basin water users upstream of Grand Junction, Colorado. Under Colorado water law, water users with senior water rights are first in priority to divert water, whether from wells or surface water diversions. Water rights within the same drainage, which are junior to more senior water rights, are legally obligated to curtail or stop their water use when their use of water would impede the senior water right holder from fully utilizing its water rights. To avoid having to curtail or stop water use, junior water right holders may acquire augmentation water, which is released to ensure senior water right holders are not “injured.” Junior water right holders may enter into contracts with Reclamation to obtain direct delivery or augmentation water from Ruedi to provide the protection described above, and it is for this use that most contracts are established. Releases from Ruedi to meet contract demands may occur at any time of the year, but are primarily associated with dry seasons and seasons of peak water demand, mainly July through October.

In addition to water for replacement and contract for the West Slope, public recreation on Ruedi and the Fryingpan River are recognized under the Operating Principles. Protection of recreational values on the Fryingpan River is made through a provision of minimum flows below the junction of the Fryingpan River and Rocky Fork Creek. Ruedi and the Fryingpan River are well-established recreation destinations, supporting activities such as boating, picnicking, camping, and fishing.

1.5 ISSUES

Reclamation has executed 29 Ruedi water contracts since 1996. The NEPA process for many of these contract actions included formal scoping and comment periods, the most recent being the Colorado Water Users' Commitment to Provide 10,825 acre-feet to the 15-Mile Reach of the Upper Colorado River Environmental Assessment (10825 EA, USDI 2012b), completed in 2012. Through this volume of NEPA application, Reclamation has identified and documented key and substantive issues associated with Ruedi water contracting.

On June 14, 2013, the Draft EA for Ruedi Reservoir Round II Water Marketing Program – Repayment Contracts for 19,585.5 Acre-Feet was posted on Reclamation's webpage at http://www.usbr.gov/gp/ecao/nepa/ruedi_repayment.html, and an electronic message announcing the availability of the Draft EA for comment was sent to 204 individuals, groups, organizations, and agencies. During the 17 day public comment period of June 14, 2013, to July 1, 2013, seven commenters submitted comments. (See Appendix E.)

Below is a summary of the key issues identified during past and present scoping and public comments on Ruedi contracting. Reclamation has included these issues for evaluation in Chapter Three – Affected Environment and Environmental Consequences. Topics excluded from further evaluation are also explained.

1.5.1 Issues and Impact Topics Included for Further Evaluation

Ruedi Operations

- Adherence to the Operating Principles and minimum streamflow requirements.
- Effects on Ruedi, and the hydrology of the Fryingpan and Roaring Fork Rivers.

Threatened and Endangered Species

- Effects upon endangered fish in the 15-Mile Reach of the Colorado River.
- Impacts to non-fish species.

Other Aquatic Resources

- Impacts to sport fish, their habitat, and their food sources in Ruedi, and the Fryingpan and Roaring Fork Rivers.

Recreation

- Changes in elevation of Ruedi.
- Impacts to fishery due to change in aquatic resources and wadability in the Fryingpan River.

Socioeconomics

- Effects upon tourism, local businesses, and employment.

Environmental Justice

- Effects on minority and low-income populations.

Hydroelectric Production

- Impacts to the Ruedi Hydroelectric Power Plant licensed to the City of Aspen.

Climate Change

- Cumulative impacts of climate change.

1.5.2 Issues and Impact Topics Considered but Excluded from Further Evaluation

Air Quality, Noise, and Transportation

The Proposed Action would not require construction activities. Thus, no temporary noise impacts from construction activities would occur. Similarly, temporary air quality impacts resulting from fugitive dust emissions generated from construction activity would not occur. Traffic associated with operation and maintenance of the Proposed Action would be negligible.

Floodplains, Wetlands, Water Quality and River Physical Properties

Executive Order 11988 instructs federal agencies to avoid, to the extent possible, the long-and short-term adverse impacts associated with the occupancy and modification of floodplains and wetlands, and to avoid direct or indirect support of development in floodplains and wetlands wherever there is a practicable alternative. Executive Order 11990 Protection of Wetlands requires federal land management agencies to take action which will minimize destruction, loss, or degradation of wetlands. The proposed contracts would include the following stipulation or, where applicable, stipulate that contractors agree to include the following language in contracts with third parties: "Section 404 of the Clean Water Act (33 U.S.C. 1344) regulates the discharge of dredged or fill material into waters of the United States. Contractors shall consult with the Army Corps of Engineers if construction of facilities necessary to use the contracted water requires Section 404 compliance, which may include obtaining a permit. Further consultation and approval by the United States Fish and Wildlife Service may be required to ensure compliance with the Endangered Species Act (16 U.S.C. §1531, et seq.) if Contractors propose physical alterations to designated critical habitat of the Colorado River endangered fish species. As of June 2013, designated critical habitat exists from the Colorado State Highway 13 Road Bridge Crossing of the Colorado River in Rifle downstream to the Colorado state line." Based upon this contract stipulation there are no impacts expected to these resources.

Cultural Resources

On August 7, 1998, Reclamation, the Colorado State Historic Preservation Officer, and the Advisory Council on Historic Preservation executed a programmatic agreement (PA) regarding the Ruedi Reservoir Round II and Green Mountain Reservoir Water Marketing Programs (USBR 1998). This agreement defined different areas of potential effects (APEs) for contracts with different parties. When delivery of contracted water is to municipalities and water districts, and when construction of new facilities by the contractor is necessary to use the contracted water, the APE is "the area affected by construction of new facilities from the point of diversion to the water treatment facility." When delivery of contracted water is to individuals and corporations, and when new construction and/or new uses are proposed, the APE is "the area affected by construction of the water delivery system, and developments within the service area that use contracted water." However, because the current undertaking is providing augmentation water, there would be no construction of new facilities by municipalities and water districts in order to use the contracted water, or by individuals and corporations, and the water released would remain within the boundaries of normal flows in the downstream rivers. As a result, the PA's stipulations regarding historic properties would not be invoked.

Given that the proposed undertaking would not require the construction of new facilities or a change in land use, Reclamation has determined that there would be no potential for the proposed undertaking to affect historic properties.

Indian Trust Assets

Indian trust assets are owned by American Indians but are held in trust by the United States. Requirements for managing Indian Trust Assets are included in the Secretary of the Interior's Secretarial Order 3206, American Indian Tribal Rites, Federal-Tribal Trust Responsibilities, the Endangered Species Act; and Secretarial Order 3175, Departmental Responsibilities for Indian Trust Resources. No known Indian Trust Assets are within the project area, therefore there would be no known effect on Indian trust assets.

Visual Resources

In general, streams in the area potentially affected by the Proposed Action occur in high-quality scenic or visually sensitive locations. Water levels fluctuate diurnally and seasonally as a result of natural hydrologic cycles, reservoir management, irrigation practices, and diversions for other purposes. Even in a natural state, Colorado streams are characterized by substantial variations in flow, typically reaching the highest flow levels in May or June and then rapidly dropping off through the remainder of the year until they reach the low flows that predominate during the winter months. As a result, a stream is a dynamic system that rarely remains static and the viewer has an expectation of observing change over the course of the seasons. The Proposed Action would result in primarily negligible to minor reservoir surface area changes (averaging 1.4 percent less) and flows remaining within the historic range of variability and, thus, would not impact the visual quality of streams and reservoirs.

Farmland

None of the soils in the analysis area are classified as "prime farmland" by the NRCS. Three soil map units in the analysis area, the Cimarron, Leavitt, and Youga soils, are classified as farmland of statewide importance. Changes in streamflow, stream stage, or reservoir levels would not affect soils.

1.6 AREA OF POTENTIAL EFFECT

The spatial area for effects analysis is within the watershed of the mainstem of the Upper Colorado River to the confluence with the Gunnison River, and along the Colorado River to the state line[1]. Impacts in this area were incorporated by reference from appropriate sections of analyses completed in the RRII FSES, the Programmatic Biological Opinion regarding endangered fish species in the Upper Colorado River Basin issued by the Denver Office of the U.S. Fish and Wildlife Service in 1999 (PBO), the Ruedi Reservoir 2012 Agreement Final Environmental Assessment (2012 Agreement; USDI 2002), the Ruedi Reservoir Round II Water Marketing Program Repayment Contract – Colorado River Water Conservation District Environmental Assessment/Finding of No Significant Impact (CRWCD 2007 EA/FONSI; USDI 2007), and/or the 10,825 EA/FONSI, as well as site-specific analyses.

[1] The proposed use area boundary for the Ute Water Conservancy District (Ute) in Figure 1 was corrected to include a portion of their service area extending south of what was originally shown in the Draft EA. However, all of Ute's water is diverted from an existing diversion on the Colorado River and treated in an existing water treatment plant for distribution to their customers. No diversions would occur on the Gunnison River. Wastewater treated within Ute's service area returns to the Colorado River.

CHAPTER TWO – ALTERNATIVES

2.1 INTRODUCTION

This Chapter describes the No Action and Proposed Action Alternatives. The No Action Alternative essentially is continuation of current Ruedi contracting and operations. The Proposed Action Alternative was proposed by the contractors and further clarified by Reclamation.

2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, Reclamation would not issue repayment contracts to the contractors who have requested them. In the absence of a contract with Reclamation, the contractors would be required to look for other ways to augment out-of-priority demands and/or supplement their current water rights. Those contractors in need of augmentation water would likely continue to seek augmentation water until a source is found, especially where they are required to have an augmentation plan in place to continue their diversions when there is a "call" on the river to comply with State of Colorado law.

It is recognized that under this scenario these contractors could request a Reclamation contract in the future. However, for comparison purposes in this analysis, we are assuming that no new Ruedi repayment contracts are executed under the No Action Alternative.

2.3 PROPOSED ACTION ALTERNATIVE

Under the Proposed Action Alternative, Reclamation would enter into individual repayment contracts with the contractors for the remainder of the marketable pool, 19,585.5 acre-feet, at Ruedi Dam and Reservoir. The proposed water user and type of use, proposed water quantity, proposed contract use, and anticipated year of first delivery are displayed in Table 1.

TABLE 1. PROPOSED ACTION SUMMARY TABLE

Requestor + Type of Use: (augmentation, exchange, alternative source or replacement, and/or direct use without augmentation plan)	Quantity (acre-feet)	Proposed Contract Use (municipal/industrial (M&I) and/or irrigation for commercial agriculture (AG))	Year of Requested First Delivery
City of Aspen (augmentation/exchange)	400	M&I	2013
Basalt Water Conservancy District (augmentation/exchange)	300	M&I	2013

Requestor + Type of Use: (augmentation, exchange, alternative source or replacement, and/or direct use without augmentation plan)	Quantity (acre-feet)	Proposed Contract Use (municipal/industrial (M&I) and/or irrigation for commercial agriculture (AG))	Year of Requested First Delivery
Town of Carbondale (augmentation/exchange/ direct use without augmentation plan – not to exceed 10 AF/year in conjunction with the operation and re-development of the Town's Gateway Park)	250	M&I	2013
Colorado River Water Conservation District (augmentation/exchange/ occasional short-term direct use without augmentation plan/alternative source or replacement)	4,683.5	M&I, AG	2013
Crown Mountain Park and Recreation District (augmentation)	62	M&I	2013
Town of Debeque (augmentation/exchange)	25	M&I	2015
Elk Wallow Ranch (augmentation/exchange)	30	M&I, AG	2013
Garfield County (augmentation/exchange)	400	M&I	2013
Mid Valley Metropolitan District (augmentation)	100	M&I	2013
Owl Creek Ranch Homeowners' Association (augmentation/exchange)	15	M&I, AG	Upon court approval of aug. plan
Town of Palisade (augmentation/exchange)	200	M&I	2013
Snowmass Water & Sanitation District (augmentation/exchange)	500	M&I	2013
Board of County Commissioners of the County of Summit (alternative source)	330	M&I	2013
Ute Water Conservancy District (augmentation/exchange/ direct use without augmentation plan)	12,000	M&I	2013
W/J Metropolitan District (augmentation)	100	M&I	2015

Requestor + Type of Use: (augmentation, exchange, alternative source or replacement, and/or direct use without augmentation plan)	Quantity (acre-feet)	Proposed Contract Use (municipal/industrial (M&I) and/or irrigation for commercial agriculture (AG))	Year of Requested First Delivery
Wildcat Ranch Association (augmentation/exchange)	50	M&I, AG	2013
Wildcat Reservoir Company (augmentation/exchange)	140	M&I, AG	2013
Total Proposed Contracts: 19,585.5 acre-feet			

For most contractors, the use of Ruedi water would be triggered by a "call" on the river. All contractors have existing water rights used for their primary direct diversion needs. Ruedi water would not typically be used as a primary water source by most of them, with the exception of up to 10 ac-ft per year in conjunction with the operation and re-development of the Town of Carbondale's Gateway Park, occasional short-term direct use for subcontractors without approved augmentation plans for the Colorado River Water Conservation District, and by the Ute Water Conservancy District (Ute). Ute indicated they also would not typically use the Ruedi water directly as their primary source, but would have it available if needed as part of their water portfolio.

The proposed contracts would be subject to Reclamation law, as amended and supplemented, and the rules and regulations promulgated by the Secretary of the Interior under Reclamation law. Water released through the proposed contracts would be delivered according to the Operating Principles established for Ruedi. Further, the proposed contracts would contain a shortage provision recognizing that the contracts can be satisfied only when the water is available consistent with the Operating Principles.

In addition, as noted in section 1.2, Reclamation proposes to complete an administrative action to amend 31 existing Ruedi Round I and II contracts which allow for the delivery of water from Ruedi Reservoir by removing the expiration date to confirm their status as perpetual repayment contracts. These contracts were included as an existing condition in all modeling for both the No Action and Proposed Action alternatives. There would be no direct, indirect, or cumulative effects from this administrative action. Therefore, this action will not be analyzed further in this EA.

CHAPTER THREE – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 INTRODUCTION AND METHODOLOGY

This chapter describes the affected environment and discloses the environmental consequences associated with implementing the No Action and Proposed Action Alternative as described in Chapter Two. Resources evaluated in this chapter include: Ruedi operations, threatened and endangered species, other aquatic resources, farmland, recreation, socioeconomics, and hydroelectric production. As described in the Issues and Impact Topics section of Chapter One, there are no impacts expected to air quality, noise, transportation, floodplains, wetlands, water quality, river physical properties, cultural resources, Indian trust assets, visual resources, or prime farmland as a result of the issuance of the proposed contract, and therefore have been considered but eliminated from further evaluation.

The No Action Alternative represents current conditions and for the purposes of this analysis is assumed to represent the conditions that would exist if the contracts were not awarded as described in Chapter Two. Furthermore, the No Action Alternative provided a baseline condition, which was used to evaluate the level of impact caused by the Proposed Action Alternative.

Impact Thresholds

Direct, indirect, and cumulative effects were analyzed for each impact topic and are described in terms of type, duration, and intensity with general definitions of each provided below.

Type - describes the classification of the impact as beneficial or adverse, and direct, indirect or cumulative.

> ***Beneficial****:* positive change in the condition or appearance of the resource, or a change that moves the resource toward a desired condition.
> ***Adverse****:* negative change that detracts from the resource's appearance or condition, or a change that moves the resource away from a desired condition.
> ***Direct****:* effect caused by the alternative and occurs in the same time and place.
> ***Indirect****:* effect caused by the alternative but is later in time or farther removed in distance, but is still reasonably foreseeable.
> ***Cumulative****:* incremental effect caused by the alternative when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts can result from individually minor, but collectively significant actions taking place over time.

Duration - describes the length of time an effect would occur as short-, intermediate- or long-term.

> ***Short-term:*** lasting for one to two years of the contracts, or the resources resume pre-contract conditions quickly.
> ***Intermediate-term:*** lasting between two and 16 years of the contracts, or the resources resume pre-contract conditions in a longer period of time.

Long-term: lasting beyond 16 years of the contracts, or the resources may not resume their pre-contract conditions in the foreseeable future.

Intensity - describes the degree, level, or strength of an impact as no impact, negligible, minor, moderate, or major. The following explain the thresholds used to determine the change in intensity.

No impact: no discernable effect.
Negligible: effect is at the lowest level of detection and causes very little or no disturbance.
Minor: effect that is slight, but detectable, with some perceptible effects of disturbance.
Moderate*:* effect is readily apparent and has measurable effects of disturbance.
Major*:* effect is readily apparent and has significant effects of disturbance.

3.2 REASONABLY FORESEEABLE ACTIONS

The cumulative effects analysis focused on water-based actions because the Proposed Action involves no land-disturbing activities or other on-the-ground changes.

3.2.1 CLIMATE CHANGE

Numerous studies have been conducted on the relationship between climate change and water resources in the West. Recently, the CWCB evaluated the potential influence of climate change on streamflow in the Colorado River Basin in the Final Draft of the Colorado River Water Availability Study (AECOM 2010). In 2011, Reclamation released the SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water 2011 report (Reclamation 2011a). The report presented assessments of future supply across eight major river basins, including the Colorado River Basin. Reclamation considers climate change as a foreseeable event with important implications for water management in the Western US. Reclamation's Streamflow Projections for the Western United States (Reclamation 2011b) includes a projection for natural flow at the Cameo gage near the downstream end of the project area. The results project a minor (5.5 percent or less) trend for reduced annual runoff through 2099 in the affected area when considering all carbon emission scenarios. Compared to 1950-1999, there is a projected 4.3 percent decrease in 2030-2059, and a 5.5 percent projected decrease in 2060-2099. Based on these projections, Reclamation does not anticipate changes in climate and runoff patterns, which would occur under both alternatives, to have significant cumulative impacts when combined with the proposed action because: 1) hydrologic effects of the proposed action range from no impacts to negligible impacts, and 2) adverse changes in runoff volume or timing upstream of Ruedi would likely be lessened downstream of Ruedi Reservoir due to reservoir operations (i.e. storage and release at a later time).

3.3 RUEDI OPERATIONS

The Ruedi operation information presented here in summary can be found in detail in the Operating Principles, RRII FSES, the 2012 Agreement, the CRWCD 2007 EA, and the 10,825 EA. The analysis on the operations of Ruedi, and resultant impacts to Ruedi, and the Fryingpan and Roaring Fork Rivers in the four latter documents is incorporated here by reference. The direct and indirect impact analysis was also based upon results from a hydrologic model, which focused upon Ruedi and the Fryingpan River. Throughout the analysis direct and indirect impacts to the Roaring Fork River were not explicitly discussed; however the reader should assume the impacts to be of the same nature but of lesser intensity than that of the Fryingpan River impacts.

A description of the hydrologic model used to simulate reservoir and streamflow conditions for the two alternatives is included in Appendix C. The RRII FSES projected an 80/20 split in demands between industrial and municipal users. Considering existing and proposed contracts, the demand pattern is split closer to 50/50, excluding commitments for fish. Note that the modeling period of record chosen was 1975 to 2005. This analysis includes 1977 as was not done in past analyses. The reason for this inclusion is that 1977 was used in the RRII FSES (p. 4.5) as a representative dry year. The results of the RRII FSES model and the hydrologic model used in this analysis will be compared where possible and appropriate. Certain years were selected to represent types of years: 1977 dry year, 1981 dry year, 1988 moderate year, 1996 wet year, and 2002-2004 period of 3 dry years in a row. Even though 2003 could be considered a moderate year, it was on the border of being a dry year, and with it following the driest year on record, 2003 was operated as though it were a dry year.

3.3.1 Affected Environment

The Operating Principles describe the replacement capacity of Ruedi as that portion of the reservoir needed to replace water diverted out-of-priority to the Arkansas Basin via the Fry-Ark Project. 28,000 ac-ft is generally used as the Replacement Pool amount for analysis purposes. The Regulatory Capacity of Ruedi is that portion of the total reservoir capacity not needed for replacement purposes that would serve West Slope users. The Marketable Yield Pool represents the portion of the Regulatory Capacity of Ruedi which was dedicated to water marketing purposes. Table 3.1 summarizes the pools and the volumes associated with each.

The Operating Principles established the minimum releases as measured on the Fryingpan River immediately below the confluence with Rocky Fork as the lesser of inflow or 39 cfs during the period from November 1 to April 30, or 110 cfs during the period from May 1 to October 31. The CWCB has established minimum instream flow water rights in the Fryingpan River below Ruedi based upon these flow rates; however the water rights are junior in priority to the minimum release requirements established for Ruedi.

In the early 1980's, Reclamation began marketing water from Ruedi. In 1982 Reclamation concluded Ruedi Reservoir Round I Water Sales, which totaled 7,850 ac-ft of water contracts annually. In response to additional demand, Reclamation initiated action to provide additional water sales through the Ruedi Reservoir Round II Water Marketing Program, which involved extensive U.S. Fish Wildlife Service (USFWS) consultation. In January 1990 Reclamation completed the RRII FSES, which recommended the preferred alternative with conservation measures to offer for sale a total of 51,500 ac-ft of water annually from Ruedi; however, 5,000 ac-ft of this was to be withheld for conservation flows for identified endangered Colorado River fishes. Currently 19,064.5 ac-ft of Round II water is under contract, leaving 19,585.5 ac-ft available for water contracting.

Table 3.1 – Ruedi Reservoir Pool Volumes

Pool / Allocation	Volumes (ac-ft)	Subtotals (ac-ft)	Totals (ac-ft)
Replacement Capacity*			Up to 28,000
Regulatory Capacity			73,278
A. Marketable Yield			
1. Round I Contracts	7,850		
2. Endangered Fish Mitigation for Round II Marketing**	5,000		
3. Existing Round II Contracts (Non Endangered Fish)	19,064.5		
4. Available for Contract	19,585.5	51,500	
B. Remaining Regulatory		21,778	
Inactive Storage			1,032
Dead Storage			63
Total Storage Capacity			102,373

*The Operating Principles state the replacement capacity is that portion of the reservoir needed to replace out-of-priority diversions to the Arkansas Basin by the Project. For the purpose of analyzing Marketable Yield, the replacement pool was assumed to be 28,000 ac-ft.
**An additional 5,000 ac-ft of water is available from Ruedi to benefit endangered fish in 4 years out of 5 through re-regulation of the reservoir.

3.3.2 ENVIRONMENTAL CONSEQUENCES

No Action Alternative

With the anticipated effects of climate change, it is expected that on average flows into Ruedi would be lower. It is also anticipated that the Cameo call, which refers to a suite of senior water rights near Grand Junction, may come on sooner and last longer. It is hard to predict what the impacts of climate change would be on Ruedi elevations, as the reservoir would still fill in most years. The possible impact to the timing of releases from the reservoir and the Cameo call make prediction of late summer elevations particularly difficult. The reservoir would continue to moderate the effects of climate variations. Ruedi operations would remain in compliance with the Operating Principles.

This alternative would result in Ruedi, and the Fryingpan and Roaring Fork River flows continuing to fluctuate as they have historically as a result of yearly precipitation variations, releases for fish recovery and from previously established water contracts, and/or regulation according to the CWCB's minimum instream flows and the Operating Principles. Therefore, this alternative is expected to have no direct, indirect or cumulative impacts to Ruedi operations.

Proposed Action Alternative

Direct and indirect effects: Table 3.2 shows the simulated minimum, maximum, and average monthly flows in the Fryingpan River during all years of the period of record for the Proposed Alternative compared with the No Action Alternative. The model results indicate that the flows in November through March average about 12 cfs lower, flows in April through July average about 3 cfs lower, and that flows in August through October average about 12-25 cfs higher.

TABLE 3.2 – SIMULATED FRYINGPAN RIVER FLOWS (CFS)

Historic Hydrologic	November									December									January								
	No Action			Alternative			Difference			No Action			Alternative			Difference			No Action			Alternative			Difference		
Year	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
1975	103	103	103	103	103	103	**0**	**0**	**0**	103	103	103	103	103	103	**0**	**0**	**0**	102	103	102	102	103	102	**0**	**0**	**0**
1976	82	83	82	74	77	75	**-8**	**-6**	**-7**	81	82	82	74	74	74	**-8**	**-8**	**-8**	81	81	81	74	74	74	**-8**	**-8**	**-8**
1977*	75	75	75	66	66	66	**-10**	**-10**	**-10**	75	75	75	65	66	65	**-10**	**-10**	**-10**	74	75	75	65	66	65	**-10**	**-10**	**-10**
1978	51	52	52	40	41	40	**-12**	**-11**	**-11**	51	58	52	40	41	40	**-12**	**-17**	**-12**	51	51	51	39	40	40	**-12**	**-11**	**-11**
1979	83	83	83	71	71	71	**-12**	**-12**	**-12**	83	83	83	71	71	71	**-12**	**-12**	**-12**	83	83	83	71	71	71	**-12**	**-12**	**-12**
1980	98	101	99	91	93	92	**-8**	**-8**	**-8**	99	100	100	92	93	92	**-8**	**-8**	**-8**	99	101	100	92	93	92	**-8**	**-8**	**-8**
1981*	62	63	62	37	53	44	**-25**	**-10**	**-19**	62	62	62	36	49	39	**-26**	**-12**	**-22**	61	62	62	36	38	36	**-26**	**-24**	**-25**
1982	87	88	88	55	56	56	**-32**	**-32**	**-32**	87	88	87	55	64	56	**-32**	**-23**	**-31**	87	88	87	54	64	56	**-32**	**-23**	**-31**
1983**	182	189	182	179	186	179	**-3**	**-3**	**-3**	190	197	192	187	194	189	**-3**	**-3**	**-3**	187	197	191	184	194	188	**-3**	**-3**	**-3**
1984**	192	196	193	191	195	192	**-1**	**-1**	**-1**	163	196	173	162	195	172	**-1**	**-1**	**-1**	163	163	163	162	162	162	**-1**	**-1**	**-1**
1985	180	193	185	178	192	184	**-1**	**-1**	**-1**	180	187	183	178	185	182	**-1**	**-1**	**-1**	180	196	186	178	195	185	**-1**	**-1**	**-1**
1986**	165	174	168	164	173	167	**-1**	**-1**	**-1**	165	183	172	164	182	171	**-1**	**-1**	**-1**	165	173	168	164	172	167	**-1**	**-1**	**-1**
1987	169	185	176	169	185	176	**0**	**0**	**0**	169	207	180	169	207	180	**0**	**0**	**0**	169	179	173	169	179	173	**0**	**0**	**0**
1988	137	166	142	118	147	123	**-19**	**-19**	**-19**	137	140	139	118	121	120	**-19**	**-19**	**-19**	133	139	137	114	120	118	**-19**	**-19**	**-19**
1989*	61	65	63	44	47	45	**-18**	**-18**	**-18**	58	65	61	40	47	43	**-18**	**-18**	**-18**	60	62	61	42	44	42	**-18**	**-18**	**-18**
1990*	77	79	78	39	41	40	**-38**	**-38**	**-38**	77	79	77	39	47	42	**-38**	**-33**	**-36**	77	82	78	41	46	43	**-36**	**-35**	**-35**
1991	84	103	94	70	94	81	**-14**	**-9**	**-13**	92	103	97	78	89	83	**-14**	**-14**	**-14**	92	92	92	78	78	78	**-14**	**-14**	**-14**
1992	124	132	125	121	129	122	**-3**	**-3**	**-3**	124	124	124	121	121	121	**-3**	**-3**	**-3**	124	124	124	121	121	121	**-3**	**-3**	**-3**
1993**	105	113	108	92	100	96	**-13**	**-13**	**-12**	106	113	109	93	99	95	**-13**	**-13**	**-13**	105	108	106	92	95	93	**-13**	**-13**	**-13**
1994	148	156	149	146	153	147	**-3**	**-3**	**-3**	148	148	148	146	146	146	**-3**	**-3**	**-3**	148	159	156	146	157	154	**-3**	**-3**	**-3**
1995**	83	87	85	55	60	58	**-28**	**-27**	**-28**	84	87	85	56	60	57	**-28**	**-27**	**-28**	85	88	87	57	60	59	**-28**	**-28**	**-28**
1996**	195	295	199	192	292	196	**-3**	**-3**	**-3**	195	196	195	192	193	192	**-3**	**-2**	**-3**	195	195	195	192	192	192	**-3**	**-3**	**-3**
1997**	161	162	161	155	156	155	**-6**	**-6**	**-6**	161	161	161	155	155	155	**-6**	**-6**	**-6**	161	162	161	155	156	155	**-6**	**-6**	**-6**
1998	188	190	188	188	190	188	**0**	**0**	**0**	188	188	188	188	188	188	**0**	**0**	**0**	188	189	188	188	189	188	**0**	**0**	**0**
1999	145	245	155	145	245	155	**0**	**0**	**0**	145	149	147	145	149	147	**0**	**0**	**0**	145	153	147	145	153	147	**0**	**0**	**0**
2000	160	163	162	160	163	162	**0**	**0**	**0**	159	162	161	159	162	161	**0**	**0**	**0**	160	162	160	160	162	160	**0**	**0**	**0**
2001*	85	92	86	65	92	69	**-20**	**0**	**-17**	84	86	85	64	66	65	**-20**	**-20**	**-20**	84	86	85	64	66	65	**-20**	**-20**	**-20**
2002*	82	100	85	62	80	64	**-20**	**-20**	**-20**	82	84	82	62	66	63	**-20**	**-18**	**-20**	82	83	82	62	63	62	**-20**	**-20**	**-20**
2003*	43	45	44	43	45	44	**0**	**0**	**0**	43	45	44	43	45	44	**0**	**0**	**0**	43	44	44	43	44	44	**0**	**0**	**0**
2004*	94	128	107	74	108	88	**-20**	**-20**	**-20**	93	94	94	74	74	74	**-20**	**-20**	**-20**	94	98	98	74	79	78	**-20**	**-20**	**-20**
2005	79	80	79	53	56	53	**-27**	**-25**	**-26**	79	80	79	53	54	53	**-26**	**-26**	**-26**	80	80	80	53	54	54	**-27**	**-26**	**-26**
Ave	**124**	**140**	**127**	**112**	**130**	**115**	**-12**	**-10**	**-11**	**123**	**129**	**125**	**111**	**118**	**114**	**-12**	**-11**	**-12**	**123**	**127**	**118**	**111**	**115**	**116**	**-12**	**-11**	**-12**

* Indicates dry years, ** indicates wet years, and no asterisks indicate moderate years

Historic	February									March									April								
Hydrologic	No Action			Alternative			Difference			No Action			Alternative			Difference			No Action			Alternative			Difference		
Year	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
1975	102	137	134	102	137	134	**0**	**0**	**0**	137	137	137	137	137	137	**0**	**0**	**0**	87	137	115	87	137	115	**0**	**0**	**0**
1976	81	111	109	74	104	101	**-8**	**-8**	**-8**	111	113	112	104	105	105	**-8**	**-8**	**-8**	59	121	89	59	121	86	**0**	**-1**	**-3**
1977*	76	77	77	66	67	67	**-10**	**-10**	**-10**	77	78	77	67	68	67	**-10**	**-10**	**-10**	43	80	63	43	73	58	**0**	**-6**	**-5**
1978	51	75	72	39	41	41	**-12**	**-34**	**-31**	47	79	59	41	44	41	**-6**	**-35**	**-18**	79	131	106	43	99	68	**-36**	**-31**	**-38**
1979	72	83	73	60	71	61	**-12**	**-12**	**-12**	72	73	72	60	60	60	**-12**	**-12**	**-12**	73	129	97	60	129	90	**-12**	**0**	**-7**
1980	95	100	95	87	92	88	**-8**	**-8**	**-8**	95	95	95	87	88	87	**-8**	**-8**	**-8**	70	95	84	70	88	80	**0**	**-8**	**-4**
1981*	61	69	68	36	38	38	**-26**	**-30**	**-30**	68	69	69	38	41	39	**-30**	**-28**	**-30**	49	81	65	40	79	56	**-9**	**-2**	**-10**
1982	88	96	95	56	63	62	**-32**	**-34**	**-33**	96	97	96	46	68	59	**-50**	**-28**	**-37**	58	134	90	53	139	77	**-6**	**5**	**-12**
1983**	167	187	172	164	184	168	**-3**	**-3**	**-3**	167	176	175	164	173	172	**-3**	**-3**	**-3**	114	175	146	114	171	144	**0**	**-3**	**-2**
1984**	131	163	134	130	162	133	**-1**	**-1**	**-1**	131	131	131	130	130	130	**-1**	**-1**	**-1**	131	207	165	130	207	165	**-1**	**0**	**0**
1985	174	183	175	172	181	174	**-1**	**-1**	**-1**	176	186	179	174	184	178	**-1**	**-1**	**-1**	115	201	158	119	263	167	**4**	**63**	**9**
1986**	170	192	186	169	191	185	**-1**	**-1**	**-1**	183	208	194	182	207	193	**-1**	**-1**	**-1**	131	244	186	131	244	186	**0**	**0**	**0**
1987	163	173	168	163	173	168	**0**	**0**	**0**	163	163	163	163	163	163	**0**	**0**	**0**	74	163	127	74	163	127	**0**	**0**	**0**
1988	127	135	129	108	116	110	**-19**	**-19**	**-19**	127	135	131	108	116	112	**-19**	**-19**	**-19**	58	166	106	57	161	92	**0**	**-5**	**-14**
1989*	61	83	75	39	50	43	**-22**	**-33**	**-32**	52	83	69	42	50	46	**-10**	**-34**	**-22**	49	113	78	42	55	46	**-7**	**-59**	**-32**
1990*	82	86	84	44	47	45	**-38**	**-39**	**-39**	78	86	81	39	47	42	**-39**	**-39**	**-39**	45	88	65	39	87	56	**-6**	**-2**	**-9**
1991	92	105	99	78	90	85	**-14**	**-14**	**-14**	93	98	95	56	84	81	**-36**	**-14**	**-15**	49	148	86	49	148	78	**0**	**0**	**-8**
1992	121	124	122	118	121	118	**-3**	**-3**	**-3**	121	129	126	118	125	123	**-3**	**-3**	**-3**	56	159	101	56	156	96	**0**	**-4**	**-5**
1993**	99	106	100	85	93	86	**-14**	**-13**	**-13**	100	120	113	86	106	100	**-14**	**-14**	**-14**	102	135	111	88	135	102	**-14**	**0**	**-9**
1994	149	159	156	147	157	153	**-3**	**-3**	**-3**	145	155	148	142	152	146	**-3**	**-3**	**-3**	59	155	116	59	152	115	**0**	**-3**	**-2**
1995**	88	116	113	60	88	85	**-28**	**-28**	**-28**	107	118	113	47	89	77	**-60**	**-29**	**-36**	84	133	112	47	117	97	**-37**	**-16**	**-15**
1996**	195	201	201	192	198	197	**-3**	**-3**	**-3**	201	201	201	198	198	198	**-3**	**-3**	**-3**	96	213	152	96	231	159	**0**	**18**	**7**
1997**	154	161	155	148	155	149	**-6**	**-6**	**-6**	154	164	156	148	158	150	**-6**	**-6**	**-6**	106	155	133	106	151	128	**0**	**-4**	**-5**
1998	164	188	167	164	188	167	**0**	**0**	**0**	164	164	164	164	164	164	**0**	**0**	**0**	63	171	125	63	171	125	**0**	**0**	**0**
1999	145	149	149	145	149	149	**0**	**0**	**0**	149	155	152	149	155	152	**0**	**0**	**0**	89	155	127	89	155	127	**0**	**0**	**0**
2000	160	172	170	160	172	170	**0**	**0**	**0**	170	173	172	170	173	172	**0**	**0**	**0**	95	209	147	95	209	147	**0**	**0**	**0**
2001*	85	87	87	65	67	66	**-20**	**-20**	**-20**	85	87	87	49	67	65	**-37**	**-21**	**-22**	59	109	83	49	114	74	**-11**	**5**	**-9**
2002*	82	104	101	62	84	81	**-20**	**-20**	**-20**	104	105	104	83	84	83	**-20**	**-20**	**-20**	56	214	114	56	228	111	**0**	**14**	**-3**
2003*	43	44	43	43	44	43	**0**	**0**	**0**	43	45	44	43	45	44	**0**	**0**	**0**	44	68	55	44	52	48	**0**	**-16**	**-7**
2004*	98	128	125	79	108	106	**-20**	**-20**	**-20**	96	130	122	49	109	88	**-47**	**-21**	**-34**	44	157	103	44	157	104	**0**	**0**	**1**
2005	80	91	90	53	64	63	**-27**	**-27**	**-27**	90	91	90	44	64	61	**-46**	**-27**	**-29**	65	114	84	42	105	66	**-22**	**-9**	**-18**
Ave	**119**	**132**	**126**	**107**	**119**	**114**	**-12**	**-13**	**-13**	**122**	**131**	**127**	**105**	**118**	**113**	**-17**	**-13**	**-14**	**76**	**155**	**113**	**71**	**154**	**108**	**-4**	**-1**	**-6**

Historic	May									June									July								
Hydrologic	No Action			Alternative			Difference			No Action			Alternative			Difference			No Action			Alternative			Difference		
Year	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
1975	88	236	188	88	236	188	0	0	0	228	375	323	228	375	323	0	0	0	224	466	394	224	466	394	0	0	0
1976	60	179	150	60	179	150	0	0	0	179	204	192	179	204	192	0	0	0	150	213	196	150	214	197	0	1	0
1977*	44	123	112	44	123	112	0	0	0	118	230	158	118	255	167	0	25	9	121	336	233	146	347	252	25	11	18
1978	106	269	220	100	256	210	-6	-12	-10	269	451	386	257	424	364	-13	-28	-22	162	647	405	163	543	389	1	-104	-16
1979	128	338	267	128	338	267	0	0	0	326	581	475	326	579	475	0	-2	0	237	912	529	237	911	529	0	-1	0
1980	77	196	162	77	196	162	0	0	0	193	294	243	193	293	243	0	-1	0	140	347	223	140	346	223	0	0	0
1981*	65	145	119	65	145	119	0	0	0	120	153	135	120	153	135	0	0	0	118	350	182	118	350	184	0	0	2
1982	80	221	177	80	221	177	0	0	0	221	316	279	221	315	278	0	0	0	222	390	303	222	390	303	0	0	0
1983**	114	303	239	114	303	239	0	0	0	297	541	439	297	541	439	0	0	0	350	667	518	350	667	518	0	0	0
1984**	207	485	384	207	485	384	0	0	0	485	1139	732	485	1139	732	0	0	0	263	1096	638	263	1096	638	0	0	0
1985	125	312	255	125	312	254	0	0	0	296	911	591	295	910	589	0	-1	-2	187	460	274	187	460	274	0	0	0
1986**	137	324	269	137	323	269	0	0	0	315	421	380	315	421	380	0	0	0	286	559	421	286	559	421	0	0	0
1987	76	188	158	76	188	158	0	0	0	178	203	192	178	203	192	0	0	0	190	354	269	190	354	269	0	0	0
1988	49	148	123	49	148	123	0	0	0	122	164	138	122	164	138	0	0	0	120	360	216	120	360	216	0	0	0
1989*	53	149	123	51	147	122	-1	-1	-1	116	146	132	116	145	131	0	-1	-1	115	273	170	115	298	179	0	25	9
1990*	41	135	112	41	135	112	0	0	0	118	157	138	118	157	138	0	0	0	116	122	119	116	122	119	0	0	0
1991	48	187	140	48	187	140	0	0	0	171	210	190	171	210	190	0	0	0	162	180	172	162	180	172	0	0	0
1992	64	148	127	64	148	127	0	0	0	120	143	129	120	143	129	0	0	0	112	275	164	112	275	164	0	0	0
1993**	129	365	305	129	365	305	0	0	0	309	806	470	309	808	470	0	1	0	216	710	405	216	711	405	0	0	0
1994	47	126	115	47	125	115	0	0	0	133	179	158	133	179	158	0	0	0	151	357	242	151	357	243	-1	0	1
1995**	116	353	260	115	354	261	0	0	0	301	567	468	302	568	468	0	0	0	457	762	663	457	763	664	0	0	0
1996**	97	242	205	97	242	204	0	0	0	263	709	447	263	708	446	0	-1	-1	171	450	274	171	449	274	0	-1	0
1997**	106	338	242	106	338	242	0	0	0	316	813	488	316	814	489	0	0	0	188	630	340	188	630	340	0	0	0
1998	67	225	159	67	225	159	0	0	0	182	225	196	182	225	196	0	0	0	149	248	204	149	248	204	0	0	0
1999	91	240	196	91	240	196	0	0	0	229	374	302	229	374	302	0	0	0	226	511	359	226	511	359	0	0	0
2000	102	232	195	102	232	195	0	0	0	214	584	358	214	584	358	0	0	0	175	348	234	175	348	234	0	0	0
2001*	79	182	149	81	182	149	2	0	0	162	205	183	162	205	183	0	0	0	137	205	178	137	201	177	0	-3	-1
2002*	123	245	153	123	260	156	0	14	3	115	185	133	115	186	137	0	1	4	112	349	229	138	351	248	25	2	19
2003*	64	168	146	47	133	117	-16	-35	-29	166	290	203	128	149	135	-39	-141	-68	123	298	181	81	183	125	-43	-115	-56
2004*	119	142	127	120	152	128	1	10	1	117	127	122	117	127	122	0	0	0	114	220	137	114	228	140	0	8	3
2005	64	198	153	64	199	153	0	0	0	182	214	200	182	214	200	0	0	0	188	272	224	188	272	224	0	0	0
Ave	**91**	**232**	**185**	**90**	**232**	**184**	**-1**	**-1**	**-1**	**210**	**391**	**288**	**208**	**386**	**285**	**-2**	**-6**	**-3**	**186**	**418**	**118**	**185**	**414**	**116**	**-1**	**-3**	**-1**

Historic	August									September									October								
Hydrologic	No Action			Alternative			Difference			No Action			Alternative			Difference			No Action			Alternative			Difference		
Year	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave	Min	Max	Ave
1975	118	215	148	118	215	148	**0**	**0**	**0**	181	355	325	195	355	333	**13**	**0**	**7**	75	181	92	92	329	124	**17**	**147**	**32**
1976	136	316	231	136	345	243	**0**	**29**	**12**	98	343	178	101	348	198	**3**	**5**	**20**	76	98	90	94	116	105	**17**	**17**	**16**
1977*	90	339	147	114	348	176	**24**	**9**	**30**	82	101	93	116	162	149	**34**	**61**	**56**	70	105	83	113	158	136	**42**	**52**	**52**
1978	156	356	312	156	357	314	**0**	**1**	**2**	103	348	183	129	354	228	**26**	**7**	**45**	50	103	68	67	129	86	**17**	**26**	**18**
1979	122	265	180	122	265	180	**0**	**0**	**0**	105	353	246	131	354	265	**26**	**1**	**19**	57	105	69	74	131	87	**17**	**26**	**18**
1980	125	336	251	125	349	261	**0**	**14**	**9**	107	352	228	174	395	298	**67**	**43**	**70**	51	107	78	93	174	135	**43**	**67**	**57**
1981*	126	356	273	165	356	310	**38**	**0**	**37**	119	158	133	165	224	196	**46**	**67**	**63**	75	118	95	133	185	155	**59**	**67**	**60**
1982	138	230	163	138	230	163	**0**	**0**	**0**	117	245	157	117	245	157	**0**	**0**	**0**	121	160	135	123	177	151	**2**	**17**	**15**
1983**	165	409	260	165	409	260	**0**	**0**	**0**	139	356	226	139	357	226	**0**	**1**	**1**	92	388	164	92	390	168	**0**	**1**	**3**
1984**	173	247	216	173	247	216	**0**	**0**	**0**	103	173	130	103	173	130	**0**	**0**	**0**	89	197	129	89	213	135	**0**	**17**	**7**
1985	126	210	150	126	210	150	**0**	**0**	**0**	131	349	244	131	349	247	**0**	**0**	**3**	102	185	121	102	192	123	**0**	**7**	**1**
1986**	132	246	169	132	246	169	**0**	**0**	**0**	112	187	147	112	187	147	**0**	**0**	**0**	94	130	114	94	130	114	**0**	**0**	**0**
1987	84	214	140	84	214	143	**0**	**0**	**3**	94	266	143	95	294	194	**1**	**28**	**52**	59	112	72	101	179	116	**42**	**67**	**44**
1988	147	364	289	185	364	327	**38**	**0**	**38**	94	338	170	161	379	229	**67**	**41**	**59**	62	107	83	104	174	140	**43**	**67**	**57**
1989*	171	303	226	200	319	254	**29**	**15**	**28**	134	330	226	201	389	293	**67**	**58**	**66**	66	137	90	107	204	145	**41**	**67**	**55**
1990*	175	353	299	236	357	324	**61**	**4**	**25**	123	175	139	149	236	169	**26**	**61**	**31**	110	144	126	127	169	144	**17**	**25**	**18**
1991	139	294	196	139	294	196	**0**	**0**	**0**	99	351	190	101	351	196	**2**	**0**	**6**	68	94	82	70	109	95	**2**	**14**	**13**
1992	236	360	307	281	360	328	**45**	**0**	**22**	139	337	216	164	355	243	**26**	**18**	**27**	89	139	101	95	164	117	**6**	**26**	**16**
1993**	135	209	161	135	209	161	**0**	**0**	**0**	127	167	143	127	167	143	**0**	**0**	**0**	128	324	222	132	333	236	**4**	**9**	**13**
1994	135	359	290	190	372	333	**55**	**13**	**42**	110	356	170	177	399	230	**67**	**43**	**60**	62	109	80	103	176	121	**42**	**67**	**42**
1995**	166	443	255	166	443	255	**0**	**0**	**0**	123	167	142	123	167	142	**0**	**0**	**0**	142	217	172	142	234	187	**0**	**17**	**15**
1996**	151	344	274	151	349	283	**0**	**5**	**9**	111	342	237	112	350	264	**1**	**8**	**27**	92	111	102	92	112	103	**0**	**1**	**0**
1997**	137	213	176	137	213	176	**0**	**0**	**0**	118	156	131	118	156	131	**0**	**0**	**0**	99	144	120	99	144	120	**0**	**0**	**0**
1998	114	217	147	114	217	147	**0**	**0**	**0**	115	230	167	115	230	167	**0**	**0**	**0**	81	154	110	81	154	110	**0**	**0**	**0**
1999	145	225	189	145	225	189	**0**	**0**	**0**	120	238	172	120	238	172	**0**	**0**	**0**	74	142	108	74	142	108	**0**	**0**	**0**
2000	113	360	261	126	360	292	**13**	**0**	**31**	108	275	151	125	307	186	**17**	**32**	**35**	60	116	92	102	167	135	**42**	**52**	**43**
2001*	113	303	153	113	303	155	**0**	**0**	**2**	110	312	204	131	371	256	**21**	**60**	**52**	62	122	84	104	184	136	**42**	**62**	**52**
2002*	58	198	103	80	263	132	**22**	**66**	**30**	58	194	111	80	254	167	**22**	**61**	**56**	57	136	84	96	197	122	**39**	**61**	**38**
2003*	122	351	257	123	353	267	**1**	**2**	**9**	100	188	134	113	262	163	**13**	**74**	**30**	73	138	103	132	203	163	**59**	**65**	**59**
2004*	122	351	279	123	351	298	**0**	**1**	**18**	96	249	139	137	320	210	**41**	**71**	**71**	65	96	82	107	150	129	**42**	**53**	**47**
2005	122	198	155	122	198	155	**0**	**0**	**0**	114	347	245	114	347	245	**0**	**0**	**0**	109	114	113	109	114	113	**0**	**0**	**0**
Ave	**138**	**294**	**216**	**150**	**298**	**227**	**12**	**4**	**12**	**112**	**259**	**171**	**129**	**284**	**196**	**17**	**25**	**25**	**85**	**153**	**111**	**104**	**184**	**135**	**19**	**30**	**24**

Table 3.3 Annual Average Differences in Fryingpan Flows (cfs)

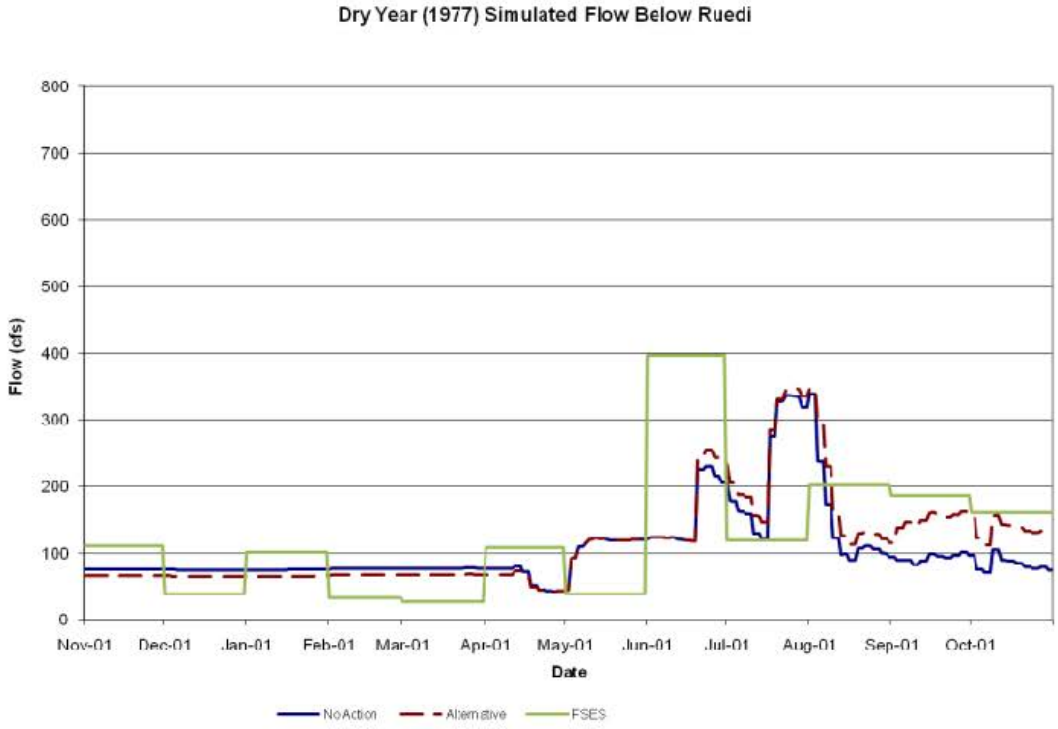
Historic Hydrologic Year	Average Annual Difference (cfs)			Historic Hydrologic Year	Average Annual Difference (cfs)		
	Min	Max	Ave		Min	Max	Ave
1975	3	12	3	1991	-7	-4	-5
1976	-1	1	1	1992	5	2	3
1977*	6	9	9	1993**	-6	-5	-5
1978	-5	-21	-9	1994	12	9	11
1979	-2	-3	-3	1995**	-17	-11	-12
1980	6	6	8	1996**	-1	1	2
1981*	0	2	2	1997**	-2	-3	-3
1982	-15	-10	-14	1998	0	0	0
1983**	-1	-1	-1	1999	0	0	0
1984**	0	1	0	2000	6	7	9
1985	0	5	0	2001*	-5	3	0
1986**	0	0	0	2002*	1	10	4
1987	4	8	8	2003*	-2	-14	-5
1988	4	1	4	2004*	-3	4	2
1989*	4	-1	1	2005	-15	-12	-13
1990*	-8	-8	-10	**Average**	**-1**	**0**	**0**

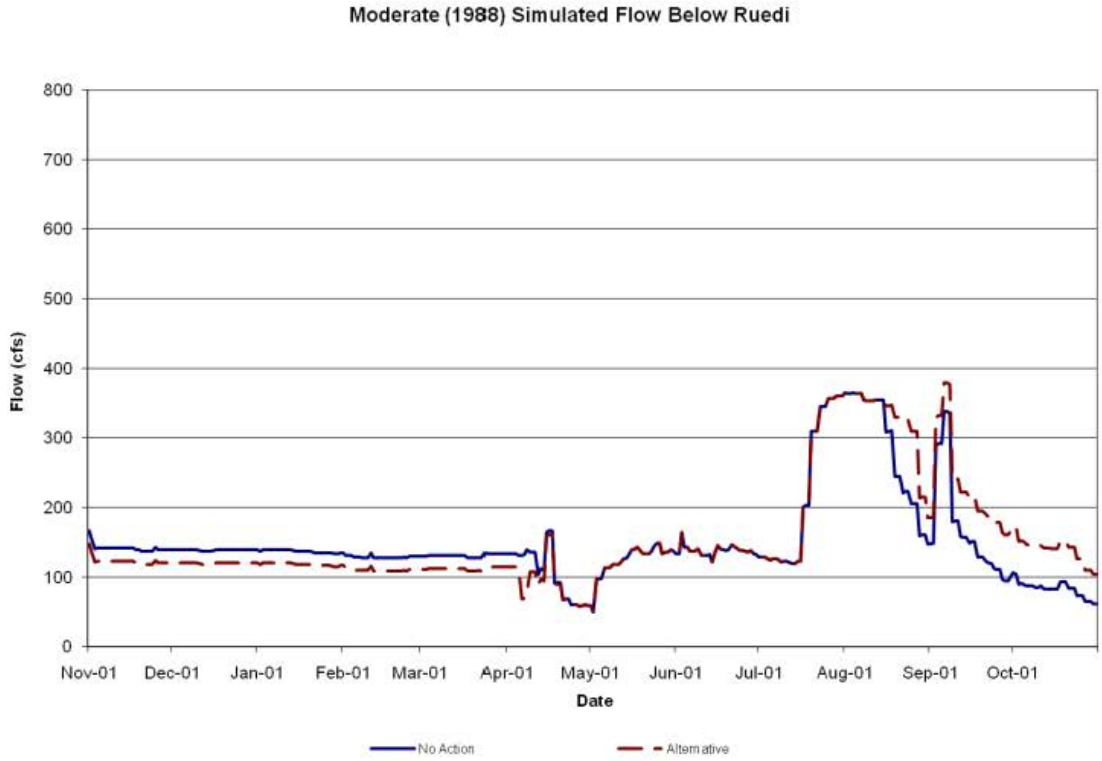
*Indicates dry years, ** indicates wet years, and no asterisks indicate moderate years.

Table 3.3 shows that on an annual average, releases are very similar, with some slight increases in dry years, and slight decreases in the following year. Analysis related to the impacts of the changes in flows on sport fish, their habitat, or their food sources will be discussed in the Aquatic Resources section of this chapter; and impacts to fishery will be discussed in the Recreation section of this chapter.

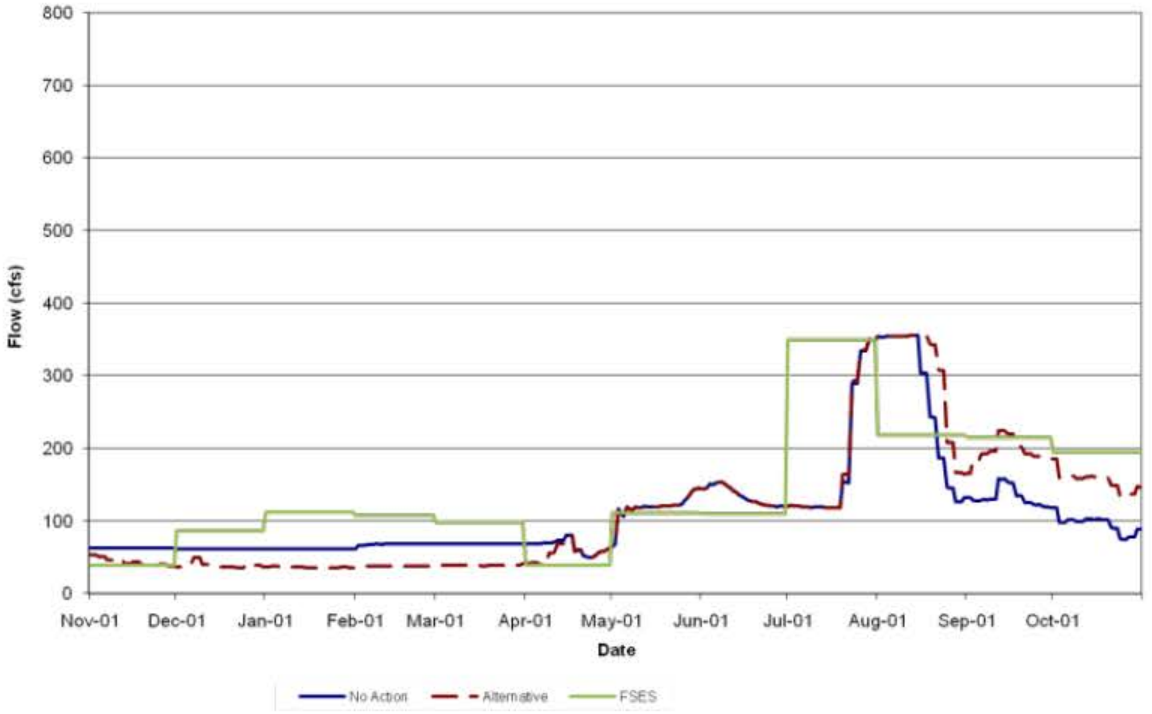
Figure 3.1 shows the simulated relative effect of this alternative on Fryingpan River flows in representative dry, moderate, and wet years compared to what would be expected in the no action alternative. In most years there would be minor to moderate increases in flows starting in late summer and continuing through October as a result of the majority of the contract water being released during this time. Although contract water may be required at other times of the year, past operations at Ruedi show that a drawdown of the reservoir would be made in winter, and that flows would generally be bypassed in spring and early summer regardless of whether this alternative was implemented. However, flows in the Fryingpan River would sometimes be lower than current conditions as the reservoir is reaching the spring fill target date of April 15 as seen in the moderate model year run, and two of the later dry year model runs (see below). Despite this, at no point would the flows violate minimum instream flow targets as described in the Operating Principles as a result of this alternative. Furthermore, the selection of this alternative is not expected to result in direct or indirect impacts to the flows greater than those presented and evaluated in the RRII FSES (p. 4.13).

FIGURE 3.1 SIMULATED FLOWS IN THE FRYINGPAN RIVER

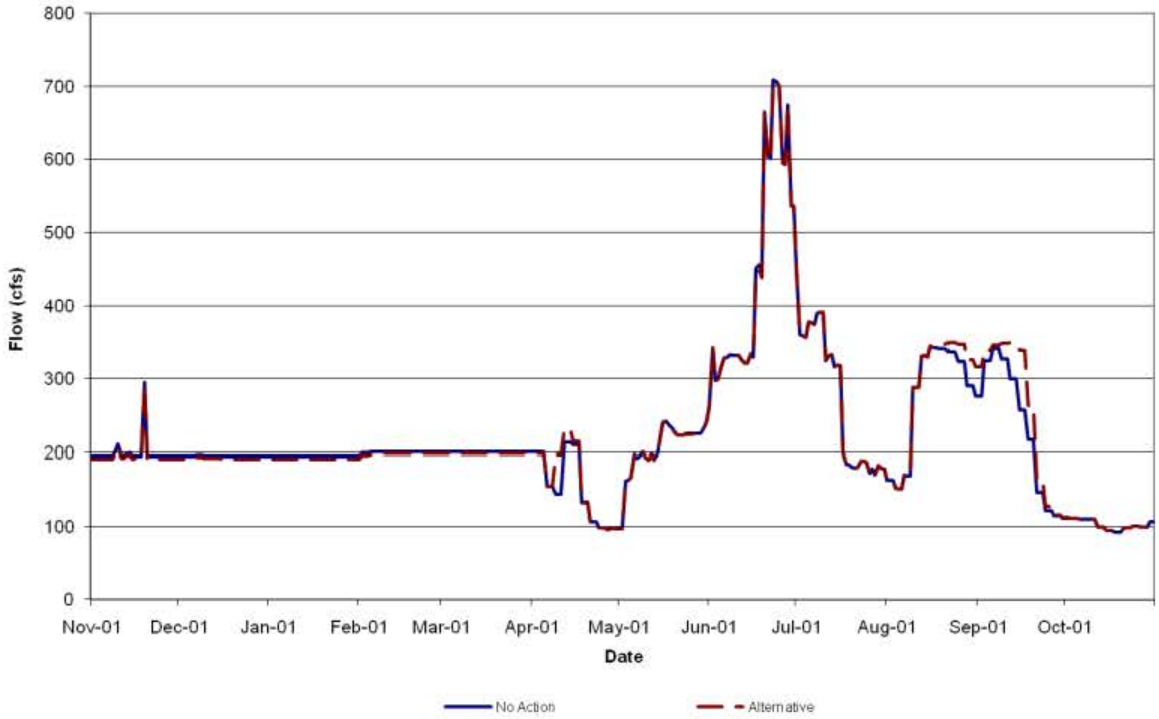




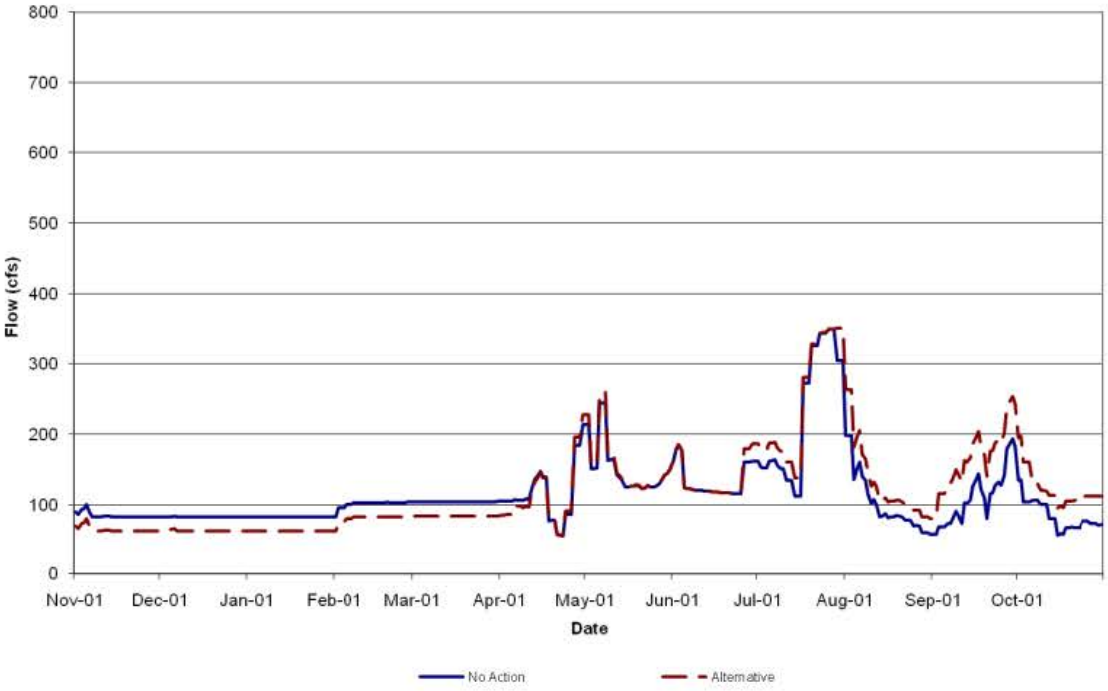
Dry Year (1981) Simulated Flow Below Ruedi



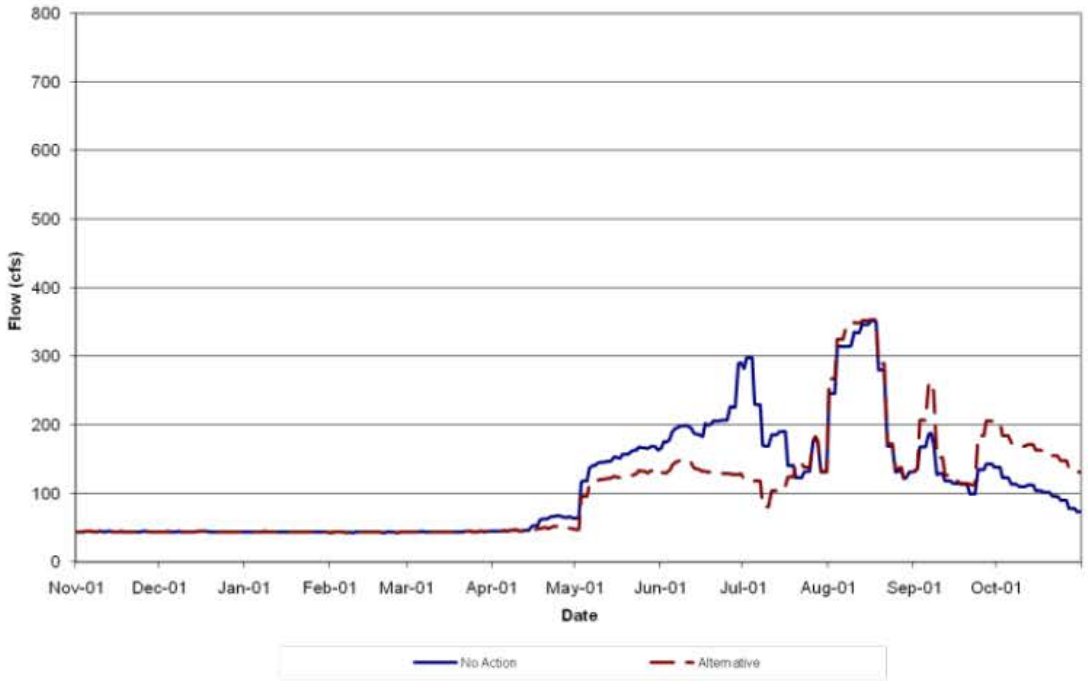
Wet Year (1996) Simulated Flow Below Ruedi



Dry Year (2002) Simulated Flow Below Ruedi



Dry Year (2003) Simulated Flow Below Ruedi



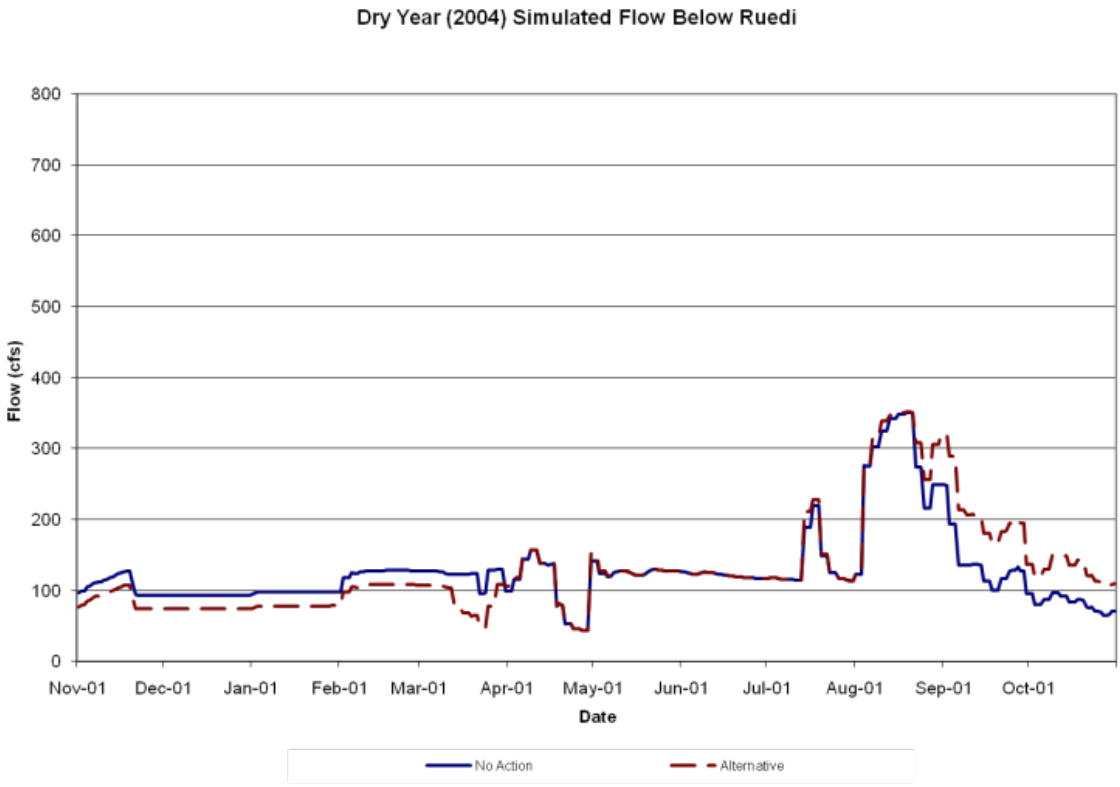


Table 3.4 shows the simulated average monthly storage level in Ruedi for all years during the period of record for the Proposed Alternative compared with the No Action Alternative. The model results indicate that the average difference in storage levels would be 1,720 ac-ft, which equates to a reduction of 3,573 ac-ft in dry years, 1,257-ft in moderate years, and 659 ac-ft in wet years. However, the annual reduction would vary between 0 ac-ft and 8,482 ac-ft, and throughout the year could be as low as 0 ac-ft and as high as 10,242 ac-ft.

TABLE 3.4 – SIMULATED AVERAGE MONTHLY RUEDI STORAGE LEVELS (AC-FT)

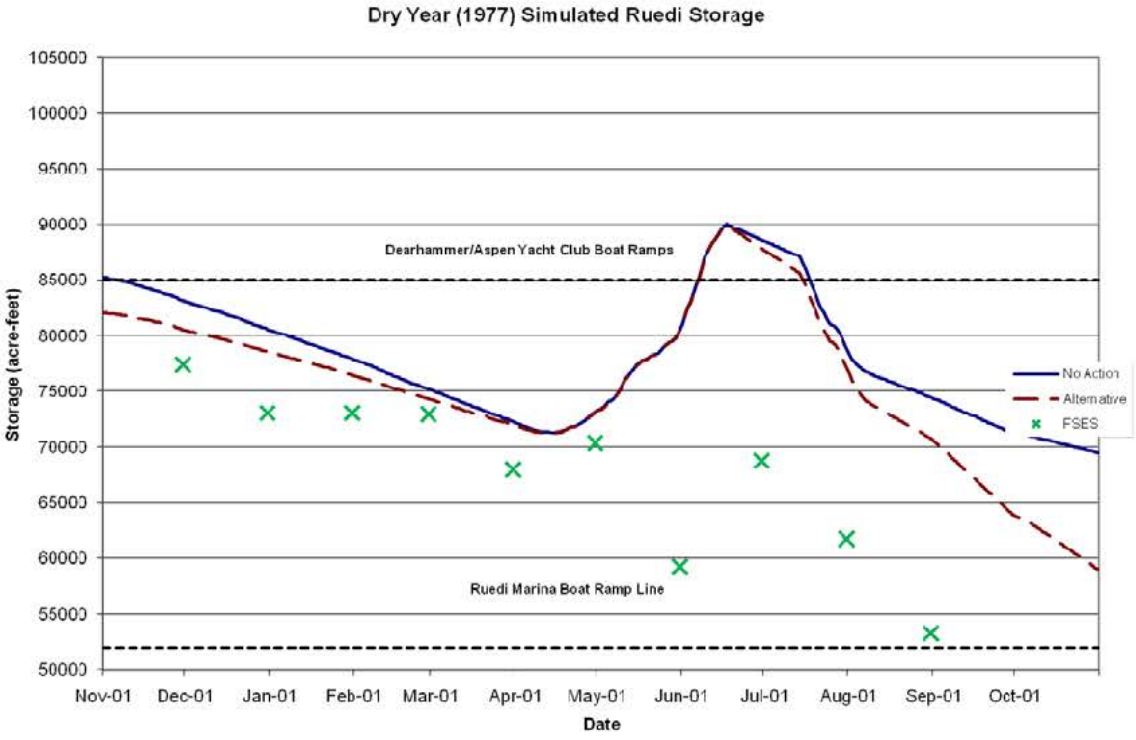
Historic Hydrologic Year	November			December			January			February			March			April		
	No Action	**Prop. Action**	**Diff.**	**No Action**	**Prop. Action**	**Diff**	**No Action**	**Prop. Action**	**Diff**	**No Action**	**Prop. Action**	**Diff**	**No Action**	**Prop. Action**	**Diff**	**No Action**	**Prop. Action**	**Diff**
1975	93,248	93,248	**0**	88,447	88,447	**0**	83,524	83,524	**0**	78,309	78,309	**0**	72,145	72,145	**0**	66,729	66,729	**0**
1976	83,335	81,082	**-2,253**	80,515	78,717	**-1,799**	77,031	75,695	**-1,336**	72,972	72,077	**-894**	68,198	67,747	**-451**	65,399	65,396	**-3**
1977*	84,327	81,428	**-2,899**	81,871	79,560	**-2,311**	79,221	77,507	**-1,714**	76,499	75,354	**-1,146**	73,679	73,101	**-577**	71,828	71,727	**-101**
1978	69,158	59,052	**-10,106**	68,493	59,104	**-9,389**	67,720	59,030	**-8,690**	65,906	58,524	**-7,382**	65,006	58,783	**-6,223**	65,215	61,277	**-3,937**
1979	79,020	75,376	**-3,645**	76,279	73,374	**-2,906**	73,668	71,513	**-2,155**	71,379	69,938	**-1,440**	69,163	68,435	**-728**	66,592	66,493	**-99**
1980	86,230	83,984	**-2,246**	82,375	80,585	**-1,790**	78,347	77,019	**-1,328**	74,555	73,668	**-888**	70,740	70,292	**-447**	67,641	67,582	**-60**
1981*	80,100	72,100	**-8,000**	78,577	71,890	**-6,687**	76,813	71,602	**-5,211**	74,664	71,084	**-3,581**	72,369	70,556	**-1,813**	71,625	71,097	**-528**
1982	78,261	68,605	**-9,656**	75,521	67,798	**-7,723**	72,919	67,051	**-5,867**	69,969	66,012	**-3,957**	67,063	65,139	**-1,924**	65,540	65,444	**-96**
1983**	96,504	95,540	**-963**	89,517	88,749	**-768**	81,546	80,977	**-570**	74,242	73,861	**-381**	67,271	67,079	**-192**	60,566	60,540	**-26**
1984**	88,940	88,679	**-261**	82,836	82,628	**-208**	77,309	77,155	**-155**	71,422	71,319	**-103**	65,514	65,462	**-52**	60,464	60,457	**-7**
1985	97,866	97,463	**-404**	91,640	91,318	**-322**	84,857	84,618	**-239**	77,189	77,029	**-160**	69,757	69,676	**-80**	66,588	66,541	**-48**
1986**	90,816	90,550	**-266**	84,948	84,737	**-212**	78,294	78,136	**-157**	71,103	70,998	**-105**	64,065	64,012	**-53**	60,832	60,816	**-16**
1987	99,368	99,368	**0**	92,610	92,610	**0**	85,333	85,333	**0**	78,100	78,100	**0**	71,348	71,348	**0**	66,851	66,851	**0**
1988	89,442	83,843	**-5,599**	84,552	80,088	**-4,464**	79,428	76,118	**-3,311**	74,381	72,168	**-2,213**	68,654	67,538	**-1,116**	66,063	66,075	**12**
1989*	74,379	65,102	**-9,277**	73,496	65,318	**-8,178**	72,593	65,530	**-7,063**	71,168	65,592	**-5,575**	70,033	66,046	**-3,987**	71,519	69,333	**-2,186**
1990*	79,762	69,520	**-10,242**	77,901	69,922	**-7,979**	75,874	69,984	**-5,890**	73,408	69,717	**-3,691**	70,939	69,525	**-1,414**	70,871	70,848	**-23**
1991	79,396	75,239	**-4,158**	76,537	73,198	**-3,338**	73,465	70,968	**-2,497**	70,099	68,419	**-1,680**	66,714	65,871	**-842**	65,341	65,323	**-18**
1992	87,735	86,705	**-1,030**	83,489	82,668	**-821**	78,510	77,901	**-609**	73,477	73,070	**-407**	68,407	68,202	**-205**	65,914	65,873	**-41**
1993**	76,787	72,817	**-3,970**	73,565	70,383	**-3,182**	69,802	67,429	**-2,373**	66,306	64,712	**-1,594**	62,797	61,994	**-803**	60,037	59,951	**-86**
1994	91,733	90,962	**-771**	86,909	86,294	**-615**	81,222	80,766	**-456**	74,878	74,574	**-305**	69,806	69,652	**-154**	66,770	66,751	**-20**
1995**	75,097	66,665	**-8,433**	72,625	65,882	**-6,743**	69,629	64,613	**-5,016**	65,874	62,516	**-3,358**	61,893	60,331	**-1,563**	59,958	59,948	**-10**
1996**	93,390	92,427	**-963**	87,396	86,622	**-774**	80,278	79,701	**-577**	72,562	72,175	**-387**	64,607	64,412	**-195**	60,885	60,822	**-63**
1997**	84,208	82,390	**-1,817**	79,452	78,003	**-1,449**	74,191	73,117	**-1,075**	69,230	68,512	**-718**	63,629	63,267	**-362**	60,568	60,543	**-25**
1998	99,878	99,878	**0**	94,574	94,574	**0**	86,014	86,014	**0**	78,034	78,034	**0**	70,880	70,880	**0**	65,957	65,957	**0**
1999	97,624	97,624	**0**	91,368	91,368	**0**	84,083	84,083	**0**	77,200	77,200	**0**	70,327	70,327	**0**	65,651	65,651	**0**
2000	97,899	97,899	**0**	91,299	91,299	**0**	84,337	84,337	**0**	77,451	77,451	**0**	70,068	70,068	**0**	66,133	66,133	**0**
2001*	82,646	76,605	**-6,041**	80,207	75,383	**-4,824**	77,423	73,835	**-3,588**	74,583	72,179	**-2,404**	71,673	70,477	**-1,196**	70,740	70,670	**-70**
2002*	89,173	83,160	**-6,013**	86,426	81,609	**-4,817**	82,815	79,230	**-3,584**	78,403	76,002	**-2,401**	73,245	72,035	**-1,211**	71,141	70,708	**-434**
2003*	62,605	52,679	**-9,926**	62,854	52,929	**-9,926**	62,551	52,626	**-9,926**	61,990	52,065	**-9,925**	61,599	51,676	**-9,923**	63,046	53,274	**-9,772**
2004*	88,048	82,176	**-5,872**	85,473	80,792	**-4,682**	81,530	78,058	**-3,472**	75,963	73,642	**-2,321**	70,919	70,129	**-791**	70,753	70,800	**47**
2005	78,186	70,245	**-7,941**	75,700	69,338	**-6,363**	73,100	68,363	**-4,738**	70,222	67,045	**-3,177**	67,019	65,448	**-1,571**	66,093	66,090	**-3**
Average	**85,650**	**81,691**	**-3,960**	**81,853**	**78,554**	**-3,299**	**77,530**	**74,898**	**-2,632**	**72,953**	**71,011**	**-1,942**	**68,372**	**67,150**	**-1,222**	**65,913**	**65,345**	**-568**

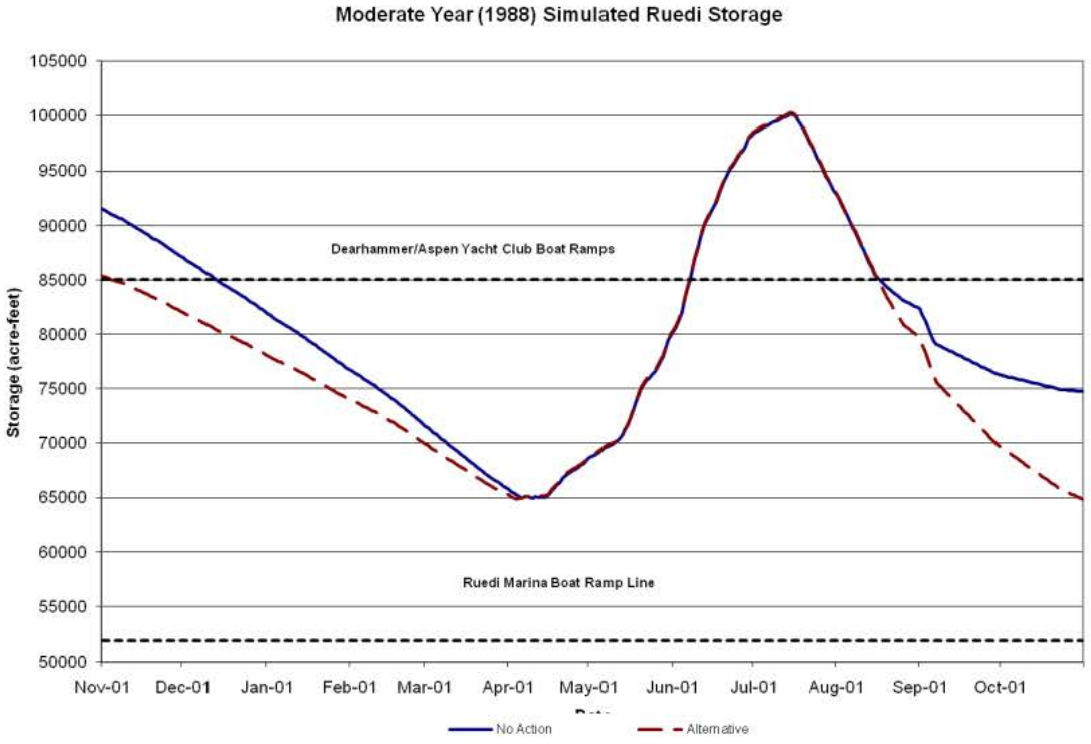
*Indicates dry years, ** indicates wet years, and no asterisks indicate moderate years.

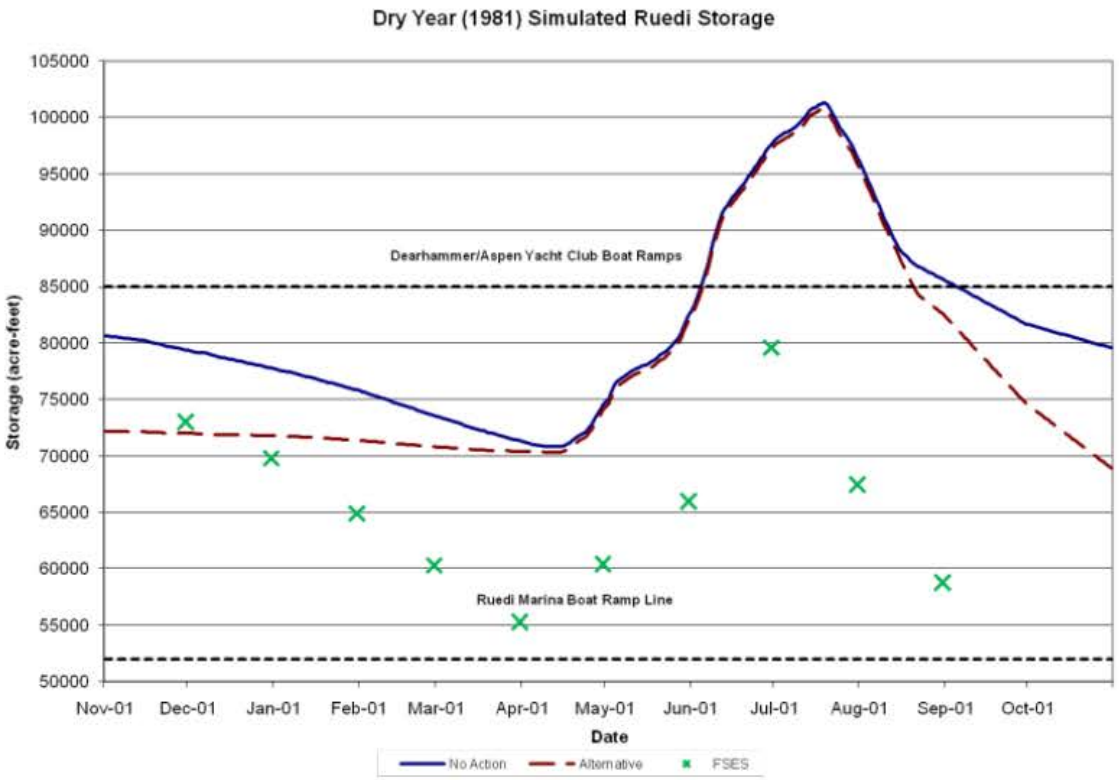
Historic Hydrologic Year	May			June			July			August			September			October		
	No Action	**Prop. Action**	**Diff**	**No Action**	**Prop. Action**	**Diff**	**No Action**	**Prop. Action**	**Diff**	**No Action**	**Prop. Action**	**Diff**	**No Action**	**Prop. Action**	**Diff**	**No Action**	**Prop. Action**	**Diff**
1975	66,706	66,706	0	81,814	81,814	0	100,863	100,863	0	102,152	102,152	0	92,510	92,402	-108	85,068	83,104	-1,964
1976	71,692	71,739	47	93,336	93,368	31	102,170	102,174	4	98,491	98,263	-228	88,646	87,000	-1,646	86,166	83,482	-2,684
1977*	76,957	76,899	-57	87,551	87,325	-226	84,829	83,450	-1,379	75,978	73,025	-2,952	72,781	67,245	-5,536	70,383	61,536	-8,847
1978	66,992	63,987	-3,006	85,415	83,405	-2,010	102,225	102,232	7	95,871	95,839	-31	83,855	81,863	-1,992	81,183	77,676	-3,507
1979	66,535	66,513	-22	87,918	87,903	-14	102,040	102,040	0	101,329	101,329	0	93,396	92,925	-471	88,897	86,934	-1,963
1980	72,481	72,468	-13	93,005	92,997	-8	102,233	102,233	0	97,427	97,209	-218	84,994	82,041	-2,954	81,305	74,293	-7,011
1981*	78,342	77,873	-469	91,586	91,118	-468	99,343	98,827	-517	89,346	87,853	-1,493	83,619	78,501	-5,118	80,600	71,700	-8,900
1982	71,476	71,423	-53	89,359	89,324	-35	102,243	102,240	-2	102,373	102,373	0	101,280	101,280	0	100,395	99,847	-548
1983**	58,384	58,378	-5	76,893	76,889	-4	101,688	101,688	0	102,373	102,373	0	100,212	100,199	-13	92,394	92,138	-256
1984**	62,428	62,426	-1	95,590	95,589	-1	102,200	102,200	0	102,373	102,373	0	102,363	102,363	0	101,106	100,746	-359
1985	79,190	79,115	-75	100,018	99,998	-20	102,311	102,311	0	102,278	102,278	0	97,079	97,018	-61	93,173	92,887	-286
1986**	68,437	68,425	-12	90,796	90,788	-8	102,187	102,186	-1	102,373	102,373	0	102,366	102,366	0	102,365	102,365	0
1987	78,996	78,996	0	95,964	95,964	0	100,817	100,817	0	96,812	96,750	-62	93,734	91,950	-1,784	91,870	86,925	-4,945
1988	73,078	73,195	117	90,509	90,626	117	97,996	98,113	117	86,363	85,600	-763	78,335	73,758	-4,577	75,388	67,043	-8,346
1989*	81,049	79,386	-1,663	94,287	92,695	-1,592	100,855	99,145	-1,710	95,610	92,489	-3,120	85,711	79,534	-6,177	81,372	71,374	-9,998
1990*	75,538	75,532	-7	90,636	90,629	-7	99,866	99,859	-7	92,141	91,641	-500	84,463	81,752	-2,711	81,370	77,376	-3,993
1991	71,769	71,778	9	93,416	93,421	6	102,236	102,237	1	99,830	99,830	0	92,595	92,382	-214	90,303	89,422	-881
1992	76,691	76,654	-36	91,088	91,052	-36	98,688	98,651	-36	90,455	89,942	-514	81,631	79,019	-2,612	78,442	74,442	-4,000
1993**	64,706	64,720	14	94,051	94,058	7	102,171	102,171	0	102,373	102,373	0	102,287	102,287	0	96,570	96,088	-483
1994	77,075	77,080	5	96,698	96,724	26	100,161	100,177	15	87,567	86,669	-898	79,027	74,071	-4,956	76,580	68,449	-8,130
1995**	57,552	57,603	52	73,422	73,457	35	99,979	99,984	5	102,373	102,373	0	102,094	102,094	0	99,768	99,220	-548
1996**	73,832	73,761	-71	98,390	98,361	-29	102,225	102,225	0	97,951	97,810	-142	87,056	85,513	-1,543	86,234	84,229	-2,005
1997**	68,268	68,274	7	95,392	95,395	3	102,276	102,276	0	102,373	102,373	0	102,373	102,373	0	102,368	102,368	0
1998	69,836	69,836	0	88,526	88,526	0	101,916	101,916	0	102,333	102,333	0	101,569	101,569	0	99,363	99,363	0
1999	68,351	68,351	0	85,870	85,870	0	102,214	102,214	0	102,373	102,373	0	101,646	101,646	0	101,558	101,558	0
2000	84,380	84,380	0	102,194	102,194	0	101,640	101,640	0	91,495	90,787	-708	85,942	82,999	-2,942	84,101	78,690	-5,411
2001*	81,411	81,364	-47	97,046	97,015	-31	102,094	102,096	1	100,490	100,471	-19	94,471	92,401	-2,069	91,094	85,847	-5,246
2002*	73,429	72,667	-763	80,060	79,225	-835	76,634	74,858	-1,775	68,169	64,757	-3,412	65,057	59,131	-5,927	62,725	53,909	-8,816
2003*	70,694	62,198	-8,496	97,885	92,292	-5,593	102,169	101,889	-280	95,707	95,312	-395	92,409	90,710	-1,700	90,447	85,715	-4,732
2004*	77,424	77,416	-7	89,901	89,894	-7	97,447	97,316	-132	90,915	90,256	-658	82,549	78,437	-4,111	79,955	72,537	-7,418
2005	73,782	73,818	36	94,296	94,320	24	102,274	102,277	3	102,206	102,206	0	94,773	94,773	0	92,151	92,151	0
Average	**72,177**	**71,708**	**-468**	**91,062**	**90,717**	**-344**	**99,935**	**99,752**	**-183**	**96,126**	**95,606**	**-520**	**90,672**	**88,761**	**-1,910**	**87,893**	**84,304**	**-3,590**

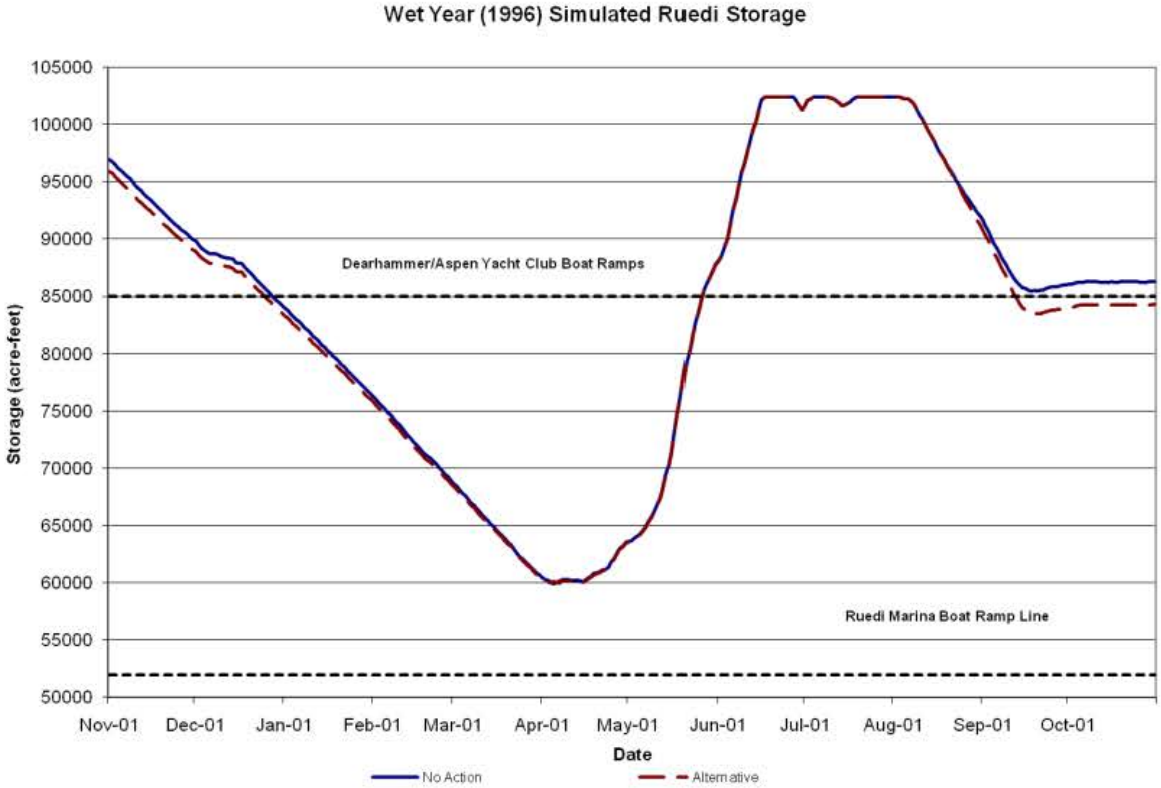
*Indicates dry years, ** indicates wet years, and no asterisks indicate moderate years.

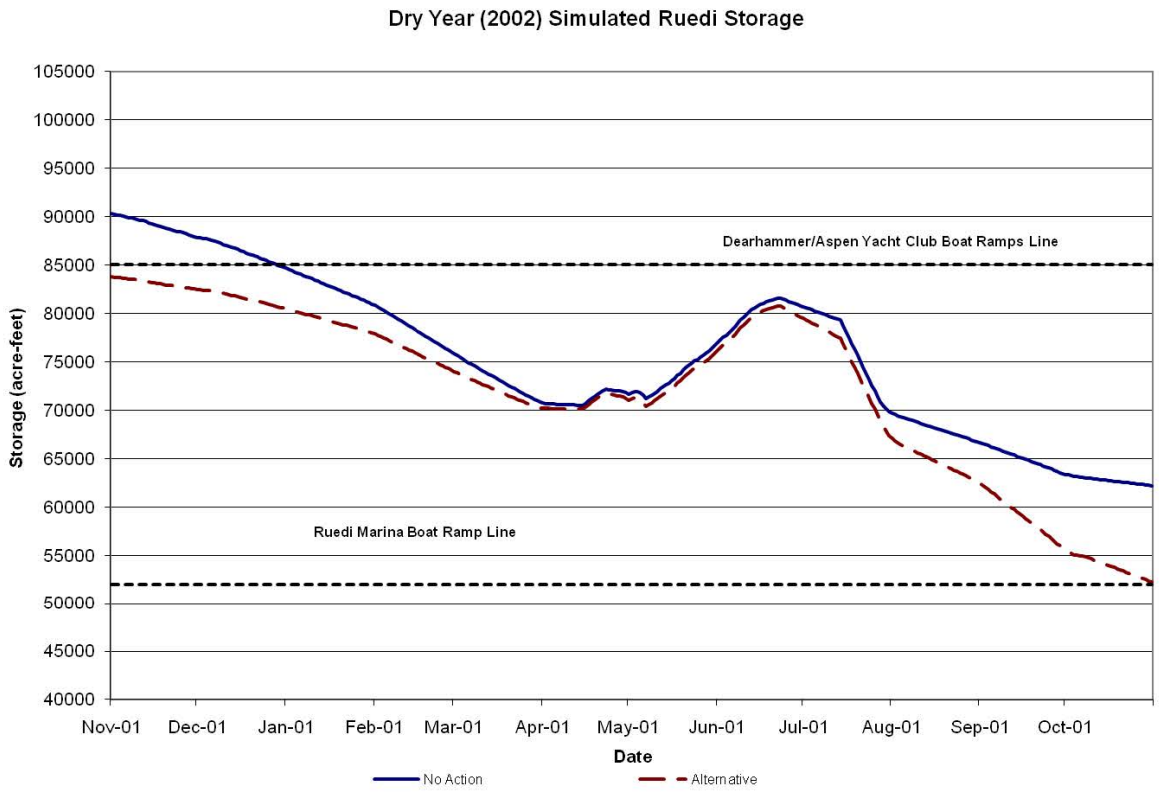
FIGURE 3.2 - SIMULATED RUEDI STORAGE LEVELS

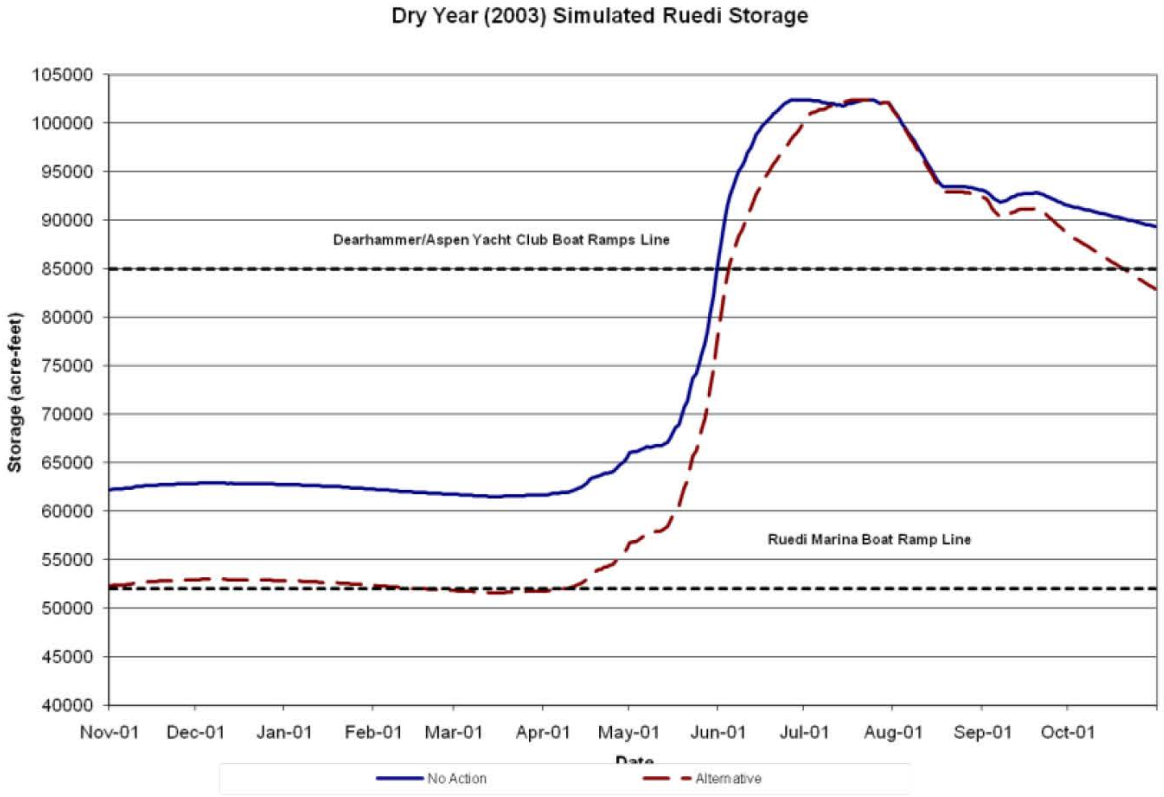





Dry Year (1981) Simulated Ruedi Storage
105000
100000
95000
90000
85000
80000
75000
70000
65000
60000
55000
50000
Storage (acre-feet)
Dearhammer/Aspen Yacht Club Boat Ramps
Ruedi Marina Boat Ramp Line
Nov-01
Dec-01
Jan-01
Feb-01
Mar-01
Apr-01
May-01
Jun-01
Jul-01
Aug-01
Sep-01
Oct-01
Date
No Action
Alternative
FSES


Wet Year (1996) Simulated Ruedi Storage
105000
100000
95000
90000
85000
80000
75000
70000
65000
60000
55000
50000
Storage (acre-feet)
Dearhammer/Aspen Yacht Club Boat Ramps
Ruedi Marina Boat Ramp Line
Nov-01
Dec-01
Jan-01
Feb-01
Mar-01
Apr-01
May-01
Jun-01
Jul-01
Aug-01
Sep-01
Oct-01
Date
No Action
Alternative


Dry Year (2002) Simulated Ruedi Storage
105000
100000
95000
90000
85000
80000
75000
70000
65000
60000
55000
50000
45000
40000
Storage (acre-feet)
Dearhammer/Aspen Yacht Club Boat Ramps Line
Ruedi Marina Boat Ramp Line
Nov-01
Dec-01
Jan-01
Feb-01
Mar-01
Apr-01
May-01
Jun-01
Jul-01
Aug-01
Sep-01
Oct-01
Date
No Action
Alternative


Dry Year (2003) Simulated Ruedi Storage
105000
100000
95000
90000
85000
80000
75000
70000
65000
60000
55000
50000
45000
40000
Storage (acre-feet)
Dearhammer/Aspen Yacht Club Boat Ramps Line
Ruedi Marina Boat Ramp Line
Nov-01
Dec-01
Jan-01
Feb-01
Mar-01
Apr-01
May-01
Jun-01
Jul-01
Aug-01
Sep-01
Oct-01
No Action
Alternative

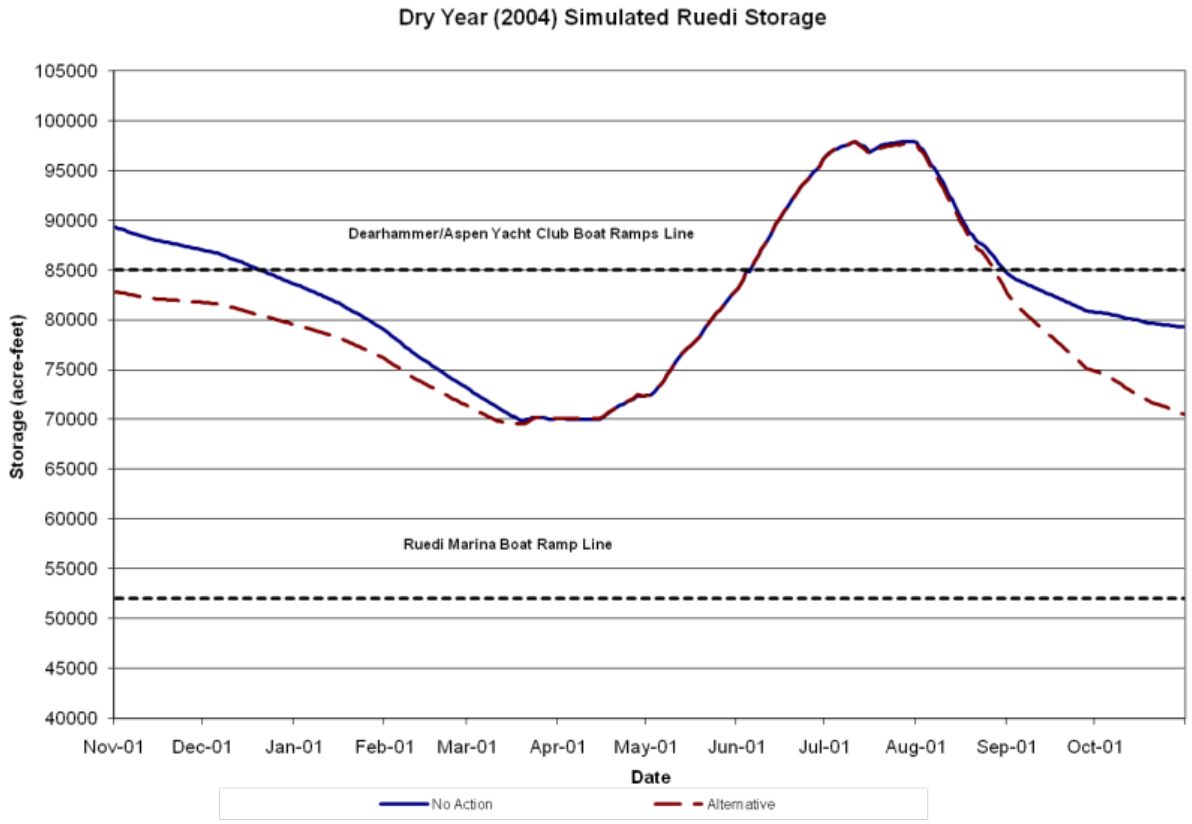


Figure 3.2 shows the simulated relative effect of this alternative on Ruedi storage levels when compared to current conditions in representative dry, moderate, and wet years. The differences between the alternatives relative to the boat ramps will be discussed in the Recreation section. For almost all year types the Proposed Action Alternative level of Ruedi would be lower during the late summer/early fall period. However, at no point would the Replacement Capacity or Regulatory Pools other than the Marketable Yield Pool change as a result of the contracts. The changes to the Marketable Yield Pool are within the limits as described and analyzed in the RRII FSES.

The Proposed Alternative is expected to cause hydrologic changes as previously described; however, the changes are expected to be within the Operating Principles.

There are several reasons why it is difficult to directly compare the results of the current hydrologic model to the model used in the RRII FSES. First, the period of record used in the RRII FSES model was monthly data from 1948 to 1983, where the 1948-1983 undepleted inflow averaged 2,600 acre-feet higher, as compared to 1975 to 2005 in the current model. Further, the RRII FSES model did not consider steady flows in the winter, or any of the other analyses, contracts, and environmental commitments that have been made in the last 25 years. Lastly, the RRII FSES model appeared to overestimate the impacts of the Cameo call. However, because the Proposed Action

Alternative contracts for the remainder of the Marketable Pool identified in the RRII FSES, some comparisons must be drawn. The RRII FSES results for the "Preferred Alternative with Conservation Measures" in dry years 1977 and 1981 (Simons, Li, and Associates, 1988, p. D.80) are shown as monthly steady flows in Figure 3.1, and as end of month storage values in Figure 3.2. These figures clearly show that dry year impacts analyzed in the RRII FSES were greater than the impacts represented by the current model of the Proposed Action. Other comparisons between the RRII model results and the current results are presented in appropriate sections below.

Cumulative Effects: The effects of reduced flows into Ruedi and the Cameo call potentially coming on sooner and lasting longer would likely translate into releases for contracts lasting longer, with peak flows in late summer and fall being at the same level, and flows in the winter averaging slightly lower, although still within the range evaluated in the FSES. The predicted percentage decrease of 4.3-5.5 percent over the next 87 years is in a range considered negligible (Section 3.2.1). Reclamation does not anticipate the negligible changes in runoff patterns to have significant cumulative impacts when combined with the direct and indirect effects of the proposed action, outside of the range disclosed in the RRII FSES.

3.4 THREATENED AND ENDANGERED SPECIES

The endangered fish species information presented here in summary can be found in detail in the PBO and the 10825 EA.

3.4.1 AFFECTED ENVIRONMENT

Refer to Appendix D for a listing of Federally-listed threatened or endangered species located within counties in the project area. No effect is expected on federally threatened and endangered wildlife or plant species since the proposed action does not involve ground disturbance that would affect these species. Four federally listed endangered fish are present in the Colorado River in Colorado, including the bonytail (*Gila elegans*), humpback chub (*Gila cypha*), Colorado pikeminnow (*Ptychocheilus lucius*), and razorback sucker (*Xyrauchen texanus*) (CDOW 2010a). Of these four species, humpback chub, Colorado pikeminnow, and razorback suckers are located in the analysis area (USFWS 2010, unpublished data); bonytail has not recently been collected upstream of the 15-Mile Reach. The Colorado River from the Colorado River bridge at Rifle, Colorado downstream to Lake Powell is designated critical habitat for the Colorado pikeminnow and razorback sucker (Federal Register 1994). Portions of this river reach are also designated critical habitat for the humpback chub and bonytail. Federally listed threatened or endangered fish species are not found in any other stream segment in the analysis area.

Loss of stream flows in the 15-Mile Reach due to upstream depletions in the watershed is a major factor that has contributed to the decline of the endangered fish species in that area in recent times. This decline is primarily due to the loss of quantity and quality of habitat, which directly affect key reproductive life stages. The existing depletions in the Upper Colorado River Basin above the Gunnison River are estimated to be approximately one million ac-ft a year (USDI 1999).

Reclamation, the states of Colorado, Utah, and Wyoming, and water users are signatories to the Recovery Implementation Program for Endangered Fishes in the Upper Colorado River (Recovery Program). The purpose of the Recovery Program is to recover the four endangered fish in the

Colorado River and its tributaries above Lake Powell while allowing for existing and new water use in the basin. See the Upper Colorado River Endangered Fish Recovery Program web page at http://www.coloradoriverrecovery.org/general-information/recovery-program-elements.html for more detailed information.

Coordinated Reservoir Operations (CROS) is an element of the Recovery Program, which aims to attain spring peak flow targets by augmenting peak flows through bypasses of inflow from participating reservoirs during a seven to ten day period around the peak. Participation in CROS is voluntary and is not meant to affect the timing or volume of fill of the participating reservoirs. Ruedi is one of the participating reservoirs in the CROS program.

A Programmatic Biological Opinion (PBO; USDI 1999) was issued to Reclamation in 1999 identifying mitigation measures and elements to allow future development of water by users in the Colorado River Basin. As one of the "habitat protection elements" of the PBO, Reclamation makes 5,000 ac-ft available from Ruedi to the Recovery Program annually, and 5,000 ac-ft 4 out of 5 years through re-regulation of Ruedi operations. The water users make available 5,412.5 ac-ft by a Ruedi contract under previous commitments. A team, including West and East slope water users, CWCB, Colorado Division of Water Resources, USFWS, and Reclamation, has frequent communications regarding coordination of releases to assist in attaining the 15-Mile Reach flow targets. Reclamation releases and/or bypasses water from Ruedi and/or Green Mountain Reservoirs in any given year and is ultimately responsible for scheduling releases from either reservoir for operational and contractual needs, including the CROS bypass. Reclamation has completed its commitment to provide 10,825 ac-ft per year through the year 2012 for Ruedi Round II water sales mitigation (Gelatt, pers. comm. 2013).

3.4.2 Environmental Consequences

No Action Alternative

Under this alternative Reclamation would continue to provide water annually to the 15-Mile Reach as specified in the PBO. Therefore, this alternative would be projected to have no impact to the endangered fish of the Colorado River Basin.

Proposed Action Alternative

As under the No Action alternative, the allocation of water to endangered fish in the 15 Mile Reach is not impacted by the Proposed Action. However, in wet years when the need for fish water is lower, there might be a negligible impact to total releases from Ruedi. A modeling artifact shows that in some years, the timing of releases may be slightly delayed as contract water deliveries leave less capacity in the Fryingpan River below Ruedi. For an example, see Table 3.5, year 1977. This is due to a modeling assumption that releases fish water as soon as there is any need. In actuality, the releases from all sources of fish water are determined by a collaborative process. Therefore, this result will not affect the 15-Mile Reach, both because the model releases water earlier than actuality, and if capacity limitations were experienced, the release of fish water from other reservoirs would be adjusted in compensation.

TABLE 3.5 – SIMULATED RUEDI RELEASES TO 15-MILE REACH FROM ALL COMMITMENTS (AC-FT)

Historic Hydrology	July			August			September			October			Annual Total
Year	No Act	Prop	Diff	No Act	Prop	Diff	No Act	Prop	Diff	No Act	Prop	Diff	Diff
1975	0	0	0	3467	3467	0	11946	11946	0	0	0	0	0
1976	3565	3565	0	9275	9255	-20	2572	2592	20	0	0	0	0
1977*	6321	5692	-630	1488	2118	630	0	0	0	0	0	0	0
1978	437	437	0	12098	11109	-989	2878	3867	989	0	0	0	0
1979	0	0	0	7561	7561	0	7851	7851	0	0	0	0	0
1980	0	0	0	9884	9470	-414	5528	5943	414	0	0	0	0
1981*	3457	2785	-672	6956	7628	672	0	0	0	0	0	0	0
1982	0	0	0	577	577	0	5966	5966	0	288	288	0	0
1983**	0	0	0	0	0	0	7262	6617	-644	4083	4339	256	-388
1984**	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0	0	0	2033	2033	0	11934	11829	-106	1236	1309	73	-33
1986**	0	0	0	186	186	0	1344	1344	0	0	0	0	0
1987	9353	9353	0	3560	3560	0	2500	2500	0	0	0	0	0
1988	6092	5218	-874	6821	7695	874	2500	2500	0	0	0	0	0
1989*	1473	1300	-173	3507	3430	-77	5433	5683	250	0	0	0	0
1990*	919	785	-134	9426	9491	64	67	137	70	0	0	0	0
1991	100	100	0	11417	11417	0	3896	3896	0	0	0	0	0
1992	6302	6167	-134	6370	6183	-187	2741	3063	322	0	0	0	0
1993**	0	0	0	1791	1791	0	6185	6185	0	6989	6965	-23	-23
1994	5329	4187	-1142	7584	8726	1142	2500	2500	0	0	0	0	0
1995**	0	0	0	0	0	0	5746	5746	0	3095	3095	0	0
1996**	151	151	0	10512	10199	-313	4751	5063	313	0	0	0	0
1997**	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	2849	2849	0	7798	7798	0	3013	3013	0	0
1999	0	0	0	1645	1645	0	5757	5757	0	1674	1674	0	0
2000	6691	6490	-202	6221	6423	202	2500	2500	0	0	0	0	0
2001*	3989	3989	0	2662	2662	0	3761	3761	0	0	0	0	0
2002*	7621	7409	-212	189	400	212	0	0	0	0	0	0	0
2003*	2119	2119	0	7609	7294	-315	684	999	315	0	0	0	0
2004*	657	526	-131	9397	9225	-173	358	662	303	0	0	0	0
2005	0	0	0	3616	3616	0	11797	11797	0	0	0	0	0

*Indicates dry years, ** indicates wet years, and no asterisks indicate moderate years.

As stated in the PBO, no further ESA consultation is required for the proposed contracts because the PBO addressed the effects of all Federal and non-Federal depletions from the 15-Mile Reach, considered all existing and future operations and depletions from Ruedi, and provided mitigation for a portion of the adverse impacts. It determined the cumulative Federal and non-Federal

depletions from the 15-Mile Reach "may affect" the endangered fishes and their critical habitats, but were not likely to jeopardize the continued existence, or destroy or adversely modify the designated critical habitat of these species.

Additionally, the Service concluded that although the flow-related recovery actions would not be sufficient to fully offset all the adverse effects of historic and new water depletions, it was expected that a combination of flow and non-flow management activities in the Recovery Program for the Upper Colorado River Basin would provide suitable habitat for increasing the numbers of endangered fishes and likely restore critical habitat areas that have been substantially modified or completely lost (USDI 1999). Furthermore, as discussed in the Issues and Impact Topics Considered but Excluded from Further Evaluation in Chapter One, the stipulation that contractors would include language in contracts with third parties concerning Section 404 consultation with the Army Corps of Engineers would ensure that the USFWS would be consulted with when the construction of facilities necessary to use the contracted water proposes physical alterations to designated critical habitat of the Colorado River endangered fish species. Therefore this alternative would not be expected to result in cumulative impacts greater than those presented in the PBO.

3.5 OTHER AQUATIC RESOURCES

The information presented here in summary can be found in detail in the RRII FSES and 2012 Agreement. The analysis related to aquatic resource impacts in these documents is included here by reference. The direct and indirect impact analysis was also based upon results from the hydrologic model.

3.5.1 AFFECTED ENVIRONMENT

Ruedi:

Fish data were available for Ruedi in 1997 and 2008. White suckers were the dominant species in 2008. Brown trout, lake trout, and rainbow trout each comprised 9 or 10 percent of the fish sampled in 2008. Kokanee salmon comprised 3 percent of the fish sampled and mountain whitefish comprised 1 percent of the fish sampled. Yellow perch were relatively abundant in the 2008 samples comprising 7 percent of the fish sampled. Yellow perch were illegally introduced into Ruedi and can compete with other species for resources and, thus, their removal is encouraged by CDOW (K. Ross, CDOW, unpublished report). Lake trout were the dominant species sampled in Ruedi in 1997, followed by white suckers. Brown trout were also relatively abundant in the 1997 sample and Snake River cutthroat trout comprised a small percentage of the fish community.

The lake trout population in Ruedi is a self-sustaining, naturally reproducing population (K. Ross, CDOW, unpublished report). Ruedi is stocked with 60,000 catchable rainbow trout annually and kokanee salmon are also stocked annually (K. Ross, CDOW, unpublished report; CDOW 2010b, unpublished data). During the last 10 years, cutthroat x rainbow trout hybrids and Snake River cutthroat trout have also been stocked.

Fryingpan River–Ruedi to Roaring Fork River:

The Fryingpan River study segment extends from Ruedi Dam downstream to the Roaring Fork River. This segment is classified as an Aquatic Life Cold 1 stream (CDPHE 2011), is managed as a trout fishery, and is classified as a Gold Medal Water (CDOW 2009). Multiple sites were sampled on the Fryingpan River in several years from 2000 through 2008. The fish community was similar among years with brown trout the most abundant species (CDOW 2010b, unpublished data). Rainbow trout and mottled sculpin were the next most abundant species, while brook trout, cutthroat trout, and white suckers each comprised a small percentage of the fish sampled.

Brown trout densities were high in the Fryingpan River, consistent with its Gold Medal Water classification. The upstream portion of the Fryingpan River is known for large rainbow and brown trout that often exceed 10 pounds, with some individuals reaching 22 pounds (Nehring et al. 2000). Fish reach these sizes by feeding on opossum shrimp (*Mysis relicta*) flushed out of Ruedi (Nehring et al. 2000). As in the Colorado River, whirling disease has been attributed to severe declines in rainbow trout recruitment in the Fryingpan River since the 1990s (Nehring et al. 2001; Nehring 2006). The parasite that causes whirling disease was first detected in the Fryingpan River in 1995 (Nehring et al. 2001).

The flow regime, as related to releases from Ruedi, directly influences the benthic macroinvertebrate community in the Fryingpan River (Ptacek et al. 2003). Ruedi operations result in increased thermal stability and periods of flow stability in the Fryingpan River. Two sites were sampled on the Fryingpan River in spring and fall of 2001 and 2002, and spring 2003 (Ptacek et al. 2003; Rees et al. 2003). One site was less than 1 kilometer downstream of Ruedi Dam and the other was downstream of the confluence with Taylor Creek. Both sites supported large numbers of benthic invertebrates, which were capable of supporting large and healthy fish populations (Ptacek et al. 2003). Benthic invertebrate densities and biomass were often highest at the site downstream of Ruedi Dam, but most other metrics indicated a more balanced community structure at the site downstream of Taylor Creek (Ptacek et al. 2003).

Tailwater is the reach of river immediately downstream of a dam that is influenced by fluctuations in reservoir discharge operations (Summerfelt 1999). Deep reservoir releases, like the release from Ruedi Dam, result in the discharge of cold water that may be nutrient-rich. These areas are capable of producing abundant fish populations (Moser and Hicks 1970), as observed in the Fryingpan River. The Fryingpan River site immediately downstream of Ruedi Dam also has benthic invertebrate characteristics that are consistent with other deep-water release tailwaters (Ptacek et al. 2003). The site downstream of Ruedi Dam had a lower diversity, and increased percentages of baetid mayflies and chironomids than at the site downstream of Taylor Creek.

Physical habitat simulation (PHABSIM) habitat relationships were developed for the Fryingpan River downstream of Ruedi in 2001 for three hydraulically distinct habitat types (Ptacek et al. 2003). In these habitat types, habitat availability for most life stages of brown and rainbow trout is relatively high from 100 cfs up to 600 cfs, depending on the dataset. In the pool habitat types, flows up to 800 cfs provide suitable habitat availability for adult trout. A minimum baseflow near 100 cfs has been recommended to minimize the formation of anchor ice (Ptacek et al. 2003). This section of the river has a CWCB minimum flow requirement that matches flow requirements in the Fry-Ark

Operating Principles, which is a minimum of 39 cfs from November 1 to April 30, and 110 cfs from May 1 to October 31.

Roaring Fork River–Fryingpan River to Colorado River:

This segment of the Roaring Fork River from the confluence with the Fryingpan River downstream to the Colorado River is classified as Aquatic Life Cold 1 (CDPHE 2011). This segment of the Roaring Fork River is managed as a trout fishery and is classified as a Gold Medal Water (CDOW 2009). Fish data were available for three study sites within the Roaring Fork study segment in 2000 and 2004 (CDOW 2010b, unpublished data). Brown trout were the dominant species of fish during the two 2004 samples in the upper portion of the river segment, comprising 70 and 68 percent of the fish sampled. Mountain whitefish were the dominant species in 2000 at the site in the lower portion of the river segment. Brown trout were the second most abundant species at this site. Rainbow trout were also relatively abundant, comprising between 5 and 18 percent of the fish sampled. Many of the rainbow trout collected are likely stocked fish, as this reach of the Roaring Fork is heavily stocked with rainbow trout by CDOW annually (CDOW 2010b, unpublished data). A few mottled sculpin, flannelmouth sucker, and largemouth bass were also collected.

Benthic invertebrates were sampled at two sites on the Roaring Fork River in spring 2001 and at three sites in fall 2001 and spring 2002 (Ptacek et al. 2003). All sites supported large numbers of benthic invertebrates and were capable of supporting large and healthy fish populations (Ptacek et al. 2003).

Brown and rainbow trout use similar redds (gravel beds) for spawning. Brown trout spawn in the fall with fry emergence in late spring, and rainbow trout spawn in the spring with fry emergence occurring approximately one month after brown trout fry emergence. It is believed the minimum and optimum winter flows for various life stages of all species of trout ranges from 50 to 250 cfs (Nehring 1988).

Macroinvertebrates represent a significant food source for trout species, and their presence is important to maintaining a productive fishery. Of the basic physical requirements necessary to sustain macroinvertebrate populations, river depth and flow velocity are the most critical (Nelson and Roline 1996). Significant fluctuations in flow velocity and depth can have negative effects on macroinvertebrates; however, since this variation is typical for high mountain environments, where summer storm events are common, these species are adapted to fluctuations of this nature (Roline 2001). Of particular concern is the formation of anchor ice (river is allowed to freeze over entirely or in large part), which is influenced by both the flow of the river and air temperature. The longer the anchor ice event, the greater the negative effect on macroinvertebrate community structure and function. Maintaining winter flows greater than 70 cfs seems to result in less anchor ice than flows of 40 cfs in the upper half of the river, and after severe anchor ice formation macroinvertebrate community diversity and evenness appear to recover in one to two years if winter flows remain greater than 70 cfs (Miller Ecological Consultants, Inc. 2006).

3.5.2 Environmental Consequences

No Action Alternative

This alternative would result in Ruedi, and Fryingpan and Roaring Fork River flows continuing to fluctuate as they have historically as a result of yearly precipitation variations, releases for fish recovery and from previously established water contracts, and/or regulation according to the Ruedi Operating Principles. Therefore, this alternative is expected to have no direct, indirect, or cumulative impact on sport fish, their habitat, or their food sources in these areas.

Proposed Action Alternative

Direct and Indirect Effects: As previously discussed, the model results in Table 3.1 and Figure 3.1 indicate that in the late summer there is potential for an elevation or extension in time of elevated flows as a result of the issuance of these contracts. Brown trout often benefit from lower velocity flows during late summer prior to the fall spawn, because instead of putting energy into fighting higher currents the fish can prepare physiologically for spawning (Ewert 2007). Approximately 55 percent of the years have negligible effects to maximum flows in August and September. About 20 percent of the years have a minor increase and 25 percent see moderate increases. With this range of effects to flows, there may be a minor long-term adverse impact on spawning success of brown trout as compared to current conditions.

In those years when November-March flows are reduced in the Fryingpan River to store water to meet the spring fill target there would likely be a negligible to minor adverse direct impact to rainbow trout as this lower flow would limit the available amount of spawning habitat in the spring as compared to current conditions.

Table 3.6 Average Days per Year, Flows in the Fryingpan River below 70, 50 and 40 cfs thresholds

Comparison of Fryingpan River Flows	Average Days Flows Below 70 cfs	Average Days Flows Below 50 cfs	Average Days Flows Below 40 cfs
No Action Alternative	27	6	0
Proposed Action Alternative	62	28	7
RRII FSES	50	30	25
Change from RRII FSES	12	-2	-18
Change from NA	35	22	7

In Table 3.6, the model results indicate that as a result of the Proposed Action, there would be an increase of 22 days on average from October through April that would be expected to have minimum flows reduced below 50 cfs. Note that the RRII FSES analyzed impacts of an increase of 24 days, so the Proposed Action is within the bounds of the RRII FSES. Therefore, with an approximately 10 percent increase in days with flows below 50 cfs, this alternative would likely have a minor long-term adverse direct impact to trout when compared to current conditions.

Model results also indicate that the RRII FSES had less flows below 70 cfs, but also more flows below 40 cfs than the Proposed Action. This appears to be a result of the RRII FSES model fluctuating flows more in the winter than current operations. See graphs for 1977 and 1981 in

Figure 3.1 for examples. The winter flow fluctuations analyzed in the RRII FSES would have much greater anchor ice impacts compared to the steady winter flow patterns of the Proposed Action. As a result of this alternative there would be flows below 70 cfs 29 percent of the time during the months of October through April, an increase from 13 percent in the No Action. The RRII FSES modeled flow below 70 cfs 24 percent of the time, but also had flows below 40 cfs 12 percent of the time, compared to only 4 percent for the Proposed Action. Therefore, with reductions of flows to below 70 cfs, this alternative would likely have a minor to moderate long-term adverse direct impact to macroinvertebrates when compared to current conditions.

In summary, it is important to note that despite causing negligible to moderate adverse impacts to aquatic resources as compared to current conditions, this alternative is not expected to result in direct or indirect impacts greater than those presented in the RRII FSES.

Cumulative Effects: Reclamation does not anticipate the negligible changes in runoff patterns predicted under climate change (Section 3.2.1) to have significant cumulative impacts when combined with the direct and indirect effects of the proposed action, outside of the range disclosed in the RRII FSES.

3.6 RECREATION

The information presented in summary here relates to Ruedi, and the Fryingpan and Roaring Fork Rivers and can be found in detail in the RRII FSES, the CRWCD 2007 EA, and the 10825 EA. The analysis related to impacts to recreation in these documents is included here by reference.

3.6.1 Affected Environment

Ruedi

Ruedi provides visitors with three boat ramps, four campgrounds with 81 developed sites, and 3 day-use picnic areas. One of the boat ramps is part of a privately owned facility called the Aspen Yacht Club, which currently has 75 members and 60 boat slips (Dickinson, pers. comm. 2013). Lands adjacent to Ruedi were transferred from Reclamation to the United States Forest Service (USFS) in 1968. Facilities such as the boat ramps at Dearhamer Campground and Aspen Yacht Club are designed to be operable when the reservoir levels are at or above 85,000 ac-ft. The Ruedi Marina Boat ramp is located on the western shoreline near the dam, and is designed to remain operable at reservoir volumes above 52,000 ac-ft. Refer to Table 3.3 for a listing of storage levels in Ruedi, and Table 3.10 for a listing of the resultant surface area in recent years.

Approximately 72 percent of visitors to the reservoir participate in some form of watercraft related activity, including motor boating (30 percent), sailing (20 percent), personal water craft use (10 percent), kayaking/canoeing (7 percent) and sailboarding (5 percent) (Crandall 2002). Camping (50 percent), fishing (53 percent) and sightseeing (35 percent) were also popular activities of visitors to Ruedi. Approximately 65 percent of Ruedi use is attributed to local users, many of whom make multiple trips during the season of use (Crandall, 2002). USFS records indicate that there were a total of 15,306 visitor days at Ruedi during the 2001 summer season, not including use at the Yacht Club (Keneally 2001). More recent USFS visitor use survey data shows 3 year (2006-2008) average annual peak period occupancy for the Dearhamer, Little Mattie, Little Maud, Mollie B,

and Ruedi Marina campgrounds at Ruedi at 45, 40, 41, 48, and 39 percent respectively. Visitor days at Ruedi were not available. (Moran, pers. comm. 2013)

The general season of use at Ruedi is Memorial Day through the weekend after Labor Day, with the heaviest use occurring from July 4th to Labor Day. Use of the area decreases after Labor Day, when campgrounds begin to close and other services end for the season, although use has been increasing during this shoulder season. Fall and winter recreation activities at the reservoir primarily include camping (associated with hunting), fishing and, when available, ice fishing (Moran, pers. comm. 2013).

Fryingpan and Roaring Fork Rivers

The Fryingpan River, which flows 14 miles from Ruedi Dam to Basalt, is also well known for its recreational opportunities. The river is managed by the Colorado Division of Wildlife as a "Gold Medal" trout fishery with catch-and-release requirements because of its ability to produce high numbers of trophy trout. This has made the Fryingpan River a nationally recognized fly-fishing destination.

Only about 7.5 miles of a total of 14 miles of the Fryingpan River from Ruedi to the confluence with the Roaring Fork River are available to the public for fishing and other recreation activities. Between November 2000 and October 2001 it was estimated that there was approximately 34,248 to 39,128 annual visitor days in this stretch of the river. The portion of public land just below the Ruedi Dam to just below Baetis Bridge accounts for approximately 72 percent of this use. Most of the use came from anglers (86 percent), during the on-season (71 percent), and from outside of the Roaring Fork Valley (84 percent) (Crandall 2002).

The USFS currently permits outfitter-guides along the public land portions of the Fryingpan River below Ruedi Dam. Outfitter-guide operations generally run from the beginning of May through the end of October, with 69 percent or more of historic user trips occurring in July, August and September. In general, about half of the guide revenue generated from this fishery occurs during the dry fly fishing season between mid-July and mid-September (USFS 2009).

Preferred flows for fishing range between 200 and 350 cfs. River flows of about 230 cfs are considered ideal (Mowbray, pers. comm. 2009), while flows exceeding about 250 cfs are considered unsafe and unsuitable for wade fishing (USFS 2009). Extreme low winter flows (below about 70 cfs) can be detrimental to fish habitat (Mowbray, pers. comm. 2009). The Fryingpan River provides limited boating opportunities (high water only) and is not a popular destination (Banks and Eckardt 1999).

Access along the Fryingpan River below Ruedi Dam is a concern to many fisherman, because once flows exceed 250 cfs there is limited access to the opposing shoreline since access to about half of the 14 miles of riverbank in this reach is controlled by private land ownership. These factors lead to overcrowding along publicly-owned portions of streambanks and diminish user experience when flows limit wading.

The Roaring Fork River between Basalt and Glenwood Springs is popular for both fishing and boating. The reach of river between Carbondale and the Colorado River is considered a Gold Medal Water. Boating activity is generally limited to private boaters and float fishing, while bank fishing is also popular. Some commercial boating does occur—about 2,500 commercial user days were reported in 2008 (CROA 2009). The USFS permits outfitter/guides along the public land portions of the Roaring Fork. The section of the Roaring Fork River between Carbondale and Glenwood Springs has Class II to III rapids and is popular for private boaters (Stafford and McCutchen 2007).

3.6.2 Environmental Consequences

No Action Alternative

This alternative would result in Ruedi levels, and Fryingpan and Roaring Fork River flows continuing to fluctuate as they have historically as a result of yearly precipitation variations, releases for fish recovery and from previously established water contracts, and/or regulation according to the CWCB's minimum instream flows and the Ruedi Operating Principles. As a result this alternative is expected to have no direct, indirect, or cumulative impact on recreation in these areas.

Proposed Action Alternative

Table 3.7 shows the number of days greater than 250 cfs in the Fryingpan River during the period of record for the Proposed Alternative compared to current conditions. According to the model results there would be an average increase of 3.6 days a year or roughly an 11 percent increase. By year type that equates to an average increase of 8.3 days in dry years, 2.6 days for moderate years, and 0.4 days for wet years. These changes in flows are expected to result in minor long-term direct impacts on fishery recreation in the Fryingpan River.

In comparison to the RRII FSES, Table 3.8 shows that although the Proposed Action does increase the number of days per year above 250 cfs, the RRII FSES expected increases of 14 days at fully contracted levels, much more than the 3.6 days expected as part of the Proposed Action.

Refer to the Other Aquatic Resources section for a discussion of the expected impacts to sport fish, their habitat, and their food sources as a result of the implementation of the Proposed Alternative. Using a conservative estimate, by extension it would be expected that similar levels of impact would result to fishery recreation in the Fryingpan River.

As seen in Figure 3.2 and Table 3.4, and discussed in the Ruedi Operations section, this alternative is expected to cause a drop in the storage level of Ruedi. As shown in the model results for the 1981 year, as a result of this alternative the level would drop below that needed to keep Dearhamer Campground and Aspen Yacht Club Boat Ramps operable sooner and longer in a dry year. Assuming a September 7 Labor Day, the impact would occur for 2 weeks before Labor Day, rather than 2 days before Labor Day as under the No Action. Visitors would need to use the Ruedi Marina Boat Ramp in order to gain access to the reservoir during these times. Therefore, a minor direct adverse impact would be expected to those whose recreation experience depends upon the Dearhamer and Aspen Yacht Club boat ramps.

TABLE 3.7 – SIMULATED NUMBER OF DAYS FRYINGPAN RIVER FLOWS WOULD BE GREATER THAN 250 CFS

Historic Hydrologic Year	July			August			September			October			Annual Total Diff.
	No Act	Prop	Diff	No Act	Prop	Diff	No Act	Prop	Diff	No Act	Prop	Diff	
1975	28	28	0	0	0	0	27	28	1	0	2	2	3
1976	0	0	0	13	13	0	8	8	0	0	0	0	0
1977*	15	15	0	3	6	3	0	0	0	0	0	0	3
1978	22	22	0	25	25	0	8	11	3	0	0	0	3
1979	28	28	0	6	6	0	18	18	0	0	0	0	0
1980	16	16	0	19	19	0	14	17	3	0	0	0	3
1981*	9	9	0	18	24	6	0	0	0	0	0	0	6
1982	22	22	0	0	0	0	0	0	0	0	0	0	0
1983**	31	31	0	12	12	0	13	13	0	5	5	0	0
1984**	31	31	0	0	0	0	0	0	0	0	0	0	0
1985	19	19	0	0	0	0	12	15	3	0	0	0	3
1986**	31	31	0	0	0	0	0	0	0	0	0	0	0
1987	19	19	0	0	0	0	3	3	0	0	0	0	0
1988	12	12	0	18	27	9	6	6	0	0	0	0	9
1989*	6	12	6	9	17	8	12	23	11	0	0	0	25
1990*	0	0	0	27	30	3	0	0	0	0	0	0	3
1991	0	0	0	6	6	0	9	9	0	0	0	0	0
1992	6	6	0	27	31	4	9	11	2	0	0	0	6
1993**	16	16	0	0	0	0	0	0	0	15	15	0	0
1994	15	15	0	21	30	9	6	6	0	0	0	0	9
1995**	31	31	0	15	15	0	0	0	0	0	0	0	0
1996**	16	16	0	22	22	0	17	20	3	0	0	0	3
1997**	16	16	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	28	28	0	0	0	0	0	0	0	0	0	0	0
2000	10	10	0	15	21	6	3	3	0	0	0	0	6
2001*	0	0	0	4	4	0	8	20	12	0	0	0	12
2002*	15	15	0	0	3	3	0	1	1	0	0	0	4
2003*	4	0	-4	18	21	3	0	2	2	0	0	0	1
2004*	0	0	0	21	28	7	0	5	5	0	0	0	12
2005	3	3	0	0	0	0	15	15	0	0	0	0	0

*Indicates dry years, ** indicates wet years, and no asterisks indicate moderate years.

Table 3.8 Average Days Per Year Fryingpan River Flows above 250 cfs July-October

Comparison Fryingpan River Flows – July-October	Average days per year Fryingpan River Flows Above 250 cfs
No Action	31
Proposed Action	34
RRII FSES	45
Change from RRII FSES	-11
Change from No Action	3.6

On page 4.40, the RRII FSES summarizes the probabilities of lost access to boat ramps at Ruedi. Table 3.9 compares this data to the current alternatives. The impacts of the Proposed Action are less than the RRII FSES in July. Within the resolution of the 31 years of record (3 percent) the impacts to boat ramp access are the same in the Proposed Action as in the RRII FSES. The RRII FSES had 9 years in the 36 year record below 85,000 acre-feet storage at Ruedi, while the Proposed Action has 8 years in the 31 year record. Of particular note is that during the months of July through August, which is a critical period for retaining storage levels capable of operating boat ramps, the model indicated that if the entire 51,500 ac-ft is released for contracts and fish recovery the probability of the reservoir levels dropping below 85,000 ac-ft in the months of July and August are 8 and 25 percent respectively. The probability of the reservoir levels falling below 52,000 ac-ft for the months of July and August are less than 1 percent.

Table 3.9 Probability of Reservoir Levels below Boat Ramp elevations in July and August

Ruedi Levels in July and August	Probability of Reservoir Levels below 52,000 ac-ft		Probability of Reservoir Levels below 85,000 ac-ft	
	July	August	July	August
No Action	<1%	<1%	(2 of 31 years) 6.5%	(5 of 31 years) 16.1%
Proposed Action	<1%	<1%	(2 of 31 years) 6.5%	(8 of 31 years) 25.8%
RRII FSES	<1%	<1%	(3 of 36 years) 8.3%	(9 of 36 years) 25.0%

Table 3.10 shows the simulated change in acres of surface area of the reservoir as a result of the implementation of this alternative compared to the No Action Alternative. The model results indicate that through the life of the contract there would be an annual average decrease of about -12 acres of surface area a year, which represents an approximate 1.4 percent decrease.

This equates to an annual average reduction in surface area of 25 acres in dry years, 9 acres in moderate years, and 5 acres in wet years due to the implementation of this alternative. However, within a year the surface area could increase up to 6 acres and decrease up to 74 acres. Therefore, this alternative would likely have a direct impact on those who recreate at Ruedi ranging between negligible to minor.

In summary, it is important to note that despite causing various beneficial and adverse impacts to recreation as compared to current conditions, this alternative is not expected to result in direct or indirect impacts greater than those presented in the RRII FSES, as displayed in tables 3.8 and 3.9.

Cumulative Effects: Reclamation does not anticipate the negligible changes in runoff patterns predicted under climate change (Section 3.2.1) to have significant cumulative impacts to recreation when combined with the direct and indirect effects of the proposed action, outside of the range disclosed in the RRII FSES.

TABLE 3.10 – SIMULATED AVERAGE MONTHLY RUEDI SURFACE AREA (AC)

Historic Hydrologic Year	November			December			January			February			March			April		
	No Action	Proposed	Difference	No Action	Proposed	Difference	No Action	Proposed	Difference	No Action	Proposed	Difference	No Action	Proposed	Difference	No Action	Proposed	Difference
1975	935	935	**0**	906	906	**0**	871	871	**0**	835	835	**0**	790	790	**0**	751	751	**0**
1976	871	853	**-18**	853	841	**-12**	830	818	**-11**	796	790	**-6**	762	762	**0**	745	745	**0**
1977*	876	859	**-18**	859	847	**-12**	841	830	**-11**	824	813	**-11**	801	801	**0**	790	790	**0**
1978	773	699	**-74**	768	699	**-69**	762	699	**-63**	745	694	**-51**	739	699	**-40**	745	713	**-32**
1979	841	813	**-28**	824	801	**-23**	801	790	**-11**	785	779	**-6**	773	768	**-6**	751	751	**0**
1980	888	876	**-12**	865	853	**-12**	835	830	**-6**	807	801	**-6**	785	779	**-6**	762	762	**0**
1981*	847	790	**-57**	841	790	**-51**	824	790	**-34**	813	785	**-28**	796	779	**-17**	790	785	**-6**
1982	835	768	**-68**	818	762	**-57**	796	756	**-40**	779	751	**-28**	756	739	**-17**	745	745	**0**
1983**	959	947	**-12**	912	906	**-6**	859	853	**-6**	807	807	**0**	756	756	**0**	709	709	**0**
1984**	906	906	**0**	865	865	**0**	830	830	**0**	785	785	**0**	745	745	**0**	709	709	**0**
1985	965	959	**-6**	924	924	**0**	882	876	**-6**	830	830	**0**	773	773	**0**	751	751	**0**
1986**	918	918	**0**	882	876	**-6**	835	835	**0**	785	785	**0**	734	734	**0**	713	713	**0**
1987	971	971	**0**	930	930	**0**	882	882	**0**	835	835	**0**	785	785	**0**	756	756	**0**
1988	912	871	**-41**	876	847	**-30**	847	818	**-29**	807	790	**-17**	768	756	**-11**	751	751	**0**
1989*	807	739	**-68**	801	745	**-57**	796	745	**-51**	785	745	**-40**	779	751	**-28**	790	773	**-17**
1990*	847	773	**-74**	835	779	**-57**	818	779	**-40**	801	773	**-28**	785	773	**-11**	785	785	**0**
1991	841	813	**-28**	824	801	**-23**	801	785	**-17**	779	768	**-11**	751	745	**-6**	745	745	**0**
1992	900	894	**-6**	871	865	**-6**	835	835	**0**	801	801	**0**	768	762	**-6**	745	745	**0**
1993**	824	796	**-28**	801	779	**-23**	773	756	**-17**	751	739	**-11**	723	718	**-5**	704	704	**0**
1994	924	918	**-6**	894	888	**-6**	859	853	**-6**	813	807	**-6**	773	773	**0**	756	751	**-6**
1995**	813	751	**-62**	796	745	**-51**	773	739	**-34**	745	723	**-22**	718	709	**-10**	704	704	**0**
1996**	935	930	**-6**	894	894	**0**	847	847	**0**	796	790	**-6**	739	734	**-6**	713	713	**0**
1997**	876	865	**-12**	847	835	**-12**	807	801	**-6**	773	768	**-6**	728	728	**0**	709	709	**0**
1998	977	977	**0**	941	941	**0**	888	888	**0**	835	835	**0**	785	785	**0**	745	745	**0**
1999	965	965	**0**	924	924	**0**	876	876	**0**	830	830	**0**	779	779	**0**	745	745	**0**
2000	965	965	**0**	924	924	**0**	876	876	**0**	830	830	**0**	779	779	**0**	751	751	**0**
2001*	865	824	**-41**	847	818	**-29**	830	807	**-23**	807	790	**-17**	790	779	**-11**	785	779	**-6**
2002*	906	871	**-35**	888	859	**-30**	865	841	**-24**	835	818	**-17**	801	790	**-11**	785	785	**0**
2003*	723	655	**-68**	728	655	**-73**	723	650	**-73**	718	650	**-68**	718	646	**-73**	728	655	**-73**
2004*	900	865	**-35**	882	853	**-30**	859	835	**-23**	818	801	**-17**	785	779	**-6**	785	785	**0**
2005	835	779	**-57**	818	773	**-45**	801	768	**-34**	779	756	**-23**	756	745	**-11**	751	751	**0**

* Indicates dry years, ** indicates wet years, and no asterisks indicate moderate years

Historic Hydrologic Year	May			June			July			August			September			October			Average Annual Differemce
	No Act.	Prop. Action	Diff.	No Act.	Prop. Action	Diff.	No Act.	Prop. Action	Diff.	No Act.	Prop. Action	Diff.	No Act.	Prop. Action	Diff.	No Act.	Prop. Action	Diff.	
1975	751	751	0	859	859	0	983	983	0	989	989	0	930	930	0	882	871	-12	-1
1976	790	790	0	935	935	0	989	989	0	971	965	-6	906	894	-12	888	871	-18	-7
1977*	830	824	-6	900	894	-6	882	871	-12	818	796	-23	796	756	-40	779	718	-61	-17
1978	756	734	-23	882	871	-12	989	989	0	953	953	0	871	859	-12	853	830	-23	-33
1979	751	751	0	900	900	0	989	989	0	983	983	0	935	935	0	906	894	-12	-7
1980	796	796	0	935	935	0	989	989	0	959	959	0	882	859	-24	859	807	-52	-10
1981*	835	835	0	924	924	0	971	971	0	912	900	-12	871	835	-35	853	790	-63	-25
1982	790	785	-6	912	912	0	989	989	0	995	995	0	983	983	0	977	977	0	-18
1983**	694	694	0	824	824	0	989	989	0	995	995	0	977	977	0	930	930	0	-2
1984**	723	723	0	947	947	0	989	989	0	995	995	0	989	989	0	983	983	0	0
1985	841	841	0	977	977	0	989	989	0	989	989	0	959	959	0	935	930	-6	-1
1986**	768	768	0	918	918	0	989	989	0	989	989	0	989	989	0	989	989	0	0
1987	841	841	0	953	953	0	983	983	0	959	959	0	935	924	-12	924	894	-30	-3
1988	801	801	0	918	918	0	965	965	0	888	882	-6	835	801	-34	818	756	-62	-19
1989*	853	841	-12	941	930	-12	983	971	-12	953	930	-24	888	847	-41	859	785	-74	-36
1990*	818	818	0	918	918	0	977	977	0	930	924	-6	876	859	-18	859	830	-29	-22
1991	790	790	0	935	935	0	989	989	0	977	977	0	930	930	0	918	912	-6	-8
1992	824	824	0	918	918	0	971	971	0	918	912	-6	859	841	-18	835	807	-28	-6
1993**	739	739	0	941	941	0	989	989	0	989	989	0	989	989	0	959	953	-6	-7
1994	830	830	0	959	959	0	977	977	0	900	894	-6	841	807	-34	824	768	-57	-10
1995**	689	689	0	801	801	0	977	977	0	995	995	0	989	989	0	977	971	-6	-15
1996**	807	801	-6	965	965	0	989	989	0	965	965	0	894	882	-12	888	876	-12	-4
1997**	762	762	0	947	947	0	989	989	0	989	989	0	989	989	0	989	989	0	-3
1998	773	773	0	906	906	0	989	989	0	989	989	0	989	989	0	971	971	0	0
1999	768	768	0	888	888	0	989	989	0	995	995	0	989	989	0	989	989	0	0
2000	876	876	0	989	989	0	989	989	0	924	918	-6	888	865	-24	876	841	-35	-5
2001*	859	859	0	959	959	0	989	989	0	983	983	0	941	930	-12	918	888	-30	-14
2002*	801	796	-6	847	841	-6	824	813	-11	762	739	-23	739	699	-40	723	660	-63	-22
2003*	785	723	-61	965	930	-36	989	989	0	953	947	-6	930	918	-12	918	888	-30	-48
2004*	830	830	0	912	912	0	959	959	0	918	918	0	865	835	-29	847	796	-51	-16
2005	801	807	6	941	941	0	989	989	0	989	989	0	947	947	0	930	930	0	-14

* Indicates dry years, ** indicates wet years, and no asterisks indicate moderate years

3.7 SOCIOECONOMICS

The information presented here on socioeconomics related to Ruedi, and the Fryingpan and Roaring Fork Rivers in summary can be found in detail in the RRII FSES, the CRWCD 2007 EA, and the 10825 EA. The analysis related to impacts to socioeconomics in these documents is included here by reference.

3.7.1 AFFECTED ENVIRONMENT

Population

The socioeconomic analysis area of Grand, Summit, Eagle, Pitkin, Garfield, and Mesa counties was home to about 315,300 permanent residents in 2010. About 112,200 of these residents lived in the four upstream counties, Grand, Summit, Eagle and Pitkin, referred to in the remainder of this section as the resort counties. The larger share of the analysis area population (about 203,100 residents) lived in the downstream counties, Garfield County and Mesa County, referred to in this section as the west slope counties (Census 2010).

Since 1990, the population of the analysis area has grown by almost 136,700 residents, an increase of 77 percent. The population in the resort counties has grown most rapidly, reflecting an average annual increase of 3.6 percent over the 1990 through 2010 period. The west slope counties have grown more gradually, but their combined average annual growth rate of 2.5 percent still exceeded the state average of 2.1 percent for the 1990 through 2010 period. Eagle County has been the fastest growing county within the analysis area (on a percentage basis) since 1990. Pitkin County, which has sought to actively manage and limit growth, has grown the most gradually (Census 1990, 2010).

The most recent population projections from the Colorado State Demography Office (SDO) anticipate the analysis area will continue to grow more rapidly than the state as a whole. Based on the SDO projections, the analysis area population is expected to include about 612,100 residents by 2040, a cumulative increase of 94 percent from the 2010 population totals. While the average annual population growth rate for the analysis area is projected to slow to 2.2 percent per year through 2040, this growth rate would continue to exceed the projected average annual growth rate for Colorado's population as a whole (1.6 percent) (SDO 2011a).

Demographic Characteristics

Within the analysis area, Eagle and Summit counties had the youngest populations in 2000, with a median age of 31 years. Mesa and Pitkin counties had the oldest populations in 2000, with a median age of 38 years. The median age of Garfield County residents (34 years) and Grand County residents (37 years) in 2000 was closer to the statewide median age of 34 years (Census 2000a). More recent data from the American Community Survey (ACS) indicate the median age of Eagle County residents (now 33 years), Summit County residents (33 years), and Garfield County residents (34 years) remained slightly younger than the statewide average in 2005–2009 (36 years), while the median ages in Mesa County (38 years) and Grand County (40 years) were older than the statewide median age (ACS 2011).

Relative to Colorado as a whole, minority residents comprised a somewhat smaller percentage of the overall analysis area's population in 2000. About 13 percent of analysis area residents in 2000 were Hispanic (compared to 17 percent statewide) and about 3 percent were non-White and non-Hispanic (compared to 8 percent statewide). Analysis area counties varied in their racial and ethnic composition in 2000. Minority residents made up 26 percent of Eagle County's population (23 percent were Hispanic), while minority residents comprised only 7 percent of Grand County's population (4 percent were Hispanic) (Census 2000a).

Recently released data from the 2010 Census indicate the proportion of the analysis area's population comprised of minority residents has increased since 2000. About 18 percent of the analysis area population was Hispanic in 2010 (the statewide proportion has also increased, to 21 percent Hispanic). The non-White and non-Hispanic population in the analysis area in 2010 remained about 3 percent of the total—similar to the proportion in 2000 (9 percent of the state's overall population was non-White and non-Hispanic in 2010). Eagle County continues to have the largest proportion of minority residents in the analysis area (33 percent of Eagle County's total population), but the proportion of minority residents in Garfield County has increased to 31 percent, also slightly higher than the state average, Grand County continues to have the smallest proportion of minority residents (10 percent of the county's total population in 2010) (Census 2010).

Income

The median household income in three of the four resort counties (Eagle, Pitkin, and Summit) was considerably higher than the statewide median household income in 1999. The median household incomes in Grand and Garfield counties were comparable to the statewide average, while the median household income in Mesa County was considerably lower than the statewide median in 1999 (Census 2000b).

More recent data from the 2005–2009 ACS indicate that median household incomes in all four resort counties now exceed the statewide median ($56,222). The median household income is highest in Eagle County ($69,139) and Summit County ($67,329). In the west slope counties, the median household income in Garfield County ($64,837) is higher than the statewide median, while the median household income in Mesa County ($50,611) is about 10 percent lower than the median income in Colorado (ACS 2011).

In 1999, 8.9 percent of the residents of the analysis area were living below the federally defined poverty level, a slightly lower proportion of the population than throughout Colorado (9.3 percent). Mesa County had the largest proportion of residents living below the poverty level (10.2 percent). The other five counties in the analysis area had less than 9 percent of their residents living below the poverty level (Census 2000b).

More recent ACS data indicate the incidence of poverty has increased in Colorado, with 11.9 percent of the population living below the poverty level during 2005–2009. Across the analysis area as a whole, 10.0 percent of the population lived below the poverty level in 2005–2009, including an estimated 12.2 percent of Mesa County residents.

The incidence of poverty in the other analysis area counties was less than the statewide average. In Eagle County, 9.9 percent of residents lived below the poverty level during 2005–2009, while the proportions of the population living below the poverty level in Garfield, Grand, and Pitkin counties were nearly identical at 8.0 to 8.1 percent. Summit County had the smallest proportion of its population living below the poverty level at 5.2 percent in 2005–2009 (ACS 2011).

Ruedi, Fryingpan, and Roaring Fork Area

Ruedi, and the Fryingpan and Roaring Fork Rivers are located in west central Colorado in Pitkin, Eagle and Garfield counties (refer to Figure 1.1). The Town of Basalt is the only major community located along the Fryingpan River and is situated at the confluence of the Fryingpan and the Roaring Fork Rivers. There are numerous private parcels upstream from Basalt along the Fryingpan River, most of which have been developed as single-family dwellings. There are several communities located along the Roaring Fork River downstream of its confluence with the Fryingpan River, the most prominent being Carbondale and Glenwood Springs.

Other than localized urban development around community centers, the Roaring Fork River Valley has significant rural development between the Roaring Fork River's confluence with the Fryingpan River and the Colorado River. Historically, ranching interests occupied a majority of the lands in the valley. However, within the last fifteen years this area has seen an increase in real estate development, generally for single-family dwellings, businesses, and resorts.

Recreation activity associated with Ruedi, the Fryingpan River, and the Roaring Fork River benefits the valley economy and local communities where recreation visitors purchase goods and services. Of the total direct spending by Fryingpan River and Ruedi visitors within the Roaring Fork Valley, 49 percent is estimated to occur in the Basalt and El Jebel area. It is estimated that the total annual expenditures in the Basalt area from Ruedi and lower Fryingpan River visitors is $1,352,063 or 1.55 percent of Basalt's $87 million total sales for 2001. Total annual expenditures in the entire Roaring Fork Valley by these visitors are estimated to be $2,755,532 (Crandall 2002).

Fryingpan River recreation, especially fishing, generated nearly 50 percent of the direct recreation expenditures in the Fryingpan Valley. These recreation expenditures accounted for approximately 3 percent of the total estimated $87 million gross sales in Basalt in 2001 (Roaring Fork Conservancy, 2002). Annual direct spending on lodging related to Lower Fryingpan River recreation was about $292,000 or 31 percent of the 2001 gross lodging sales of $944,750 (Crandall 2002).

Within the Roaring Fork Valley, $1.52 million annually in total income (for businesses and employees) and an estimated 69 jobs are linked to the economic activity generated by lower Fryingpan River visitors. Ruedi recreation activities are responsible for creation of $86,750 in total annual income and 4 jobs (Crandall 2002). River rafting on the Roaring Fork River was estimated to be responsible for $328,600 in direct spending in 2001 (Colorado River Outfitters Association 2001).

3.7.2 Environmental Consequences

No Action Alternative

This alternative would result in Ruedi, and Fryingpan and Roaring Fork River flows continuing to fluctuate as a result of yearly precipitation variations, releases for fish recovery and from previously established water contracts, and/or regulation according to the CWCB's minimum instream flows and the Ruedi Operating Principles. Therefore, this alternative is expected to have no direct, indirect, or cumulative impacts to socioeconomics.

There is a potential that in the absence of Ruedi contracting, augmentation supplies needed by West Slope communities may occur by "buying and drying" agricultural water rights or development of new storage supplies. This is speculative at this time and is not being analyzed in detail in this EA.

Proposed Action Alternative

Refer to the Recreation section for a discussion of the expected impacts to fishery recreation on the Fryingpan River, and recreation at Ruedi as a result of the implementation of the Proposed Alternative. Using a conservative estimate, by extension it would be expected that similar levels of impact would result to the socioeconomics of the Roaring Fork Valley.

The availability of suitable augmentation water to supply demands in the growing Colorado River Basin area could also potentially play a role in local economies. If these contracts were not issued, contractors would need to find other sources of water to meet their needs. This could be minimized somewhat by the availability of water from Wolford Mountain; however, Wolford Mountain cannot meet contracting demands on the Fryingpan and Roaring Fork Rivers unless the demands on these rivers are generated by calls on the Colorado River downstream of the Roaring Fork River. Any augmentation water that is necessary to meet calls on the Fryingpan and Roaring Fork Rivers can only be met by Ruedi or conversion of other rights to augmentation. However based on current requests and the availability of Wolford Mountain to meet at least some of the demand, it is not believed that the failure to implement this alternative would result in lost development opportunities on the west slope. Therefore, this alternative is expected to have no direct or indirect impacts to development in the Colorado River Basin.

This alternative is not expected to result in direct, indirect, or cumulative impacts greater than those presented in the RRII FSES. Based on the demographic characteristics and income data presented above, this alternative would not have disproportionately high and adverse human health or environmental effects on minority and low-income populations.

3.8 HYDROELECTRIC PRODUCTION

The information presented here in summary can be found in detail in the RRII FSES and 10825 EA. The analysis related to hydroelectric production impacts in these documents is included here by reference.

3.8.1 AFFECTED ENVIRONMENT

The city of Aspen is licensed by the Federal Energy Regulatory Commission (FERC) to operate a hydropower facility at Ruedi Dam and Reservoir (Ruedi Hydroelectric Plant) and to make use of operational releases from Ruedi to generate energy. According to Aspen's FERC license, Aspen's hydropower production objectives are subordinate to the operation of Reclamation's facilities; and

according to a Memorandum of Agreement between Reclamation and Aspen, Reclamation has sole discretion concerning release rates from Ruedi.

The power plant can effectively use flows at or above 40 cfs and must cease operation below this level. In addition, the power plant can only use flows up to 250 cfs. The portion of the flow above that level will be bypassed around the power plant.

3.8.2 Environmental Consequences

No Action Alternative

This alternative would result in Ruedi, and Fryingpan and Roaring Fork River flows continuing to fluctuate as they have historically as a result of yearly precipitation variations, releases for fish recovery and from previously established water contracts, and/or regulation according to the CWCB's minimum instream flows and the Ruedi Operating Principles. Therefore, this alternative is expected to have no direct, indirect, or cumulative impacts to hydroelectric production for Aspen.

Proposed Action Alternative

Direct and Indirect Effects: Aspen's FERC license affords them the opportunity to use any releases made from Ruedi, consequently any releases within the capacity of the power plant, between 40 cfs and 250 cfs, are considered a benefit to Aspen. The implementation of this alternative would be expected to increase the number of days above 250 cfs by an average of 3 days compared to No Action, as shown in Table 3.8. Water bypassed above 250 cfs would not be available for hydroelectric generation. It should be noted that in some months after a dry year, the alternative results in less bypassed water. As shown in Table 3.6, there would be 7 additional days in the average number of days per year that flows would be below 40 cfs as compared to No Action. Therefore, it is expected that the implementation of this alternative would cause a negligible to slight long-term impact to hydroelectric production.

As described in Tables 3.6 and 3.8, impacts from the Proposed Action are lower than the RRII FSES for both flows above 250 cfs, and below 40 cfs.

Cumulative Effects: Reclamation does not anticipate the negligible changes in runoff patterns predicted under climate change (Section 3.2.1) to have significant cumulative impacts to hydropower when combined with the direct and indirect effects of the proposed action, outside of the range disclosed in the RRII FSES. Days with flows above 250 cfs and below 40 cfs would be expected to still be within the range evaluated in the RRII FSES.

3.9 SUMMARY OF ENVIRONMENTAL EFFECTS

General Summary:

Implementation of the Proposed Action would result in a moderate increase in late summer and fall flows in the Fryingpan River, a minor decrease in winter flows, and a minor decrease in reservoir elevations compared to the recent past, especially in drier years.

Under the Proposed Action, contracted water would generally be used when the contractors' junior water rights are called out by the more senior Cameo call on the Colorado River. This usually occurs in August through October. The need grows larger the drier the river is. When the Cameo call is on, the Ruedi water released for these contractors would be more than it would have been without the proposed contracts. However, in comparison, the RRII FSES anticipated impacts to Ruedi and the Fryingpan River that were generally larger than the impacts determined to occur under the Proposed Action.

There is a finite amount of inflow into Ruedi each year. When more contracted water is released, there will not be as much water in the reservoir at the end of October. Ruedi's spring fill targets remain the same, so less water would be released in the winter in order to meet those targets. Again, this would most likely occur in dry years.

Winter streamflows analyzed in the RRII FSES were more variable and were sometimes much lower than future expected flows under the Proposed Action. The reservoir storage levels were mostly comparable, although in dry years the RRII FSES showed generally lower levels. As mentioned in Section 3.3, these differences result from comparing different period of record, the RRII monthly assumptions about impacts of the Cameo Call, and the change in the contract split between industrial dominated demands to a more even split between municipal and industrial. However, this future with the contracts in place would still be within the range analyzed in the RRII FSES.

Cumulative Effects: With the anticipated effects of climate change, it is expected that on average flows into Ruedi would be lower under the No Action Alternative. It is also anticipated that the Cameo call may come on sooner and last longer under the No Action Alternative. The cumulative effects of these two factors when combined with the Proposed Action would likely translate into releases for contracts lasting longer, with peak flows in late summer and fall being at the same level, and flows in the winter averaging a bit lower, although still within the range evaluated in the RRII FSES. It is hard to predict what the impacts of climate change would be on Ruedi elevations, as the reservoir would still fill in most years. The possible impact to the timing of releases from the reservoir and the Cameo call make prediction of late summer elevations particularly difficult. The reservoir would continue to moderate the effects of climate variations.

Table 3.11 provides a summary of environmental effects described in EA.

TABLE 3.11 SUMMARY OF ENVIRONMENTAL CONSEQUENCES OF NO ACTION AND PROPOSED ACTION ALTERNATIVES

Affected Resource	No Action Alternative	Proposed Action Alternative
Ruedi Operations	• All Operating Principles and minimum streamflow requirements would be met. • No impacts to Ruedi operations.	• All Operating Principles and minimum streamflow requirements would be met. • Flows November-March average 12 cfs lower, flows April- July decrease 3 cfs on average, and flows in August-October increased 12-25 cfs on average. • For most year types the level of

Affected Resource	No Action Alternative	Proposed Action Alternative
		Ruedi would be lower during the late summer/early fall period. • Direct, indirect, and cumulative effects are within the range presented in the RRII FSES.
Threatened and Endangered Species	• No effect on federally threatened and endangered wildlife or plant species. • No impact to endangered fish.	• No effect on federally threatened and endangered wildlife or plant species. • Negligible impact to releases for the endangered fish. • Effects are within those presented in the PBO.
Other Aquatic Resources	• No impact on sport fish, their habitat, or their food sources.	• Negligible to minor impact to brown trout spawning success and rainbow trout spawning habitat. • Minor to moderate adverse impact to macroinvertebrates. • Direct, indirect, and cumulative effects are within the range presented in the RRII FSES.
Recreation	• No impact on recreation.	• Minor impact to fishery recreation with increased days of greater than 250 cfs flows in the Fryingpan River, especially in dry years. • Minor impact to boating on Ruedi with elevations dropping lower and sooner in dry years. • Direct, indirect, and cumulative effects are within the range presented in the RRII FSES.
Socioeconomics	• No impacts to socioeconomics.	• Negligible to minor effects on water-based recreation economies. • Direct, indirect, and cumulative effects are within the range presented in the RRII FSES.
Environmental Justice	No disproportionately high and adverse human health or environmental effects on minority and low-income populations.	
Hydroelectric Production	• No impacts to hydroelectric production.	• Increased number of days above 250 cfs by an average of 3 days; decreased number of days below 40 cfs by an average of 7 days. • Direct, indirect, and cumulative effects are within the range presented in the RRII FSES.
Air Quality, Noise and Transportation	No effect to air quality, noise, or transportation.	
Floodplains, Wetlands, Water Quality	No impacts to floodplains, wetlands, water quality, and physical properties of the Fryingpan and Roaring Fork rivers.	

Affected Resource	No Action Alternative	Proposed Action Alternative
and River Physical Properties		
Cultural Resources and Indian Trust Assets	No potential for the proposed undertaking to affect historic properties. No known effect on Indian trust assets.	
Visual Resources	No impact to the visual quality of streams and reservoirs.	
Farmland	No effect to prime farmlands.	

CHAPTER FOUR – CONSULTATION AND COORDINATION

SCOPING PROCESS

As noted in Section 1.5, Reclamation has executed 29 Ruedi water contracts since 1996. The NEPA process for many of these contract actions included formal scoping and comment periods, the most recent being the Colorado Water Users' Commitment to Provide 10,825 acre-feet to the 15-Mile Reach of the Upper Colorado River Environmental Assessment (10825 EA), completed in 2012. Through this volume of NEPA application, Reclamation has identified and documented key and substantive issues associated with Ruedi water contracting. Those issues were utilized in the evaluation of alternatives in the Draft EA.

On June 14, 2013, the Draft EA for Ruedi Reservoir Round II Water Marketing Program – Repayment Contracts for 19,585.5 Acre-Feet was posted on Reclamation's webpage at http://www.usbr.gov/gp/ecao/nepa/ruedi_repayment.html, and an electronic message announcing the availability of the Draft EA for comment was sent to 204 individuals, groups, organizations, and agencies. During the 17 day public comment period of June 14, 2013, to July 1, 2013, seven commenters submitted comments. In addition, following the comment period, two additional comments were received. (See Appendix E.)

NEPA documents reviewed for identification of issues included but were not limited to: RRII FSES, 10825 EA, CRWCD 2007 EA, EA NO. EC-1300-02-01 Ruedi Reservoir 2012 Agreement Final Environmental Assessment (2002), and EA No. 2010-32 Ruedi Round II Water Marketing Program Repayment Contract City of Rifle Environmental Assessment (2007). In addition, other publications such as the 2012 Roaring Fork Watershed Plan and the Northwest Colorado Council of Governments Foundation document "Water and its Relationship to the Economies of the Headwaters Counties" were reviewed for the same purpose.

PREPARERS

TABLE 4.1 – LIST OF PREPARERS

Name	Title	Contribution
Bureau of Reclamation		
Coutant, Brad	Archeologist	Cultural resources compliance.
Gilmore, Andrew	Civil Engineer (Hydrologic)	Water model configuration and analysis and document preparation and review.
Lamb, Kara	Public Information Specialist	Public and agency involvement and notification.
Maldonado, Lucy	Environmental Specialist	Environmental compliance guidance and document preparation and review.
Rice, Robert	Water Rights and Repayment Specialist	Water contracting information and document review.
Schwendler, Rebecca	Archeologist	Cultural resources and Indian Trust Assets compliance.
Colorado River Water Conservation District		
Smith, David	Engineering Technician	GIS Mapping

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APPENDIX A – EXISTING RUEDI ROUND I AND II CONTRACTS TO BE AMENDED

Ruedi Round	Existing Contractor	Contract Number
I	Basalt Water Conservancy District	2-07-70-W0546
I	Battlement Mesa Metropolitan District	2-07-70-W0545
I	Exxon Mobil Corporation	2-07-70-W0544
I	West Divide Water Conservancy District	2-07-70-W0547
II	Basalt Water Conservancy District	009D6C0014
II	Basalt Water Conservancy District	039F6C0012
II	City of Glenwood Springs	6-07-60-W0503
II	City of Rifle	119D6C0042
II	City of Rifle	119D6C0074
II	Colorado River Water Conservation District Acting By And Through Its Colorado River Water Projects Enterprise	009D6C0111
II	Colorado River Water Conservation District Acting By And Through Its Colorado River Water Projects Enterprise	009D6C0118
II	Colorado River Water Conservation District Acting By And Through Its Colorado River Water Projects Enterprise	039F6C0011
II	Colorado River Water Conservation District Acting By And Through Its Colorado River Water Projects Enterprise	079D6C0106
II	Crown Mountain Park and Recreation District	079F6C0052
II	Mid-Valley Metropolitan District	9-07-60-W0847
II	Owl Creek Meadows, LLC	009E6C0147
II	Ruedi Water and Power Authority	009D6C0130
II	Starwood Metropolitan District	009D6C0001
II	Ted L. and Hilda M. Vaughan	039F6C0026
II	Thomas H. Bailey	009D6C0037
II	Town of Basalt	9-07-60-W0814
II	Town of Basalt	9-07-60-W0815
II	Town of Carbondale	009D6C0016
II	Town of DeBeque	029F6C0128
II	Town of New Castle, Colorado Water and Sewer Enterprise	009E6C0129
II	Town of Parachute	009D6C0032
II	Town of Silt	009D6C0147
II	Town of Silt	009D6C0149
II	West Divide Water Conservancy District	039F6C0025
II	Westbank Ranch Homeowners Association	6-07-70-W0499
II	Wildcat Ranch Association	009D6C0061

APPENDIX B – INDIVIDUAL CONTRACTOR'S PROPOSED ACTION, PURPOSE, AND NEED

PROPOSED ACTION

There are 17 potential contractors from the western slope of Colorado (contractors), who have requested repayment contracts for the use of Reclamation's Ruedi water to meet current and future municipal, industrial, and commercial irrigation water needs. The contractors include: City of Aspen, Basalt Water Conservancy District, Town of Carbondale, Colorado River Water Conservation District (River District), Crown Mountain Park and Recreation District, Town of Debeque, Elk Wallow Ranch, Garfield County, Mid Valley Metropolitan District, Owl Creek Ranch Homeowners' Association, Town of Palisade, Snowmass Water and Sanitation District, Summit County, Ute Water Conservancy District, W/J Metropolitan District, Wildcat Ranch Association, and Wildcat Reservoir Company. The 17 requests total 19,585.5 acre-feet. The proposed area of use for the contract water is within the watershed of the mainstem of the Upper Colorado River above the confluence with the Gunnison, and along the Colorado River below that confluence to the state border.

PURPOSE AND NEED

Augmentation and Exchange

All of the contractors would use Ruedi water to replace their diversions or depletions from a river when a water right holder places a "call" on the river. A "call" occurs when there is insufficient water in a river for a water right holder to divert the amount of water under their water right to which they are entitled. When this happens, junior water right holders, such as the contractors, must reduce or stop their diversions. To avoid this, the contractors would have their Ruedi water released to replace the water in the river that they are diverting during a "call" on the river. This type of water use is referred to as augmentation. Contractors may also have the Ruedi water released as part of an exchange where water can be diverted out of priority at one point by replacing it with a like amount of water at another point, so long as no water right holders are injured or provided with less water than they are legally entitled to. The contractors anticipate the need for augmentation and exchange will increase in the future due to the contractors' increasing demands for water to meet municipal and industrial needs.

Alternative Source or Replacement

Two contractors (Colorado River Water Conservation District (River District) and Summit County) have proposed using contracted Ruedi water for use as required alternative source water or as a replacement supply when other water supplies are not legally or physically available. For example, Summit County's Green Mountain Reservoir contract requires an alternative or replacement supply and their Ruedi contract may serve in this capacity. Other sources of supply may similarly need to use contracted Ruedi water for replacement needs. The alternative source or replacement water use may include augmentation.

Direct Use Without An Augmentation Plan

Three contractors, the River District, Town of Carbondale (Carbondale), and Ute Water Conservancy District, also want Ruedi water for direct use without an augmentation plan. The River District would like to be able to provide third party contracts to entities that do not yet have an approved augmentation plan. Without an augmentation plan, this option can be significantly more expensive and would most likely be used on a short-term, temporary basis. Carbondale desires the ability to directly divert up to 10 ac-ft per year to support the re-development and operation of the Town's Gateway Park. Ute Water Conservancy District has requested direct use without an augmentation plan in addition to augmentation and exchange to meet their future water needs.

Minimum Stream Flow Recommendations and Recreational In-Channel Diversion Water Right

Carbondale requests that before the year 2020, their Ruedi contract water be made available to augment CWCB minimum instream flows for the Roaring Fork River; and to protect the Town's recreational in-channel diversion (RICD) water right located on the Roaring Fork River - upstream from its confluence with the Crystal River. The CWCB's minimum instream flow recommendations are junior water rights that at times may be out-of-priority during a call. Ruedi water would be used to augment flows when the minimum stream flow recommendations are out-of-priority, thereby meeting the objectives established for the minimum stream flow recommendations, such as meeting aquatic habitat needs. Maintaining a healthy aquatic habitat has beneficial effects on fish populations and angler visitation, which indirectly benefits Carbondale's economics. From a Reclamation contracting perspective, these are considered an M&I use.

Drought Response

Fifteen contractors (all but Summit County and W-J Metropolitan District) request that, on a voluntary basis, their Ruedi contract water be allowed to augment flows for Green Mountain Reservoir operations as part of a drought response effort coordinated with the River District. From a Reclamation contracting perspective, this is considered an M&I use.

City of Aspen (Aspen)

Proposal Summary: Aspen has requested a contract for 400 acre-feet for use by augmentation and exchange through existing river diversions, with potential initial delivery of water as early as 2013. This water is expected to be used to augment out-of-priority depletions associated with municipal and industrial water operations. Augmentation water is primarily expected to be required April to October, but could occur year-round. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Aspen's municipal and industrial water use is considered a diversion from the Roaring Fork River. An estimated 95 percent of municipal use diversions return to the river. The 5 percent that does not return is considered a depletion to the Roaring Fork River. When a downstream water user with senior water rights needs to use water and there is insufficient water in the river to meet their water right, Aspen must either augment their water use with enough water to replace the 5 percent depletion or stop diverting. Aspen is seeking a Ruedi ReservoirRound II water contract to take care of this 5 percent depletion when there is a senior water right holder "call" on the river.

Basalt Water Conservancy District

Proposal Summary: Basalt Water Conservancy District is seeking a contract for 300 acre-feet for use by augmentation and exchange with delivery of water as early as 2013. Ruedi water would be integrated into the Basalt Water Conservancy District's Water Marketing Program for municipal use within the boundaries of the District. Under the Water Marketing Program, the Basalt Water Conservancy District uses its substantial water rights to provide reliable water supplies for those that contract with the District. Ruedi water would be used to augment both diversions and depletions associated with existing and future water use from wells, springs, streams and rivers within the Basalt Water Conservancy District's boundaries, and are anticipated to be needed April through November. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Basalt Water Conservancy District's municipal water use is considered a diversion from the Roaring Fork River or tributaries to the Roaring Fork River. When a downstream water user with senior water rights needs to use water and there is insufficient water in the river to meet that water right, Basalt Water Conservancy District or their contractees must either augment their water use with enough water to replace the diversion or depletion, or stop diverting. Basalt Water Conservancy District is seeking a Ruedi Reservoir Round II water contract to have sufficient water in the future to augment river flows when required. The Basalt Water Conservancy District has a number of water rights and contracts for water; this request for 400 acre-feet of Ruedi water would become part of the water portfolio developed and continually supplemented by the District to meet water needs within the District.

Crown Mountain Park and Recreation District (Crown Mountain)

Proposal Summary: Crown Mountain is seeking a contract for 62 acre-feet for use by augmentation with delivery of water as early as 2013. Contract water would be used to augment out-of-priority depletions for municipal park non-commercial irrigation and pond evaporation through existing wells. Augmentation needs could occur year-round. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Crown Mountain's municipal park irrigation and pond evaporation water use is considered a depletion from the Roaring Fork River or its tributaries. When a downstream water user with senior water rights needs to use water and there is insufficient water in the river to meet their water right, Crown Mountain must either augment their water use with enough water to replace the depletion, or forego these water uses. Crown Mountain is seeking a Ruedi Reservoir Round II water contract to replace this depletion when there is a senior water right holder "call" on the river.

Elk Wallow Ranch

Proposal Summary: Elk Wallow Ranch is seeking a contract for 30 acre-feet for use by augmentation and exchange with potential initial delivery as early as 2013. Contract water would

be used on the Elk Wallow Ranch to augment out-of-priority depletions for irrigation, stock watering, piscatorial, fish propagation, domestic, storage, drought response, and replacement of evaporation through augmentation and exchange, and are anticipated to be needed April through November. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Elk Wallow Ranch's water use is considered a depletion from the Roaring Fork River or its tributaries. When a downstream water user with senior water rights needs to use water and there is insufficient water in the river to meet their water right, Elk Wallow Ranch must either augment their water use with enough water to replace the depletion, or forego these water uses. Elk Wallow Ranch is seeking a Ruedi Reservoir Round II water contract to replace this depletion when there is a senior water right holder "call" on the river.

Garfield County

Proposal Summary: Garfield County is seeking a contract for 400 acre-feet for use by augmentation and exchange with potential initial delivery as early as 2013. Augmentation will be based on both diversions and depletions. The County contemplates no new primary use and no direct diversion. Ruedi water would be used year-round to meet a broad selection of municipal and industrial needs within the portions of the county located within the main stem Upper Colorado hydrologic watershed. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Garfield County's use is considered a diversion and/or a depletion from the Colorado River or its tributaries. Garfield County has contracts it holds with the West Divide Water Conservancy District, which total approximately 16 AF in service of county road maintenance, which it would like to replace with this proposed contract; this request for 400 acre-feet of Ruedi water would replace those contracts and become part of the water portfolio developed by the County to meet future water needs within the County, especially those portions of the County not serviced by other municipalities or water districts.

Mid Valley Metropolitan District (Mid Valley Metro)

Proposal Summary: Mid Valley Metro is seeking a contract for 100 acre-feet for use by augmentation with potential initial delivery of water as early as 2013 through existing wells. Contract water would be used to augment out-of-priority depletions for municipal use within the District's service area. Contract water is expected to be used year-round. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Mid Valley Metro's municipal water use is considered a depletion from the Roaring Fork River. When a downstream water user with senior water rights needs to use water and there is insufficient water in the river to meet their water right, Mid Valley Metro must augment their water use with enough water to replace their depletions. Mid Valley Metro is seeking a Ruedi Reservoir Round II water contract to take care of this depletion when there is a senior water right holder "call" on the river.

Owl Creek Ranch Homeowners' Association (HOA)

Proposal Summary: Owl Creek Ranch HOA is seeking a contract for 15 acre-feet for use by augmentation and exchange. Delivery of contract water would not occur until they have a court-approved augmentation plan. Contract water would be used to augment out-of-priority depletions for municipal and irrigation use within the approximately 1,110 acre Owl Creek Ranch, within the Basalt Water Conservation District's service area. Contract water is expected to be needed April through October. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Owl Creek Ranch HOA's municipal and irrigation water use is considered a depletion from the Roaring Fork River. When a downstream water user with senior water rights needs to use water and there is insufficient water in the river to meet their water right, Owl Creek Ranch HOA must either augment their water use with enough water to replace their depletions or stop diverting. Owl Creek Ranch HOA is seeking a Ruedi Reservoir Round II water contract to take care of this depletion when there is a senior water right holder "call" on the river.

Colorado River Water Conservation District (River District)

Proposal Summary: The River District is seeking a contract for 4,683.5 acre-feet for use by augmentation, exchange, and direct use (occasionally without an augmentation plan) with delivery of water as early as 2013. Ruedi water would be integrated into the River District's Water Marketing Program for municipal and domestic, industrial, and irrigation use within the boundaries of the District located within the main stem Upper Colorado hydrologic watershed.

The River District subcontracts with entities in their district to supply them a reliable source of water. Ruedi water would be used to augment or supplement both diversions and depletions associated with existing and future water use from wells, springs, streams and rivers within the River District's boundaries located within the main stem Upper Colorado hydrologic watershed, and are anticipated to be needed year-round. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

The River District may also use Ruedi supplies as an "alternative source" back-up supply for entities entering into contracts for Green Mountain Reservoir water supplies.

Purpose and Need: The River District's municipal and domestic water use is considered a diversion and/or a depletion from the Colorado River or its tributaries. When a downstream water user with senior water rights needs to use water and there is insufficient water in the river to meet that water right, the River District or their contractees must either augment their water use with enough water to replace the diversion or depletion, or stop diverting. The River District is seeking a Ruedi Reservoir Round II water contract to have sufficient water in the future to augment river flows when required, or in some cases supplement primary water rights. The River District has a number of water rights and contracts for water; this request for 4,683.5 acre-feet of Ruedi water would become part of the water portfolio developed and continually supplemented by the District to meet water needs within the District located within the main stem Upper Colorado hydrologic watershed.

Snowmass Water & Sanitation District (Snowmass)

Proposal Summary: Snowmass is seeking a contract for 500 acre-feet for use by augmentation and exchange with delivery of water as early as 2013. Contract water would be used through existing diversions to augment out-of-priority depletions primarily for municipal use, but also for industrial and irrigation use, within the District's service area. Contract water is expected to be needed year-round. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Snowmass' municipal water use is considered a depletion from the Roaring Fork River. When a downstream water user with senior water rights needs to use water and there is insufficient water in the river to meet their water right, Snowmass must either augment their water use with enough water to replace their depletions or stop diverting. Snowmass is seeking a Ruedi Reservoir Round II water contract to take care of this depletion when there is a senior water right holder "call" on the river.

Board of County Commissioners of the County of Summit (Summit County)

Proposal Summary: Summit County is seeking a contract for 330 acre-feet with potential initial water delivery as early as 2013. Contract water would be used as an Alternative Source under the terms of Article IV of a Green Mountain Reservoir contract to be issued by Reclamation to Summit County. No construction of new facilities is needed for this contracted water.

Purpose and Need: During the drought of 2002, Green Mountain Reservoir did not fill. To meet contractor demands, water was supplied from other sources. In order to prevent exacerbating this type of situation in the future, Reclamation has determined that it is appropriate for new contracts from Green Mountain Reservoir to be contingent upon the contractor obtaining an Alternative Source Contract, that would be released at the discretion of Reclamation from a different water source. This Ruedi contract would serve as Summit County's required Alternative Source Contract for their Green Mountain Reservoir contract.

Town of Carbondale (Carbondale)

Proposal Summary: Carbondale has requested a contract for 250 acre-feet. Contract water would be used to augment out-of-priority depletions, primarily for municipal/domestic use but also for non-commercial irrigation and potential industrial use, within Carbondale's service area with a potential initial water delivery of 2020 for these purposes. Contract water is expected to be needed year-round. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Prior to 2020, during low stream flows, Carbondale wishes to use contract water to help protect the Colorado Water Conservation Boards' minimum stream flow water right and Carbondale's RICD water right located on the Roaring Fork River upstream from its confluence with the Crystal River.

Purpose and Need: Carbondale's municipal and irrigation water use is considered a diversion or a depletion from the Roaring Fork and Crystal rivers. When a downstream water user with senior

water rights needs to use water and there is insufficient water in the river to meet their water right, Carbondale must either augment their water use with enough water to replace their depletions or stop diverting. Carbondale is seeking a Ruedi Reservoir Round II water contract to take care of this depletion when there is a senior water right holder "call" on the river. In addition, the Town reserves the right to use water directly from the Roaring Fork River in conjunction with the operation and re-development of the Town's Gateway Park. Any direct use is not expected to exceed 10 AF per year. From time to time, the Town also reserves the right to allocate its share of water stored in Ruedi to drought response.

Town of Debeque (Debeque)

Proposal Summary: Debeque is seeking a contract for 25 acre-feet for use by augmentation or exchange with potential initial water delivery as early as 2015. Contract water would be used to augment out-of-priority depletions for municipal and industrial use within Debeque's service area through existing diversions and potential future use of wells and springs. Contract water is expected to be used primarily during irrigation season, but some municipal use would occur year-round. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Debeque's municipal and industrial water use is considered a depletion from Roan Creek and the Colorado River. Debeque wants to have sufficient water for future irrigation and municipal needs when either their existing water rights are insufficient to provide adequate water supplies or they are out-of-priority because there is a "call" on the river. Debeque needs a supplemental water source, such as a Ruedi water contract, to meet this need.

Town of Palisade (Palisade)

Proposal Summary: Palisade is seeking a contract for 200 acre-feet for use by augmentation or exchange with potential initial water delivery as early as 2013. Contract water would be used to augment out-of-priority diversions or depletions for municipal and industrial use within Palisade's service area through their existing diversion system and any future expansion thereof. Contract water is expected to be used year-round, with the primary use being between April and October. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Palisade's municipal and industrial water use is considered a diversion or depletion from Rapid Creek, a tributary to the Colorado River. Palisade wants to have sufficient water for future municipal and industrial needs when its water use is out-of-priority because there is a "call" on the river. Palisade needs a supplemental water source, such as a Ruedi water contract, to meet this need.

Ute Water Conservancy District (Ute District)

Proposal Summary: The Ute District is seeking a contract for 12,000 acre-feet for use by augmentation, exchange, or direct use (without an augmentation plan) with potential initial water delivery as early as 2013. Ruedi water would be integrated into the Ute District's water programs

for municipal and domestic, irrigation, and industrial use within the boundaries of the District through existing river diversions. The Ute District cooperates with other governmental entities in the Grand Valley to help supply a reliable source of water for residents of the Grand Valley. Ruedi water would be used to augment or supplement both diversions and depletions associated with existing and future water use from streams and rivers, and is anticipated to be needed year-round.

Purpose and Need: The Ute District's municipal and domestic, irrigation, and industrial water use is considered a diversion or depletion from the Colorado River or tributaries to the Colorado River. When a downstream water user with senior water rights needs to use water and there is insufficient water in the river to meet that water right, the Ute District must either augment its water use with enough water to replace the diversion or depletion, or stop diverting. The Ute District is seeking a Ruedi Reservoir Round II water contract to have sufficient water in the future to augment river flows when required, or in some cases supplement primary water rights. The Ute District has a number of water rights; this request for Ruedi water would become part of the water portfolio developed to meet the Ute District's water needs.

W/J Metropolitan District (W/J Metro District)

Proposal Summary: The W/J Metro District is seeking a contract for 100 acre-feet for use by augmentation with potential initial water delivery as early as 2015. Contract water would be used to augment out-of-priority depletions for municipal use within W/J Metro District's service area through existing diversion and wells; depletions accrue to the Roaring Fork River. Contract water is expected to be used year-round.

Purpose and Need: W/J Metro's municipal water use is considered a depletion from the Roaring Fork River. W/J Metro District wants to have sufficient water for future municipal needs when their water use is out-of-priority because there is a "call" on the river. W/J Metro District needs a supplemental water source, such as a Ruedi water contract, to meet this need.

Wildcat Ranch Association (Wildcat Ranch)

Proposal Summary: Wildcat Ranch is seeking a contract for 50 acre-feet for use by augmentation or exchange with potential initial water delivery as early as 2013. Contract water would be used to augment out-of-priority depletions for municipal/domestic and irrigation use within Wildcat Ranch's service area through an existing stream diversion; depletions accrue to Snowmass Creek. Contract water is expected to be used July through October. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Wildcat Ranch's municipal/domestic and irrigation water use is considered a depletion from Snowmass Creek, a tributary to the Roaring Fork River. Wildcat Ranch is an approximately 5,000 acre ranch near Snowmass with 16 homeowners and a reservoir. The reservoir serves both the homeowners and the ranch. Wildcat Ranch wants to have sufficient water for future municipal/domestic and irrigation needs when their water use is out-of-priority because there is a "call" on the river. Wildcat Ranch needs a supplemental water source, such as a Ruedi water contract, to meet this need.

Wildcat Reservoir Company

Proposal Summary: Wildcat Reservoir Company is seeking a contract for 140 acre-feet for use by augmentation or exchange with potential initial water delivery as early as 2013. Use would be primarily from April through November through an existing diversion. Contract water would be used to provide water for the Wildcat Ranch to have sufficient water for future municipal/domestic and irrigation needs when their water use is out-of-priority because there is a "call" on the river. Wildcat Reservoir needs a supplemental water source, such as a Ruedi water contract, to meet this need. Water may also be used to augment flows for Green Mountain Reservoir operations, on a voluntary basis, as part of a drought response effort.

Purpose and Need: Wildcat Reservoir Company's municipal/domestic and irrigation water use is considered a depletion from the Snowmass Creek and Wildcat Creek, tributaries to the Roaring Fork River. Wildcat Reservoir Company wants to have sufficient water for future municipal/domestic and irrigation needs when their water use is out-of-priority because there is a "call" on the river. Wildcat Reservoir Company needs a supplemental water source, such as a Ruedi water contract, to meet this need.

APPENDIX C – MS EXCEL RUEDI RESERVOIR OPERATIONS MODEL

The following list provides a description of the model operations.

- Model simulates daily operations for 31 years using the assumption that the 1975 - 2005 climatological conditions will repeat into the future with fully contracted demands. A simulation year begins November 1 and ends October 31.

- Each simulation year is pre-classified on a scale of 1 to 4 based on historic runoff volumes (1 = wet, 4 = dry).

- Inflow bypass requirements to meet minimum streamflow are the lesser of 39 cfs or actual inflow for November 1 - April 30, and the lesser of 110 cfs or actual inflow for May 1 - October 31.

- Ruedi daily contract releases are sum of those releases that are required due to Cameo call, and those releases that are independent of any call. When Ruedi is in or out of priority is based on historic records. Contract releases for the current Round I and II contracts in the model for No Action are:

    1. Call dependent contracts - municipal monthly distribution = 13,502 af.

    2. Call dependent contracts - industrial monthly distribution = 6,000 af.

    3. Call independent contracts = 2,000 af.

        The 2,000 af Green Mountain Insurance Pool contracts are simulated as call independent contracts, and are released at a flat rate during September and October on the following schedule:

Year Type	Percent
Wet (1)	0%
Moderately Wet (2)	35%
Moderately Dry (3)	70%
Dry (4)	100%

- In the Proposed Action, the contracts are allocated as follows:

    1. Call dependent contracts - municipal monthly distribution = 16,074 af.

    2. Call dependent contracts - industrial monthly distribution = 18,000 af.

        Ute Water Conservancy District's contract request is for 12,000 af, with an average demand of 1,000 af every month. This was modeled with the industrial monthly distribution below, and is delivered in response to the Cameo call. This provides a conservative estimate, as it is unknown when Ute will need their water. Although this

water would pass through the 15 Mile Reach, this was not modeled as a benefit under the PBO, because of the uncertainty in their demands.

3. Call independent contracts = 2,000 af.

   This is modeled the same as the No Action.

4. CRWCD and Summit County have both requested Green Mountain Alternative Source as a potential use in their contracts. The entire 5,013.5 ac-ft of their contracts are modeled at a constant flow and 100 percent usage in September and October in years when Green Mountain Alternate Source contracts would be needed. These years are 1977, 1980, 1981, 1987-1989, and 2000-2004. This provides a conservative (i.e. relatively high) representation of their contract use.

5. This represents 16,074 + 18,000 + 2,000 + 5,013.5 = 41,087.5 ac-ft of non-fish contracts. The fish commitments are for 5,000 + 5,412.5 ac-ft, making a total of 51,500 ac-ft which is the total Marketable Yield.

- The Monthly Contract Distribution Percent for municipal use was modified from the previous model to consider the existing contracts and the 2,572 ac-ft of new contracts modeled as municipal water. The current distribution schedule is as follows:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Municipal (%)	1	1	1	3	4	18	25	23	17	4	1	1
Industrial (%)	7	7	7	7	9	10	12	10	9	8	7	7

- For the period November 1 - April 15 the model simulates release of water to meet the storage drawdown target, which is picked by the model based on each years runoff level (i.e. 1 = 60K ac-ft, 2 = 65 K ac-ft, 3 = 65 K ac-ft, 4 = 70 K ac-ft). During this period the model calculates the uniform daily release rate based on inflow and storage volume to be evacuated during this period. To provide a slightly more realistic simulation of actual operations, the drawdown period is broken into two forecasting periods:

  1. November 1 - January 31 and February 1 - April 15. This allows for some fluctuation of winter-time releases rather than one uniform value over the entire period. The minimums specified above are considered.

  2. April 15 to July 15. The model calculates a release rate that targets filling the conservation pool around July 15. This is an attempt to mimic management decisions during the spring reservoir filling period to control releases based on available storage space, forecasted inflows and snowpack runoff, and anticipated release demands. The model computes a new release every half-month period during April 15 thru July 15. The release for the period is calculated as:

{[(inflow – total releases) - (maximum conservation storage - present storage)] / # days in period} * factor

Where :

a. Inflow is total inflow from start of half-month period to July 15.

b. Total releases are total Fry-Ark replacement releases, west slope contract, and estimated inflow bypass discharge from start of period to July 15

c. Factor is an adjustment factor for progressively increasing the influence of the forecasted inflows as follows:

April 15 - July 15, factor = 0.3	June 1 - July 15, factor = 0.6
May 1 - July 15, factor = 0.4	June 15 - July 15, factor = 0.8
May 15 - July 15, factor = 0.5	July 1 - July 15, factor = 1.0

- From July 15 - October 31 the model simulates releases for west slope contract demands, USFWS requested release for 15-Mile Reach, Fryingpan River winter flow release, bypass for river administration, bypass for minimum streamflow requirements, and spills if necessary.

- Shortages are applied in extremely dry years (1977, 2002) as a 25 percent reduction to municipal, industrial, and fish contract water for the contract year beginning July 1.

- The USFWS daily recommended flows in 15-Mile Reach are based on each years level-of-runoff scale (1 - 4). The original recommended flows for July were replaced with August recommended values, since the original values are often adjusted in practice based on water availability.

- Total releases from all sources to meet USFWS recommendations begin July 15. The required daily release is calculated as the deficit between the recommended daily flow rate and the average historic flow for the previous seven days. Historic flow for the 15-Mile Reach is determined as:

    1. Gauged flow on Colorado River near Palisade if simulation year is 1991 or later.

    2. Sum of gauged flow on Colorado River above Cameo, Plateau Creek, and Orchard Mesa Irrigation District return flows, minus the sum of Government Highline and Grand Valley Irrigation Company canal diversions if simulation year is earlier than 1991.

    3. The total required release is increased by 10% for transit losses to 15-Mile Reach.

- The USFWS 15-Mile Reach demands are to be met by shared releases from Ruedi, Granby, Wolford Mountain, and Green Mountain Reservoirs. Each reservoir is assigned an annual starting storage account for meeting the USFWS demands. Ruedi, Granby, and Wolford Mountain USFWS accounts become available on July 15. The Green Mountain Reservoir Historic Users Pool surplus account does not become available until August 15.

    1. Ruedi Reservoir's annual account is a maximum of 15,412.5 ac-ft broken down as:

Designation	(af)
Mitigation	5,000
Fish 4 of 5 years	5,000
One-half of the Water Users 10,825 ac-ft obligation	5,412.5

2,500 af of the 4 of 5 water is reserved until September 1 to simulate actual practice in allocation of water from Ruedi.

2. Lake Granby's account (remaining half of the Water Users 10,825 ac-ft obligation) is set to 5,412.5 acre-feet each year.

3. Green Mountain Reservoir's account is adjusted by a percentage according to the runoff volume level for the year (i.e. 1 to 4) being simulated:

Runoff Level	**Green Mountain Available**	
1	100%	30,000 ac-ft
2	66%	20,000 ac-ft
3	33%	10,000 ac-ft
4	10%	3,000 ac-ft

4. Wolford Mountain Reservoir's account is set each year based on the following table:

Year	Total (ac-ft)	**Year**	Total (ac-ft)	**Year**	Total (ac-ft)
1975	6000	**1986**	6000	**1997**	6000
1976	3600	**1987**	3400	**1998**	6000
1977	1200	**1988**	5000	**1999**	6000
1978	6000	**1989**	3400	**2000**	6000
1979	6000	**1990**	1800	**2001**	3078
1980	6000	**1991**	4200	**2002**	300
1981	1200	**1992**	1800	**2003**	3000
1982	6000	**1993**	5000	**2004**	4500
1983	6000	**1994**	3100	**2005**	6000
1984	6000	**1995**	6000		
1985	6000	**1996**	6000		

- The amount released from each reservoir is based on the ratio of the previous day's remaining available storage in account in each reservoir to the total available from all reservoirs. The ratio is then applied to the potential USFWS demand to get each reservoir's proportional release contribution.

- Once proportional release rates are calculated, any individual release limits are then applied. Granby releases are limited to a maximum of 50 cfs to attempt to represent the expected allocation of flows. Wolford Mountain Reservoir fish releases are limited to 200 cfs. Although

Green Mountain fish releases are not limited by capacity, a maximum of 500 cfs was applied to more realistically simulate actual practice.

- The model had several other significant enhancements as part of this EA process. The following adjustments and changes were made:

    1. Numerous changes to historical data were made to correct inaccuracies.

        a. The historic Fryingpan diversions for 1981-1998 were recomputed based on gage records for the Hunter collection system and the Boustead Tunnel.

        b. Specifically, the 1981 historic and projected Fryingpan-Arkansas Project diversions were about 24,000 af higher than reported in the 1981 Annual Operating Plan. This significantly reduced the required replacement releases from Ruedi in that year.

        c. The Hunter arm of the collections system did not operate until 1980. Therefore, incorrectly extrapolated diversions in 1975-1979 were deleted. This correction increased the Fryingpan undepleted flows in these years.

    2. The pre-computed year categories, wet through dry were recomputed based on the 20th percentile, 50th percentile, and 80th percentile annual volumes. The 4 out of 5 fish water was not available in the bottom 20 percentile years.

    3. An additional check was added to the Ruedi fish water demand function to check if the reservoir release capacity has already been used up by other releases (inflow bypass, contracts).

    4. Some issues preventing correct simulations of 1999-2005 were fixed.

APPENDIX D – FEDERALLY LISTED SPECIES AND HABITAT (COUNTY)

Species	Scientific Name	Status	Eagle	Garfield	Grand	Gunnison	Mesa	Pitkin	Routt	Summit
Bonytail chub	*Gila elegans*	Endangered	Yes	Yes	Yes	Yes	Yes*	Yes	Yes	Yes
Canada Lynx	*Lynx canadensis*	Threatened	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Colorado Hookless Cactus	*Sclerocactus glaucus*	Threatened	No	Yes	No	Yes	Yes	No	No	No
Colorado Pikeminnow	*Ptychocheilus lucius*	Endangered	Yes	Yes*	Yes	Yes	Yes*	Yes	Yes	Yes
DeBeque Phacelia	*Phacelia submutica*	Threatened	No	Yes	No	No	Yes	No	No	No
Greater sage-grouse	*Centrocercus urophasianus*	*Candidate*	Yes	Yes	Yes	No	No	No	No	Yes
Greenback Cutthroat trout	*Oncorhynchus clarki ssp. Stomias*	*Threatened*	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gunnison's prairie dog	*Cynomys gunnisoni*	*Candidate*	No	No	No	Yes	No	No	No	No
Gunnison sage-grouse	*Centrocercus minimus*	*Proposed Endangered*	No	No	No	Yes	Yes	No	No	No
Humpback Chub	*Gila cypha*	Endangered	Yes	Yes	Yes	Yes	Yes*	Yes	Yes	Yes
Mexican Spotted Owl	*Strix occidentalis*	Threatened	Yes	Yes	No	No	Yes	Yes	No	Yes
North American wolverine	*Gulo gulo luscus*	Proposed Threatened	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Species	Scientific Name	Status	Eagle	Garfield	Grand	Gunnison	Mesa	Pitkin	Routt	Summit
Osterhout Milkvetch	*Astragalus osterhoutii*	Endangered	No	No	Yes	No	No	No	No	Yes
Parachute Beardtongue	*Penstemon debilis*	Threatened	No	Yes	No	No	No	No	No	No
Penland Alpine Fen Mustard	*Eutrema penlandii*	Threatened	Yes	No	No	No	No	No	No	Yes
Penland Beardtongue	*Penstemon penlandii*	Endangered	No	No	Yes	No	No	No	No	No
Razorback Sucker	*Xyrauchen texanus*	Endangered	Yes	Yes*	Yes	Yes	Yes*	Yes	Yes	Yes
Skiff milkvetch	*Astragalus microcymbus*	Candidate	No	No	No	Yes	No	No	No	No
Uncompahgre Fritillary Butterfly	*Boloria acrocnema*	Endangered	Yes	No	Yes	Yes	No	Yes	No	Yes
Ute ladies'-tresses	*Spiranthes diluvialis*	Threatened	Yes	Yes	No	No	No	Yes	No	No
Yellow-billed Cuckoo	*Coccyzus americanus*	Candidate	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*There is designated critical habitat for the species within the county

(USFWS 2013)

APPENDIX E – RESPONSE TO COMMENTS ON THE DRAFT EA

On June 14, 2013, the Draft Environmental Assessment (EA) was posted on Reclamation's webpage at http://www.usbr.gov/gp/ecao/nepa/ruedi_repayment.html, and an electronic message announcing the availability of the draft EA for comment was sent to 204 individuals, groups, organizations, and agencies. During the 17 day public comment period of June 14, 2013, to July 1, 2013, seven commenters submitted comments. Two additional comments were received following the end of the comment period. Each comment document was assigned a number from 1 to 9. Comments are addressed in this document.

1	**ROARING FORK CONSERVANCY**	**RECLAMATION RESPONSE**
1a	Thank you for the opportunity to comment on the Ruedi Contracts Draft Environmental Assessment.	Thank you for your comments.
1b	Roaring Fork Conservancy (RFC) recognizes the hard work and thought that has been put into this alternative, and the consequences of no action. We have concerns about the potential detrimental effects of the Proposed Action Alternative to the aquatic life and recreational economy in the Fryingpan River and hope that the contracts can be awarded with stipulations or conditions that protect the aquatic resources of the Fryingpan River.	The Fry-Ark Project Operating Principles for Ruedi Reservoir require minimum flows below the dam of 39 cfs in the winter and 110 cfs in the summer for the protection of aquatic life. All contracts are required to be administered in compliance with the operating principles. The Colorado Water Conservation Board holds an instream flow water right for the same amount, identified in the decree to be "for the purpose of maintaining such minimum flows in the stream bed as are required to preserve the natural environment to a reasonable degree…" Reclamation, within the limits of its authority and applicable laws, including Colorado Water Law, attempts to manage operations with the multitude of values affected by reservoir releases in mind, including minimizing negative effects on aquatic life and the recreational economy.

1c	The Fryingpan River below Ruedi Reservoir to the confluence with the Roaring Fork River and the Roaring Fork River down to the confluence of the Colorado River is classified as Gold Medal water by Colorado Parks and Wildlife. This is the longest contiguous section of Gold Water in the state and represents 25 percent of this water in the state. The acceptance of the given contract proposing significant changes to Fryingpan River flows, namely a decrease of an average of 12cfs in the winter and an increase of 12-25cfs in the summer/early fall, could have environmental and economic impacts. These threats are summarized as "negligible to minor" or in the case of macroinvertebrates "minor to moderate"[1] in the Draft Environmental Assessment. We believe there are potential for long-term impacts and respectfully request these areas are further evaluated. In addition, if the Proposed Alternative is pursued, we stress that every reasonable action should be taken to minimize impacts and to ensure the preservation of high quality fisheries in the Fryingpan River. 1 Table 3.11 in the EA states that there will be "Neglible to minor impacts to brown trout spawning success and rainbow trout spawning habitat.	As noted in the comment, the EA discloses that there could be negative effects. These are identified as potential long-term impacts. Modeling completed for this EA attempted to disclose a conservative, or maximum demand, effects analysis. For example, the assumptions that all contract water would be called for when the Cameo Call comes on is an extreme assumption, although theoretically possible. This was used to predict a maximum effect scenario. The Ruedi Reservoir, Fryingpan-Arkansas Project, Final Supplement to the Final Environmental Statement, Round II Water Marketing Program (Ruedi Round II FSES), dated August 1, 1989, analyzed and disclosed effects of fully contracting a 51,500 ac-ft marketable pool from Ruedi Reservoir. The Record of Decision (ROD), dated January 1990, stated that the major criteria used in selecting the preferred alternative were the Fryingpan-Arkansas Project Operating Principles (House Document No. 130. 87th Congress, 1st Session), protection of natural resources, and preservation of economic and recreation values. Mitigation measures for significant effects of the selected alternative were included as part of that decision. This EA tiers to the Ruedi Round II FSES and, as noted in Chapter 3 of the EA, pp. 14 through 54, effects of the proposed action are within the range analyzed in the RRII FSES and are much

		less in some cases, such as in average days flows are below 40 cfs (7 days predicted for the proposed action compared to 25 days predicted in the RRII FSES). No significant new effects have been identified that would need additional mitigation. Please note that coordinated reservoir operations take into consideration the multitude of values affected by reservoir releases, including the impacts to fisheries in the Fryingpan River. In addition, typical reservoir operations also strive to keep ramping of releases, up or down, to less than 50 cfs in a 24 hour period to minimize adverse effects, as well as setting winter flows in a manner to minimize adverse impacts to brown trout redds.
1d	A decrease in average winter flows on the Fryingpan River will likely increase the formation of anchor ice, which creates the potential for adverse effects on aquatic vegetation, macroinvertebrate populations and fish populations, both directly and indirectly because of habitat alteration and scouring events. The study Macroinvertebrate Community Responses to Winter Flows on the Fryingpan River asserts that "the magnitude of discharge may be the most important factor that influences macroinvertebrates during winter months." [2] The formation of anchor ice is shown to increase on the Fryingpan River when flow drops below 70cfs.[3] Anchor ice is likely to be at least partially responsible for degraded macroinvertebrate conditions in the past.[4] However, "macroinvertebrate diversity and evenness recover than 70 cfs."[5] A study of similar taxa suggested that populations took nearly 27 months to recover after a	The document "Summary Report – A Study of Macroinvertebrate Community Responses to Winter Flows on the Fryingpan River, prepared for the Roaring Fork Conservancy by Miller Ecological Consultants, Inc., is cited in both the Draft EA and the Final EA (p. 38) and was used as a basis for the effects determination. (Note: The copy we referenced was dated 2006, but the quote referred to in your comment matches that document. We did not find a 2008 report.) The Final EA, pages 36-40, discusses effects to aquatic species, including the effects of winter flows. The EA predicts more average days flows

	particularly severe winter.[6] Based on this information, Roaring Fork Conservancy is concerned that the Proposed Action increases events where flows are below 70 cfs for two or more consecutive years. (See Table 1)[7] The change in the flow regime resulting from the Proposed Action Alternative on the Fryingpan River could significantly impact the macroinvertebrate community by not allowing adequate flows for populations to recover. Significant alteration to the macroinvertebrate community will, in turn, undoubtedly alter the fish community that relies on macroinvertebrates as a food source. 2 Miller Ecological Consultants, Inc, 2008. A Study of Macroinvertebrate Community Responses to Winter Flows on the Fryingpan River, p14. 3 Id. 4 *Id.* p.18 5 Id. 6 Brandt et al, "Stability and Resilience in benthic macroinvertebrate assemblages," *Hydrobiologia* 403 (1999): 123-133.	are below 70 cfs, but fewer average days flows are below 40 cfs. While the EA discloses potential negative effects, they are within the range analyzed in the RRII FSES. The winter flow fluctuations analyzed in the RRII FSES would have much greater anchor ice impacts compared to the steady winter flow patterns of the Proposed Action. No significant new effects have been identified that would require additional mitigation.
1e	Anchor ice could also stress fish populations by changing their winter habitat. Fish metabolism slows as water temperature drops, rendering them less active. When anchor ice is formed and fills pools formerly used as wintering habitat, fish are forced to move more often which "can be energetically costly to fish and increase the probability of mortality."8 This phenomenon, coupled with potential loss of food source by impacted macroinvertebrate communities poses a threat to the long term health of the Fryingpan fisheries. 7 Table based on the 30-year data from Table 3.2 – Simulated Fryingpan River Flows (cfs) from the Ruedi Reservoir Round II Water Marketing Program, Draft Environmental Assessment 8 Brown et al., 2011."A Primer on Winter, Ice and Fish: What Fisheries Biologists Should Know about Winter Ice Processes and Stream-dwelling Fish, Fisheries. Vol. 36, No. 1, pg. 8-22	Please see responses to 1c and 1d.
1f	The potential exists for the lower Fryingpan River serving as a conduit for all contracted Ruedi Reservoir releases to see significantly higher flows in the late summer/early fall, increasing the hydrologic alteration in both the	Please see responses to 1b and 1c.

	Lower Fryingpan and Roaring Fork Rivers. Because most of these releases will occur from mid-July to mid-October, RFC recommends further evaluation to ensure functioning rivers and the economic value derived from angling is not impacted.	
1g	Vibrant fish and macroinvertebrate communities are not only essential to the overall stream health of the Fryingpan River, but also an economic driver for the town of Basalt as well as the Roaring Fork Valley. A 2002 study by RFC found that "the lower Fryingpan River generates 95 percent of the new economic spending brought in by Fryingpan Valley recreation, contributing $2,608,465 annually in direct spending to the Roaring Fork Valley."[9] In addition, a thriving fish population provides employment for numerous fishing guides in the town of Basalt and the Roaring Fork Valley. 9 Crandall, 2002. Fryingpan Valley Economic Study, p. 29.	Crandall's 2002 "Fryingpan Valley Economic Study" was utilized to determine both recreation and socioeconomic effects (EA pp. 40-51).
1h	Given the climate change statistics in the Draft Environmental Assessment, low water events are likely to increase both in number and duration with even the conservative 4.3% predicted decrease in total inflows caused by climate change.[10] Realizing the potential threat to fish and macroinvertebrate communities, Roaring Fork Conservancy urges the BOR to further study and undertake a program of continued monitoring with thresholds identified that would trigger remedial actions to minimize the impacts of decreased winter flows and increased summer/early fall flows on the Fryingpan River. 10 Climate change statistics taken from Ruedi Reservoir Round II Water Marketing Program, Draft Environmental Assessment	Effects to fish and macroinvertebrate communities were analyzed and displayed in Chapter 3, Section 3.5, including the expected cumulative effects. Minimum instream flow commitments under the Operating Principles would continue to be adhered to. It should be noted that the minimum instream flow releases are often higher than the native inflows to Ruedi in the winter time.
1i	In summary, we recommend further evaluation, monitoring and incorporation of conditions into these water contracts that would limit flow amounts and timing. Such contracts would acknowledge and mitigate the impacts of water sales on the local environment without necessarily	Please see response to 1b.

	limiting access to the resources.	
2	**PITKIN COUNTY**	**RECLAMATION RESPONSE**
2a	Please accept this letter as Pitkin County's public comments on the Bureau of Reclamation's Ruedi Reservoir Round II Water Marketing Program ("Ruedi II Marketing") Draft Environmental Assessment ("Draft EA''). Pitkin County understands the Environmental Assessment has not been finalized and these comments will be used to identify elements of the environment that could be affected by the proposed contracts and should be further addressed in the final Environmental Assessment.	Thank you for your comments.
2b	The Draft EA appropriately identifies Other Aquatic Resources and Recreation as issues requiring evaluation and consideration. However the Draft EA is currently deficient in consideration of impacts and alternatives analysis of these issues. The final report could be improved with further attention to the impacts of a new Fryingpan River flow regime resultant from Ruedi II Marketing and a range of alternatives in addressing such impacts.	A new flow regime resulting from the proposed contracts was modeled for this EA. Appendix C provides a description of the model operations that were used for the analysis of the alternatives. The new model results are presented throughout Chapter 3 of the EA. In regards to a range of alternatives, the RRII FSES analyzed and disclosed effects of fully contracting a 51,500 ac-ft marketable pool from Ruedi Reservoir. Three alternatives were chosen to be analyzed in detail in the RRII FSES from the initial 11 reviewed in depth during the NEPA process for the Round II marketing analysis of Ruedi. The ROD stated that the major criteria used in selecting the preferred alternative were the Fryingpan-Arkansas Project Operating Principles (House Document No. 130. 87th Congress, 1st Session), protection of natural

		resources, and preservation of economic and recreation values. Mitigation measures for significant effects of the selected alternative were included as part of that decision. The EA tiers to the RRII FSES and, as noted in Table 3.11 of the EA, effects of the proposed action are within the range analyzed in the RRII FSES. The daily model analysis presented in the EA led to the conclusion that no significant new effects have been identified that would need additional mitigation.
2c	Given the lack of stationarity due to climate change, as discussed in §§3.2.1, 3.3.2, the Cameo Call may come on sooner and last longer. Under Ruedi II Marketing, it is anticipated that pursuant to contract, augmentation water will be released from Ruedi primarily to meet the Cameo Call downstream on the Colorado River in late summer. The Draft EA notes the potential for resultant flows to be elevated over a longer period of time in late summer. As a result, Reclamation concludes these flows will have a "minor long-term adverse impact" to brown trout spawning success as compared to current conditions. Large volume "slug" releases have the potential to cause substantial and serious fisheries habitat degradation. These adverse impacts are to a Gold Medal Water fishery and conclusory statements that the impacts are minor are insufficient under the Environmental Assessment process. Sierra Club v. Bosworth, 510 F.3d 1016, 1029 (9th Cir. 2007).	The EA, pp. 36-40, displays the effects analysis for aquatic resources, including brown trout. Modeling completed for this EA attempted to disclose a conservative, or maximum demand, effects analysis. For example, the assumptions that all contract water would be called for when the Cameo Call comes on is an extreme assumption, although theoretically possible. This was used to predict a maximum effect scenarioand to determine if maximum effects of the proposal were within the range of effects analyzed in the RRII FSES. The EA page 39 states: "Approximately 55 percent of the years have negligible effects to maximum flows in August and September. About 20 percent of the years have a minor increase and 25 percent see moderate increases. With this range of effects to flows, there may be a minor long-term adverse impact on spawning success of brown trout as

		compared to current conditions." As displayed in Table 3.8, there is only a 10 percent increase (3.6 days) in the average number of days above 250 cfs in the summer/fall. The model did not predict "slug" releases for contractors. Please also see response to 1c.
2d	The Draft EA cites a twenty-five-year-old study for the proposition that "optimum winter flows for various life stages of all species of trout ranges from 50 to 250 cfs." Regardless of whether a dated study adequately supports the proposition, it does not even address the necessary, let alone optimal, flow regimes during late-summer spawning season. This deficiency must be cured for Reclamation to have a basis state that spawning impacts are "minor."	Please see responses to comments 1c, 1d, and 2c. Reclamation recognizes that there are different ideal conditions for different species of fish and even for the same species of fish at different life stages. Operationally, Reclamation considers potential impacts to brown trout redds and attempts to manage Ruedi releases in a manner to avoid impacts to them.
2e	Upon determining what actual impacts of increased flows during late summer will be upon brown trout spawning, further analysis of how to alleviate negative impacts needs to be undertaken. Here, Reclamation has only conducted a no action/ proposed action analysis. Rather additional alternatives and mitigation needs to be considered and addressed. Such alternatives/ mitigation analysis should include: (1) Extended Flow Timing; (2) Spawning Habitat Identification and Construction, (3) a Pipeline; and (4) Integrated Management and Releases from other reservoirs including Green Mountain and Wolford Mountain. Examining extended flow timing would include consideration of whether contract releases may be made in a manner which reduces negative spawning impacts. Specifically this should include analysis of timing of releases within a 24-hour period as well as releases made over an extended	Please see responses to comments 1c, 2b, and 2c. Regarding the suggested alternatives, (1) Reclamation strives to keep ramping up or down of releases to 50 cfs or less per 24 hour period under normal conditions. Please also see response to comment 2c. (2) Reclamation recognizes that there are various species of non-native fish which are economically important to the Roaring Fork Valley which live in the Fryingpan River. While additional studies could be performed, it is recognized that there will be conditions and areas that are better suited for the different species of fish in the Fryingpan River at different life stages. Operations of Ruedi Reservoir over the past 38 years have created the

	period of days rather than singular large volume "slug" releases. Analysis of what spawning habitat would be needed under higher flow regimes and a determination if that habitat could be created/restored/protected needs to be done. Examining a pipeline option would include consideration of a pipeline constructed to deliver water directly to the Roaring Fork River. Certainly the late summer contract releases conveyed by pipeline would have less negative impact on spawning habitat than under the proposed action. Lastly, Reclamation controls Green Mountain Reservoir in addition to Ruedi Reservoir and Wolford Mountain Reservoir is controlled by the Colorado River Water Conservation District, a contract applicant for approximately 25% of the water to be made available under Ruedi Marketing II. Releases made pursuant to contract from three reservoirs should be under an integrated management regime. This would allow for releases to be made from an appropriate reservoir in a manner than could not only reduce brown trout spawning impacts on the Fryingpan River but similarly address fisheries concerns downstream of Green Mountain and Wolford Mountain Reservoirs. Thus, Reclamation could build flexibility to mitigate negative impacts to fisheries into the system while addressing the stochastic nature of water supply by providing additional contracted water.	Gold Medal habitat that exists there now. We do not have information that this is currently threatened, nor do we believe the effects predicted in the EA threaten that status. (3) A pipeline alternative was not considered because no significant new impacts were identified that would require the development of alternatives, such as a pipeline, to resolve. (4) Regarding the final suggested alternative of integrated reservoir management, for at least the past 15 years, Reclamation has participated in coordinated reservoir operations. This coordination occurs during runoff and late summer and early fall months. Normally, weekly conference calls are held between various reservoir operators and interested parties. These are known as the "Coordinated Reservoir Operations (CROS)" and "Historic Users Pool (HUP)" calls. However, Reclamation must comply with our contracts and make releases for beneficial uses under Colorado Water Law. Therefore, integrated reservoir management must also be limited to the scope of Reclamation's authority. The multitude of values affected by release patterns from the various reservoirs are considered, including effects to flow regimes in the Fryingpan River below Ruedi. This is considered a very successful effort by the majority of the participants and is anticipated to

		continue into the future. This does provide opportunities to reduce some of the negative impacts to fisheries, especially for the endangered fish in the 15 mile Reach, although it does not provide any additional contract water as suggested.
2f	The Draft EA also notes the potential for reduced flows in the spring when attempting to meet the spring fill target and the associated potential for "negligible to minor adverse direct impact" to rainbow trout spawning success as compared to current conditions. Again, conclusory statements regarding impact are insufficient in this NEPA process and there is no analysis beyond that of no action/ proposed action. Additional alternatives and mitigation needs to be considered and addressed. Further analysis of how bypasses may be made to reduce negative spawning impacts should be conducted.	The negligible to minor adverse direct impact is based on predicted effects to rainbow trout spawning habitat from an approximately 10 percent increase in days with flows below 50 cfs from October through April. (EA Section 3.5.2) Please see response to comments 1c and 2b in regards to alternatives and mitigation.
2g	Incorporated into the final Environmental Assessment analyses must be a consideration of mitigation of the negative effects to fisheries in the Fryingpan River to be caused proposed action as well as consideration of actual alternatives. Only upon inclusion of these considerations can there be true assessment of the environmental impacts of the proposal and assurance that action includes adequate protections.	Please see response to comments 1c and 2b.
3	**RUEDI WATER AND POWER AUTHORITY**	**RECLAMATION RESPONSE**
3a	This is to provide comments regarding the Draft Environmental Assessment on Ruedi Contracting. These comments are made on behalf of the Ruedi Water and Power Authority, a quasi-governmental body made up of representatives from the five municipalities and three counties that govern the Roaring Fork Valley.	Thank you for your comments.

3b	As noted in the EA, the Proposed Action will result in a moderate increase in late summer and fall flows in the Fryingpan River. While we agree that these increases are within the range of impacts studied in connection with previous federal actions, it is important to note that late summer and fall flows in the Fryingpan are influenced by a number of factors that complicate impact analysis. For instance, if Green Mountain and Wolford Mountain Reservoirs have shortages of water in any given year, the timing and instantaneous amount of water released from Ruedi for endangered fish may be significantly affected. It is difficult to predict when and to what degree conditions elsewhere in the watershed might affect Ruedi operations but it is important that the EA acknowledge these interrelationships and discuss how the proposed action might impact, or be impacted by, management of other facilities within the Colorado River watershed. These interrelationships have developed since the Round II EIS was completed and have an operational history going back a number of years, so release patterns and the interconnections between releases from one reservoir and another may be discernible.	Please see response to 2e. In regards to water releases for endangered fish, the proposed action does not impact the availability of water for endangered fish (see EA section 3.4.2). The releases of water to the 15 Mile Reach are coordinated among the various facilities. The availability of fish water at all the different facilities is a constant in both the No Action and Proposed Action alternatives. If shortages at other facilities exist, it is possible that water released from Ruedi could be carefully metered out over longer periods to have the most benefits for fish in the 15 Mile Reach, depending on how the US Fish and Wildlife Service "calls" for it.
3c	The various demands on Ruedi that have developed over the years – for endangered species flows, contract flows, hydropower, recreation, etc. – are not always compatible. Reduced flows to assure that the Reservoir fills for summer recreational uses work against hydropower production. Increased flows to provide water for endangered species can work against fishing access on the Fryingpan. The Ruedi Water and Power Authority supports multiple use management of Ruedi that acknowledges the value of all of these purposes but the interests of the Roaring Fork Valley are in maintaining a sustainable and healthy environment, supporting the recreational economy and contributing to local energy self-sufficiency. With those values in mind, we would ask that the Bureau of Reclamation reiterate and reinforce the informal guidelines that have guided Ruedi management in the past, namely that Ruedi lake levels be maintained at	Please see responses to comments 1b, 1c, and 2e. Reclamation concurs with the statement that the various demands on Ruedi are not always compatible. As stated in response to comment 1b, Reclamation, within the limits of its authority and applicable laws, including Colorado Water Law, attempts to manage operations soundly with the multitude of values affected by reservoir releases in mind, and will continue to do so in the future.

	85,000 af prior to September 1 and that releases from Ruedi be limited to 250 cfs or less prior to October 1. We understand that these are goals that will be subject to year-to-year conditions and other Bureau obligations but we want to take this opportunity to note that they are supportive of local interests and values as listed above.	
3d	We also believe that reiterating those guidelines would be a good starting point for a discussion of how to maintain the Fryingpan as a fishery and as a recreational, aesthetic and environmental resource in the face of future demands on Ruedi that might require releases in excess of those projected by the EA. The fact that the EA does not anticipate major changes in Ruedi release patterns does not relieve our obligation to consider a future in which downstream contractors rely far more heavily on Ruedi water than is now the case. The incremental increases in releases projected by the EA could grow significantly depending on a number of plausible scenarios involving climate change, energy development, increased transbasin diversions and growth on the Western Slope. Our concern for the future of Ruedi and the Fryingpan is tempered by the sale of Ruedi's remaining contract water to local communities but as long as Ruedi exists and demand for water downstream of Ruedi grows, the prospect of the Fryingpan becoming a flume for significant seasonal releases remains. It is also important that this concern go on the record and that the Bureau acknowledge the potential conflicts between using Ruedi as a water source for municipal and domestic supplies and as an environmental and recreational resource. This is particularly critical to the Town of Basalt that depends on recreational use of Ruedi and the Fryingpan to sustain its economy. Recreation on Ruedi and the Fryingpan contributes millions of dollars to the economy of Basalt and the Roaring Fork Valley annually. Protection of this economic resource must be an essential element and objective of future Ruedi management and contracting.	Please see responses to comments 1b, 1c, 1g, 2c, and 3c.

	Thank you for this opportunity to comment on the EA.	
4	**COLORADO RIVER WATER CONSERVATION DISTRICT**	**RECLAMATION RESPONSE**
4a	Please accept this letter as the River District's comments on the above draft EA dated June 14, 20 13. We appreciate the opportunity to comment. Overall we are in support of the document and believe it reasonably represents and supports the minimal nature of the impacts associated with the contracts. Attached are some detailed comments pertaining to the draft EA.	Thank you for your comments.
4b	Replace paragraph 1 in Section 1.1: • Ruedi Reservoir (Ruedi), a feature of the Fryingpan-Arkansas Project (Fry-Ark Project), was primarily constructed to provide storage capacity for replacement water for senior downstream diversion rights in western Colorado at times when the Fry-Ark Project diverts Fryingpan River Basin flows to the Arkansas River Basin in eastern Colorado. The reservoir was oversized under the authority of the Water Supply Act of 1958 to provide storage space for the marketable pool. This pool allows water to be marketed for municipal and industrial use on the west slope, and fulfills obligations under Colorado's Compensatory Storage Act (see Operating Principles, paragraph 7). Revenue from marketable pool contracts is used to repay the United States for the cost of Ruedi construction; operation, maintenance, and replacement costs (OM&R); and accrued interest per the authorizing legislations. With the following paragraph: • Ruedi Reservoir (Ruedi), a feature of the Fryingpan-Arkansas Project (Fry-Ark Project), was primarily constructed to provide the water required for the protection of western Colorado water users by the	Reclamation believes it is important to recognize the fact that Ruedi Reservoir was oversized, because without this additional storage capacity, the proposed contracts would not be possible. That sentence was retained. The other suggested changes were editorial and did not alter the meaning of the paragraph. The original paragraph was retained.

	provisions of Colorado's Compensatory Storage Act (See Operating Principles, paragraph 7). The reservoir provides storage capacity for replacement water for senior downstream diversion rights in western Colorado at times when the Fry-Ark Project diverts Fryingpan River Basin flows to the Arkansas River Basin in eastern Colorado as well as a marketable pool for municipal and industrial use on the west slope. Revenue from marketable pool contracts is used to repay the United States for the cost of Ruedi construction; operation, maintenance, and replacement costs (OM&R); and accrued interest per the authorizing legislations.	
4c	Comment under Section 3.2.1 Climate Change: In our view, the proposed action represents a benefit with respect to Climate Change because the supply of water under contract will be used to offset the impacts from Climate Change.	Reclamation agrees.
4d	Comment under Section 3.7.2 Socioeconomics: The amount of supplies from Wolford would not be sufficient for the purpose of replacing Ruedi under the no action alternative. The conclusion that failure to implement the alternative would not result in lost development is probably correct, but absent Ruedi contracting, needed augmentation supplies would likely occur by "buying and drying" agricultural water rights or development of new storage supplies, both of which would result in a greater level of adverse impact.	Reclamation agrees that this is a potential outcome, although it is speculative at this time and is not analyzed in detail in this EA.
4e	Comment under Appendix B – page 52, Augmentation and Exchange: Suggested adding "replacement" to the type of use.	Reclamation determined it was appropriate to separate replacement from Augmentation and Exchange and combine with "Alternative Source" as suggested by Summit County. See responses to comments 7a and 7b below. Reclamation also determined that this clarification of use does not change any environmental effects determinations.

4f	Comment under Appendix C – page 62, item #4: It is very unlikely that the River District would contract for more than several hundred acre feet of its Ruedi supply as a GMR Alternative Source Contract. I think this sentence and modeling assumption should be revised. There shouldn't be a big difference, if any, in impacts because the RD's Ruedi water likely will still follow similar patterns of release.	A sentence was revised and more detail about water use was provided. The modeling assumption is retained to keep the impact analysis conservative, as described in responses to comments 1c and 2c.
4g	Comment under Appendix C – page 64, item #4: Does this chart suggest that more than the FWS 6Kaf pool of fish water is available at WMR? If so, it should be revised to reflect only the fish pool. The WMR 5412 is no longer available.	The table was updated. It did not affect any modeling outputs.
5	**MR. ROY C. PALM**	**RECLAMATION RESPONSE**
5a	Email 1: All of us realize that the ice buildup on the Fryingpan will break up. When is the question? I sincerely hope it does not cause any damage on its way down stream. If we had a minimum stream flow of 80-100 c.f.s., this would probably help to lessen this problem in the future. A minimum stream flow of 80-100 c.f.s. would also help the aquatic micro invertebrates and give the trout a better chance to survive. I worked with the Miller ecological consultants and we had several test stations on the Fryingpan River. I also studied the Fryingpans micro invertebrates with Dr. George Edmunds jr. The University of Utah. Dr. Edmunds is an aquatic entomologist (specialty mayflies). Dr. Edmunds studied aquatic insects all over the world. I am just a very concerned old fly fisherman who is concerned about the health of our little river. Years ago you could not sit on my deck without the	Thank you for your comments. Please see responses to comments 1b, 1d, and 1g. As noted in response to comment 1d, Miller's "Summary Report – A Study of Macroinvertebrate Community Responses to Winter Flows on the Fryingpan River" is cited in our effects analysis. Crandall's 2002 report is also cited.

	caddis flies blocking out the deck lights. Today, there are very few on the mid river. Many of the larger insects have diminished. I have lived, fished, outfitted, studied the Fryingpan for over 40 years and these are some of my observations. All flow recommendations are subject to state law and existing water rights. READING Miller Ecological –Pg 10 (caddis flies) – pg 14 (discussion) Fryingpan Valley Economic Study (Kristine Crandall June 21,2002) Email 2: Although macroinvertebrate impact and recovery seem to be associated with the magnitude of discharge at both sites on the Fryingpan River, the data suggests that the community at FPR-TC is also influenced by some indirect effects of discharge. The data for FPR-BAS suggests more influence of ambient conditions at this site than release from the dam. The formation and frequency of occurrence of anchor ice at FPR-TC appears to be a contributing influence on macroinvertebrate community structure and function. The results of sampling in 2004 after higher winter flows indicated that densities of many EPT taxa had recovered but chironomid numbers had increased as well. This recent data suggests that two or more concurrent winters with higher flows may be necessary to achieve an optimum balance in the macroinvertebrate community at FPR-TC. Results of sampling in 2005 after winter flows showed that the densities of many EPT taxa were similar to 2004 indicating the continued higher winter	

	flows were beneficial to the system. This result was hypothesized after the 2004 sampling that winter flows higher than 40 cfs would be beneficial for the invertebrates in the Fryingpan River.	
6	**MID VALLEY METROPOLITAN DISTRICT**	**RECLAMATION RESPONSE**
6a	1. On page 53, in the paragraph entitled "Drought Response," the draft EA says that MVMD did not request the right to use its Ruedi Water to augment flows for Green Mountain Reservoir operations as part of a voluntary drought response effort. Yet, on page 55, in the description of MVMD's uses, drought protection is clearly included. MVMD does desire to include drought response to augment Green Mountain flows as a proposed use for both its new contract and its existing contract.	Thank you for your comments. This error has been corrected in the final EA.
6b	2. Also, a minor issue: on page 9, in the first complete paragraph, the River District is referred to as a conservancy district. It is in fact a "Conservation" district. That appeared to be the only place that error occurred.	This error has also been corrected.
7	**SUMMIT COUNTY BOARD OF COUNTY COMMISSIONERS**	**RECLAMATION RESPONSE**
7a	The County's comments relate to the characterization of its use of the Ruedi water as being for "augmentation" purposes, which appears in Table 1, on p. 8, and on p. 57. From a water rights administration standpoint, this is not entirely accurate, and the County is concerned that this description of its use of water may create a risk that the State of Colorado or other parties would argue that a court-approved plan for augmentation is necessary. That would not otherwise be required, since the actual use of the water, as stated on p. 57 of the EA, is: • Contract water would be used as an Alternative Source under the terms of Article IV of a Green Mountain Reservoir contract to be issued by Reclamation to Summit County. No construction of new facilities is needed for this contracted water.	Thank you for your comments. Reclamation agrees the alternative source use should be characterized separately from augmentation.

	• Purpose and Need: During the drought of 2002, Green Mountain Reservoir did not fill. To meet contractor demands, water was supplied from other sources. In order to prevent exacerbating this type of situation in the future, Reclamation has determined that it is appropriate for new contracts from Green Mountain Reservoir to be contingent upon the contractor obtaining an Alternative Source Contract, that would be released at the discretion of Reclamation from a different water source. This Ruedi contract would serve as Summit County's required Alternative Source Contract for their Green Mountain Reservoir contract. This description is consistent with the one that appears in Bob Rice's e-mail below. While it is theoretically possible that Ruedi water might at certain times be released for the specific benefit of Green Mountain contractors above Green Mountain, it is much more likely that Ruedi releases would be delivered to HUP users or other beneficiaries below the Roaring Fork confluence, or used for other authorized purposes of Green Mountain Reservoir. The Alternative Source contract simply provides assurance to Reclamation that sufficient water will be available to meet the needs of all of the Green Mountain beneficiaries. No decreed augmentation plan would be required for Reclamation to use the Alternative Source water in this manner, and it is in neither party's interest to use terminology that could be misinterpreted.	
7b	Accordingly, I suggest that the description of Summit County's intended use on p. 57 be revised simply by deleting the words "for use by augmentation," and that the description in Table 1 be changed from "augmentation" to "Alternative Source." In order to clarify the intent of the latter reference, it might be helpful to put the following sentence that now appears on p. 52 under the "Augmentation and Exchange" heading under a separate heading entitled "Alternative Source Water": "Two contractors (Colorado River Water Conservancy [this should be changed to Conservation] District (River District) and Summit County) have proposed using contracted Ruedi water for use as required alternative source water	The language in the final EA has been changed to incorporate the suggested language. Reclamation determined that this clarification of use does not change any environmental effects determinations. See response to comment 4e.

	for Green Mountain Reservoir contracts." I would also suggest adding another sentence here: "This use may include augmentation." That should be sufficient to cover all possible uses of the Ruedi water, including augmentation if that ever became necessary.	
8	**COLORADO PARKS AND WILDLIFE – personal communication (phone), with Taylor Elm, Land Use Specialist**	**RECLAMATION RESPONSE**
8a	Mr. Elm contacted Reclamation to confirm that CPW had been provided notice of the availability of the Draft EA and comment period.	Confirmed that CPW Senior Aquatic Biologist Sherman Hebein was sent the notice on June 14, 2013.
8b	Mr. Elm noted that he and a fisheries biologist from his office had reviewed the EA and that their concern areas had been evaluated. Discussion included evaluation of flows for fishermen. He noted that up to 300 cfs is considered a general measure for that. In addition, reservoir operations were discussed. It was explained that Reclamation strives to set winter flows in a manner to limit impacts to brown trout redds.	The EA analyzed flows above 250 cfs as an effects threshold for fisherman. This may actually be a conservative analysis.
9	**MR. JOHN ROWLEY, BASALT, CO**	**RECLAMATION RESPONSE**
9a	I just saw an article in the Glenwood Post regarding the Ruedi water contracts and the request for comments. As a regular Ruedi boat user, I am surprised I never heard of this and feel most users on the lake would agree they have no idea that there is a proposal to take additional water from our lake. I feel there has been a very poor job communicating this. Maybe you should send someone to survey users at the actual boat ramp?	The notice of availability for commenting on the Draft EA was sent to 204 individuals, groups, organizations, and agencies, including to the email of record we currently have on file for Mr. Rowley.
9b	As boaters, we are greatly effected by Ruedi water levels. You report references July and August however many of us boat on Ruedi from early May- late October. Your proposal would effect us in a significant way even though the language in your report does not support that. I feel the report was not written well or the recreation compenenet was not researched	Water levels and their effect on boat ramps was recognized as an issue in both the RRII FSES and in this EA. In the EA Section 3.6.2, Table 3.10 shows the simulated change in acres of surface area of the reservoir year round as a result of the

	appropriately. I strongly encourange you NOT to lease any more water as the levels are already too low. I know many others would agree if they were properly informed and surveyed.	implementation of this alternative compared to the No Action Alternative. The model results indicate that through the life of the contract there would be an annual average decrease of about -12 acres of surface area a year, which represents an approximate 1.4 percent decrease.