RECLAMATION

Managing Water in the West

Environmental Assessment
Finding of No Significant Impact

Colorado Water Users' Commitment to Provide 10,825 acre-feet to the 15-Mile Reach of the Upper Colorado River
Great Plains Region, Eastern Colorado Area Office

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

March 2012

Mission Statements

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

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

RECLAMATION
Managing Water in the West

FONSI NO. 2012 - 031

Finding of No Significant Impact

Colorado Water Users' Commitment to Provide 10,825 acre-feet to the 15-Mile Reach of the Upper Colorado River
Great Plains Region, Eastern Colorado Area Office

Approved: _____ MARCH 28, 2012
Mike Collins, Area Manager — Date

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

March 2012

Introduction

This Finding of No Significant Impact has been prepared to document the environmental review and evaluation of the proposed action in compliance with the National Environmental Policy Act of 1969, as amended. Based on the following finding, the Bureau of Reclamation (Reclamation) has determined that completing contracting actions that would allow releases of 10,825 acre-feet per year (AF/yr) of water to benefit endangered fish species habitat as part of the east and west slope water users' commitment in the Upper Colorado River Endangered Fish Recovery Program (Recovery Program) will not result in a significant impact to the human environment.

Preferred Alternative

Reclamation evaluated the effects of two alternatives: the No Action Alternative and the Proposed Action Alternative, and has selected the Proposed Action as the Preferred Alternative for implementation. Under this alternative, Reclamation will complete contracts and agreements that are:

- A contract with the Colorado River Water Conservation District for release of up to 5,412.5 AF/yr of water from Ruedi Reservoir. The term of this contract would be for up to 40 years.
- A contract with the Colorado River Water Conservation District for release of up to 2,000 AF/yr of water from Ruedi Reservoir to provide an insurance pool to help offset certain effects of the proposed action. The term of this contract would be for up to 40 years.
- An excess capacity contract for use of facilities to store and exchange 10825 fish water in Green Mountain Reservoir, a Reclamation facility on the Blue River. The term of this contract would be for up to 40 years.
- An excess capacity contract for use of facilities to store and exchange up to 2,000 AF/yr of non-project insurance pool water in Green Mountain Reservoir, a Reclamation facility on the Blue River. The term of this contract would be for up to 40 years.
- A contract or similar agreement between Northern Colorado Water Conservancy District (Northern Water) and an entity in the Grand Valley to release 5,412.5 AF/yr of water from Granby Reservoir, which would allow the state to protect the water during conveyance to and through the 15-Mile Reach of the upper Colorado River. Reclamation would consent to the contract in writing but would not be a party to the contract. The term of this contract or agreement would be for up to 40 years.
- Supplement (modify) Contract No. 9-07-70-W0020 with Northern Water, which would recognize that 5,412.5 AF/yr of the Redtop Valley Ditch water that would accrue to the Colorado-Big Thompson Project (C-BT) would be delivered to water users in Mesa County, Colorado.
- Contracts or similar agreements to provide for operation and Reclamation control of the release of water from the insurance pool.

The purpose of the proposed 10825 Project is to allow water users who divert from the Colorado River or its tributaries upstream of the Gunnison River to fulfill a commitment described in the *1999 Final Programmatic Biological Opinion* [PBO] *for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of the Recovery Program Actions in the Upper Colorado River Above the Confluence with the Gunnison River* (Service

1999). Pursuant to the PBO, the water users will make 10,825 AF/yr of water permanently available for release to augment baseflow in the 15-Mile Reach of the upper Colorado River in late summer and early fall in support of the recovery of endangered fish species.

The Proposed Action Alternative is comprised of the following elements:

- Annual release of up to 5,412.5 AF of water from Ruedi Reservoir.
- Annual release of 5,412.5 AF of water from Granby Reservoir. This release would be facilitated by a permanent dry-up of a portion of the land irrigated by the Redtop Valley Ditch near Granby Reservoir through shares in the ditch that Northern Water owns or would acquire from the Miller-Hereford and E Diamond H ranches. Water not used for irrigation as a result of the agricultural dry-up would accrue to the Colorado-Big Thompson Project (C-BT Project) consistent with the Colorado water rights system and be released from Granby Reservoir in accordance with the supplement to Contract No. 9-07-70-W0020, which would allow Northern Water to contract with a Grand Valley entity with Reclamation concurrence.
- A periodic exchange or substitution of up to 5,412.5 AF/yr of water released from Granby Reservoir for Recovery Program purposes into Green Mountain Reservoir and the subsequent release of this water from Green Mountain Reservoir.
- Development of an up to 2,000-AF insurance pool to provide water to help offset certain effects of the Proposed Action, which would consist of one or more of the following:
    - A periodic exchange or substitution of up to 2,000 AF/yr of water used for Grand County environmental purposes into Wolford Mountain Reservoir and the subsequent release of this water from Wolford Mountain Reservoir.
    - A periodic exchange or substitution of up to 2,000 AF/yr of water used for Grand County environmental purposes into Green Mountain Reservoir and the subsequent release of this water from Green Mountain Reservoir.
    - A periodic release of up to 2,000 AF/yr of water from Ruedi Reservoir.
- Contracting actions between Reclamation and the appropriate parties to implement the above actions.

Finding of No Significant Impact

After considering the environmental effects described in the EA and the effectiveness of the project design measures in this decision, it is determined that these actions will not have a significant effect on the quality of the human environment considering the context and intensity of impacts (40 CFR 1508.27). Therefore, an environmental impact statement will not be prepared. The finding of no significant impact is based on the following points and the effects of the proposed action which are summarized in Table 1.

(a) *Have significant impacts on public health or safety?*

Public health and safety was not identified as an issue during the scoping process. There are no specific issues related to the safety and welfare of the public. Therefore it is concluded that the proposed action will not pose a threat to public health or safety.

(b) *Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?*

The proposed action would not affect the unique characteristics of park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. In addition there would be no effect on historic or cultural resources found in the area.

(c) *Have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources [NEPA section 102(2)(E)]?*

Effects of the action are generally consistent with those found to comparable projects in the same locale or setting. Reasonable alternatives were considered and addressed in the environmental assessment. The proposed action does not result in controversial effects nor leave conflicts unresolved.

(d) *Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?*

The Interdisciplinary Team conducting the analysis used scientifically acceptable methods to measure the effects of the proposed action and found that there were no substantial risks due to uncertain, unique, or unknown consequences on the human environment.

(e) *Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?*

The action adheres to agency regulations and policy for water contracts administered by Reclamation. The proposed action falls within the framework of this regulatory process and would therefore not establish any new precedents or principles for decisions involving significant effects on the environment.

(f) *Have a direct relationship to other actions with individually insignificant but cumulatively significant environmental effects?*

Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts. The EA included analysis of cumulative effects or impacts from past, present, and reasonably foreseeable future actions in Chapter 3. It was concluded that the action would not result in any adverse significant impacts to the environment. The analyses were accurate and based on reasonable consideration of cumulative impacts.

(g) *Have significant impacts on properties listed, or eligible for listing, on the National Register of Historic Places as determined by the Bureau?*

The proposed action, because it does not involve land disturbances, will have no significant adverse effect on districts, sites, highways, structures, or objects listed in, or eligible for listing, in the National Register of Historic Places.

(h) *Have significant impacts on species listed, or proposed to be listed, on the List of Endangered or Threatened Species or have significant impacts on designated Critical Habitat for these species?*

Federally listed threatened and endangered species and State species of concern were considered in the EA. It was concluded that the proposed action would have no effect on federally threatened and endangered wildlife or plant species or Colorado plant species of concern. The project would be consistent with the recovery of endangered fish species in the Colorado River as described in the EA.

(i) *Violate a Federal law, or a State, local, or tribal law or requirement imposed for the protection of the environment?*

The activities of this project would not violate federal, state, local or tribal laws enacted for the protection of the environment. The proposed action meets the requirements of the Clean Air Act, the Clean Water Act, the Endangered Species Act, the National Environmental Policy Act, and the National Historic Preservation Act.

(j) *Have a disproportionately high and adverse effect on low income or minority populations (EO 12898)?*

In accordance with Executive Order 12898, this project will not have a disproportionately adverse health or environmental effect on low income or minority populations.

(k) *Limit access to and ceremonial use of Indian sacred sites on Federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites (EO 13007)?*

No ceremonial or sacred sites would be affected by the proposed action.

(l) *Contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of such species (Federal Noxious Weed Control Act and EO 13112)?*

Noxious weeds and other invasive species were not identified as a key issue for the proposed action.

Table 1. Summary of Direct and Indirect Environmental Effects of Proposed Action.

Surface Water Hydrology	Moderate long-term increase in North Fork Colorado River flow between the Redtop Valley Ditch and Shadow Mountain Reservoir and in Stillwater Creek between the Redtop Valley Ditch and Granby Reservoir during May, June, and July. Minor long-term decrease in Willow Creek flow during May, June, and July. Minor long-term decrease in Muddy Creek flow when exchange or substitution was made into Wolford Mountain Reservoir. Moderate long-term increase in Colorado River flow between Granby Reservoir and 15-Mile Reach during August and September. Minor, long-term infrequent changes in Blue River flow when an exchange or substitution of water was made from Granby Reservoir to Green Mountain Reservoir.
Groundwater Hydrology	Minor to negligible long-term reduction in groundwater levels near the Redtop Valley Ditch and agricultural dry-up area due to flow reductions in the Redtop Valley Ditch.
Water Quality	Minor long-term reduction in temperatures in Colorado River below Windy Gap when reservoir releases were made. Negligible effect on stream water quality. No effect on reservoir water quality.
Reservoir Operations and Hydroelectric Generation	No effect on Shadow Mountain Reservoir and Grand Lake storage levels and minor effect on Granby Reservoir storage levels. Minor, long-term infrequent increase in Green Mountain Reservoir storage levels if an exchange of water was made from Granby Reservoir to Green Mountain Reservoir. Minor decreased summer reservoir levels in Green Mountain Reservoir in dry years only. No effect on the contract and HUP allocations in Green Mountain Reservoir or Denver Water and Colorado Springs Utilities substitution requirements No effect on hydroelectric generation.
Aquatic Resources	Minor to negligible long-term beneficial effect in North Fork Colorado River and Stillwater Creek. Minor to moderate long-term adverse effect in Willow Creek. Minor long-term reduction in August and September stream temperatures and improvement in fish habitat in Colorado River below Windy Gap. Negligible effect on other rivers, streams, and reservoirs.
Wetland and Riparian Resources	Increased riparian and wetland vegetation along Stillwater Creek long-term. Negligible effect on wetlands along Muddy Creek, Willow Creek, Colorado River, and Blue River. About 62 acres of wetlands occur within the agricultural dry-up area. Wetlands that are supported solely by irrigation would be permanently lost; wetlands supported by a naturally occurring high water table or streamflows that existed before development of irrigated agriculture would remain. No effect on wetlands associated with Granby or Green Mountain reservoirs.
Vegetation and Wildlife Resources	No effect on federally threatened and endangered wildlife or plant species or Colorado plant species of concern. Minor long-term habitat reduction for sandhill crane, greater sage grouse, boreal toad, and wood frog. Negligible effect on raptor foraging habitat and no effect on known raptor nests or on large game. Minor change in species composition in agricultural dry-up area.
Soils and Farmland	Permanent loss of 752 acres of farmland of statewide importance in agricultural dry-up area.
Recreation	Negligible to minor long-term effects on reservoir recreation in Granby and Green Mountain. Negligible effects on boating and fishing in the Blue River and Colorado River.
Socioeconomics and Land Use	Negligible to minor long-term effects on water-based recreation economies. Negligible adverse effect on the agricultural portion of the Grand County economy. No disproportionately high and adverse human health or environmental effects on minority and low-income populations.

RECLAMATION

Managing Water in the West

Environmental Assessment

Colorado Water Users' Commitment to Provide 10,825 acre-feet to the 15-Mile Reach of the Upper Colorado River
Great Plains Region, Eastern Colorado Area Office

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

March 2012

Contents

Tables

Figures

Appendices

Acronyms

15-Mile Reach	Colorado River from the confluence of the Gunnison River upstream approximately 15 miles to the Grand Valley Irrigation Company Diversion Dam near Palisade, CO
10825 water	10,825 acre-feet of water permanently released by the water users
2012 Agreement	Ruedi Reservoir 2012 Agreement
AF	acre-feet
AF/yr	acre-feet per year
ACS	American Community Survey
C-BT	Colorado-Big Thompson Project
CEQ	Council on Environmental Quality
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
cfs	cubic feet per second
CRCA	Colorado River Cooperative Agreement
CROA	Colorado River Outfitters Association
CRWCD	Colorado River Water Conservation District
CWCB	Colorado Water Conservation Board
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EPT	Ephemeroptera, Plecoptera, and Trichoptera (common aquatic insects)
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
Fry-Ark	Fryingpan-Arkansas Project
GVIC	Grand Valley Irrigation Company
HUP	Historic Users Pool
MW	Megawatt
NEPA	National Environmental Policy Act
Northern Water	Northern Colorado Water Conservancy District
OMID	Orchard Mesa Irrigation District
PBO	15-Mile Reach Programmatic Biological Opinion
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Recovery Program	Upper Colorado River Endangered Fish Recovery Program
SDO	Colorado State Demography Office
Service	U.S. Fish and Wildlife Service
Subdistrict	Municipal Subdistrict of the Northern Colorado Water Conservancy District
USGS	U.S. Geological Survey
Water users	Subset of east and west slope water providers in Colorado that divert water from the Colorado River Basin participating in the 10825 Project
WQS	Water Quality Standards

1.0 Proposed Action - Purpose and Need

1.1 Proposed Action

The Bureau of Reclamation (Reclamation) is proposing to complete contracting actions that would allow releases of 10,825 acre-feet per year (AF/yr) of water to benefit endangered fish species habitat as part of the east and west slope water users' commitment in the Upper Colorado River Endangered Fish Recovery Program (Recovery Program) (10825 Project). The completion of these contracting actions is the proposed federal action. The Recovery Program was formed in 1988 to recover the Colorado pikeminnow, razorback sucker, humpback chub, and bonytail, which are endangered fish species inhabiting the upper Colorado River Basin. The target reach, which is referred to as the 15-Mile Reach, is a reach on the Colorado River that extends from the confluence of the Gunnison River upstream about 15 miles to the Grand Valley Irrigation Company Diversion Dam near Palisade, Colorado. Reclamation's Proposed Action is in response to a request from Northern Colorado Water Conservancy District (Northern Water) on behalf of a group of east and west slope water users that divert from the upper Colorado River Basin. The water users participating in the 10825 Project are: City of Aurora, Colorado River Water Conservation District, Denver Water, Eagle River Water and Sanitation District, Municipal Subdistrict-Northern Colorado Water Conservancy District, Northern Colorado Water Conservancy District, Southeastern Colorado Water Conservancy District, Upper Eagle Regional Water Authority, and Ute Water Conservancy District. The proposed contracting actions are:

- A contract with the Colorado River Water Conservation District for release of up to 5,412.5 AF of water from Ruedi Reservoir, a Reclamation facility on the Fryingpan River. The term of this contract would be for up to 40 years.
- A contract with the Colorado River Water Conservation District for release of up to 2,000 AF of water from Ruedi Reservoir to provide an insurance pool to help offset certain effects of the Proposed Action. The term of this contract would be for up to 40 years.
- An excess capacity contract for use of facilities to store and exchange 10825 fish water in Green Mountain Reservoir, a Reclamation facility on the Blue River. The term of this contract would be for up to 40 years.
- An excess capacity contract for use of facilities to store and exchange non-project insurance pool water in Green Mountain Reservoir, a Reclamation facility on the Blue River. The term of this contract would be for up to 40 years.
- A contract or similar agreement between Northern Water and an entity in the Grand Valley to release 5,412.5 AF of water from Granby Reservoir, a Reclamation facility on the Colorado River, which would allow the state to protect the water during conveyance to and through the 15-Mile Reach of the upper Colorado River. Reclamation would consent to the contract in writing but would not be a party to the contract. The term of this contract or agreement would be for up to 40 years.
- Supplement (modify) Contract No. 9-07-70-W0020 with Northern Water, which would recognize that 5,412.5 AF of the Redtop Valley Ditch water that would accrue to the Colorado-Big Thompson Project (C-BT) would be delivered to water users in Mesa County, Colorado.
- Contracts or similar agreements to provide for operation and Reclamation control of the release of water from the insurance pool.

As the lead federal agency, Reclamation prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act

(NEPA) of 1969, as amended; the Council on Environmental Quality (CEQ) regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500-1508); the U.S. Department of the Interior's regulations for Implementation of the National Environmental Policy Act of 1969 (43 CFR 46); and Reclamation's NEPA Handbook (Reclamation 2012). This EA is not a decision document, but rather it is a disclosure of the potential environmental consequences of Reclamation's Proposed Action.

The U.S. Fish and Wildlife Service (Service), an agency of the U.S. Department of the Interior, was invited to participate in the NEPA process as a cooperating agency. The Service accepted formal cooperating agency status and retains review and comment responsibility on the 10825 Project.

1.2 Purpose and Need

The purpose of the proposed 10825 Project is to allow water users who divert from the Colorado River or its tributaries to fulfill a commitment described in the *1999 Final Programmatic Biological Opinion* [PBO] *for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of the Recovery Program Actions in the Upper Colorado River Above the Confluence with the Gunnison River* (Service 1999). Pursuant to the PBO, the water users will make 10,825 AF of water ("10825 water") permanently available for release to augment baseflow in the 15-Mile Reach of the upper Colorado River in late summer and early fall in support of the recovery of endangered fish species. Under the PBO, the water users are to determine the existing or new facilities in Colorado Water Division 5 from which the water will be released and execute any necessary agreements to supply the 10825 water on a permanent basis. Water Division 5 is the mainstem of the Colorado River; major tributaries including the Fraser, Blue, Eagle, and Roaring Fork rivers. Reclamation law allows for issuance of contracts of up to 40 years.

The 15-Mile Reach of the upper Colorado River provides important habitat for endangered fish.

The water users and the Service implemented two interim agreements to supply the 10825 water until a permanent supply could be developed. Each of the interim agreements provided up to 5,412.5 AF of water for the 15-Mile Reach. These agreements are explained in Section 1.4.3.2.

The Service recommended numeric mean monthly streamflow targets for the 15-Mile Reach as part of the Recovery Program (Osmundson et al. 1995). The Recovery Program is described in more detail in Section 1.4.3. The actual recommended flow targets vary by type of year (i.e., dry, average, and wet). Targets are defined for the baseflow period (August, September, and October) measured at the Palisade gage, ranging from a high of 1,630 cubic feet per second (cfs) at least 50 percent of the time for a wet year, to a low of 810 cfs 100 percent of the time for a dry year (Table 1; Figure 1). The recommended flow targets are based on biological and habitat requirements of the listed fish species and do not vary in response to the amount of water available to the Recovery Program.

The interim agreements (Section 1.4.3.2) to augment flows in the 15-Mile Reach are important components to meeting the Service's recommended flow targets. With flow augmentation, the flow targets have been met at about twice the frequency than without augmentation (Table 1).

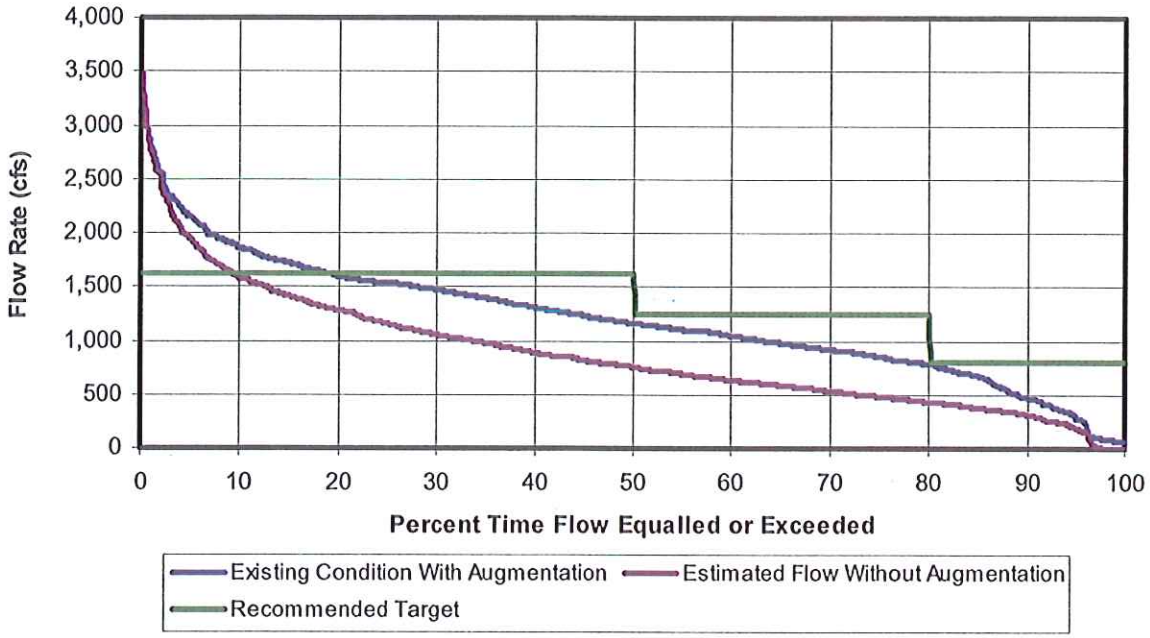


Figure 1. 15-Mile Reach Historical and Target Flow between August 1 and October 31 (Water Years 1998-2008).

1.3 Analysis Area

The analysis area includes reaches of streams and reservoirs potentially affected by the 10825 Project and encompasses the upper Colorado River from the Redtop Valley Ditch Diversion downstream to the 15-Mile Reach, the Fryingpan and Roaring Fork rivers from Ruedi Reservoir to the Colorado River, and several tributaries and reservoirs within these stream reaches (Figure 2). The locations of physical modification and agricultural dry-up along the Redtop Valley Ditch are also included in the analysis area. A more detailed discussion of the analysis area used to describe existing conditions and evaluate impacts is provided in Chapter 3.

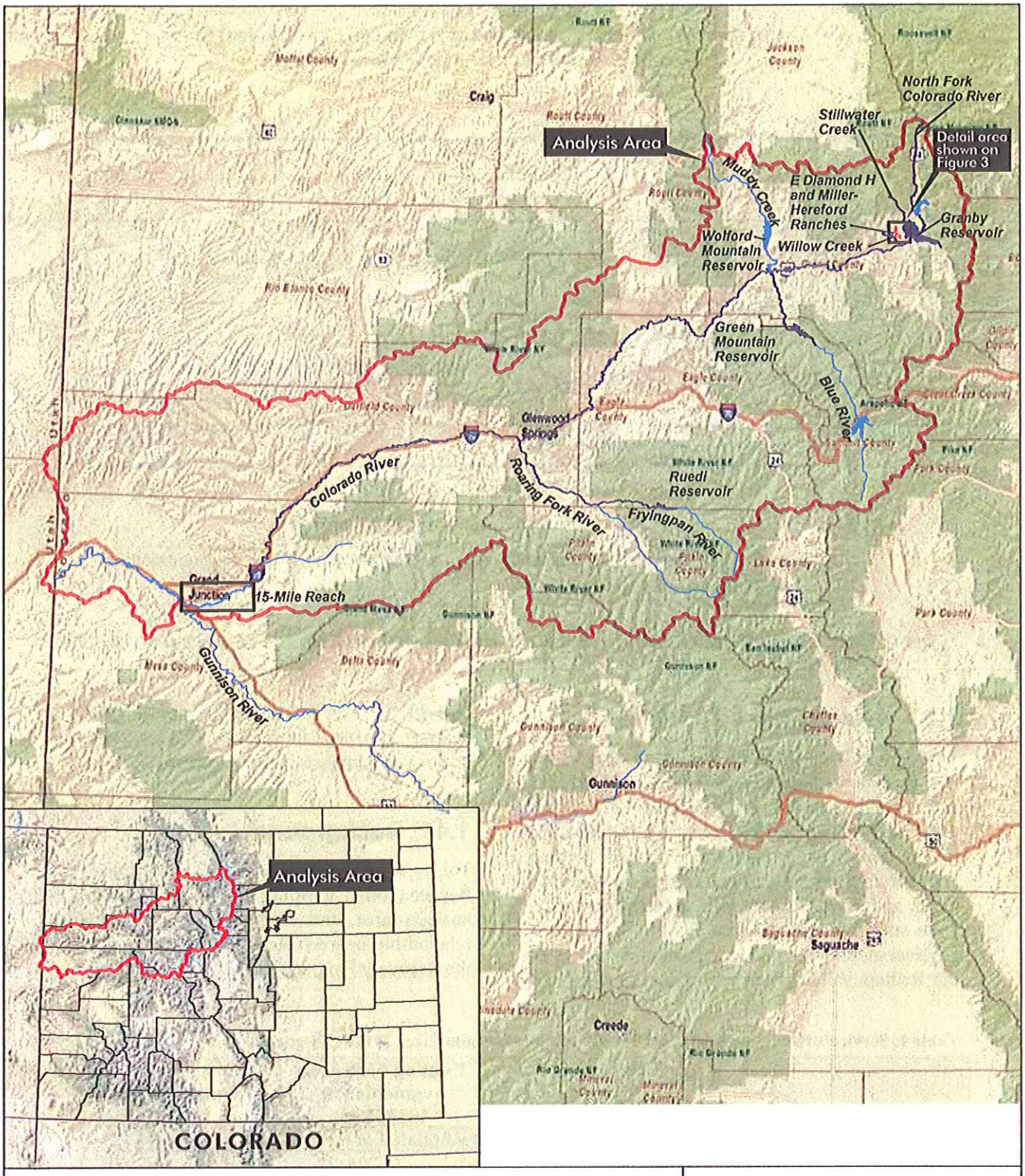
1.4 Background

This section provides a description of Reclamation's existing operations within the analysis area, the Recovery Program, and the relationship between Reclamation's operations and the Recovery Program.

Table 1. Service's Recommended Flow Targets on the Colorado River at the Palisade Gage.

Recommended Flow Target			Existing Flow (with Augmentation, 1998-2008)	Estimated Flow (without Augmentation, 1998-2008)
Type of Year	Flow (cfs)	Percent Time Flow Equaled or Exceeded Aug – Oct		
Wet	1,630	50	18	9
Average	1,240	80	45	23
Dry	810	100	80	47

Source: Osmundson, et al. 1995.



10825 Environmental Assessment

Grand, Summit, Routt, Eagle, Pitkin, Gunnison, Garfield, Rio Blanco, and Mesa Counties, Colorado

0 10 20 Miles

N

Figure 2
General Analysis Area Evaluated in this EA

File: 4537 figure 2.pdf [dlH]
February 2012

ERO Resources Corp

Granby Reservoir is the largest reservoir in the C-BT Project.

1.4.1 Reclamation and Granby and Green Mountain Reservoirs

The Colorado-Big Thompson Project (C-BT) stores, regulates, and diverts water from the Colorado River on the west slope of the Continental Divide to the east slope of the Rocky Mountains. The C-BT provides supplemental water primarily for irrigation and municipal and industrial use. As these purposes are met, the project generates hydroelectric power, and provides water-oriented recreational opportunities. Reclamation operates power, storage, and carriage (conveyance facilities such as pipelines and canals) features on the west slope, and similar works on the east slope upstream of the supply canals leading from Carter Lake and Horsetooth Reservoir. All East Slope project works downstream of these two reservoirs are owned, operated, and maintained by Northern Water. The C-BT was designed to divert 310,000 AF of water annually from the upper reaches of the Colorado River Basin west of the Continental Divide. Not all originally planned C-BT project facilities were built and the design diversion of 310,000 AF/yr has not been achieved. The historical average annual diversion has been about 230,000 AF.

Granby Reservoir, located on the Colorado River about 4.5 miles northeast of the town of Granby, Colorado, collects and stores water from the upper Colorado River Basin. Reclamation pumps C-BT water from Granby Reservoir into Shadow Mountain Reservoir, at the same elevation as Grand Lake, from where it can flow under the Continental Divide through the Adams Tunnel to the east slope.

Green Mountain Reservoir is about 13 miles southeast of Kremmling, Colorado on the Blue River. The reservoir's primary purposes are to provide replacement water for out-of-priority diversions in the upper Colorado River Basin by the C-BT Project, for power purposes, and to preserve existing and future water uses and interests on the West Slope. Water from the Blue River drainage is stored in this reservoir and later released for C-BT-authorized purposes on the West Slope. Green Mountain Power Plant, at the base of Green Mountain Dam, uses the regulated streamflow of the Blue River and the water released from storage in Green Mountain Reservoir to generate electricity. Releases of water from the 66,000-AF Historic Users Pool (HUP) allocation within Green Mountain Reservoir are used primarily in the Grand Valley near Grand Junction, Colorado and also indirectly result in improved flow and habitat conditions in the 15-Mile Reach.

1.4.2 Reclamation and Ruedi Reservoir

Reclamation operates the Fryingpan-Arkansas (Fry-Ark) Project, which is a multipurpose transmountain diversion project. The Fry-Ark Project is authorized to divert up to 120,000 AF of water in any year, or 2,352,800 AF in any 34 consecutive years, from the Roaring Fork River Basin on the west slope to the Arkansas River on the east slope of the Rocky Mountains. The average annual diversion has been 69,000 AF.

Ruedi Reservoir, a component of the Fry-Ark Project, is on the Fryingpan River about 15 miles east of Basalt, Colorado and provides storage for replacement of Fry-Ark Project out-of-priority diversions to the east slope and contract water that is used by west slope contractors primarily to augment out-of-priority diversions. The primary

Ruedi Reservoir provides water to the west slope to make up for water diverted to the east slope.

source of water is spring runoff, which is stored during the runoff period and then released later in the year.

1.4.3 Recovery Program

Colorado pikeminnow, razorback sucker, humpback chub, and bonytail are endangered fish species inhabiting the upper Colorado River Basin. These warm water species are listed as endangered under the Endangered Species Act (ESA). The Colorado River from Rifle, Colorado downstream to the confluence with the Gunnison River, which includes the 15-Mile Reach, is designated critical habitat for the Colorado pikeminnow and razorback sucker and provides valuable habitat for all life stages of these species. The reach has an optimum balance between temperature and food availability for adult Colorado pikeminnow and provides an important refuge for endangered fishes should a catastrophic event cause a loss of populations in the Gunnison River or in the Colorado River below the Gunnison River confluence. Upstream diversions reduce spring peak flows and result in low flows during late summer and fall, both of which reduce the availability of important habitat elements.

The Recovery Program was formed in 1988 to recover these fish species in compliance with the ESA and other federal and state laws, while providing for new and existing water development in the upper Colorado River Basin. A variety of federal and state agencies and private organizations work cooperatively to implement strategies to recover the endangered fish while agricultural, hydroelectric, and municipal water needs are met in compliance with interstate compacts and applicable laws. Recovery strategies include improving physical habitat, assuring adequate streamflow, controlling nonnative fish populations, propagating and stocking endangered fish, and conducting research and monitoring for adaptive management. The Service developed streamflow recommendations for the 15-Mile Reach to restore and maintain sufficient habitat and promote attainment of recovery goals (Table 1). Cooperative water resource management by Recovery Program partners results in operation of reservoirs to enhance spring peak flows and augment late summer and fall flows in the Colorado River. Agreements to meet recovery goals in the 15-Mile Reach are outlined in the 1999 PBO, Interim 10825 Agreements, and Ruedi Reservoir 2012 Agreement. These agreements are discussed briefly below.

1.4.3.1 Programmatic Biological Opinion

In 1999, the Service issued a PBO (Service 1999) for water operations by Reclamation, Western Area Power Administration, and other water users for funding and implementation of the Recovery Program in the upper Colorado River Basin upstream of the confluence with the Gunnison River. The PBO provided Section 7 compliance for all existing Reclamation depletions upstream of the Gunnison River, all nonfederal depletions in the same area, and 120,000 AF/yr of new water depletions by Reclamation and nonfederal water users. All nonfederal depletions upstream of the Gunnison River were treated as interrelated actions and, therefore, were covered by the PBO provided there is continued progress towards implementing the recovery actions outlined in the PBO and the fish continue to recover. The PBO provides ESA compliance for these water operations. As part of the consultation, nonfederal water users agreed to provide up to 10,825 AF of water annually to the

15-Mile Reach from existing or new Colorado Water Division 5 (mainstem Colorado River Basin) facilities to benefit endangered fish (10825 water). Equal contributions of up to 5,412.5 AF/yr were to be provided by east and west slope water users. The water users are required to determine the existing or new facilities from which the water would be released and to enter into any necessary agreements. In 2012, the water users expect to execute a permanent agreement with the Service that identifies the permanent 10825 water sources as those discussed in this EA.

1.4.3.2 Interim 10825 Agreements

In 2000, interim agreements were executed 1) among the City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water), the Colorado Water Conservation Board (CWCB), and the Service and 2) between the Colorado River Water Conservation District (CRWCD) and the Service. In this EA, these two agreements are collectively called "interim agreements." Under the interim agreements, Denver Water and CRWCD each provide half of the 10825 water through June 30, 2010, subject to extensions of up to 5 years if agreed to by the parties. Through these agreements, Denver Water releases water from Williams Fork Reservoir (or other available sources), and the CRWCD releases water from Wolford Mountain Reservoir or from Ruedi Reservoir pursuant to water contracts the CRWCD has with Reclamation. In 2010, the interim agreements were extended until July 1, 2013, with a possible extension for 2 more years.

The water users have indicated that if Reclamation does not complete the contracting actions, they will have to find an alternative source or sources for the 10825 water. The releases from Williams Fork and Wolford Mountain reservoirs will cease by as late as July 1, 2015 regardless of whether or not Reclamation issues the proposed contracts.

1.4.3.3 Ruedi Reservoir 2012 Agreement

In 2003, Reclamation entered into an agreement with the CWCB and the Service to make 10,825 AF of water available annually through 2012 for release from Ruedi Reservoir to the 15-Mile Reach of the Colorado River. The 2012 Agreement water is separate from the 10,825 AF of water associated with the commitment of the water users. Reclamation may contract for the Ruedi Reservoir water that is committed in the 2012 Agreement beginning in 2013.

1.4.3.4 Colorado River Water Conservation District 5,000 AF Contract

In 2007, Reclamation contracted with the CRWCD for 5,000 AF/yr of Ruedi Reservoir water, which among other things, could be used to augment flows in the 15-Mile Reach in no more than 5 in 25 years and no more than 3 consecutive years in the event supply from Wolford Mountain Reservoir is not adequate to provide 5,412.5 AF. If it is projected that the contract water will not be needed for the 5,412.5 AF commitment to the 15-Mile Reach, then the CRWCD may use up to 75 percent of the uncommitted contract water to supplement winter instream flows in the Fryingpan River from January 1 to March 31. The CRWCD has not used the 5,000 AF/yr of Ruedi Reservoir water for the 15-Mile Reach. The contract is for 40 years and will remain in effect under the Proposed Action.

1.4.3.5 Coordination of Reservoir Releases

The Recovery Program also relies on multiple water sources and agreements to supplement spring peak flows within the 15-Mile Reach. A team comprised of various water users, CWCB, State Division Engineer, the Service, and Reclamation has frequent communications regarding coordination of water releases to assist in attaining the 15-Mile Reach target spring peak flows. The Service also determines when and from which reservoirs releases of its committed pools of Recovery Program water are made for the Recovery Program. Releases are made voluntarily by water users and Reclamation to enhance the magnitude and duration of spring peak flows through the Coordinated Reservoir Operations

Program in a manner that does not impair the yield of these reservoirs. Late summer and fall releases to augment baseflow, which is the purpose of the 10825 water, are independent of the Coordinated Reservoir Operations Program.

Any modifications in reservoir release patterns for late summer and fall baseflow augmentation would depend on a decision-making process that considers many factors including:

- The total amount of water available in each reservoir that stores Recovery Program water
- Existing streamflow conditions below each reservoir at the time of release
- Streamflow in the 15-Mile Reach
- Regional weather and streamflow forecasts
- Forecasted irrigation diversions above the 15-Mile Reach
- Forecasted inflow and timing of inflow into Reclamation and non-federal reservoirs

1.5 Agency and Public Involvement

Reclamation initiated a scoping process to provide an early and open process to gather information from the public and interested agencies on the issues and alternatives to be evaluated in this EA. Reclamation conducted stakeholder interviews with federal, state, and local agencies to solicit concerns and comments on the project, and determine the level of anticipated participation from each agency. During the scoping period, Reclamation held public scoping meetings on November 4, 2009 in Granby, Colorado and on November 5, 2009 in Carbondale, Colorado. The scoping period extended from October 28 to November 18, 2009. The scoping process and comments gathered by Reclamation are discussed in a Scoping Report (Reclamation 2009) and in Chapter 4, *Coordination and Consultation*.

Reclamation issued a Draft EA and draft Finding of No Significant Impact (FONSI) on September 22, 2011. Two public open houses were held on October 11, 2011 in El Jebel and on October 12 in Hot Sulphur Springs, Colorado. Reclamation accepted written comments via e-mail or hard copy through October 24, 2011.

2.0 Alternatives

2.1 Introduction

Chapter 2 describes the No Action Alternative, Proposed Action Alternative, and alternatives that were dismissed from further consideration. Direct, indirect, and cumulative effects of the Proposed Action are described in Chapter 3.

2.2 No Action Alternative

In the No Action Alternative, Reclamation would not complete any of the proposed contracting actions. Northern Water would likely sell portions of the Miller-Hereford Ranch and would not purchase the water rights of the E Diamond H Ranch.

If Reclamation did not complete the contracting actions, the water users would then need to identify other feasible, permanent sources of water to provide 10,825 AF/yr to the 15-Mile Reach that would not require Reclamation contracts. If the water users were unable to provide the 10825 water as required in the PBO (Service 1999), reinitiation of ESA consultation pursuant to the PBO would be required. The Service's reconsultation process would be with the parties to the PBO (i.e., Reclamation, the Service, and Western Area Power Administration).

The eventual outcome of either the renegotiation among water users to provide another source of 10825 water or the reconsultation process with the Service cannot be reliably predicted in terms of specific institutional, operational, or structural measures. As such, potential environmental effects of the No Action Alternative are too speculative, cannot be determined, and are not discussed in this EA. Therefore, they cannot be used to determine the effects of the Proposed Action as directed by Reclamation's NEPA guidance. Consequently, potential effects of the Proposed Action Alternative (Section 2.3) are determined through comparison with the existing conditions, which are described in the *Affected Environment* sections in Chapter 3. Existing conditions are not anticipated or proposed to continue substantially into the future (i.e., beyond 2012) due to the interim and 2012 agreements discussed in Chapter 1, but do provide a reasonable basis for analyzing environmental consequences of the Proposed Action Alternative. This is the best proxy in Reclamation's technical judgment.

2.3 Proposed Action Alternative

The Proposed Action Alternative is comprised of the following elements:

- Annual release of up to 5,412.5 AF of water from Ruedi Reservoir
- Annual release of 5,412.5 AF of water from Granby Reservoir. This release would be facilitated by a permanent dry-up of a portion of the land irrigated by the Redtop Valley Ditch near Granby Reservoir through shares in the ditch that Northern Water owns or would acquire from the Miller-Hereford and E Diamond H ranches. Water not used for irrigation as a result of the agricultural dry-up would accrue to the C-BT Project consistent with the Colorado water rights system and be released from Granby Reservoir in accordance with the supplement to Contract No. 9-07-70-W0020, which would allow Northern Water to contract with a Grand Valley entity, with Reclamation concurrence.
- A periodic exchange or substitution of up to 5,412.5 AF/yr of water released from Granby Reservoir for Recovery Program purposes into Green Mountain Reservoir and the subsequent release of this water from Green Mountain Reservoir.
- Development of an up to 2,000-AF insurance pool to provide water to help offset certain effects of the Proposed Action, which would consist of one or more of the following:
    - A periodic exchange or substitution of up to 2,000 AF/yr

of water used for Grand County environmental purposes into Wolford Mountain Reservoir and the subsequent release of this water from Wolford Mountain Reservoir.

- A periodic exchange or substitution of up to 2,000 AF/yr of water used for Grand County environmental purposes into Green Mountain Reservoir and the subsequent release of this water from Green Mountain Reservoir.
- A periodic release of up to 2,000 AF/yr of water from Ruedi Reservoir.

- Contracting actions between Reclamation and the appropriate parties to implement the above actions as described in Section 1.1.

The proposed contracting actions described in Chapter 1 would allow water to be stored, released, and conveyed to augment the late summer and fall streamflow to help meet the needs of the endangered fish in the 15-Mile Reach. Releases would be made for the Recovery Program as called for by the Service and would be coordinated with other supplies to benefit the 15-Mile Reach in the same manner that releases from Wolford Mountain and Williams Fork reservoirs meet those needs. All releases would be in addition to any releases made to satisfy downstream senior water rights for minimum or instream flow requirements. The Reclamation and the Service would meet with interested parties each spring to discuss a recommended release pattern for the 10825 water from Granby Reservoir. For Ruedi Reservoir releases, Reclamation and the Service would meet with interested parties to discuss Ruedi Reservoir operations, as they have in past years. Under the PBO, the Service's goal is that the late summer and fall flow in the 15-Mile Reach be at the recommended flow targets shown in Table 1. When recommended flow targets in the 15-Mile Reach were met, such as during a wet year, the full 5,412.5 AF from Ruedi Reservoir may not be released. The Service would consider other resource values when determining a release pattern to meet this goal. All releases would be made in compliance with federal and Colorado law.

2.3.1 Ruedi Reservoir Releases

The Proposed Action includes a contract for the release of up to 5,412.5 AF of water from Ruedi Reservoir annually for Recovery Program purposes. The releases would be in addition to the water that Reclamation is committed to releasing from Ruedi Reservoir for the 15-Mile Reach (5 plus 5 Water – see Section 3.8.1.1.5). A long-term water supply contract with Reclamation would likely be used to provide these releases.

A contract for the periodic release of up to 2,000 AF/yr of water from Ruedi Reservoir for an insurance pool also is included in the Proposed Action. The insurance pool is discussed in Section 2.3.4. The release of up to 2,000 AF/yr of water, when needed, would likely be made during the same period that HUP and contract allocation releases from Green Mountain Reservoir have been made historically.

2.3.2 Granby Reservoir Releases

Each year, a total of 5,412.5 AF of water would be released from Granby Reservoir. The water would be obtained by ceasing irrigation on 752 acres on the Miller-Hereford and E Diamond H ranches served by the Redtop Valley Ditch (Figure 3). Northern Water would surrender its shares to the remaining shareholders in exchange for a written commitment by the Redtop Valley Ditch Company that future consumptive use would be limited by placing restrictions on increases in irrigated lands, transfer of shares, and changes of water rights. Shares of the Redtop Valley Ditch associated with the Miller-Hereford Ranch are currently owned by Northern Water, while Northern Water would purchase shares associated with the E Diamond H Ranch as part of the Proposed Action. Water made available from irrigation cessation would be stored in Shadow Mountain and Granby reservoirs under existing C-BT water rights. Irrigation cessation on

10825 Environmental Assessment

- Ditch
- Agricultural Dry-Up Study Area
- E Diamond H Ranch Irrigated Acreage
- Miller Hereford Ranch Irrigated Acreage

0 1,500 3,000 Feet

N

Figure 3
Lands Proposed for Agricultural Dry-Up

File: 4537 Figure 3.mxd [dlH]
June 2011

ERO
ERO Resources Corp.

752 acres served by the Redtop Valley Ditch is estimated to result in an increase the average annual inflow to Granby Reservoir sufficient to provide the annual release of 5,412.5 AF from the reservoir. Areas of both ranches not subirrigated by natural sources would slowly transition to native vegetation. Northern Water would not likely use the ranches for agricultural purposes.

It is expected that the Redtop Valley Ditch would be operated in the following manner:

- Northern Water's share of the ditch water would remain in the North Fork Colorado River, or would remain in the ditch to facilitate deliveries to shareholders (see description below).
- For this analysis, the total amount of Redtop Valley Ditch diversion from the North Fork Colorado River would be a maximum of 80 cfs, which would provide sufficient water to ensure adequate delivery of water to remaining ditch shareholders. Actual maximum diversions may be higher or lower than this amount, but based on discussions with Northern Water, this was determined to be a reasonable estimate for analysis.
- The amount of diversions by the ditch that would otherwise be in excess of the assumed maximum diversion of 80 cfs would remain in the North Fork Colorado River. Streamflow in the North Fork would remain unchanged from existing conditions when flows were below the estimated 80 cfs maximum diversion threshold.
- Northern Water's share of the ditch water that would remain in the ditch and would be used to facilitate deliveries to other ditch shareholders would ultimately accrue to Stillwater Creek upstream of its confluence with Granby Reservoir. This water would be turned out of the ditch at one or more of the irrigation laterals and would eventually flow into Stillwater Creek and Granby Reservoir.

The additional inflow to Shadow Mountain Reservoir and Granby Reservoir would be diverted by the C-BT Project under the existing decreed water rights for the C-BT Project. The increased supply to the C-BT Project would include water that was historically consumed by irrigation, as well as water that was applied to irrigation and accrued to the Colorado River drainage below Granby Reservoir as irrigation return flow. All water stored in Granby Reservoir would be stored under existing decreed water rights and operational policies of the C-BT Project, including the replacement of all out-of-priority diversions into Granby Reservoir from the C-BT replacement pool in Green Mountain Reservoir.

The Granby release pattern would depend on the type of hydrologic year (dry, average, or wet) and targeted stream flow in the Colorado River downstream of Granby Reservoir during late summer and early fall. The Granby releases would be in addition to the releases required under Senate Document 80 and the minimum flows to which Windy Gap Reservoir diversions are subject. For the purposes of this EA, the releases from Granby Reservoir are evaluated based on fixed schedules (Table 2), depending upon hydrologic conditions. For modeling purposes in this assessment, a dry year is considered any year when Reclamation reduces flows from Granby Reservoir in accordance with the "Principles to Govern the Release of Water at Granby Dam to provide Fishery Flows immediately Downstream in the Colorado River" signed and approved by the Secretary of the Interior on January 19, 1961. Although the Service may modify the schedules shown in Table 2 each year to best meet the needs of the Recovery Program and the targeted stream flow in the Colorado River downstream of Granby Reservoir, the schedules represent a reasonable basis for evaluation of impacts.

2.3.3 Green Mountain Reservoir Exchange

Under some hydrologic conditions, releases from Granby Reservoir may not coincide with the

Table 2. Granby Release Schedule Analyzed in this EA.

Date	Granby Releases (cfs) Type of Year		
	Dry	Average	Wet
July 1-14	0	0	0
July 15-31	22	0	0
August 1-14	47	50	35
August 15-31	47	50	50
September 1	55	50	70
September 2-9	38	50	70
September 10-15	38	50	50
September 16-20	21	29	50
September 20-30	21	29	24

Source: Grand River Consulting 2012.

Service's requirements for the 10825 water at the 15-Mile Reach. In instances when water was released from Granby Reservoir, but not needed in the 15-Mile Reach, the Service would have the option of exchanging the unneeded water into Green Mountain Reservoir and storing it for later release by Reclamation. The exchange would entail the release of water from Granby Reservoir with a concurrent and equal reduction in the Green Mountain Reservoir release rate. Therefore the flow in the Colorado River below the confluence with the Blue River would remain the same. The rate of exchange would not exceed the instantaneous rate of release of 10825 water from Granby Reservoir, which is projected to be 50 cfs or less in an average year (Table 2). The decision to exchange water would be made by the Service and would be based on many factors including streamflow in the 15-Mile Reach, climatic conditions, weather forecasts, space available for additional storage, comments and concerns of Reclamation and other water diverters, and the amount of water supplies available to the Service in other reservoirs. The exchange may allow a reduction in releases from other reservoirs used for the Recovery Program, such as Ruedi Reservoir.

Any exchanges would most likely occur in either August or September during one of the following conditions:

Early August of Wet Years. In wetter than average years, releases may begin from Granby Reservoir as early as August 1. Under such conditions, streamflow in the 15-Mile Reach may be greater than the established flow targets for the Recovery Program. The Service may desire to exchange the Granby Reservoir releases into Green Mountain Reservoir until such time as streamflow receded in the 15-Mile Reach. In some of these wetter than average years, storage in Green Mountain Reservoir may be at capacity through the early part of August and the exchange of water would not be possible.

Summer Rainfall Events. Prolonged rainfall events or monsoonal weather patterns may increase the flow in the 15-Mile Reach to a level greater than the established flow targets for the Recovery Program. It may be desirable to exchange Granby Reservoir releases into Green Mountain Reservoir during these events.

For example, if 25 cfs were released from Granby Reservoir and the Service did not desire this water in the 15-Mile Reach at the time of the release, the 25 cfs would be exchanged into the Green Mountain Reservoir excess capacity account by reducing the outflow from Green Mountain Reservoir by 25 cfs. Assuming that outflow from Green Mountain Reservoir was 400 cfs, releases to the Blue River would be reduced to 375 cfs, and this water would be booked into the excess capacity account. Streamflow in the Blue River above the Colorado River confluence would be reduced by 25 cfs and streamflow below the confluence of the Blue and Colorado rivers would be unchanged.

Several conditions would be met before an exchange to Green Mountain Reservoir could be made. First, excess capacity must exist in the reservoir. If the reservoir was full, no space would exist to store water via exchange and any 10825 releases from Granby Reservoir would continue to

flow downstream. Second, releases from Green Mountain Reservoir must exceed 85 cfs if Reclamation is exercising its Green Mountain Reservoir junior refill right. As a practical matter, exchanges may be made into Green Mountain Reservoir whenever releases from the reservoir were required to meet either a Shoshone or Cameo call.

The exchange would be operated so the CWCB's instream flow right in the Blue River below Green Mountain Reservoir would not be affected. The exchange would also be operated to ensure that required bypass flows for Dillon Reservoir and Green Mountain Reservoir are maintained at all times.

The exchange water could be released later at the Service's request and in accordance with the appropriate contract(s) with Reclamation, to benefit the 15-Mile Reach without adversely affecting power generation at Green Mountain Reservoir. Contract(s) with Reclamation for the storage and release of this water would include the appropriate provisions to prevent the loss of electric generation at Green Mountain Reservoir.

Releases of the exchanged water would likely occur in the late summer of the year (July through October) when streamflow in the 15-Mile Reach was low. If the Service did not release all of the water in this separate excess capacity exchange pool during the summer, it could be released by the Service the following spring to increase peak streamflow in the 15-Mile Reach. Any water remaining in the excess capacity account would likely be spilled from Green Mountain Reservoir after the peak of the hydrograph the following spring, when Green Mountain Reservoir filled to capacity. Under existing conditions, this water would be the first water spilled out of Green Mountain Reservoir.

2.3.4 Insurance Pool

The use of the Redtop Valley Ditch to supply 5,412.5 AF/yr from Granby Reservoir would result in a portion of water that historically was diverted to the Redtop Valley Ditch being diverted into Granby Reservoir under a C-BT 1935 priority. At times when Redtop Valley Ditch water was stored in Granby Reservoir when the C-BT Project was out of priority, additional releases from the 52,000 AF C-BT replacement pool in Green Mountain Reservoir would be necessary. Because the replacement pool in Green Mountain Reservoir fills first, the out of priority diversions could impact or short required releases from Green Mountain Reservoir's 100,000 AF pool to contract and HUP allocations in subsequent years when Green Mountain Reservoir did not fill. In a worst-case scenario, the shortage caused by the additional C-BT replacement release would be up to an estimated 1,786 AF/yr. In a similar fashion, storage in Granby Reservoir and the additional C-BT replacement releases from Green Mountain Reservoir also would increase the substitution requirements of Denver Water and Colorado Springs Utilities. Reduced irrigation return flows from the Redtop Valley Ditch would decrease streamflow in the Colorado River below Willow Creek (primarily in May, June, and July) by an average monthly amount of up to 28 cfs. It is unlikely that this small decrease would cause a Shoshone or Cameo water right call to occur earlier in the year, but the lack of return flows may cause facilities to bypass additional water for the mainstem calling water right.

The water users would establish an insurance pool that would eliminate effects of the Proposed Action on the Green Mountain Reservoir contract and HUP allocations, on the Denver Water and Colorado Springs Utilities substitution supplies, and on existing water right holders in the Colorado River. Substitution requirements of Denver Water and Colorado Springs Utilities are discussed in Section 3.8.2.1.1, *Reservoir Operations.* The insurance pool would consist of any of the following three options.

1. An excess capacity storage pool in Wolford Mountain Reservoir that would be filled by exchange or substitution from Grand County environmental water supplies if and when they

were not needed for environmental or recreational purposes on the Colorado River below the confluence with the Blue River, as determined by Grand County. This pool would be the first to spill in the event that Wolford Mountain Reservoir filled and thus may not be available in all years. The CRWCD owns and operates Wolford Mountain Reservoir, 5 miles above the confluence of Muddy Creek with the Colorado River northwest of the town of Kremmling.

Under terms of the Colorado River Cooperative Agreement (CRCA) (see Section 3.2.4), a negotiated but not formally approved agreement between Denver Water and a group of West Slope interests, Denver Water has proposed that Grand County receive 1,000 AF/yr of water supply from Denver's Moffat Collection system and up to 1,000 AF/yr from Denver's Williams Fork Reservoir, which will be used to improve stream flows in the Upper Colorado River. Denver Water would make such water available only if Denver Water's proposed Moffat Collection System Project receives all required permits (see Section 3.2.3). Additionally, negotiations are currently underway with the Municipal Subdistrict of the Northern Colorado Water Conservancy District related to the Windy Gap Firming Project. Additional environmental water supplies may be made available to Grand County as the result of these negotiations. The Municipal Subdistrict would make such water available only if Municipal Subdistrict's proposed Windy Gap Firming Project receives all required permits (see Section 3.2.2). Collectively, these releases are called "Grand County environmental water."

Grand County, the Municipal Subdistrict, and Denver Water agree that the use of Grand County environmental water will provide instream environmental benefits in Grand County. Grand County would make water available for the insurance pool when it determines in its discretion that stream flows in the Upper Colorado River were sufficient for environmental or recreational purposes. Contracts between Grand County, the Municipal Subdistrict, and Denver Water probably would be required to accomplish this objective.

2. Similar to option 1 above, Grand County environmental water would be exchanged or substituted into Green Mountain Reservoir at the discretion of Grand County and Reclamation and held in an excess capacity storage pool which would be available, if needed, to offset the effects on the 100,000-AF pool resulting from the 10825 water being stored in Granby Reservoir. The conditions would be met before an exchange or substitution to Green Mountain Reservoir could be made and would be the same as described previously in Section 2.3.3.

The exchanges or substitutions in either reservoir would typically occur in the following manner: The amount of additional C-BT replacement pool releases made each year would be estimated. It is anticipated that this volume of water would range from 0 AF up to about 2,000 AF. An equal volume of water would be exchanged or substituted into Wolford Mountain Reservoir, at the sole discretion of Grand County and the CRWCD, or into Green Mountain Reservoir, at the discretion of Grand County and Reclamation, likely during the period when the environmental water was bypassed or released. The exchange or substitution would occur only if the bypasses or releases of environmental water are not desired in the reach of the Colorado River below the Blue River. Because the exchange or substitution would be intended to offset any reduction in Green Mountain Reservoir supplies, Reclamation would control the subsequent release of water from the insurance pool. The pool at Wolford Mountain Reservoir would be subject to spill in order to protect the rights of the CRWCD and Denver Water at the reservoir. The releases would be made for any authorized purposes associated with Green Mountain Reservoir, including C-BT replacement releases, HUP releases, contract releases and power generation.

3. The CRWCD would obtain a water supply contract for up to 2,000 AF/yr in Ruedi Reservoir

that would back up the Wolford Mountain Reservoir and Green Mountain Reservoir pools in years when they were not available or sufficient.

2.4 Alternatives Considered but Eliminated from Detailed Analysis

Prior to this EA, the water users considered a range of alternatives to provide 10,825 AF/yr of water to the 15-Mile Reach. Additional alternatives were suggested by the public during scoping. While all of these alternatives were considered, only the Proposed Action was retained for detailed analysis in this EA. This section summarizes the alternatives considered and their basis for elimination.

2.4.1 Prior Alternatives Development and Screening

In 2007, the water users initiated a process to develop and evaluate alternatives for providing the 10825 water. The alternatives were evaluated for anticipated environmental effects, cost, engineering feasibility, ability to meet release requirements, and institutional feasibility. Details on the location, facilities, operation, and screening of the alternatives are provided in the following two reports:

- 10825 Water Supply Study Phase 1 Report: Screening of Water Supply Alternatives (Grand River Consulting 2007)
- 10825 Water Supply Study Phase 2 Report: Selected Alternative for 10,825 Acre-Feet of Water per Year for the Upper Colorado River Endangered Fish Recovery Program (Grand River Consulting 2009)

Appendix A summarizes the 24 alternatives that were evaluated and provides the primary reason why the stakeholders selected the Proposed Action (termed the "Selected Alternative" in Grand River Consulting (2009)).

Although several alternatives were judged to be viable sources for the 10825 water, the Proposed Action adequately met all of the project objectives and evaluation criteria, including providing the most benefit to headwater streams. Also, the Proposed Action was the only option that received consensus support of the East and West-slope water users. Reclamation and the Service participated in a consulting capacity in the evaluation process and reevaluated the results of that process during preparation of this EA. The range of alternatives developed by the water users and the water users' alternatives evaluation process were comparable to the process typically used by Reclamation to identify and screen alternatives and identify a Proposed Action. Consequently, the alternatives analysis process and its outcome, a recommended Proposed Action, is acceptable for Reclamation's NEPA compliance purposes. Therefore, only the Proposed Action is analyzed in detail in this EA.

2.4.2 Scoping Alternatives

The public and agencies suggested five alternatives during scoping; each was intended to avoid or limit the use of the Fryingpan River or Ruedi Reservoir for 10825 purposes to limit impacts to recreation. A description and evaluation of each alternative follows.

2.4.2.1 Releases to the Upper Roaring Fork River

This alternative would avoid use of the Fryingpan River and would enhance low flows in the upper Roaring Fork River. An alternative that would achieve these objectives, the Ruedi Reservoir to Roaring Fork Tunnels Alternative, was evaluated previously (Grand River Consulting 2007). Two tunnel and pumping station configurations were considered. This alternative was dismissed from further consideration due to its prohibitively high cost (more than $100 million). Potential permitting concerns and a lengthy time for implementation (perhaps 10 years to permit and construct) were also noted. Consequently, this alternative was dismissed from detailed analysis in this EA.

2.4.2.2 Pipeline or Canal from Ruedi Reservoir to Basalt

Similar to the above alternative, this alternative would avoid use of the Fryingpan River. The Ruedi Reservoir to Basalt Gravity Pipeline Alternative evaluated previously (Grand River Consulting 2007) would achieve this objective. This alternative was dismissed from further consideration due to its prohibitively high cost (more than $40 million). Potential permitting concerns and a lengthy time for implementation (perhaps 5 to 10 years to permit and construct) were also noted. These prior screening issues remain and, consequently, this alternative was dismissed from detailed analysis in this EA.

2.4.2.3 Placita Reservoir and Use of Historic Storage Rights

Placita Reservoir is a proposed storage facility on the Crystal River near Redstone (Western Engineering, Inc. 1983). This new reservoir would require construction of a dam on the mainstem of the Crystal River, a tributary of the Roaring Fork River. To construct this dam on a water of the U.S. and inundate several existing wetlands would require a permit under Section 404 of the Clean Water Act. This alternative was eliminated from detailed analysis because of wetland impacts and the time required to permit and construct the reservoir (likely more than 10 years).

2.4.2.4 Obtain Water from Rivers Other than the Fryingpan River

This conceptual alternative would use water obtained from outside the Fryingpan River Basin to meet 10825 water needs. Several alternatives that relied on non-Fryingpan River water supplies were considered in the prior alternatives development and evaluation processes (Grand River Consulting 2007, 2009). These alternatives were eliminated for a variety of cost, logistical, and environmental reasons (Appendix A).

2.4.2.5 Subdaily Release Pattern

This alternative is identical to the Proposed Action, except releases of 5,412.5 AF/yr from Granby Reservoir would be made only 12 hours each day. The releases would be timed so that the water is conveyed through the Colorado River below Windy Gap Reservoir at the times of the day when water temperatures are historically highest. This would improve aquatic habitat conditions for the coldwater fishery in this reach of the Colorado River.

The subdaily release pattern was not evaluated in this EA because of large streamflow fluctuations associated with the shorter release times from Granby Reservoir, difficulty in operating Windy Gap Reservoir to allow the subdaily releases to pass without attenuation, difficulty in water administration on a subdaily scale, and adverse effects on irrigators.

3.0 Affected Environment and Environmental Consequences

3.1 Introduction

This chapter describes the affected environment and discloses the potential environmental consequences associated with implementing the Proposed Action as described in Chapter 2. Resources evaluated in this chapter include surface water hydrology, groundwater hydrology, water quality, hydroelectric generation, aquatic resources, wetland and riparian resources, vegetation and wildlife, soil and farmland resources, recreation, and socioeconomics and land use. A summary of effects is shown in Table 4 on page 27. As described in Section 3.2.12, air quality, flooding/floodplains, transportation, visual resources, noise and vibration, cultural resources, Indian trust assets, and hazardous materials would not be affected by the Proposed Action, and have been considered but eliminated from further evaluation.

10825 water is currently supplied through interim agreements (Section 1.4.3.3) that will not continue beyond 2013, with a possible extension for 2 more years. This existing condition provides a baseline condition, which was used to evaluate the level of potential impact resulting from the implementation of the Proposed Action. Impact thresholds used to analyze the Proposed Action are defined in the next section.

3.1.1 Impact Thresholds

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

3.1.1.1 Duration

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

Short-term: effects lasting up to 2 years.

Long-term: effects lasting more than 2 years and up to the length of the proposed contracts, which is up to 40 years.

All effects described in this chapter would be long term unless otherwise noted.

3.1.1.2 Type

Type describes the classification of the effect 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.

All effects described in this chapter would be adverse unless otherwise noted.

Direct: effects caused by the Proposed Action and occurring in the same time and place as the Proposed Action activities.

Indirect: effects caused by the Proposed Action but occurring later in time or farther removed in distance than the Proposed Action activities.

Cumulative: incremental effects caused by the Proposed Action 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.

Several reasonably foreseeable actions are anticipated to occur in the future regardless of the implementation of the Proposed Action. The cumulative effects analysis evaluates reasonably foreseeable actions that, when combined with the

Proposed Action, result in a cumulative effect on the environment. Potential future actions were considered reasonably foreseeable and were included in the cumulative effects analysis if they met all of the following criteria:

- The action would occur within the same geographic area where effects from the Proposed Action are expected to occur.
- The action would affect the same environmental resources as the Proposed Action, and contribute to the total resource impact.
- There is reasonable certainty as to the likelihood of the action occurring (e.g., actions that are funded or permitted for implementation or are included in firm near-term plans).

Potential future actions were identified through available data on known projects or actions under consideration in the vicinity of the analysis area. Future actions meeting the criteria described above are described in Section 3.2. Because the Proposed Action would result in limited new infrastructure or ground disturbance in remote areas, reasonably foreseeable actions were limited to those water-based actions that would have overlapping effects with the Proposed Action on water resources.

3.1.1.3 Intensity

Intensity of the effect describes the degree, level, or strength of an effect using qualitative terms of no impact, negligible, minor, moderate, or major. The following explains the thresholds used to determine intensity. Effects other than major effects are insignificant.

No effect: no discernable effect.

Negligible: effect is at the lowest level of detection and causes very little or no disturbance.

Minor: effect 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

Water-based actions refer to proposed water storage and diversion projects, water rights changes, or other activities requiring authorization under Section 404 of the Clean Water Act. The cumulative effects analysis focused on water-based actions because the Proposed Action involves very limited land-disturbing activities or other on-the-ground changes. All of the following reasonably foreseeable water-based actions were considered in the evaluation of cumulative effects.

3.2.1 Orchard Mesa Irrigation District–Efficiency Improvements

The Orchard Mesa Irrigation District (OMID) is a major supplier of irrigation water in the Grand Valley area, located just east of Grand Junction. OMID provides irrigation water to a 9,200-acre area south of the Colorado River, adjacent to the 15-Mile Reach. Water management techniques will be implemented to improve irrigation efficiency and reduce irrigation spills to the Colorado River from the OMID canal system. The improvements could reduce OMID's Colorado River diversions by an average 17,000 AF each year, without affecting local crop production. Reduced OMID irrigation diversions will be replaced with increased utilization of the Grand Valley Power Plant and associated water right. The power plant discharges water back to the Colorado River directly above the 15-Mile Reach thereby increasing flows in the reach. This operation may also result in reduced demand on the Green Mountain Reservoir HUP which would contribute to more frequent and larger magnitude surplus water declarations in some years.

3.2.2 Northern Water–Windy Gap Firming Project

The Municipal Subdistrict of the Northern Colorado Water Conservancy District (Subdistrict), is proposing to improve the firm yield of the existing Windy Gap Project. Reclamation completed a final Environmental Impact Statement (EIS) for the project in 2011 (Reclamation 2011a). Construction of Chimney Hollow Reservoir with prepositioning, along with associated operational changes developed as part of mitigation, is Reclamation's preferred alternative. This project is anticipated to result in additional average annual depletions of 21,000 AF from the Colorado River upstream of the Gunnison River.

In conjunction with the environmental evaluation of the Windy Gap Firming Project, the Subdistrict prepared a Fish and Wildlife Mitigation Plan and a Fish and Wildlife Enhancement Plan in coordination with the Colorado Division of Parks and Wildlife. Both plans were adopted by the Colorado Wildlife Commission on June 9, 2011 and subsequently by the CWCB on July 13, 2011 in accordance with CRS §37-60-122. The mitigation plan includes measures on the West Slope in the Colorado River basin in addition to East Slope mitigation measures. Components of the mitigation and enhancement plans with potential direct effects on the Colorado River below Windy Gap Reservoir include higher streamflow in the Colorado River and lower temperatures when specified temperature values are exceeded between July 15 and August 31. The Subdistrict is also participating with Denver Water on the Upper Colorado River Habitat Project. As described in the Fish and Wildlife Enhancement Plan, the goal of the Habitat Project is to design and implement a stream restoration program to improve the existing aquatic environment from the Windy Gap diversion at Windy Gap Reservoir to the lower terminus of the Kemp-Breeze State Wildlife Area, about 2 miles downstream from the confluence with the Williams Fork. If an action alternative is selected for implementation, Reclamation would incorporate final mitigation measures into the Record of Decision. Reclamation would be responsible for enforcing the monitoring and mitigation measures that are finalized in the ROD. The Corps may require additional mitigation measures as part of its evaluation for compliance with Section 404 Clean Water Act requirements. The Corps would be responsible for enforcing mitigation measures that were included in any Section 404 permit for the project.

3.2.3 Denver Water–Moffat Collection System Project

Denver Water's total system demand is anticipated to grow to 363,000 AF/yr on average by 2030. Denver Water's current demand is 285,000 AF/yr on average; therefore, an average increase in demand of 78,000 AF/yr is anticipated by 2030. The Moffat Collection System Project is proposed by Denver Water to develop 18,000 AF of new annual yield to Denver Water's collection system to meet future water demands on the east slope. The remainder of the deficit would be fulfilled by savings from implementing various conservation measures and by using existing infrastructure.

Denver Water proposes to enlarge its existing Gross Reservoir by 72,000 AF for Denver Water needs and 5,000 AF for an environmental pool, resulting in a total storage capacity of approximately 119,000 AF. The environmental pool would not increase diversions from the west slope. Using existing collection system infrastructure, water from the Fraser River, Williams Fork River, and South Boulder Creek would be diverted and delivered during average to wet years via the Moffat Tunnel and South Boulder Creek to Gross Reservoir. The project would not have additional diversions in dry years because Denver Water already diverts the maximum amount physically and legally available under their existing infrastructure and water rights even without the proposed additional storage in their system. The U.S. Army Corps of Engineers released a draft EIS for this project in 2009 (Corps 2009) and currently is preparing a final EIS.

In conjunction with the environmental evaluation of the Moffat Project, Denver Water prepared a Fish and Wildlife Mitigation Plan and a Fish and Wildlife Enhancement Plan in coordination with the Colorado Division of Parks and Wildlife. Both plans were adopted by the Colorado Wildlife Commission on June 9, 2011 and subsequently by the CWCB on July 13, 2011 in accordance with CRS §37-60-122. The mitigation plan includes measures on the West Slope in the Fraser, Williams Fork, and Colorado River basins in addition to East Slope mitigation measures. Denver Water is also participating with the Subdistrict on the Upper Colorado River Habitat Project as described in Section 3.2.2. The Corps may require additional mitigation measures as part of its evaluation for compliance with Section 404 Clean Water Act requirements. The Corps would be responsible for enforcing mitigation measures that are included in any Section 404 permit for the project.

3.2.4 Colorado River Cooperative Agreement

Denver Water and west slope interests have developed a proposed comprehensive agreement known as the Colorado River Cooperative Agreement (CRCA) and related Intergovernmental Agreement Learning by Doing for the Cooperative Effort. Among other things, the Cooperative Effort is intended to addresses impacts that may be associated with existing operations by Denver Water, Grand County, and other water users. In the CRCA, Denver Water has committed to provide certain enhancements to the aquatic environment in the Fraser, Williams Fork, and upper Colorado rivers. Included in these enhancements is water made available by Denver Water to Grand County for the aquatic environment. The CRCA also establishes a cooperative process known as Learning By Doing/Cooperative Effort managed by Grand County, the Colorado River Water Conservation District, Colorado Division of Parks and Wildlife, Trout Unlimited, Middle Park Water Conservancy District, and Denver Water. The purpose of Learning By Doing is to utilize available resources to protect and where possible, enhance, the Upper Colorado River and Fraser Rivers. The Municipal Subdistrict also intends to participate in Learning By Doing. Denver Water also has agreed to study how to maintain the historical agricultural uses of the Big Lake Ditch to maximize the environmental benefits while substantially preserving the yield for Denver Water.

As part of the draft CRCA, the parties also will work toward implementing a "Shoshone Outage Protocol" during an unscheduled outage of the Shoshone Power Plant to mitigate the potential adverse effects of the absence of the Shoshone call. Denver Water, the Middle Park Water Conservancy District and the CRWCD agree to operate their water collection and storage systems as if the senior Shoshone Power Plant right were in priority during specified times when the plant is not operational. The parties will cooperate to manage flows in the Colorado River based on historical conditions and will work with Reclamation to achieve operation of Green Mountain Reservoir based on the Outage Protocol. Reclamation has not yet taken a position on participation in the Outage Protocol, but has operational flexibility to participate with or without a formal agreement on how releases from Green Mountain Reservoir are managed during an outage. Reclamation has used this operational flexibility in recent years to participate in ad hoc flow management that is similar to the Shoshone Outage Protocol, and it is reasonably foreseeable that Reclamation will participate in the Shoshone Outage Protocol.

The parties agree to not oppose the existing 2007 Shoshone call relaxation agreement between Denver Water and Xcel Energy (see next section) and to support renewal of the agreement.

3.2.5 Grand County Environmental Water

Denver Water and the Municipal Subdistrict of the Northern Colorado Water Conservancy District have proposed to make water available to Grand County for environmental purposes. The amount of environmental water made available to Grand County would exceed 2,000 AF/yr. Denver Water

would make such water available only if Denver Water's proposed Moffat Collection System Project receives all required permits (see Section 3.2.3). The Municipal Subdistrict would make such water available only if Municipal Subdistrict's proposed Windy Gap Firming Project receives all required permits (see Section 3.2.2). The environmental water would be either bypassed at, or released from, facilities of Denver Water that are located within Grand County or from Subdistrict water supplies stored in C-BT facilities in Grand County. The timing and rate of the environmental bypasses or releases would be directed by Grand County, with guidance from the Grand County Stream Management Plan (Tetra Tech et al 2010).

3.2.6 Xcel Energy–Reduction in Shoshone Call

The Shoshone Power Plant, which is owned by Xcel Energy, has two water rights to divert a total of 1,408 cfs from the Colorado River 8 miles east of Glenwood Springs. Denver Water and Xcel Energy have negotiated an agreement to invoke a relaxation of the Shoshone call at limited times when river flows are less than 1,408 cfs at the point of diversion. The agreement to relax the call could result in a call of 704 cfs, which would be managed to prevent injury to irrigation users in the Cameo/Grand Valley area. The Cameo call refers to a suite of senior water rights near Grand Junction. The Shoshone call would be increased above 704 cfs as needed to keep the Cameo water rights satisfied. The Shoshone call relaxation could be invoked if, in March, Denver Water predicts its total system storage to be at or below 80 percent on July 1 that year, and the March 1 Natural Resources Conservation Service forecast for Colorado River flows at Kremmling or Dotsero are at or below 85 percent of average. The Shoshone call relaxation could be invoked between March 14 and May 20. The term of this agreement is from January 1, 2007 through February 28, 2032.

3.2.7 Colorado Springs Utilities Continental-Hoosier System Exchanges

Colorado Springs Utilities has absolute and conditional rights of exchange in Case No. 03CW314 in connection with the Continental-Hoosier System. These exchange rights would allow Colorado Springs Utilities to divert additional water at the Continental-Hoosier System when their rights are out of priority (e.g., Xcel Energy's Shoshone Power Plant rights are calling) and exchange potential exists in the Blue River Basin. These exchange rights would typically be exercised in late summer/early fall after Colorado Springs Utilities has completed diverting under the Blue River Decree. The circumstances under which these exchanges could occur are varied and difficult to predict since they depend on the physical availability of water at the Continental-Hoosier System and intervening water rights in the exchange reach including Denver Water's rights at Roberts Tunnel and Dillon Reservoir. The operation of these exchanges also depends on Colorado Springs Utilities' operational needs and potential benefits to its system. Although Colorado Springs Utilities may have the physical and legal ability to exercise an exchange, it may choose not to do so based on other factors related to their overall system operation. Reclamation completed a final EA and FONSI for this project in 2008 (Reclamation 2008).

3.2.8 Colorado River Water Conservation District–Increases in Wolford Mountain Reservoir Contract Demands

The CRWCD projects that the demand for contract water out of Wolford Mountain Reservoir will increase in the future. Currently, there is about 8,750 AF/yr of available contract water in Wolford Mountain Reservoir. (Colorado Springs has a lease for contract water from Wolford Mountain Reservoir that reduces the firm yield of the contract pool from 10,000 AF/yr to 8,750 AF/yr.) The CRWCD indicates that the full 8,750 AF/yr will

likely be contracted for by 2030. In addition, MPWCD has 3,000 AF/yr of storage in Wolford Mountain Reservoir, of which 613 AF/yr is owed to Denver under the Clinton Reservoir Agreement. The CRWCD indicated that the remaining 2,387 AF/yr will likely be contracted for by 2030. Therefore, the total additional future demand for contract water from Wolford Mountain Reservoir is assumed to be 11,137 AF/yr by 2030.

3.2.9 Denver Water–Expiration of Big Lake Ditch Contract

The Big Lake Ditch is a senior irrigation right in the Williams Fork Basin that diverts below Denver Water's Williams Fork collection system and above Williams Fork Reservoir. Big Lake Ditch diversions are currently delivered for irrigation above Williams Fork Reservoir and for use in the Reeder Creek drainage, which is a tributary of the Colorado River. Return flows associated with irrigation in the Reeder Creek drainage return to the Colorado River below the confluence with the Williams Fork.

In 1963, Denver Water entered into a contract with Bethel Hereford Ranch Inc., which owned and operated the Big Lake Ditch, whereby Denver Water purchased the ranch's water rights. Bethel Hereford was granted a 40-year lease to continue its operation under the condition that the Big Lake Ditch water rights are not called if needed by Denver Water. The 1963 agreement was superseded by a 1998 agreement, which extended the operation of the Big Lake Ditch through 2013, and provided more detail on the conditions under which Denver Water would need the water. The 1998 agreement expires in 2013 and Denver Water does not plan to extend the existing contract. After the contract expires in 2013, diversions by the Big Lake Ditch may be substantially reduced.

3.2.10 Grand and Summit Counties–Increased Water Use

The population in Grand and Summit counties is expected to more than double over the next 25 years, from a year-round population of about 39,000 in 2005 to about 79,000 in 2030 (ERO Resources Corporation and Harvey Economics 2005). Most growth in Grand County is likely to occur in the Fraser River Basin while future increases in water use in Summit County are expected to occur in that portion of the Blue River Basin downstream of Dillon Reservoir. Build-out municipal and industrial demands are estimated to be 16,168 AF/yr for Grand County and 17,940 AF/yr for Summit County as identified in the Upper Colorado River Basin Study (Hydrosphere 2003). The timing of the growth in demand depends upon economic development trends in the respective service areas of the individual water providers. Increased water use and wastewater discharges are expected to result in changes in the quantity and timing of streamflows and water quality.

3.2.11 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 2011b). The report presented assessments of future supply across eight major river basins, including the Colorado River Basin. Reclamation considers a changing climate as reasonably foreseeable. Reclamation accessed the Bias Corrected and Downscaled World Climate Research Programme's Coupled Intercomparison Project Phase 3 Climate and Hydrology Projections to project potential changes in runoff in the headwaters of the Colorado and Fryingpan river basins. The results (Reclamation 2012) project a negligible to slight trend for reduced runoff when existing trends for green house gas emissions were assumed . Greater or lesser carbon emission scenarios were not considered. Based on these projections, we do not anticipate changing climate and runoff patterns to

have significant cumulative influences on the federal action when combined with other potential project impacts because: 1) runoff from the upper reaches of these basins is not projected to be significantly reduced, and 2) any potential reduction in runoff volume or change in runoff timing can be ameliorated by the regulating nature of Granby and Ruedi reservoirs.

3.2.12 Mountain Pine Beetle-Killed Trees

Severe mountain pine beetle infestation in Colorado is significantly impacting the extensive lodgepole pine forest that dominates the higher elevations of the upper Colorado River Basin. Many trees have been killed and remaining large areas of trees are likely to die in the near future. The loss of these trees has several implications in the upper Colorado River watershed within the analysis area depending on harvest activities, the composition and age class of the forest, forest fire, and other factors. A reduction in live tree cover in even-aged stands is likely to result in an increase in water yield through reduced consumptive use losses until replacement vegetation is established (Stednick et al. 2010). In mixed-age forests, other vegetation may replace dying lodgepole pines and water yield could decrease. Where trees are harvested or killed by beetles, soils can warm increasing the rate of nitrification, which could increase nitrate concentrations in runoff (Stednick et al. 2010). The potential for wildfire also increases in pine beetle-damaged forests, which could result in increased runoff along with sediment and nutrient increases in streams in the Colorado River Basin.

Because the hydrologic and water quality implications of the pine beetle epidemic would be very similar for existing conditions and the Proposed Action, and because evaluating the effects would require a substantial number of assumptions on likely conditions in the watershed, a detailed analysis of the range of potential effects of this reasonably foreseeable action was not conducted in the EA.

3.2.13 Actions Not Considered Reasonably Foreseeable

Table 3 presents actions suggested during the scoping process that Reclamation has determined are not reasonably foreseeable.

3.3 Issues Considered but Eliminated from Further Evaluation

Issues were dismissed from further evaluation if impacts do not have the potential to occur because they are not related to the Proposed Action or if impacts would clearly be negligible. Topics dismissed from analysis based on these guidelines are discussed in Table 3.

3.3.1 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.

3.3.2 Cultural Resources and Indian Trust Assets

Cultural resources include significant historic and prehistoric sites that constitute an important part of the legacy of human presence on the land. The Proposed Action would have no effect on cultural resources because no land disturbances would occur as a result of the Proposed Action.

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 Rights, Federal-Tribal Trust Responsibilities; the Endangered Species Act; and Secretarial Order 3175, Departmental Responsibilities. No known

Table 3. Actions Not Considered Reasonably Foreseeable.

Action Suggested During Scoping	Reason Considered Not Reasonably Foreseeable
Future of Xcel Energy's Shoshone call (i.e., if the call were off for an extended period, it could be detrimental to the endangered fish at times of the year when the proposed 10825 Project would not result in releases)	River operations at times of the year when proposed 10825 operations or effects would not occur are not germane to this NEPA process
Future Ruedi Reservoir contracts	There are no outstanding requests for new contracts from Reclamation for water stored in Ruedi Reservoir
Planned policies of the Colorado Statewide Water Supply Initiative (SWSI)	SWSI has no firm plans or policies that could be analyzed at this time
Increased water demand from Wolcott Reservoir (i.e., a proposed new reservoir on a tributary to the Eagle River)	The project is at the conceptual stage; project proponents have made no requests for permitting or other approvals
Oil shale development	There are no firm quantifiable plans for oil shale development; Reclamation has received no requests for related water contracts
Multibasin Water Supply Project (Yampa River Project)	The project is at the conceptual stage; project proponents have made no requests for permitting or other approvals
Ruedi Reservoir Pumpback Project (i.e., pumping from Ruedi Reservoir upstream to the Boustead Tunnel)	The project is at the conceptual stage; project proponents have made no requests for Reclamation action
"Around the Horn" alternative to Moffat Collection System Project	The alternative was dismissed from further consideration during alternatives analysis for the Moffat Collection System Draft EIS

Indian trust assets are within the area potentially affected by the Proposed Action, and the Proposed Action would have no effect on Indian Trust Assets.

3.3.3 Floodplains

Anticipated flows in all analysis area streams and rivers are anticipated to be below channel forming flows and floodplains are not anticipated to be affected by the Proposed Action.

3.3.4 Hazardous Materials

Hazardous materials are defined in various ways under a number of federal and state regulatory programs (e.g., Environmental Protection Agency [EPA] and Colorado Department of Public Health and Environment [CDPHE]). Sites with recognized environmental conditions of concern are those where known, existing, or past releases of hazardous substances, including petroleum products and other organic substances, metals, and other inorganic substances have been released to soil or groundwater. Risks to human health and the environment may occur when these materials are not managed properly. No hazardous materials are anticipated to be affected by the Proposed Action.

3.3.5 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 flow and reservoir level changes and, thus, would not impact the visual quality of streams and reservoirs.

3.4 Summary of Effects

Table 4 presents a summary of the environmental consequences of the Proposed Action. These effects are discussed in greater detail in the subsections below for each resource.

Table 4. Summary of Direct and Indirect Environmental Effects.

Affected Resource	Direct and Indirect Effects from the Proposed Action
Surface Water Hydrology	Moderate long-term increase in North Fork Colorado River flow between the Redtop Valley Ditch and Shadow Mountain Reservoir and in Stillwater Creek between the Redtop Valley Ditch and Granby Reservoir during May, June, and July. Minor long-term decrease in Willow Creek flow during May, June, and July. Minor long-term decrease in Muddy Creek flow when exchange or substitution was made into Wolford Mountain Reservoir. Moderate long-term increase in Colorado River flow between Granby Reservoir and 15-Mile Reach during August and September. Minor, long-term infrequent changes in Blue River flow when an exchange or substitution of water was made from Granby Reservoir to Green Mountain Reservoir.
Groundwater Hydrology	Minor to negligible long-term reduction in groundwater levels near the Redtop Valley Ditch and agricultural dry-up area due to flow reductions in the Redtop Valley Ditch.
Water Quality	Minor long-term beneficial reduction in temperatures in Colorado River below Windy Gap when reservoir releases were made. Negligible effect on stream water quality. No effect on reservoir water quality.
Reservoir Operations and Hydroelectric Generation	No effect on Shadow Mountain Reservoir and Grand Lake storage levels and minor effect on Granby Reservoir storage levels. Minor, long-term infrequent increase in Green Mountain Reservoir storage levels if an exchange of water was made from Granby Reservoir to Green Mountain Reservoir. Minor decreased summer reservoir levels in Green Mountain Reservoir in dry years only. No effect on the contract and HUP allocations in Green Mountain Reservoir or Denver Water and Colorado Springs Utilities substitution requirements No effect on hydroelectric generation.
Aquatic Resources	Minor to negligible long-term beneficial effect in North Fork Colorado River and Stillwater Creek. Minor to moderate long-term adverse effect in Willow Creek. Minor long-term beneficial reduction in August and September stream temperatures and improvement in fish habitat in Colorado River below Windy Gap. Negligible effect on other rivers, streams, and reservoirs.

Affected Resource	Direct and Indirect Effects from the Proposed Action
Wetland and Riparian Resources	Increased riparian and wetland vegetation along Stillwater Creek long-term. Negligible effect on wetlands along Muddy Creek, Willow Creek, Colorado River, and Blue River. About 62 acres of wetlands occur within the agricultural dry-up area. Wetlands that are supported solely by irrigation would be permanently lost; wetlands supported by a naturally occurring high water table or streamflows that existed before development of irrigated agriculture would remain. No effect on wetlands associated with Granby or Green Mountain reservoirs.
Vegetation and Wildlife Resources	No effect on federally threatened and endangered wildlife or plant species or Colorado plant species of concern. Minor long-term habitat reduction for sandhill crane, greater sage grouse, boreal toad, and wood frog. Negligible effect on raptor foraging habitat and no effect on known raptor nests or on large game. Minor change in species composition in agricultural dry-up area.
Soils and Farmland	Permanent loss of 752 acres of farmland of statewide importance in agricultural dry-up area.
Recreation	Negligible to minor long-term effects on reservoir recreation in Granby and Green Mountain. Negligible effects on boating and fishing in the Blue River and Colorado River.
Socioeconomics and Land Use	Negligible to minor long-term effects on water-based recreation economies. Negligible adverse effect on the agricultural portion of the Grand County economy. No disproportionately high and adverse human health or environmental effects on minority and low-income populations.

3.5 Surface Water Hydrology

3.5.1 Affected Environment

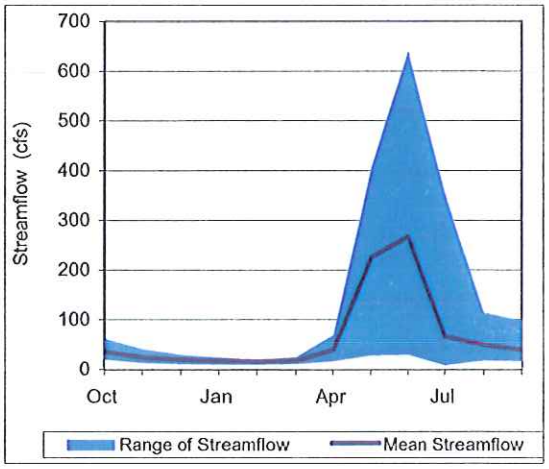
3.5.1.1 North Fork Colorado River below Redtop Valley Ditch

The North Fork Colorado River is a tributary to the Colorado River that flows into Shadow Mountain Reservoir. The North Fork Colorado River watershed is 102 square miles and originates north of the Town of Grand Lake within Rocky Mountain National Park. The potentially affected river segment of the North Fork Colorado River extends downstream of the Redtop Valley Ditch diversion 3 miles to Shadow Mountain Reservoir (Figure 2). Northern Water maintains a stream gage on the North Fork Colorado River at the inlet to Shadow Mountain Reservoir.

The Redtop Valley Ditch diverts water for irrigation use in an area generally to the west of Shadow Mountain and Granby reservoirs. The ditch is decreed a total of 150 cfs for diversion from the North Fork Colorado River. As reported by the Colorado Division of Water Resources, diversions into the ditch have historically averaged 11,708 AF/yr, over the period from 1975 to 2010 with most of the water diverted from the North Fork Colorado River. Private diversion records maintained by the ditch owners reflect an average annual diversion of 11,418 AF/yr for the period extending from 1991 through 2010. The ditch commonly diverts between 140 cfs and 150 cfs of water. Maximum diversions by the Redtop Valley Ditch are coincident with peak streamflow of the North Fork Colorado River. During peak snowmelt runoff, the flow of the North Fork Colorado River exceeds the capacity of the Redtop Valley Ditch. The amount of water diverted by the ditch typically decreases in late June and July as streamflow of the North Fork Colorado River declines to an amount that is less than the capacity of the ditch. The Redtop Valley Ditch often dries up the North Fork Colorado River below the ditch headgate from late June through the end of the irrigation season in July. Irrigation return flows from the ditch accrue to either Granby Reservoir or Willow Creek at a location downstream of Willow Creek Reservoir.

Historical streamflow of the North Fork Colorado River at the inlet to Shadow Mountain Reservoir is summarized in Figure 4. Upstream diversions by the Grand River Ditch affect streamflow. Diversion records maintained by the Division of Water Resources indicate the historical average diversion from the Grand River Ditch is 19,000 AF/yr. Smaller water diversions from the North Fork supply a limited amount of residential and irrigation use. Diversions by these structures are small in comparison to the diversions by the Redtop Valley Ditch and Grand River Ditch.

Figure 4. North Fork Colorado River below Redtop Valley Ditch, Mean Monthly Historical Streamflow (1991-2008)



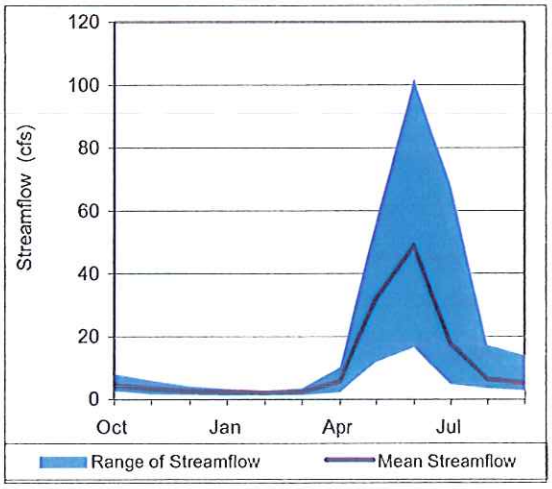
Source: Grand River Consulting 2012.

An instream flow water right has not been decreed for the North Fork Colorado River below the Redtop Valley Ditch because of the lack of streamflow to maintain such a water use. The CWCB has a decreed instream flow water right of 18 cfs from May through September, and 10 cfs from October through April, for the stream segment above the Redtop Valley Ditch diversion.

3.5.1.2 Stillwater Creek below Redtop Valley Ditch

Stillwater Creek is a tributary to the Colorado River that flows into Granby Reservoir. The affected segment of Stillwater Creek extends downstream of the Redtop Valley Ditch diversion 2 miles to Granby Reservoir (Figure 2). The drainage area at the U.S. Geological Survey (USGS) gage 09018000 (Stillwater Creek above Granby Reservoir near Grand Lake) is 17.5 square miles. Additional information on historical streamflow of Stillwater Creek at the inlet to Granby Reservoir is shown in Figure 5.

Figure 5. Stillwater Creek below Redtop Valley Ditch, Mean Monthly Historical Streamflow (1991-2008).



Source: Grand River Consulting 2012.

The Redtop Valley Ditch is decreed 150 cfs from the North Fork Colorado River and an alternate point of diversion for 10 cfs from Stillwater Creek. The ditch can also divert another 12 cfs of water at the Stillwater intake pursuant to water rights associated with other ditches in the area. The Redtop Valley Ditch is the primary diversion facility that reduces the streamflow of Stillwater Creek, although several other smaller irrigation structures are also located on the stream. A year-round instream flow water right of 3 cfs was decreed to the CWCB for Stillwater Creek upstream of the Redtop Valley Ditch headgate. An instream flow right has not been decreed for the segment of the stream below the Redtop Valley Ditch.

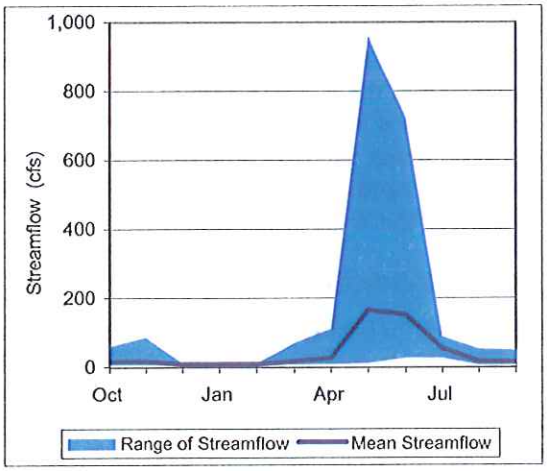
3.5.1.3 Willow Creek

Willow Creek flows into the Colorado River about 4 miles downstream of the outlet from Granby Reservoir (Figure 2). The drainage area at the USGS gage on Willow Creek (ID 09021000, Willow Creek below Willow Creek Reservoir) is 134 square miles. Willow Creek Reservoir and the Willow Creek Pump Station and Canal are part of the C-BT Project. The C-BT Project stores water in Willow Creek Reservoir and diverts water from Willow Creek Reservoir to Granby Reservoir via the Willow Creek Pump Canal. A portion of the return flows from irrigation on lands downslope of the Redtop Valley Ditch is tributary to Willow Creek downstream of Willow Creek Reservoir. As a result, streamflow of Willow Creek below the reservoir is influenced by C-BT Project operations and historical Redtop Valley Ditch irrigation. Historically, the C-BT Project has diverted 30,000 AF/yr on average from Willow Creek to Granby Reservoir (Reclamation 2007). About 5,121 AF/yr of Redtop Valley Ditch irrigation return flows have historically accrued to Willow Creek below the reservoir, which comprises 17 percent of the flow in the creek.

The affected reach of Willow Creek extends from the Willow Creek Reservoir outlet to the confluence of the Colorado River. This 1-mile segment of lower Willow Creek currently receives irrigation return flow from the Redtop Valley Ditch. Willow Creek Reservoir is operated to maintain a flow of at least 7 cfs below the reservoir from October 1 to April 30.

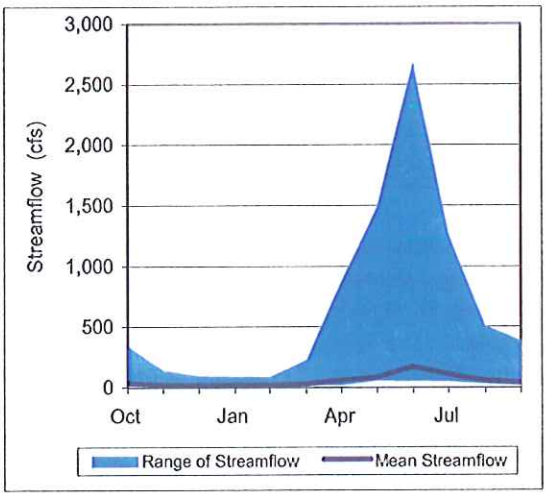
The 10825 Project would affect flow in Willow Creek only during the May through July irrigation season. Peak flow in the creek occurs between late May and early July and is about 500 cfs in an average year (Figure 6).

Figure 6. Willow Creek, Mean Monthly Historical Streamflow (1991-2008).



Source: Grand River Consulting 2012.

Figure 7. Colorado River below Granby, Mean Monthly Historical Streamflow (1991-2008).



Source: Grand River Consulting 2012.

3.5.1.4 Colorado River below Granby Reservoir

Granby Reservoir stores water for the C-BT and Windy Gap projects that is eventually diverted through the Adams Tunnel to the east slope of Colorado. Flows in the Colorado River below Granby Reservoir are a function of reservoir releases, instream flow requirements and Granby Reservoir spills. The historical streamflow of the Colorado River below Granby Reservoir is illustrated on Figure 7. During infrequent wet periods, Granby Reservoir may fill to capacity and spill water, which increases streamflow above the minimum bypass requirements in this segment.

Bypass requirements below Granby Reservoir are specified in a U.S. Department of the Interior memorandum titled "Principles to Govern the Release of Water at Granby Dam to Provide Fishery Flows Immediately Downstream in the Colorado River" (USDI 1961). The Principles are intended to preserve at all times that section of the Colorado River between Granby Reservoir and the mouth of the Fraser River as a live stream, and to insure an adequate water supply for irrigation, sanitary purposes, preservation of scenic attractions, and preservation of fish life as required by Senate Document 80, which authorized the C-BT Project. The bypass requirement is 20 cfs from September through April, 75 cfs from May through July, and 40 cfs in August. During the summer months (May through September), streamflow measurements are recorded at the USGS gage 09019500, Colorado River near Granby. During the winter months (October through April), streamflow is recorded at Granby Dam. The bypass requirement below Granby Reservoir may be reduced from May through September when the advance forecast of inflow to Shadow Mountain and Granby reservoirs (less the decreed irrigation rights in the reach of the Colorado River between Granby Reservoir and the confluence with the Fraser River) and the water capable of being pumped from Willow Creek Reservoir is less than 230,000 AF/yr. The allowable reductions in bypasses are shown in Table 5.

In recent years, additional water has periodically been released from Granby Reservoir in coordination with Grand County. Grand County has periodically paid the Subdistrict to pump water from the Colorado River through the Windy Gap pumping plant into Granby Reservoir. This pumping has occurred when the Subdistrict has

Table 5. Percent Reduction for Forecast Inflow.

Forecast Inflow (thousand AF)	Percent Reduction
220-230	15
210-220	20
195-210	25
Less than 195	30

excess capacity in the Windy Gap pumping plant, when no downstream river calls have been in place, and when storage space in Granby Reservoir is available. The Windy Gap water pumped into Granby Reservoir for Grand County has been subsequently released to the Colorado River to improve temperatures and enhance flows in the Colorado River downstream of the Windy Gap diversion.

3.5.1.5 Colorado River at Windy Gap Reservoir

Windy Gap Reservoir is on the Colorado River downstream of the confluence with the Fraser River west of Granby. Windy Gap Reservoir serves as a forebay for the Windy Gap pumping plant, which pumps water into Granby Reservoir. The historical streamflow of the Colorado River at Windy Gap Reservoir is illustrated on Figure 8. The gage is directly below the Windy Gap Reservoir.

A 1980 Memorandum of Understanding (MOU) between the Colorado Division of Wildlife (CDOW) and the Subdistrict established minimum streamflow requirements on the reach of the Colorado River downstream of the Windy Gap diversion to the confluence with the Blue River, which were subsequently decreed by the CWCB. These instream flow requirements are:

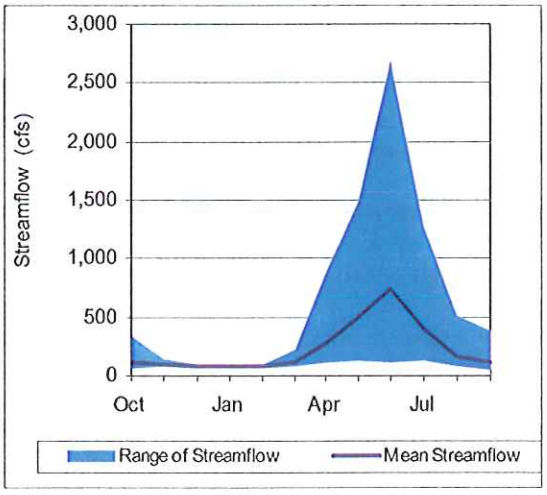
- 90 cfs from the Windy Gap diversion point to the mouth of the Williams Fork River
- 135 cfs from the mouth of the Williams Fork River to the mouth of Troublesome Creek
- 150 cfs from the mouth of Troublesome Creek to the mouth of the Blue River

The instream flows for this segment of the Colorado River have a priority that is junior to the water rights of the C-BT Project. The instream flow rights do not affect diversions of the C-BT Project; however, consistent with the MOU, the minimum streamflows in the 1980 MOU do affect diversions by the Windy Gap Project.

3.5.1.6 Muddy Creek

Muddy Creek generally flows north to south from its headwaters in the Gore and Rabbit Ears Range to the confluence with the Colorado River near Kremmling. The total drainage area of the basin is 270 square miles at the stream gage (USGS site 09041400). Average annual precipitation exceeds 25 inches near the headwaters of the basin to more than 12 inches in the lower-elevation areas. The area potentially affected by the Proposed Action extends from Wolford Mountain Reservoir downstream about 7 miles to the confluence of the Colorado River.

Figure 8. Colorado River at Windy Gap Reservoir, Mean Monthly Historical Streamflow (1991-2008).

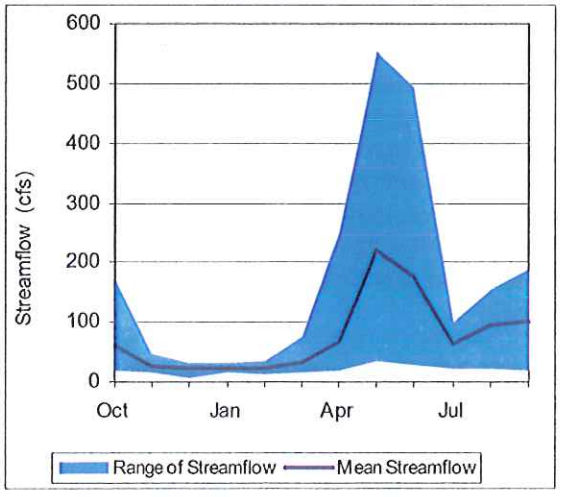


Source: Grand River Consulting 2012.

In the affected reach, flows in Muddy Creek are influenced by Wolford Mountain Reservoir operations and releases. Wolford Mountain Reservoir bypass requirements to Muddy Creek are equal to the lesser of natural flow or 20 cfs from July 15 to April 30, 70 cfs from May 1st to May 14, 105 cfs from May 15 rough June 30, and 70 cfs from July 1st rough July 14. Additional water is periodically bypassed from the reservoir during the irrigation season to satisfy downstream senior water rights that divert from Muddy Creek.

The mean monthly historical streamflow and the range of historical monthly streamflows for the 1991 through 2008 study period for Muddy Creek below Wolford Mountain Reservoir USGS gage 09041400 are shown in Figure 9. The flow of the Muddy Creek below Wolford Mountain Reservoir USGS gage 09041400 is typically greater than natural conditions from mid-summer through the end of October. The increase in flow is associated with Wolford Mountain Reservoir releases for a variety of downstream uses.

Figure 9. Muddy Creek below Wolford Mountain Reservoir, Mean Monthly Historical Streamflow (1991-2008).



Source: Grand River Consulting 2012.

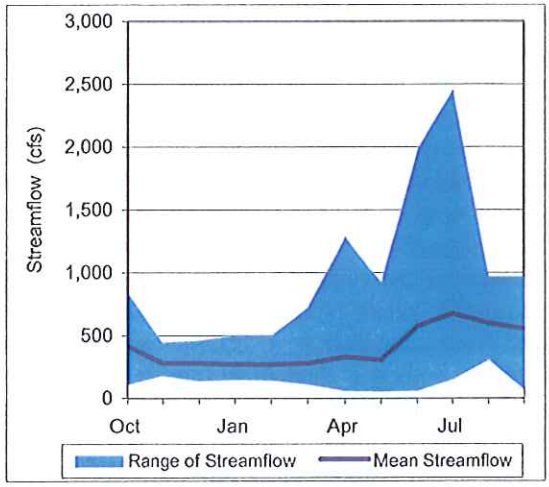
3.5.1.7 Blue River below Green Mountain Reservoir

The Blue River flows generally northwest from its headwaters in southern Summit County to Dillon Reservoir, Green Mountain Reservoir, and then to the Colorado River near Kremmling. The river forms a long valley between the Williams Fork Mountains to the north and east and the Tenmile Range and Gore Range to the south and west. The drainage area of the basin is 599 square miles at USGS gage 09057500 (Blue River below Green Mountain Reservoir). The average annual precipitation varies with elevation across the Blue River Basin, ranging from 15.5 inches at Green Mountain Reservoir dam in the lower Blue River Basin to nearly 24 inches at Climax Mine near Fremont Pass. Streamflows are highly variable by season across the basin. Most of the annual streamflow results from snowmelt from May to July. The potentially affected river segment in the Blue River Basin is downstream of Green Mountain Reservoir. Streamflow within the analysis area is heavily influenced by storage and releases from the upstream reservoirs and transmountain diversion projects.

A CWCB instream flow right was decreed in 1987 for the river reach below Green Mountain Reservoir. This instream flow right is for 60 cfs from May 1 through July 15, and 85 cfs from July 16 through April 30.

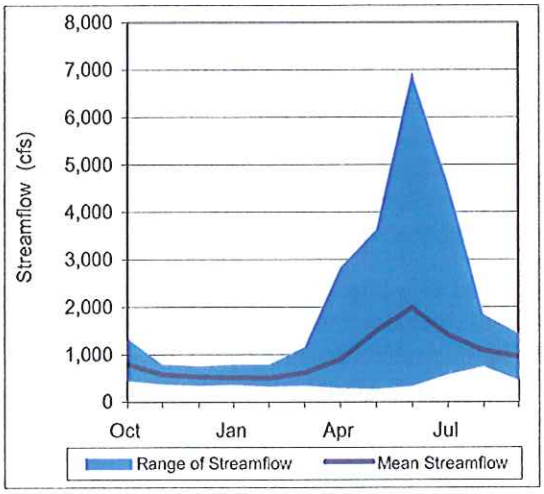
The mean monthly historical streamflow and the range of historical monthly streamflows for the 1991 through 2008 study period for the Blue River below Green Mountain Reservoir USGS gage 09057500 are shown in Figure 10. The flow of the Blue River below Green Mountain Reservoir USGS gage 09057500 is typically greater than natural conditions from mid-summer through the end of October. The increase in flow is associated with Green Mountain Reservoir releases for a variety of downstream uses.

Figure 10. Blue River below Green Mountain Reservoir, Mean Monthly Historical Streamflow (1991-2008).



Source: Grand River Consulting 2012.

Figure 11. Colorado River near Kremmling Reservoir, Mean Monthly Historical Streamflow (1991-2008).



Source: Grand River Consulting 2012.

3.5.1.8 Colorado River near Kremmling

Historical streamflow of the Colorado River below Kremmling is measured at USGS gage 09058000. This site is downstream of the Blue River and Muddy Creek. Historical streamflow conditions for this site are illustrated in Figure 11.

As with the Blue River, streamflow below Kremmling is typically greater than natural conditions from mid-summer through the end of October. Historically, the increase in flow has been associated with the following reservoir releases:

- Green Mountain Reservoir releases for a variety of downstream uses
- Temporary releases of 10825 water from Williams Fork Reservoir from 2000 through 2008
- Temporary releases of 10825 water from Wolford Mountain Reservoir in 2000, 2001, 2005, 2006, 2007, and 2008
- Releases from the 6,000-AF mitigation pool in Wolford Mountain Reservoir beginning in 1998, but not in 2004, 2005, or 2007

From 2000 through 2008, an average of 2,999 AF/yr of the temporary 10825 water was released from Wolford Mountain Reservoir (Grand River Consulting 2012), while an average of 4,045 AF/yr was released from Williams Fork Reservoir. The total historical release of temporary 10825 water from these two reservoirs has averaged 7,044 AF annually. The releases have been less than 10,825 AF/yr in several years pursuant to provisions in the interim agreements that allow a reduction in releases during drought periods, and pursuant to operational decisions by the Service. The releases of 10825 water under interim agreements have primarily occurred in August and September. Instream flow rights have not been adjudicated for the reach of the Colorado River below the Blue River.

3.5.1.9 Fryingpan River below Ruedi Reservoir

The Fryingpan River flows generally west from the Continental Divide to the confluence with the Roaring Fork River near Basalt. The total drainage area of the basin is 237 square miles at the Fryingpan River near Ruedi stream gage (USGS gage 09080400). The average annual precipitation

exceeds 30 inches near the headwaters of the basin. The area potentially affected by the Proposed Action extends from Ruedi Reservoir downstream 13 miles to the confluence of the Roaring Fork River.

Flows in the Fryingpan River are influenced by Ruedi Reservoir operations and releases. Ruedi Reservoir must bypass 39 cfs or the total inflow, whichever is less, from November through April. The bypass requirement increases to 110 cfs or inflow from May through October. The Rocky Fork Creek tributary flow is included in the bypass measurement (U.S. House of Representatives 1961). Ruedi Reservoir releases are also made based on the terms of the 2012 Agreement (Reclamation 2003):

1. Reclamation will generally release water upon the request of the Service between early July and late October, up to the amount needed to contribute toward meeting target flows in the 15-Mile Reach

2. Reclamation will determine the amount, timing, and rate of releases in consultation with the Service

3. Reclamation will notify the CWCB and the Division 5 Engineer of the date, time, and amount of the water released. The Service and Reclamation will consult with the CWCB during the release period to achieve the objectives of Reclamation, the Service and the CWCB.

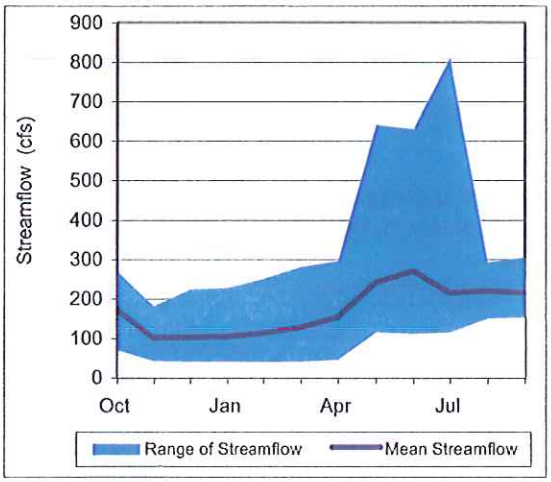
4. Reclamation will continue to attempt to make release adjustments of no more than 50 cfs increments when feasible and consistent with the multiple Fry-Ark Project purposes.

5. Reclamation will evaluate the final results of the Roaring Fork Conservancy fishery study and coordinate with the Colorado Division of Wildlife (now Colorado Parks and Wildlife) to assess recommendations in the study and work toward implementing those appropriate measures and monitoring techniques that are feasible and consistent with the multiple Project purposes.

6. Efforts will be made to limit cumulative flows to 250 cfs or less when consistent with the multiple Project purposes and reasonable to do so, and so long as future fishery research does not indicate that flows in excess of 250 cfs are important for Fryingpan or Roaring Fork River fishery maintenance or enhancement.

The mean monthly historical streamflow and the range of historical monthly streamflow for the Fryingpan River near Ruedi Reservoir are shown in Figure 12. The streamflow of this river segment is substantially affected by reservoir releases for the Recovery Program.

Figure 12. Fryingpan River below Ruedi Reservoir, Mean Monthly Historical Streamflow (1991-2008).



Source: Grand River Consulting 2012.

3.5.1.10 Roaring Fork River near Glenwood Springs

The Roaring Fork River Basin is bounded by the Eagle River Basin to the north and the Gunnison River Basin to the south. The total drainage area of the basin is 1,451 square miles at the USGS gage 09085000 (Roaring Fork River at Glenwood Springs, Colorado). The average annual

precipitation varies with elevation across the basin, ranging from 16 inches near the confluence with the Colorado River at Glenwood Springs to 30 inches near Independence Pass.

The analysis area for the Roaring Fork River is from its confluence with the Fryingpan River, downstream to the Colorado River. Historical streamflow conditions for this segment are shown in Figure 13.

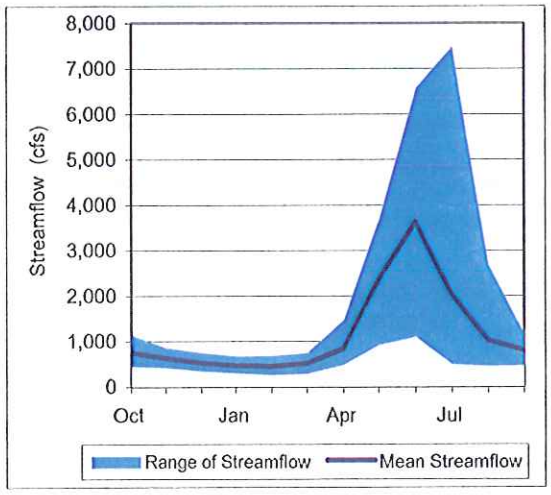
A CWCB instream flow right was decreed for the Roaring Fork River from the confluence with the Fryingpan River downstream to the confluence with the Crystal River. This instream flow right is for 145 cfs from April through September and 75 cfs from October through March. The instream flow right for the Roaring Fork River does not affect the operation of Ruedi Reservoir. The streamflow of this segment of the Roaring Fork River exceeds the instream flow right on a year-round basis.

3.5.1.11 15-Mile Reach of Colorado River

The 15-Mile Reach of the Colorado River extends from the Grand Valley Irrigation Company (GVIC) diversion dam downstream to the Gunnison River confluence (Figure 1). The streamflow in this segment is recorded at the USGS gage below the GVIC diversion (09106150). Historical streamflow at this site is shown in Figure 14. Streamflow in this river segment is substantially modified by upstream diversions, water uses, and reservoir releases.

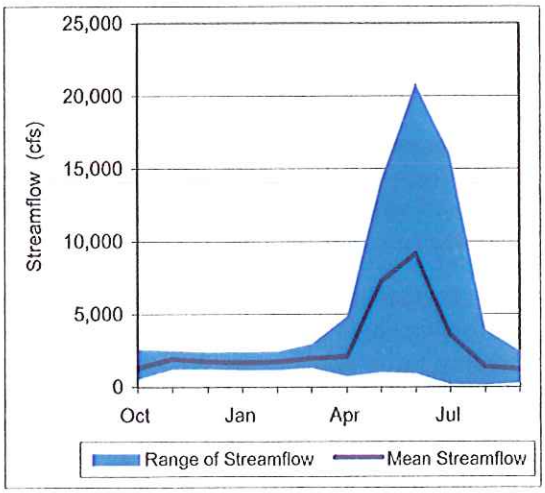
The Service directs the release of water from its pools in upstream reservoirs in accordance with the numeric targets described in Chapter 1 and other considerations. In addition, voluntary releases have been made under Coordinated Reservoir Operations. Reservoir releases for the Recovery Program have historically occurred primarily from Green Mountain Reservoir, Williams Fork Reservoir, Wolford Mountain Reservoir, and Ruedi Reservoir. Granby, Willow Creek and Windy Gap have also made releases. These historical releases have averaged 43,438 AF/yr for the study period and 58,375 AF/yr from 2000 through 2008. The extremes have ranged from 15,032 to 97,654 AF/yr depending on water availability. Historical

Figure 13. Roaring Fork River near Glenwood Springs, Mean Monthly Historical Streamflow (1991-2008).



Source: Grand River Consulting 2012.

Figure 14. Colorado River below Grand Valley Diversion near Palisade, Mean Monthly Historical Streamflow (1991-2008).



Source: Grand River Consulting 2012.

streamflow in this river segment is commonly less than the Service's biological flow targets, even with the release of water from upstream storage (Grand River Consulting 2012).

Natural streamflow, coupled with the amount of reservoir water available to the Recovery Program, is commonly insufficient to meet the biological targets established by the Service, particularly during snowmelt runoff and during late summer of dry years. As a result, the Service, in consultation with Reclamation and others, often manages reservoir releases to maintain a 15-Mile Reach flow that is substantially less than the biological targets, but that provides the best habitat conditions given the amount of water available for release.

3.5.2 Environmental Consequences

Direct effects were assessed for the following streams that would be affected by the Proposed Action only. These resources would not be affected by the expiration of the interim agreements.

- North Fork Colorado River
- Stillwater Creek
- Willow Creek
- Colorado River below Granby Reservoir
- Colorado River at Windy Gap Reservoir
- Muddy Creek
- Blue River below Green Mountain Reservoir
- Granby Reservoir
- Shadow Mountain Reservoir
- Green Mountain Reservoir

Shadow Mountain and Green Mountain Reservoir are discussed under Section 3.8.

The expiration of the interim agreements, in combination with the Proposed Action, was quantitatively analyzed as a cumulative effect for the following streams:

- Colorado River near Kremmling
- Fryingpan River below Ruedi Reservoir
- Roaring Fork River near Glenwood Springs
- 15-Mile Reach of Colorado River
- Ruedi Reservoir

Methods for determining direct, indirect, and cumulative effects on hydrology can be found in the Water Resources Assessment Report (Grand River Consulting 2012). For quantitative streamflow evaluations, both monthly and daily time step streamflow modeling was performed. Monthly average changes in streamflow were estimated for an 18-year study period extending from water year 1991 through 2008. Daily changes in streamflow were analyzed for specific representative years including drought (2002), below average (2006), average (2005), above average (1998), and wet (2008) years. The daily and monthly analyses were performed using a simple mass balance calculation in a Microsoft Excel spreadsheet at each gage that adds and subtracts component flows.

The Division Engineer administers transit losses to all reservoir releases between their point of release and ultimate delivery point, including the 15-Mile Reach. To simplify the discussion in this section, these transit losses are ignored (e.g., it is assumed that a 50 cfs release from Granby Reservoir would result in an additional 50 cfs of flow in the Colorado River at the Blue River). However, actual operations would include administration of these losses (typically 7.5 to 10 percent).

3.5.2.1 Direct and Indirect Effects

3.5.2.1.1 North Fork Colorado River below Redtop Valley Ditch

A change in streamflow under the Proposed Action is expected to occur at those times when Redtop Valley Ditch diversions from the North Fork Colorado River would otherwise be greater than 80 cfs. The change would occur because future diversions by the Redtop Valley Ditch would be reduced. The amount of reduction in Redtop Valley Ditch diversions is difficult to predict

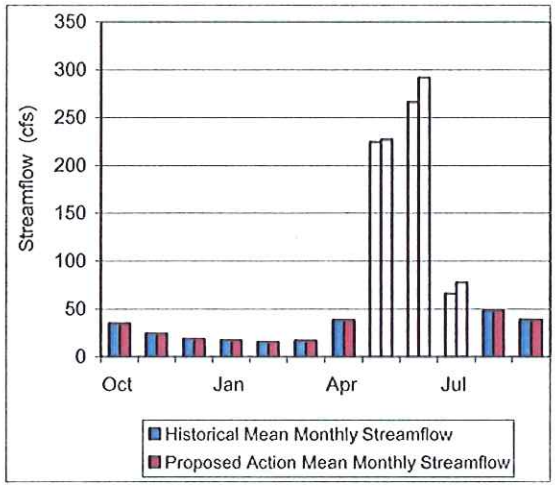
because actual operations are uncertain. For analysis purposes, future Redtop Valley Ditch diversions were limited to 80 cfs for the Proposed Action. Because Redtop Valley Ditch diversions are unlikely to exceed 80 cfs, an increase in streamflow of the North Fork Colorado River would occur equal to the difference between historical Redtop Valley Ditch diversions and 80 cfs. The 80 cfs of water expected to be diverted through the Redtop Valley Ditch under the Proposed Action would be comprised of the minority shareholder water that has been historically diverted plus a portion of Northern Water's shares that would be diverted to facilitate deliveries to remaining shareholders.

Streamflow is estimated to increase primarily in June, although increases in flow during May and July may also occur (Figure 15). With the assumed maximum Redtop Valley Ditch diversion of 80 cfs, an increase in streamflow of the North Fork up to 70 cfs would typically occur during the height of snowmelt runoff when diversions by the ditch have historically exceeded 80 cfs. Modeled increases in stage range from 0.0 to 0.2 feet. Streamflows in the North Fork would remain unchanged when flows were below the maximum diversion threshold.

Changes in streamflow would not occur during August through April, which is outside of the irrigation season for the Redtop Valley Ditch. Regardless of the maximum diversion threshold, streamflows in the North Fork Colorado River under the Proposed Action are not expected to be less than historical streamflow.

The assumptions used in this assessment may underestimate the actual increases in streamflow of the North Fork Colorado River that may occur with the Proposed Action. It is possible that minority shareholders in the ditch can receive a full supply of water with Redtop Valley Ditch diversions less than 80 cfs. Such operation would result in additional water remaining in the North Fork Colorado River during the irrigation season, and slightly higher streamflows than described.

Figure 15. North Fork Colorado River below Redtop Valley Ditch, Historical and Proposed Action Mean Monthly Streamflow.



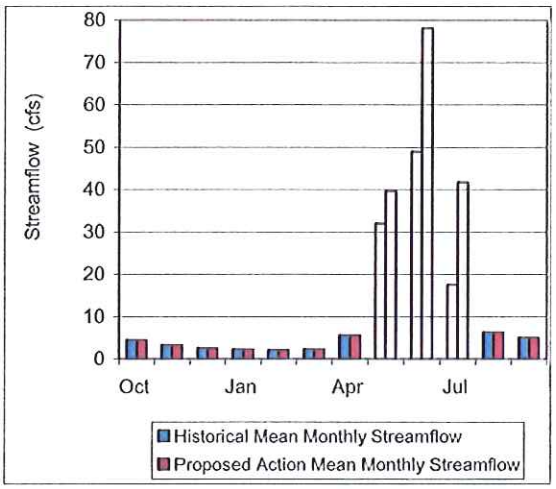
Source: Grand River Consulting 2012.

3.5.2.1.2 Stillwater Creek below Redtop Valley Ditch

With the Proposed Action, streamflow of Stillwater Creek is estimated to increase during the irrigation season (Figure 16). Streamflow would increase because a portion of the Redtop Valley Ditch diversions from the North Fork Colorado River would flow into Stillwater Creek, and subsequently flow to Granby Reservoir. Average monthly flow from May through July would increase by up to 51 cfs. Estimated increases in stage range from 0.0 to 1.7 feet. Due to regional topography and local irrigation practices, much of the additional flow would likely accrue to Stillwater Creek at a location near Granby Reservoir.

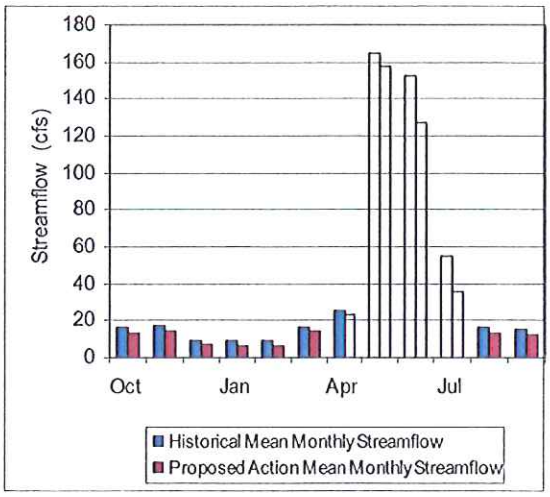
Operating assumptions used in this assessment may overestimate the amount of Redtop Valley Ditch water that is diverted from the North Fork Colorado River and flows into Stillwater Creek. If the diversion of less water to minority shareholders was required, less water would be diverted into the Redtop Valley Ditch, and the flow of Redtop Valley Ditch water to Stillwater Creek would also be less.

Figure 16. Stillwater Creek below Redtop Valley Ditch, Historical and Proposed Action Mean Monthly Streamflow.



Source: Grand River Consulting 2012.

Figure 17. Willow Creek below Redtop Valley Ditch, Historical and Proposed Action Mean Monthly Streamflow.



Source: Grand River Consulting 2012.

3.5.2.1.3 Willow Creek

Streamflow in the lower 1-mile segment of Willow Creek is estimated to decrease as a result of the Proposed Action (Figure 17). Historically, irrigation return flows from the E Diamond H and Miller-Hereford ranches have contributed to Willow Creek streamflow throughout the year. The Proposed Action would result in the permanent dry-up of these irrigated areas, resulting in a reduction in irrigation return flows to Willow Creek, and a subsequent reduction in Willow Creek streamflow. The decrease in streamflow would occur throughout the year and would be the largest during the summer irrigation months of June and July. Estimated decreases in stage range from 0.0 to 0.5 feet.

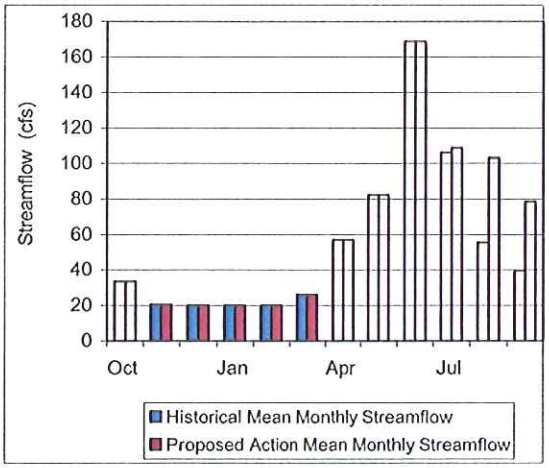
3.5.2.1.4 Colorado River below Granby Reservoir and at Windy Gap Reservoir

Streamflow in the Colorado River below Granby Reservoir would increase during late summer and early fall in all years as a result of the annual releases of 5,412.5 AF from Granby Reservoir. The mean monthly streamflow in this segment is shown in Figure 18.

An increase in the depth of water of the Colorado River below Granby Reservoir would occur as a result of increased streamflow. The increase in depth of water would vary throughout the affected reach, depending upon the morphology of the stream. Estimated increases in stage range from 0.0 to 0.1 feet from July to September (Grand River Consulting 2012).

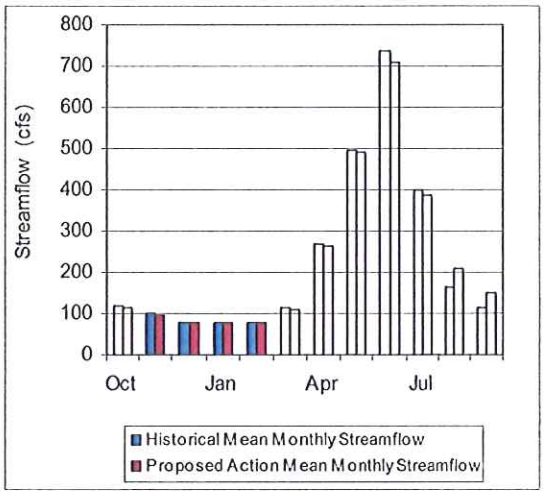
Streamflow in the Colorado River at Windy Gap Reservoir would increase during August and September in response to releases of 10825 water from Granby Reservoir. The mean monthly streamflow in this segment is shown in Figure 19. Estimated river stage would increase by up to 0.1 feet as a result of increased streamflow (Grand River Consulting 2012). From October through July, streamflow would decrease in response to the reduction in delayed irrigation return flows from the Willow Creek watershed. Below Granby, average July flow would increase slightly because in dry years, anticipated releases of 10825 water would begin in mid-July. Below Windy Gap,

Figure 18. Colorado River below Granby Reservoir, Historical and Proposed Action Mean Monthly Streamflow.



Source: Grand River Consulting 2012.

Figure 19. Colorado River at Windy Gap, Historical and Proposed Action Mean Monthly Streamflow.



Source: Grand River Consulting 2012.

average July flows would decrease slightly because the average reduction in delayed irrigation return flows from Willow Creek would be greater than the average increase associated with the release of 10825 water.

3.5.2.1.5 Muddy Creek

The specific operation of the exchange or substitution cannot be reliably quantified, given the many variables that influence the exchange of water into the reservoir. The exchange would reduce streamflow of the Muddy Creek at the time that the exchange was made. The exchange would occur only if excess capacity existed in Wolford Mountain Reservoir. Also, the exchange or substitution would occur only to the extent that outflow from the reservoir exceeds the adjudicated instream flow water rights below the reservoir. These instream flow rights are:

- 70 cfs May 1 through May 14
- 105 cfs May 15 through June 30
- 70 cfs July 1 through July 14
- 20 cfs July 15 through April 30

Exchanges or substitutions could be made into the reservoir whenever a senior downstream water right call was in place, and when reservoir outflow exceeded the Muddy Creek instream flow requirements plus the amount of water required for senior irrigation users below the reservoir. In addition, a substitution of demands could be made (not a river exchange) whereby the environmental water is substituted for downstream contract or other delivery demands from Wolford Mountain Reservoir.

The average volume of flow of Muddy Creek below the reservoir is about 20,000 AF during the July through October period. A maximum exchange or substitution of up to 2,000 AF/yr would reduce average streamflow from July through October by about 10 percent. The subsequent release of the water would result in a similar increase in streamflow below the reservoir. Streamflow below the reservoir would remain within the normal historical range of conditions at this location.

3.5.2.1.6 Blue River below Green Mountain Reservoir

Streamflow of the Blue River below Green Mountain Reservoir may be altered in response to three actions: (1) the exchange of water from Granby Reservoir to Green Mountain Reservoir and the subsequent release of this water, (2) the exchange or substitution of Grand County environmental water into Green Mountain Reservoir (Insurance Pool) and the subsequent release of this water, and (3) additional releases from the C-BT replacement pool in Green Mountain Reservoir.

Granby Reservoir/Green Mountain Reservoir Exchange

The 10825 water releases from Granby Reservoir would almost always occur at a time when streamflow in the 15-Mile Reach was less than the minimum baseflow targets established by the Service. As a result, it is anticipated that the Granby Reservoir releases would typically be routed directly to the 15-Mile Reach, at the time and amount in which the releases from Granby Reservoir were made. There may times when releases from Granby Reservoir would not be made at the same time water was needed in the 15-Mile Reach. During these times, Granby releases could be exchanged into Green Mountain Reservoir, if all conditions are met for later release to the 15-Mile Reach. This exchange would occur by reducing Green Mountain Reservoir releases (being made for other purposes) by the same amount as Granby 10825 releases in the Colorado.

The flow of the Blue River below Green Mountain Reservoir has historically averaged 500 cfs during the potential exchange periods, and an exchange would typically reduce the flow of the Blue River during these periods by 10 percent or less. The releases from Green Mountain Reservoir for CWCB's 1987 instream flow right would not be affected by the exchange. Section 2.3.2 discusses that the release of exchanged water would likely occur in the late summer of the year (July through October) when streamflow in the 15-Mile Reach was low. Other releases out of Green Mountain Reservoir would likely be occurring at the same time. As a consequence, it is likely that the proposed releases would be in addition to the instream flow requirements.

Increased Releases from the C-BT Replacement Pool

One of the primary purposes of Green Mountain Reservoir is to provide replacement storage for diversions of the C-BT Project. The reservoir's capacity dedicated to this purpose is called the C-BT replacement pool. Section 3.8.1.1.3, *Green Mountain Reservoir* discusses reservoir operation in additional detail.

Additional releases from the C-BT replacement pool would occur to offset the amount of Redtop Valley Ditch water that was stored in Granby Reservoir whenever a mainstem river call curtails diversions by the C-BT Project. The estimated out-of-priority diversions associated with Redtop Valley Ditch water from the Miller-Hereford and the E Diamond H ranches are summarized in Table 6. Based on C-BT operating principals and Colorado water law, this water would be stored out-of-priority in Granby Reservoir, and a commensurate release of water from the C-BT replacement pool in Green Mountain Reservoir would occur. Table 6 is based on historical diversions by the Redtop Valley Ditch and historical river calls. The modeled increase in replacement releases in individual years would vary from a low of 0 AF to a high of 1,873 AF. In 2001 through 2004, the modeled additional replacement release from Green Mountain Reservoir was a total of 5,651 AF, which averaged 1,413 AF/yr over that four-year period (Table 6). If the maximum out-of-priority diversion of 1,873 AF/yr was released in June and July, the effect on the Blue River would be 15 cfs. The releases required to meet downstream obligations in excess of senior water right requirements on the Blue River would not be affected by the exchange. The insurance pool described in Section 2.3.4 would maintain water supplies available to Green Mountain Reservoir and would offset the potential

Table 6. Estimated Redtop Valley Ditch Out-of-Priority Diversions.

Year	Total Historical Ditch Diversions during a Mainstem Call† (AF)	Out-of-Priority Diversions into Granby Reservoir Associated with Miller-Hereford and E Diamond H Ranches§ (AF)
1991	0	0
1992	1,428	743
1993	0	0
1994	2,867	1,491
1995	0	0
1996	0	0
1997	0	0
1998	0	0
1999	0	0
2000	643	335
2001	2,736	1,423
2002	3,602	1,873
2003	3,435	1,786
2004	1,095	569
2005	0	0
2006	0	0
2007	585	304
2008	0	0

†Amount of total ditch diversions that occurred during historical out-of-priority periods.
§Amount of out-of-priority storage in Granby Reservoir. Estimated to be 52 percent of total diversions by the Redtop Valley Ditch (6,476 AF of additional Granby supply out of 12,440 AF of total ditch diversions).
Source: Grand River Consulting 2012.

increase in substitution requirements for Denver Water and Colorado Springs Utilities.

The estimates in Table 6 are based on the assumption that whenever a river call occurred, the storage of Redtop Valley Ditch water in Granby Reservoir would also be out-of-priority. This assumption represents a worst-case scenario, and in actuality, the relatively senior water rights of Granby Reservoir would remain in-priority during some portion of a mainstem water right call. The out-of-priority diversion estimates outlined in Table 6 likely overstate the actual amount of additional replacement that may be required from Green Mountain Reservoir. Section 3.8.2.1.1, *Green Mountain Reservoir* discusses the effect of the project on reservoir operation in additional detail.

Reduced irrigation return flows from the Redtop Valley Ditch would decrease flow in the Colorado River (primarily in May, June, and July) by an average monthly amount of up to 28 cfs. If streamflow was reduced to the extent that a mainstem Colorado River water right call occurred earlier in the year, C-BT replacement requirements, other Green Mountain Reservoir releases and releases from other facilities may increase. The likelihood that this magnitude of a reduction in streamflow would cause the Shoshone or Cameo call to occur earlier in the year would be negligible.

The reduction of return flows may cause water users to store less water or replace more diversions during a Colorado River mainstem call with a swing right. As a result, less water would be stored in reservoirs. As described in Section 2.3.4, the insurance pools would be used to eliminate the effects of the Proposed Action.

The additional C-BT replacement pool releases would increase the flow of the Blue River by an equal amount. These additional releases would occur in June and July of dry years when a mainstem call occurred while the Redtop Valley Ditch would otherwise be diverting its full amount. The releases would occur when Green Mountain Reservoir was out-of-priority to a mainstem call and would not affect peak flows or spills from the reservoir. The increased releases from the C-BT replacement pool would result in either (1) a commensurate decrease in Green Mountain Reservoir releases to the Blue River during the following winter or spring months if the reservoir fills, or (2) a commensurate reduction in the amount of water stored in the contract or HUP allocation, if the reservoir did not fill the following

year. Section 3.8.2.1.1, *Green Mountain Reservoir* discusses this operation in additional detail.

Exchange or Substitution of Environmental Water into Green Mountain Reservoir (Insurance Pool)

Additional C-BT replacement pool releases could result in a commensurate reduction in the amount of water stored for HUP or contract purposes, if Green Mountain Reservoir did not fill in the following year. An "insurance pool" would be established to prevent a reduction in water supplies within the HUP or contract allocations, and to ensure that the substitution obligations of Denver Water and Colorado Springs Utilities are not increased. Water stored in the insurance pool would offset and replace any reduction in Green Mountain Reservoir storage associated with the Proposed Action. Water within the insurance pool could be used for any authorized purposes associated with Green Mountain Reservoir, including HUP releases, contract releases and power generation. Reclamation would control the release of water from the insurance pool. The insurance pool may be located in Ruedi Reservoir, Green Mountain Reservoir, and/or Wolford Mountain Reservoir.

The use of insurance pool water would occur only in substitution years. A substitution year is any year in which Denver Water or Colorado Springs Utilities owe water to Green Mountain Reservoir in association with their diversions upstream of the reservoir. Insurance pool releases would be made only to the extent that prior C-BT replacement pool releases associated with the Proposed Action contributed to an increase of substitution requirements or reduced the volume of water available to the HUP or contract allocations. Historically, substitution years have occurred in about 20 percent of the years, but the frequency of this occurrence may increase in the future as a result of additional HUP releases for Recovery Program purposes.

The source of water used for insurance pool purposes could vary from year to year. The actual source of the water would depend upon the amount of insurance pool water that had been exchanged or substituted into Green Mountain Reservoir and Wolford Mountain Reservoir, and upon streamflow management objectives at the time of the insurance pool releases. It is anticipated that the determination of the source of water to use for insurance pool purposes (Ruedi Reservoir, Green Mountain Reservoir, or Wolford Mountain Reservoir) would be a collaborative process similar to the process that is currently in place for the management of HUP releases.

The annual volume of exchange or substitution would likely be limited to the amount of additional C-BT replacement pool releases that are associated with the cessation of irrigation under the Redtop Valley Ditch. As shown in Table 6, the additional releases are estimated to range from 0 AF/yr to about 1,873 AF/yr. The additional C-BT replacement pool releases would occur during the historical May through July irrigation season associated with the Redtop Valley Ditch.

The specific operation of the exchange or substitution cannot be reliably quantified, given the many variables that influence the exchange or substitution of water into the reservoir. The exchange or substitution would reduce streamflow of the Blue River below Green Mountain Reservoir at the time that they were made. The exchange or substitution would occur only if excess capacity existed in Green Mountain Reservoir. Also, the exchange or substitution would occur only to the extent that outflow from the reservoir exceeded the releases required to meet downstream obligations in excess of senior water right requirements on the Blue River.

During the anticipated exchange or substitution period of July though October, the volume of historical streamflow of the Blue River below Green Mountain Reservoir averages over 140,000 AF. While the specific operation of the exchange or substitution cannot be reliably quantified, a maximum exchange or substitution of 2,000 AF/yr would reduce average July through October

streamflow by about 1.4 percent. The subsequent release of the water would result in a similar increase in streamflow below the reservoir. Streamflow below the reservoir would remain within the normal historical range of conditions at this location.

3.5.2.2 Cumulative Effects

Cumulative effects for surface water hydrology due to expiration of interim agreements that provide water for the Recovery Program were evaluated quantitatively and are discussed first in the next section. Because expiration of these interim agreements will affect stream reaches in different ways, cumulative effects due to expiration of the interim agreements are presented by stream reach. Other reasonably foreseeable actions are evaluated qualitatively and are presented at the end of this section.

3.5.2.2.1 Colorado River near Kremmling

Anticipated changes in the streamflow of the Colorado River near Kremmling that are associated with the Proposed Action and the expiration of the interim agreements are typically 10 percent or less. July through October streamflow is estimated to increase for those historical years when releases of 10825 water from Williams Fork Reservoir or Wolford Mountain Reservoir did not occur. For those study years when 10825 water was historically released from Williams Fork or Wolford Mountain reservoir, a slight decrease in streamflow would occur from July through October. Winter streamflow (November through April) is estimated to decline by 2 cfs in response to the loss of delayed return flows associated with the Redtop Valley Ditch. The estimated changes in river stage are 0.2 feet or less (Grand River Consulting 2012).

Grand County would direct the timing and rate of the environmental bypasses or releases using guidance from the Grand County Stream Management Plan (Tetra Tech et al. 2010). When not exchanged or substituted into Wolford Mountain Reservoir or Green Mountain Reservoir, the Grand County environmental water would increase streamflow during July through October, during periods of low streamflow or elevated water temperatures.

3.5.2.2.2 Fryingpan River below Ruedi Reservoir

The Proposed Action, coupled with the expiration of the 2012 Agreement, would allow the maximum annual release of up to 17,412.5 AF of water from Ruedi Reservoir for the Recovery Program and Green Mountain Reservoir mitigation instead of the current maximum release of 20,825 AF in a typical year (Table 7). Ruedi Reservoir releases associated with the Proposed Action would be made in a manner consistent with the interim releases of water approved for the 2012 Agreement (see Section 3.5.1.9). A detailed daily assessment of the streamflow of the Fryingpan River and the storage content in Ruedi Reservoir was included in the 2012 Agreement EA. This analysis was completed for a dry, moderate, and wet year. The 2012 Agreement EA recognized that the primary concerns associated with the 2012 Agreement were related to 1) high summertime streamflow in the Fryingpan River when releases are made, and 2) reduced summertime reservoir levels in response to the releases.

The hydrologic changes to the Fryingpan River that would be associated with the Proposed Action,

Table 7. Summary of Maximum Annual Ruedi Reservoir Releases for Recovery Program Purposes

Water	Existing Conditions (AF)	Proposed Action + Expiration of 2012 Agreement (AF)
5+5 Water	10,000	10,000
2012 Agreement Water	10,825	0
10825 Water		5,412.5
Insurance Pool†		**2,000**
Total	**20,825**	**17,412.5**

†Insurance pool would be used to offset effects to Green Mountain Reservoir storage and return flows.

including insurance pool releases, coupled with expiration of the 2012 Agreement, are within the range of changes that were assessed previously in the 2012 Agreement EA. The Proposed Action would release water at times and rates consistent with the releases that were assessed in the 2012 Agreement EA. Because the Proposed Action would release less water than is allowed under the 2012 Agreement, summertime Ruedi Reservoir storage levels would remain higher than the levels assessed in the 2012 Agreement EA, and the number of days that the flow in the Fryingpan River exceeds 250 cfs would be fewer. These effects are described below.

Streamflow in Excess of 250 cfs

Under the Proposed Action, and with the expiration of the 2012 Agreement, the modeling predicts that the number of days that streamflow would exceed 250 cfs in the Fryingpan River would be reduced. The 2012 Agreement EA recognized that releases for Recovery Program purposes would commonly range from 150 to 250 cfs. Assuming a typical reservoir release of 200 cfs, the average number of days in which the flow of the Fryingpan River exceeded 250 cfs would decline by about 14 days (Reclamation 2002). If reservoir releases were made at a rate of 250 cfs, the number of days in which flow of the Fryingpan River exceeded 250 cfs would typically decline by about 11 days. This analysis is consistent with the analysis disclosed in the 2012 Agreement EA, which estimated a 9-day reduction in flow above 250 cfs when reservoir releases were reduced by 5,412.5 AF.

Given the flexibility in Ruedi Reservoir insurance pool releases, it is anticipated that releases from the insurance pool would be made at times when streamflow in the Fryingpan River was less than 250 cfs. Accordingly, the operation of the Ruedi Reservoir insurance pool is not expected to increase the number of days that Fryingpan River streamflow exceeded 250 cfs.

Winter Streamflow Increase

Water is typically released from Ruedi Reservoir during the winter months to provide reservoir storage space for the upcoming snowmelt runoff. The specific winter releases are determined by Reclamation on a year-by-year basis, and vary in response to several factors including specified drawdown targets and snowpack conditions. An exception to this operation occurs in dry years (or the years following a dry year), when reservoir storage is already low at the end of the summer and additional reservoir drawdown is not desired.

The Proposed Action, coupled with the expiration of the 2012 Agreement, would increase the end-of-summer storage in Ruedi Reservoir. Cumulatively, reservoir storage would typically be 5,412.5 AF higher at the end of October. In average and wetter than average years, when Reclamation desires to reduce reservoir storage levels to prevent uncontrolled spills in the spring, this additional 5,412.5 AF in storage would be released to the river over the winter months. Assuming a winter release season of 150 days, the flow in the Fryingpan River would increase by 18 cfs. Average monthly flows in the river during November through March range from 102 to 127 cfs. If the release season was shorter, the increase in Fryingpan River streamflow would be greater than this amount. Reclamation typically sets a conservative release from Ruedi in the fall and increases the releases as necessary and as spring runoff forecasts are developed. This prevents adverse impacts to eggs of brown trout that are spawned in the fall. The Proposed Action may not increase winter flow of the Fryingpan River in those years that follow an exceptionally dry year, such as 1954, 1977 and 2002. In those years, winter releases may not occur because the reservoir did not fill, even with the increase in reservoir storage that would occur with the Proposed Action. The additional water stored in Ruedi Reservoir following an exceptionally dry year probably would not be released, but carried over for winter release in an average or wetter than average year.

3.5.2.2.3 Roaring Fork River near Glenwood Springs

Streamflow of the Roaring Fork River between the Fryingpan River and the Colorado River would

also be affected by the Proposed Action, expiration of the interim agreements and the 2012 Agreement. As with the Fryingpan River, no change in the annual volume of flow in this river segment would occur. Summer flow would decrease by a total of 5,412.5 AF and winter flow would typically increase by the same volume.

Releases of 10825 water from Ruedi Reservoir would commonly occur from July through October. With the Proposed Action and the expiration of the 2012 Agreement, flow of the Roaring Fork River from July through October would typically decrease by 5,412.5 AF. Historical flow of the Roaring Fork River at Glenwood Springs from July through October has averaged 1,150 cfs, with a total volume of flow of 279,700 AF during this four-month period. A reduction in releases of 5,412.5 AF would reduce the July through October flow at this location by 1.9 percent, or from 150 to 250 cfs during the period it was being released from Recovery Program purposes. Actual streamflow reductions on a given day would vary in response to the timing and magnitude of releases of 10825 water.

Assuming a winter release season from Ruedi Reservoir of 150 days, the flow in the Roaring Fork River would increase by 18 cfs during the winter months. Historical flow of the Roaring Fork River at Glenwood Springs from November through March has averaged 515 cfs, with a total volume of flow of 154,000 AF during this five-month period. Increased Ruedi Reservoir releases of 5,412.5 AF/yr would increase the November through March flow at this location by 3.5 percent.

3.5.2.2.4 15-Mile Reach of Colorado River

The Proposed Action, coupled with reasonably foreseeable actions, would change the amount of water available for release to the 15-Mile Reach of the Colorado River. As discussed below, interim releases of 10825 water from Williams Fork Reservoir and Wolford Mountain Reservoir have averaged 7,044 AF/yr since these releases were initiated in 2000. With the Proposed Action, a total of 10,825 AF would be available for release every year, which would be an annual increase from historical conditions. The largest increases would occur in dry years when drought provisions associated with the interim agreements historically resulted in reduced reservoir releases of 10825 water.

With the expiration of the 2012 Agreement, the average annual amount of water released for the Recovery Program may decline from 58,375 AF/yr to 51,331 AF/yr. This net decrease results from the increase of 10,825 AF/yr associated with the Proposed Action, loss of 10,825 AF/yr associated with the expiration of the 2012 Agreement, and loss of 7,044 AF average annual releases of water from Williams Fork and Wolford Mountain reservoirs. Historical releases of 10825 water from Williams Fork and Wolford Mountain reservoirs have on average been less than 10,825 AF/yr (Table 8) because the interim agreements allowed the release of a lesser amount of water in dry years. With the Proposed Action, 10,825 AF of water would be available for release in all years including dry years, and accordingly an increase in the amount of available 10825 water would occur in dry years.

The Service's approach to making releases for Recovery Program purposes described in Section 2.3 considers many variables. As a result, it is difficult to assess the specific change in the rate of streamflow that may result from the Proposed Action or from the expiration of the 2012 Agreement. The average volume of streamflow in the 15-Mile Reach from July through October (1991–2008) has historically averaged 450,300 AF (an average of 1,844 cfs). The Proposed Action, coupled with the expiration of the 2012 Agreement, would decrease July through October flow by about 6,340 AF (7,044 AF minus a 10 percent transit loss) to an average of 1,820 cfs (a decrease of 1.4 percent) (Table 8). If the targeted flows shown in Table 1 were not met, additional HUP surpluses probably would be available for release.

Table 8. Average Annual Change in Historical Recovery Program Releases from Upstream Reservoirs (2000–2008).

Type of Release	Average Annual Volume (AF)
Total Historical Releases	58,375
Cessation of Interim Williams Fork Reservoir Releases	-4,045
Cessation of Interim Wolford Mountain Reservoir Releases	-2,999
Permanent 10825 Water (Proposed Action)	10,825
Expiration of Ruedi Reservoir 2012 Agreement Water	-10,825
Total Recovery Program Releases under Future Conditions	51,331

Source: Grand River Consulting 2012.

3.5.2.2.5 Other Reasonably Foreseeable Actions

Grand County Environmental Water

Grand County would direct the timing and rate of the environmental bypasses or releases using guidance from the Grand County Stream Management Plan (Tetra Tech et al. 2010). When not exchanged or substituted into Wolford Mountain Reservoir or Green Mountain Reservoir, it is anticipated that the Grand County environmental water would increase streamflow during July through October, during periods of low streamflow or elevated water temperatures.

Orchard Mesa Irrigation District-Efficiency Improvements

The OMID efficiency improvement project would increase irrigation efficiency in the OMID. The efficiency improvements would typically reduce OMID diversions, which in turn would typically increase streamflow in the 15-Mile Reach. An operational study of the OMID proposal was completed in 2008 (Grand River Consulting 2008). The results of the study indicate the OMID improvements would typically increase flow by 40 cfs at the head of the 15-Mile Reach. This increase would occur during free river conditions and also when the 119 cfs water right of the GVIC is the calling water right on the river. In most years, the period of increased streamflow would extend through the entire April through October irrigation season.

During very dry conditions (typically August and September of dry years), the calling right on the Colorado River at Cameo is the senior 730-cfs right decreed to the United States and provided to the Grand Valley Water Users Association (GVWUA). When this right is calling for water, the water saved by the OMID improvements would be diverted by the GVWUA. Prior to the OMID improvements, a portion of this water would have accrued to the 15-Mile Reach via return flows from the USA Power Plant. When the 730 cfs GVWUA water is calling for water, return flows to the 15-Mile Reach would be diminished and flow in the 15-Mile Reach would decline by 66 cfs (Grand River Consulting 2009).

The decreased irrigation demand of the OMID system, coupled with the increased irrigation supply to the GVWUA, would commonly allow either a reduction in the Green Mountain Reservoir HUP releases for irrigation, or a reduction in the amount of water diverted by the Orchard Mesa Check. Additional water retained in the HUP could be used to reduce Grand Valley irrigation water shortages that can occur in dry years, and under surplus conditions, could be used to provide additional water to the 15-Mile Reach. Additional water retained in the HUP could be approximately 19,000 AF in dry years such as 1977 or 2002 (Grand River Consulting, 2008).

In summary, the OMID efficiency improvements would change streamflow in the 15-Mile Reach during the irrigation season. Streamflow would be increased by 40 cfs during free river conditions and when the 119 cfs GVIC water right is calling. Streamflow would be decreased by 66 cfs during dry conditions when the 730 cfs GVWUA water is calling. In dry years, up to 19,000 AF of additional

HUP water would be available for irrigation use or for delivery to the 15-Mile Reach. The changes in streamflow may cause the Service to alter the timing of water released for Recovery Program purposes from upstream reservoirs (primarily Green Mountain Reservoir, Wolford Mountain Reservoir fish pool, and Ruedi Reservoir). The actual changes in streamflow associated with this action are not known and cannot be reliably simulated. Any modifications in reservoir release patterns would be directed by the Service from its pools and would depend on a decision-making process that considers many factors including:

- The total amount of water available in each reservoir that stores Recovery Program water
- Existing streamflow conditions below each reservoir at the time of release
- Streamflow in the 15-Mile Reach
- Regional weather and streamflow forecasts
- Forecasted irrigation diversions above the 15-Mile Reach

The OMID improvements would likely affect streamflow conditions downstream of Wolford Mountain Reservoir, Green Mountain Reservoir, and Ruedi Reservoir. Streamflow of the North Fork Colorado River, Stillwater Creek, and Willow Creek would not be altered.

Northern Water–Windy Gap Firming Project

The Windy Gap Firming Project would allow the Windy Gap Project to divert additional Colorado River water mostly during average and wetter than average years. The additional diversions would be made possible by construction of additional reservoir storage on the east slope that would be dedicated to the storage of Windy Gap water. The additional diversions would occur at times when the existing Windy Gap pumping plant would otherwise not divert all physically available water because of a lack of reservoir space to store the water. The Windy Gap Firming Project would reduce the average annual flow in the Colorado River below the Windy Gap Reservoir by approximately 21, 000 AF.

The additional diversions would seasonally decrease streamflow in the Colorado River below Windy Gap Reservoir, commonly during the May through July snowmelt runoff period. No additional streamflow depletions are anticipated in dry years since the project currently diverts all available water during these years. Further, no additional stream depletions would occur when a downstream water right call is in-place from either the Shoshone or Cameo call. A mainstem water right call is typically in-place from August through April.

Reclamation released a final EIS for the Windy Gap Firming Project in 2011 (Reclamation 2011a). Changes in streamflow would occur for the Colorado River from Granby Reservoir through the 15-Mile Reach. Changes in the streamflow of Willow Creek would also occur, with decreases in average annual streamflow from Existing Conditions (as defined in the Windy Gap Firming Project Final EIS) for the Action Alternatives ranging from 20,900 AF/yr to 21,700 AF/yr. Streamflow would not be affected in the North Fork Colorado River, Stillwater Creek, the Blue River, the Fryingpan River, or the Roaring Fork River.

Denver Water–Moffat Collection System Project

The Moffat Collection System Project would divert additional Colorado River water during average and wetter than average years. The additional diversions would be associated with the construction of additional reservoir storage in Gross Reservoir on the east slope. The additional diversions would occur at times when the existing Moffat Collection System would otherwise not divert all legally and physically available water because of a lack of reservoir space to store the water.

The Corps released a Draft EIS for the Moffat Collection System Project in 2009 (Corps 2009).

Alternatives referred to in this discussion refer to the 2009 Corps' Draft EIS, not the 10825 EA. According to the Draft EIS, additional Denver Water diversions would occur in average and wet years and would be highly concentrated during the runoff months primarily in May, June, and July. Typically, additional diversions would be greatest in wet years following dry year sequences. For all action alternatives, the project would not have additional diversions in dry years because Denver Water currently diverts the maximum amount physically and legally available under existing water rights without additional storage in their system.

Flows in the Fraser River and Williams Fork River basins would decrease in average and wet years during the runoff months due to Denver Water's additional diversions. Average annual flows in the Fraser River at the Granby gage would decrease about 1,900 AF (2 percent) under the No Action Alternative, 8,400 AF (9 percent) under the Proposed Action, and between 7,500 AF and 8,300 AF (8 to 9 percent) for the other action alternatives. Average annual flows in the Williams Fork River below Williams Fork Reservoir would decrease about 200 AF (less than 1 percent) under the No Action Alternative, 1,700 AF (2 percent) under the Proposed Action, and between 1,400 AF and 1,700 AF (1 to 2 percent) for the other action alternatives. Flows in the Blue River Basin would decrease in average and wet years during summer months and increase slightly during winter months due to differences in Roberts Tunnel diversions and spills at Dillon Reservoir. Flow changes in the Blue River Basin would be driven primarily by the seasonal shift in water treatment plant operations. Under all action alternatives, winter operations of Foothills and Marston water treatment plants would be reduced because the Moffat water treatment plant would operate at a minimum level during the winter. Average annual flows in the Blue River at the confluence with the Colorado River would decrease about 10,200 AF (4 percent) under the No Action Alternative, 4,800 AF (2 percent) under the Proposed Action, and between 4,300 AF and 5,200 AF (2 percent) for the other action alternatives.

Flows along the Colorado River would decrease in average and wet years during the runoff months due to changes in surface water flows in the Fraser, Williams Fork, and Blue River basins, which would be translated downstream and into the Colorado River. Average annual flows in the Colorado River near the Kremmling gage would decrease about 12,100 AF (2 percent) under the No Action Alternative, 14,400 AF (2 percent) under the Proposed Action, and between 12,700 AF and 14,600 AF (2 percent) for the other action alternatives.

Xcel Energy-Reduction in Shoshone Call

Key projects/water rights that will benefit from a reduction of the Shoshone call include the Continental-Hoosier Project; Green Mountain Reservoir; Wolford Mountain Reservoir; Williams Fork Reservoir, Blue River Project (Roberts Tunnel, and Dillon Reservoir); Windy Gap; and the Homestake Project. The relaxation of the Shoshone call would allow diverters that would otherwise be called out to divert water in-priority even if they are junior to the Shoshone Power Plant water rights. Because more diversions would be made in-priority, releases from reservoirs such as Green Mountain, Wolford Mountain, and Williams Fork for exchange or substitution purposes would be less. Increased in-priority diversions and reduced reservoir releases for exchange or substitution would decrease flows primarily in the Williams Fork River, Muddy Creek, the Blue River, and the Colorado River mainstem below the Windy Gap diversion during the relaxation period. Colorado River flows at Dotsero would be increased outside of the relaxation period if additional water diverted to storage during the relaxation period is released to the Colorado River. The magnitude and timing of flow reductions attributable to a Shoshone call relaxation could vary widely from year to year and would depend on many factors including streamflows, storage contents, project operations, and bypass/instream flow requirements.

A relaxation in the Shoshone call in the early runoff season (March 14 to May 20) could allow Green

Mountain Reservoir, the Windy Gap Project, Wolford Mountain Reservoir, Williams Fork Reservoir, and other upstream junior water rights to divert additional water during that time. The call relaxation, consistent with its terms, could result in a moderate reduction in flow in March, April, and the first half of May of those years in which a call relaxation occurs.

A Shoshone call reduction would affect streamflow conditions upstream of the Shoshone Power Plant and in the Colorado River from the power plant through the 15-Mile Reach. Streamflow of the Fryingpan River and the Roaring Fork River would not be affected.

Grand and Summit Counties–Increased Water Use

As population continues to increase in Grand and Summit counties, water use in those areas will continue to increase. Additional diversions and water use in Grand and Summit counties would reduce streamflow in the entire analysis area, with the exception of the Fryingpan River and the Roaring Fork River. The change in streamflow would occur throughout the year, but would likely be minor since most of the water diverted for the increased use would return to local streams and rivers as wastewater or irrigation return flows.

Colorado Springs Utilities Continental-Hoosier System Exchanges

Colorado Springs Utilities is seeking to exchange water from its Homestake Reservoir to the Continental-Hoosier System at the headwaters of the Blue River during times that a Shoshone or Cameo call is in place. When a mainstem river call from either Shoshone or Cameo would otherwise curtail diversions by the 10825 Project, the utility would divert water out-of-priority at the Continental-Hoosier System and release a like amount of water from Homestake Reservoir, which is within the Eagle River watershed.

This exchange would cause a minor reduction in streamflow in the Blue River from the Continental-Hoosier System to the confluence with the Colorado River and in the Colorado River from the Blue River to the confluence with the Eagle River. This reduction in flow would occur in the late summer months (typically August or September) and would occur only during those infrequent times when Denver Water is not diverting all available water physically available at Dillon Reservoir. Streamflow in the Colorado River watershed upstream of the Blue River and downstream of the Eagle River, would not be affected.

Colorado River Water Conservation District–Increase in Wolford Mountain Reservoir Contract Demands

As population continues to increase in the Colorado River watershed, water use in the basin in Colorado will continue to increase. The additional water use would cause an increased demand for contract water from Wolford Mountain Reservoir. Additional contract releases from Wolford Mountain Reservoir would likely occur to augment depletions both upstream and downstream of Wolford Mountain Reservoir. The additional releases could cause a minor change in streamflow of the Colorado River from Grand and Summit counties downstream through the 15-Mile Reach. The specific change in streamflow would vary in response to the actual location and amount of water use of future contracts from Wolford Mountain Reservoir and changes in the amount of water stored by the reservoir during snowmelt runoff. Streamflow of the Fryingpan River and the Roaring Fork River would be unaffected by this reasonably foreseeable action.

The additional releases for contract demands may result in a minor increase in streamflow during the time that a Shoshone call is in-place (typically from August through April). These releases would be offset by additional water use by the Wolford Mountain Reservoir contractees and increases in streamflow would be negligible.

An increase in contract releases would reduce storage contents of Wolford Mountain Reservoir, and, in turn, the reservoir would typically store additional water in-priority during the following

snowmelt runoff season. The additional storage would cause a minor reduction in streamflow of the Colorado River below Muddy Creek from April through June in most years. In dry years, Wolford Mountain Reservoir does not fill to capacity and additional water is not available for in-priority storage by the reservoir. During these dry years, streamflow during the snowmelt runoff season would not be affected.

Denver Water–Expiration of Big Lake Ditch Contract

The expiration of the Denver Water-Big Lake Ditch Contract may reduce the amount of water consumed by irrigation use within the Reeder Creek watershed. The reduction in consumptive use would cause a minor increase in streamflow at this location during the May through September irrigation season. The loss of delayed irrigation return flows would cause a minor decrease in streamflow during the winter months.

Streamflow in the Colorado River watershed downstream of the Williams Fork River would be affected by the expiration of the Denver Water-Big Lake Ditch Contract. Streamflow of the Fryingpan River and the Roaring Fork River would not be altered.

Mountain Pine Beetle Epidemic

Pine beetle infestation is causing a regional die-off of pines throughout the analysis area. It is estimated that this infestation will generally increase streamflow during the time between die-off and the regeneration of the forest canopy.

Stednick and Jensen (2007) studied the effects of beetle infestations on water yield and water quality in northern Colorado. They concluded that changes in hydrologic processes after an insect infestation would alter streamflow responses. In forested watershed areas with even-aged forest stands (i.e., forests without much understory), water yield would increase as the forest canopy decreases in response to pine beetle defoliation. Other impacts to hydrologic processes from pine beetle kills are presumed to be similar to those effects from timber harvesting, including increases in late summer and fall streamflows, and earlier timing of peak flows. Stednick and Jensen (2007) also observed beetle kill would increase peak flows since the deforested areas allow for greater accumulation of snow, decreases in sublimation, and accelerated snowmelt. These impacts are estimated to be long-term and may last up to 60 years (Stednick and Jensen 2007).

The actual change in streamflow that may be associated with pine beetle infestation is not known. Any effects of pine beetle infestation would likely influence streamflow conditions in the entire analysis area.

3.6 Groundwater Hydrology

Changes in groundwater accrual to Willow Creek and local groundwater levels associated with agricultural dry-up of the Miller-Hereford and E Diamond H ranches were identified as key groundwater issues.

3.6.1 Affected Environment

The Redtop Valley Ditch diverts water from the North Fork Colorado River northeast of Shadow Mountain Reservoir and conveys irrigation water south to irrigated lands northwest of Granby Reservoir. Based on ditch records, historical flow at the Hudler flume, which primarily serves all of the E Diamond H and Miller-Hereford ranches plus 35.9 acres on the Lambright Property, is about 7,300 AF/yr. Flow at the Northern Water flume, which serves the Miller-Hereford Ranch and portions of the E Diamond H Ranch, is about 5,000 AF/yr (Boyle/AECOM 2008; Rademacher 2008).

No estimation of canal seepage was performed as part of available studies. However, a 90 percent delivery efficiency is reported between the Northern Water flume and irrigated fields (Boyle/AECOM 2008). Of the 5,000 AF/yr at the Northern Water flume, about 500 AF is lost during conveyance to irrigated land, primarily as seepage into shallow groundwater (evaporation losses are

likely minimal), which is primarily tributary to Willow Creek.

The Proposed Action would require the dry-up of about 844 irrigated acres, of which 92 are subirrigated. Historical deliveries to these lands average about 6,785 AF/yr. Of this total delivery, about 1,354 AF is consumptively used by crops that are not subirrigated, while the remaining 5,431 AF are return flows to the Willow Creek subbasin (Grand River Consulting 2012). Of these return flows, 500 AF are the conveyance losses previously described. A small amount is also consumptively used by subirrigated lands prior to returning to Willow Creek.

Return flows from use of irrigation water accrue as either short-term surface returns or long-term subsurface (or groundwater) returns. Based on historical data, it is estimated that 54 percent of return flows accrue as surface returns and 46 percent accrue as subsurface returns (Boyle/AECOM 2008). In addition, about 96 percent of the surface and subsurface return flows are tributary to Willow Creek via Church Creek, while the remaining return flows are tributary to Granby Reservoir via the Willow Creek Pump Canal. Therefore, of the 5,400 AF of return flows from the Miller-Hereford and E Diamond H ranches, about 2,500 AF/yr (or 3.3 AF per acre) is introduced into the local groundwater system. Of this, about 2,400 AF is tributary to Willow Creek and 100 AF is tributary to Granby Reservoir.

Some groundwater investigations were performed in the agricultural dry-up area as part of geotechnical investigations of the Jasper North Reservoir site for the Windy Gap Firming Project in 2001 and 2003 (Boyle/AECOM 2003). Saturated thickness (or the thickness of the aquifer from the very bottom to the top of the water table) within the Miller-Hereford Ranch ranged from 2 to 31 feet, with an average of 11 feet (Boyle/AECOM 2008). Although groundwater modeling has not been performed, it is likely that subsurface irrigation return flows contribute to the aquifer in this area.

Four wells are within the agricultural dry-up area (Colorado Decision Support System 2009). Three of these wells are owned by Northern Water (two are permitted for domestic use and one is permitted for construction dewatering). The fourth well was previously permitted for domestic use, but the permit has since been cancelled. Several wells are also south of the irrigated lands along Willow Creek and the Colorado River below Granby Reservoir. It is unknown whether groundwater levels at these wells are influenced by irrigation return flows from the Miller-Hereford and E Diamond H ranches. Based on surface contours, it is likely that any groundwater from these irrigated areas is tributary to surface water in Willow Creek upstream of the aquifers that supply these wells. However, flows in Willow Creek could be the source of some water within the aquifer at these locations.

3.6.2 Environmental Consequences

3.6.2.1 Direct and Indirect Effects

Flow in the Redtop Valley Ditch would generally be lower under proposed operations than for historical operations. This would result in a slight reduction in ditch seepage upstream of the Hudler flume for the Proposed Action, which would result in negligible reduction in groundwater levels in downgradient areas adjacent to the ditch.

No delivery efficiencies were estimated for the Redtop Valley Ditch upstream of the Northern Water flume. Ditch seepage upstream of the Northern Water flume is primarily tributary to Supply Creek, Soda Creek, and Stillwater Creek. Although flow in the Redtop Valley Ditch upstream of the Northern Water flume would be reduced, the ditch would continue to convey water in this portion of the ditch, and changes in seepage rates would likely be minimal.

Downstream of the Hudler flume, the Proposed Action would result in a minor decrease in groundwater levels due to cessation of flow in the Redtop Valley Ditch and downstream private ditches and due to dry-up of irrigated lands on the

Miller-Hereford and E Diamond H ranches. About 500 AF/yr of ditch seepage and 2,500 AF/yr of irrigation return flows would cease to accrue to local shallow groundwater within these areas, likely leading to decreased saturated thickness and increased depth to water. Additionally, the 92 acres of subirrigated lands adjacent to the irrigated acreages would cease to be irrigated.

Groundwater levels in wells within the agricultural dry-up area would decrease. This would be a minor beneficial effect for the Northern Water dewatering well, while it would be a minor adverse effect for the permitted domestic wells. For the wells south of the dry-up area along Willow Creek and the Colorado River, it is likely that effects would be negligible. Although streamflow in Willow Creek would decrease, the effects on localized groundwater levels would be negligible.

3.6.2.2 Cumulative Effects

None of the reasonably foreseeable actions would have a cumulative effect on groundwater resources.

3.7 Water Quality

3.7.1 Affected Environment

Water quality effects are the result of changes in the amount or sources of surface water flows described in Section 3.5, *Surface Water Hydrology*. Therefore, the water quality analysis area was the portion of the surface water hydrology analysis area for which flow or reservoir level changes were anticipated. The water quality analysis excludes the Colorado River below its confluence with the Roaring Fork River because effects are anticipated to be negligible downstream of this location. The Proposed Action, coupled with expiration of the 2012 Agreement, would result in minor flow reductions from July through October and minor increases in flow during the winter months. This relatively small change in streamflow, along with source water quality that is similar to existing conditions, would result in negligible water quality effects in this portion of the Colorado River.

Four analysis area stream segments are on Colorado's 2010 303(d) List of Impaired Waters or Monitoring and Evaluation List (CDPHE 2010c): mainstem of the Colorado River from Granby Reservoir to the Roaring Fork River, Muddy Creek from Wolford Mountain Reservoir to the Colorado River, Shadow Mountain Reservoir, and Granby Reservoir. An upper segment of Muddy Creek from Wolford Reservoir to Cow Gulch is on the Monitoring and Evaluation List and a lower segment from Cow Gulch to the Colorado River is on the 303(d) List for temperature. The Colorado River within the study area had 35 exceedances of the chronic temperature standard (18.2°C in June–September) and 27 exceedances of the acute temperature standard (23.8°C in June–September) within the last 5 years. Most exceedances were recorded in July and August in 2005 through 2008 (CDPHE 2009). Exceedances occurred at several locations along the Colorado River:

- Below Windy Gap Reservoir
- Above Hot Sulphur Springs
- Above Kid Pond (below Parshall)
- Below Byers Canyon
- County Road 3 (near Parshall)
- Lone Buck (downstream of Hot Sulphur Springs)
- Upstream of Blue River at Kremmling

All other stream segments in the analysis area meet water quality standards for temperature.

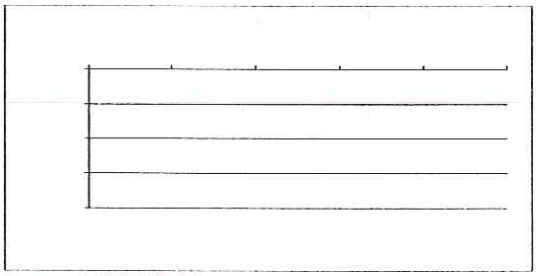
Shadow Mountain Reservoir is on the 303(d) list for concentrations of dissolved oxygen below the Water Quality Standard (WQS) for aquatic life of 6.0 mg/L. Based on data from three different sources, dissolved oxygen concentrations were not in attainment from top to bottom of the reservoir for four dates.

CDPHE issued an advisory in 2009 regarding fish consumption from Granby Reservoir because of a public health risk from high mercury levels. Lake trout exceeded CDPHE's mercury action level of 0.5 parts per million. CDPHE's issuance of a fish

consumption advisory indicates impairment of an aquatic life use classification. The source of the mercury in Granby Reservoir has not been identified. Suspected sources are past mining activities, atmospheric deposition from nearby and distant sources, and naturally occurring local geologic formations and soils.

Exceedances of applicable WQS for dissolved oxygen, dissolved manganese (for drinking water quality), and chronic summer temperature have been documented in Granby Reservoir (Reclamation 2011a). A profile of summer temperatures in Granby Reservoir is shown in Figure 20.

Figure 20. Summer Temperature Profile of Granby Reservoir.



Source: USGS 2011.

3.7.2 Environmental Consequences

3.7.2.1 Direct and Indirect Effects

3.7.2.1.1 North Fork Colorado River and Stillwater Creek below Redtop Valley Ditch

Moderate seasonal increases in streamflow are expected to occur in the North Fork Colorado River below the Redtop Valley Ditch and Stillwater Creek below the Redtop Valley Ditch. The largest increase in flow would occur in Stillwater Creek because water previously diverted by the Redtop Valley Ditch would flow to Granby Reservoir during the irrigation season. Water quality in Stillwater Creek may be slightly beneficially affected during the irrigation season because the source of the increased water in Stillwater Creek would be the North Fork Colorado River, which meets WQS. Increased flow in these segments may provide dilution for nonpoint sources of discharge that adversely affect water quality.

3.7.2.1.2 Willow Creek

Streamflow in lower Willow Creek would decrease slightly as a result of the Proposed Action due to cessation of irrigation return flows from the E Diamond H and Miller-Hereford ranches. These decreases would be largest during June and July. Water quality in Willow Creek is generally good and in attainment of WQS. A reduction in irrigation return flows, which may reduce temperatures, sediment, nutrient, and pesticide loadings and mineral leaching from the soils (Spahr et al. 2000), would likely result in a minor beneficial effect in water quality in Willow Creek. The Three Lakes Wastewater Treatment Plant is permitted to discharge 2,000,000 gallons per day to Church Creek, a tributary of Willow Creek. A reduction in flow in Willow Creek would decrease dilution flows for the plant's effluent, which may cause a minor increase in parameters such as ammonia, copper, and iron (Reclamation 2011a).

3.7.2.1.3 Colorado River below Granby Reservoir

In the last 5 years, exceedances of the temperature standard in the Colorado River below Windy Gap Reservoir occurred in July and August. The Proposed Action would make additional releases from Granby Reservoir in late summer and early fall. The releases are projected to increase flow in the Colorado River between Granby Reservoir and Willow Creek in July, August, and September and in the Colorado River below Willow Creek in August and September (see Section 3.5.2.1.4). Summer hypolimnion (bottom-most layer) temperatures ranged from 4.2 to 11.1°C in Granby Reservoir (USGS 2011), compared to the acute temperature standard in the Colorado River below Granby Reservoir of 23.8°C and chronic temperature standard of 18.2°C. Releases of additional reservoir water from the hypolimnion would decrease the likelihood of future

exceedances of the chronic temperature standards in summer and early fall.

The modeling predicted the Proposed Action would decrease flow in the Colorado River below Willow Creek in July (see Section 3.5.2.1.4). The predicted flow decrease would range from 4 to 5 percent of existing flows in July. The slightly lower flows could increase the potential for temperatures to be at or above regulatory maximums slightly more often than current conditions. The effects are anticipated to be negligible.

3.7.2.1.4 Muddy Creek

Flow in Muddy Creek would remain within its historical range and any change in water quality in the creek would be negligible.

3.7.2.1.5 Blue River below Green Mountain Reservoir

In the Blue River below Green Mountain Reservoir, flow would typically not be altered because minor changes in flow would occur infrequently. This is because the 10825 water releases from Granby Reservoir would almost always occur at a time when streamflow in the 15-Mile Reach was less than the minimum baseflow targets established by the Service. Exchanges of 10825 water from the Colorado River to Green Mountain Reservoir would commonly be 50 cfs or less in August and September, which would reduce flow in the Blue River during these periods by 10 percent or less. Because the source of water in the Blue River would not change, these short-term changes in streamflow would have a negligible effect on water quality in this reach.

3.7.2.1.6 Shadow Mountain Reservoir

Storage levels in Shadow Mountain Reservoir would not appreciably change. The amount of water pumped from Granby Reservoir into Shadow Mountain Reservoir would be reduced by an annual average of 710 AF, which is equal to a 0.45 percent reduction in the total amount of pumped water. Because the amount and source of water into Shadow Mountain Reservoir would not change, the Proposed Action would have no effect on water quality in Shadow Mountain Reservoir.

3.7.2.1.7 Granby Reservoir

Storage levels in Granby Reservoir would typically increase from May through September due to the Proposed Action. The increase in inflow to the reservoir from the North Fork Colorado River and Stillwater Creek would have similar quality to water that currently flows to the reservoir from these drainages. Therefore, because the source water quality would not change, and the change in storage contents from the Proposed Action would be about 1 percent of the volume of Granby Reservoir, the Proposed Action would have a negligible change on concentrations of pollutants of concern (mercury, dissolved oxygen, and manganese) within Granby Reservoir.

3.7.2.1.8 Green Mountain Reservoir

Green Mountain Reservoir would have a minor increase in storage of up to 3,000 AF annually when 10825 water released from Granby Reservoir was not needed in the 15-Mile Reach and infrequently exchanged into Green Mountain Reservoir. The overall water quality in Green Mountain Reservoir would remain similar to historical conditions.

3.7.2.1.9 Wolford Mountain Reservoir

Wolford Mountain Reservoir would have a minor increase in storage of up to 2,000 AF annually when Grand County environmental water was exchanged or substituted infrequently into the reservoir. The overall water quality in Wolford Mountain Reservoir would remain similar to historical conditions.

3.7.2.2 Cumulative Effects

Cumulative water quality effects were estimated based on the cumulative effects on surface water hydrology and reservoir storage levels.

3.7.2.2.1 Colorado River near Kremmling

Minor changes in streamflow during July to October would occur in the Colorado River near

Kremmling. Anticipated changes associated with the Proposed Action and expiration of the interim agreements are typically 10 percent or less. Changes in flow result from cessation of releases from Williams Fork and Wolford Mountain reservoirs and loss of return flows from the Redtop Valley Ditch, resulting in negligible to minor changes in water quality.

Grand County would direct the timing and rate of the environmental bypasses or releases using guidance from the Grand County Stream Management Plan (Tetra Tech et al. 2010). When not exchanged or substituted into Wolford Mountain Reservoir or Green Mountain Reservoir, it is anticipated that the Grand County environmental water would increase streamflow during July through October, during periods of low streamflow or elevated water temperatures.

3.7.2.2.2 Fryingpan River below Ruedi Reservoir

Streamflow in the Fryingpan River below Ruedi Reservoir and Roaring Fork River near Glenwood Springs would be retimed due to expiration of the 2012 Agreement. Summer flows would typically decrease and winter flows would increase. Summer discharge temperatures from Ruedi Reservoir range from about 4 to 12°C (Reclamation 1989). Water temperature in the Fryingpan River for the same period range from 6 to 17°C (USGS 2011). Temperatures on the Fryingpan River below Ruedi Reservoir and the Roaring Fork River would be influenced by the magnitude and temperature of the releases. Because summer water temperature in Ruedi Reservoir is typically lower than temperature in the Fryingpan River, stream temperature would decrease with releases of reservoir water cooler than the stream temperature. Wintertime discharge temperatures from Ruedi Reservoir were not available. An increase in flow in the Fryingpan River during winter may decrease instances of icing in the river.

3.7.2.2.3 Ruedi Reservoir

End of summer storage levels in Ruedi Reservoir would typically increase by 5,412.5 AF from existing conditions due to the Proposed Action, in combination with expiration of the 2012 Agreement. Because water quality in Ruedi Reservoir is generally good and source water into the reservoir would not change, water quality is not expected to change appreciably.

Any changes in streamflow and reservoir contents due to the Proposed Action under cumulative effects would follow a pattern similar to direct effects. The incremental hydrologic effect of the Proposed Action would be negligible, as would the water quality effects. In general, the reasonably foreseeable actions (Section 3.2) would result in additional water diversions in the future, which would reduce streamflows and reservoir contents in the analysis area. Therefore, while the magnitude of hydrologic changes under the Proposed Action would be similar under direct effects and cumulative effects, the percentage change in water quality conditions under the Proposed Action may be slightly higher under cumulative effects than described for direct effects.

3.8 Reservoir Operations and Hydroelectric Generation

The operation of Shadow Mountain and Grand Lake, Granby, Green Mountain, and Ruedi reservoirs may be affected by the Proposed Action. The Green Mountain Reservoir, Shoshone, and Ruedi Reservoir hydroelectric plants may be affected by changes in the timing of discharge through their generating units. Changes in operations at the Shoshone and Ruedi Reservoir hydroelectric plants would be negligible and are not discussed.

3.8.1 Affected Environment

3.8.1.1 Reservoir Operations

3.8.1.1.1 Shadow Mountain Reservoir

Shadow Mountain Reservoir is a component of the C-BT Project. Shadow Mountain Reservoir is on the Colorado River between Grand Lake and Granby Reservoir and has a total capacity of

18,400 AF. Water is delivered to Shadow Mountain Reservoir from the Farr Pumping Plant, which lifts water 125 feet in elevation from Granby Reservoir into Shadow Mountain Reservoir. Shadow Mountain Reservoir also captures natural inflow above the pumping plant, including inflow from the North Fork Colorado River.

Shadow Mountain Reservoir is connected to Grand Lake and both water bodies have the same water surface elevation. Senate Document 80 requires that water elevations in Grand Lake be maintained within the range of normal fluctuations. As a result, Shadow Mountain Reservoir and Grand Lake water levels are managed and held at a relatively constant level. The average storage contents of C-BT Project water in Shadow Mountain Reservoir and Grand Lake for the 1991 through 2008 study period is 17,750 AF with a range of 13,580 AF in November 2007 to 21,440 AF in October 1991. The annual fluctuation of storage contents (i.e., difference between maximum and minimum storage contents within the year) is between 385 and 4,400 AF, with an annual median fluctuation of 560 AF (Grand River Consulting 2012).

3.8.1.1.2 Granby Reservoir

Granby Reservoir is a 539,800 AF reservoir northeast of the Town of Granby in Grand County. The reservoir, which was completed in 1949, is the second largest reservoir in Colorado and serves as the primary storage reservoir in the C-BT system. Major tributary inflows to the reservoir include Arapaho Creek, Stillwater Creek, Columbine Creek, and the Colorado River. Water is also pumped to Granby Reservoir from Willow Creek Reservoir via the Willow Creek Pump Canal and from the Windy Gap Reservoir via the Windy Gap pipeline. Most of the water stored in Granby Reservoir is pumped to Shadow Mountain Reservoir via the Farr Pumping Plant and the Granby Pump Canal and is ultimately delivered through the Adams Tunnel to the east slope. Releases from Granby Reservoir accrue to the Colorado River.

The average storage contents of Granby Reservoir for the 1991 through 2008 study period is 373,910 AF with a range of 538,200 AF in July 1995 to 90,250 AF in March 2003. The annual fluctuation of storage contents is between 91,900 and 311,900 AF, with an annual median fluctuation of 138,250 AF (Grand River Consulting 2012).

3.8.1.1.3 Wolford Mountain Reservoir

Wolford Mountain Reservoir is owned and operated by the CRWCD. Construction of Wolford Mountain Reservoir Dam was completed in 1996. Wolford Mountain Reservoir is a 66,000 AF reservoir located on Muddy Creek about 5 miles upstream of the town of Kremmling and 7 miles upstream of its confluence with the Colorado River. The reservoir provides storage for replacement of out-of-priority diversions by the trans-mountain diversion collection system of Denver Water and for West Slope uses, including irrigation, municipal supplies, flood control, recreation, and fish and wildlife enhancement.

3.8.1.1.4 Green Mountain Reservoir

Green Mountain Reservoir is a 153,639 AF reservoir on the Blue River 13 miles upstream of the confluence with the Colorado River. The reservoir was completed in 1943 as a component of the C-BT Project. The reservoir's primary purposes are providing replacement storage for diversions of the C-BT Project and for power purposes. Of the total reservoir capacity, 52,000 AF are dedicated to replacement of C-BT Project out-of-priority diversions, and the remaining 100,000 AF are for power generation. The 1983 Operating Policy for Green Mountain Reservoir (Reclamation 1983) further clarified the use of water from the 100,000-AF power pool. The policy states that water released from the reservoir for irrigation and domestic uses whose water rights were perfected by use prior to October 15, 1977 would be limited to 66,000 AF. This allocation is referred to as the HUP. The balance of the 100,000-AF power pool may be used for contracting purposes and for dead/inactive storage. The Blue River Decree specifies the relative priorities of the storage and hydroelectric water

rights for Green Mountain Reservoir and the upstream water rights at Dillon Reservoir, the Roberts Tunnel, and Colorado Springs Utilities' Continental-Hoosier System.

Green Mountain Reservoir stores inflow during runoff from the Blue River and water diverted from Elliot Creek, which is delivered to the reservoir via the Elliot Creek Feeder Canal. Releases from the reservoir are typically made through the Green Mountain power plant for power generation (Section 3.8.1.2.1). Releases of HUP surplus water are typically made from June 15 through October 31. Depending on the drawdown of the HUP, surplus HUP water can be available for endangered fish in the 15-Mile Reach. The first release of surplus HUP water was made for the 15-Mile Reach in 1998. The terms and conditions under which surplus HUP water is made available to the 15-Mile Reach are defined in the stipulation and agreement for the Orchard Mesa Check water right case (State of Colorado 1996). HUP surplus water is typically not declared and made available until after August 1. Historical releases of surplus HUP water for the Recovery Program range from 119 AF in 2004 to 61,433 AF in 2008 and a mean of 19,307 AF from 1991 to 2008 (Grand River Consulting 2012).

The average storage contents of Green Mountain Reservoir for the 1991 through 2008 study period is 109,220 AF with a range of 36,170 AF in March 2003 to 155,645 AF in December 1996. The annual fluctuation of storage contents is between 35,510 and 116,580 AF, with an annual median fluctuation of 87,245 AF (Grand River Consulting 2012). Since 1990, Green Mountain Reservoir filled in all years except 1994, 2001, 2002, and 2004.

3.8.1.1.5 Ruedi Reservoir

Ruedi Reservoir, a component of the Fry-Ark Project, is a 102,373 AF reservoir on the Fryingpan River 14 miles upstream of its confluence with the Roaring Fork River. Construction of Ruedi Dam was completed in 1968. Three primary pools exist within Ruedi Reservoir: the replacement pool, the recreation pool, and the west slope pool. The replacement pool is 28,000 AF and is available to replace out-of-priority diversions associated with the Fry-Ark Project. The recreation pool consists of 20,000 AF of storage that has been set aside for recreation uses. The west slope pool is the remainder of the active storage in Ruedi Reservoir. Water from the west slope pool is available for sale under temporary and long-term contracts and is used for irrigation, municipal and industrial supplies, and fish and wildlife enhancement.

The initial contracts for water, called "Round I sales," consist of four, long-term (40-year) contracts for a total of 7,850 AF of water from Ruedi Reservoir. Due to additional requests for contract water after Round I, Reclamation initiated studies to determine the impacts of the proposed Ruedi Round II Water Marketing Program, or "Round II program." Reclamation completed NEPA compliance on Round II in 1990. In 1991, the razorback sucker was listed as endangered and in 1994, critical habitat was listed for all four Colorado River endangered fish. With the 1991 and 1994 listings, Reclamation reinitiated Section 7 consultation on Round II contracting. In 1995, Reclamation received a jeopardy biological opinion on the marketing of up to 17,000 AF of Round II water. The biological opinion contained two reasonable and prudent alternatives (RPAs) for Reclamation to implement prior to proceeding with Round II water contracts. Reclamation was to: (1) continue the 5,000 AF annually and 5,000 AF in 4 out of 5 years commitments; and, (2) make the remaining uncommitted portion of the marketable yield (estimated at 21,650 AF) available through an interim agreement with the Service and CWCB for up to 15 years to enhance flows in the 15-Mile Reach. Reclamation was unable to implement one of the RPAs (an interim agreement to which all parties could agree) and in 1997 Reclamation reinitiated consultation to develop a new RPA.

In 1997, water users, environmentalists, Reclamation, and the Service began discussing the elements of a Programmatic Biological Opinion (PBO) to address the effects of all historic

depletions affecting the 15-Mile Reach, including those from Ruedi Reservoir. Rather than proceed with developing a separate RPA for the Round II program, Reclamation decided to pursue a new RPA through the PBO process. However, development of the PBO took longer than originally anticipated and west slope water users were urging Reclamation to reinitiate Round II contracting to address immediate water sale needs. As a result, in 1998 Reclamation again reinitiated consultation with the Service to develop a new RPA for the Round II program. In 1999, Reclamation received and accepted a final amendment to the May 1995 Biological Opinion on the Round II program, which allowed contracting for up to 6,135 AF to meet immediate needs out of a total projected demand of 17,000 AF of Ruedi Reservoir water. Reclamation proceeded with this contracting.

In late 1999, agreement was reached and the PBO finalized. The PBO superseded previous biological opinions on Ruedi Reservoir operations. Reclamation committed to continue to provide 5,000 AF per year and 5,000 AF in 4 out of 5 years (referred to as "5 plus 5 Water") and to seek an agreement to provide up to 21,650 AF of Ruedi Reservoir water to the Recovery Program through 2012 to improve flows in the 15-Mile Reach. The PBO states that when the east and west slope water users dedicate a total of 10,825 AF to the Recovery Program, Reclamation's commitment will be reduced from 21,650 AF to 10,825 AF of Ruedi Reservoir water. This occurred in 2000. Finally, when a long term (through 2012) agreement is signed committing Reclamation to make 10,825 AF of Ruedi water available to enhance flows in the 15-Mile Reach thru 2012, Reclamation may, per the PBO, contract for the 10,865 AF remainder of the 17,000 AF (17,000 AF minus the 6,135 AF to meet immediate needs). The 2012 Agreement is discussed in Section 1.4.3.4.

A total of 19,002 AF (7,850 AF under Round I and 11,152 AF under Round II) has been contracted for water supply purposes, not including the reservoir water allocated for Recovery Program purposes. The total remaining amount available for contract is 16,673 AF until the 2012 agreement between Reclamation, CWCB and the Service for release of 10,825 AF of water expires, at which time additional water will be available for contract from Ruedi Reservoir.

Ruedi Reservoir is normally operated to offset out-of-priority diversions, store spring runoff, accommodate recreational interests, and provide for downstream fishery requirements. Through releases for fish flow purposes and contract water releases, the reservoir is typically drawn down during the winter months through March in an attempt to "fill without spill" during the summer based on forecasted runoff. Historically, the reservoir has typically filled by late June or July. Following the fill, the reservoir is operated to enhance recreational uses until it becomes necessary to make releases to meet contract demands and demands for fish flow releases. The Division Engineer assesses a transit loss of 7.5 percent and a 2-day lag for Ruedi Reservoir releases to the 15-Mile Reach.

The Water Resources Assessment Report (Grand River Consulting 2012) provides an annual summary of historical Recovery Program releases from Ruedi Reservoir in the late summer and fall. The average storage contents of Ruedi Reservoir for the 1991 through 2008 study period is 84,740 AF with a range of 32,810 AF in April 1996 to 103,160 AF in June 2000. The annual fluctuation of storage contents is between 27,810 and 66,240 AF, with an annual median fluctuation of 37,280 AF (Grand River Consulting 2012).

3.8.1.2 Hydroelectric Generation

3.8.1.2.1 Green Mountain Reservoir Power Plant

The Green Mountain Reservoir power plant is a 26-MW facility at the base of Green Mountain Reservoir Dam and is federally owned and operated by Reclamation. Green Mountain Reservoir was constructed for the primary purposes of providing replacement storage for diversions by the C-BT Project and for power purposes. Releases

from the reservoir are made through the Green Mountain Reservoir power plant. The power plant has a decree of 1,726 cfs.

In most years, all outflow from Green Mountain Reservoir is routed through the power plant. In wet years, the reservoir may spill, and outflow to the Blue River can exceed the capacity of the power plant. During the analysis period, outflow from the reservoir exceeded the capacity of the power plant for the following periods:

- 1995—June 28 to July 24
- 1996—June 19 to July 8
- 1997—June 14 to July 1
- 1999—July 3 to July 4
- 2007—June 18 to June 25
- 2008—July 7 to July 9

3.8.2 Environmental Consequences

Because Granby Reservoir, Shadow Mountain Reservoir, and the Green Mountain Reservoir and power plant would be affected by the Proposed Action only, and not the expiration of the interim agreements, direct effects were assessed. The expiration of the interim agreements, in combination with the Proposed Action, was analyzed as a cumulative effect on Ruedi Reservoir for this EA.

3.8.2.1 Direct and Indirect Effects

3.8.2.1.1 Reservoir Operations

Shadow Mountain Reservoir

The Proposed Action would bypass a portion of the water that has historically been diverted by the Redtop Valley Ditch to the North Fork Colorado River. The flow would accrue to Shadow Mountain Reservoir. Additional inflow to the reservoir from the North Fork Colorado River is estimated to average 2,404 AF/yr (Grand River Consulting 2012).

Because of the Senate Document 80 requirement to keep Shadow Mountain Reservoir and Grand lake at a nearly constant level, any change in storage contents of the reservoir would be negligible. The increased volume in the reservoir would be released to the Colorado River from Granby Reservoir. It is anticipated that a portion of the additional water available to Shadow Mountain Reservoir would be directly diverted through Grand Lake to the Adams Tunnel, thereby reducing the amount of water that would have to be pumped from Granby Reservoir to Shadow Mountain Reservoir (likely in July). For the month of July, inflow to the reservoir from the North Fork Colorado River would increase by 710 AF (Grand River Consulting 2012) and the amount of water pumped to Shadow Mountain Reservoir from Granby Reservoir would decrease by a commensurate amount. Average annual diversions by the Farr Pumping Plant are 180,731 AF. Annual pumping would decrease by 0.4 percent of the total annual amount of water pumped by the Farr Pumping Plant.

Granby Reservoir

With the Proposed Action, storage levels in Granby Reservoir would typically increase from May through September. The increase in storage would be associated with an increase in inflow to the reservoir from the North Fork Colorado River and Stillwater Creek. The increase in reservoir inflow would be equal to the amount of water that has historically been supplied for irrigation on the E Diamond H and Miller-Hereford ranches.

Granby Reservoir contents would increase in May, June, and July with the increase of Redtop Valley Ditch water. Storage in the reservoir would typically increase by an average of 6,475 AF during this period. The amount of actual increase would vary from year to year (Grand River Consulting 2012). The water surface elevation of Granby Reservoir would typically increase 0.9 to 1.4 feet by the end of July.

In late July, August, and September, the release of 5,412.5 AF of water would be made from Granby Reservoir. These releases would be in addition to other Granby Reservoir releases that occur in July, August, and September. Disposition of the

remaining estimated 1,062.5 AF of Redtop Valley Ditch water that would accrue to the C-BT Project has yet to be determined. As a result, average storage volumes in Granby Reservoir at the end of September could be slightly higher as a result of the Proposed Action.

Green Mountain Reservoir

Three components of the Proposed Action may affect Green Mountain Reservoir: the exchange of water from the Colorado River, increased releases from the C-BT replacement pool, and the exchange or substitution of environmental water into Green Mountain Reservoir (insurance pool).

Exchange from the Colorado River

An exchange between the Colorado River and Green Mountain Reservoir would be operated infrequently and would occur for relatively short periods. Any exchanges would most likely occur in either August or September of wet years when water released from Granby Reservoir was not desired in the 15-Mile Reach because of high streamflow at this downstream location.

An exchange is predicted to affect Green Mountain Reservoir storage levels in the following manner:

- Water exchanged to Green Mountain Reservoir would increase reservoir storage in an amount equal to the exchanged volume of water.
- Reservoir storage would remain at a higher level until the water was subsequently released for Recovery Program purposes later in the year or in the following spring.
- Following the release of water, Green Mountain Reservoir contents would decline to the level that would have occurred without the exchange.
- At no time would the exchange of water decrease Green Mountain Reservoir storage levels.

The maximum amount of a Colorado River-to-Green Mountain Reservoir exchange is anticipated to be less than 3,000 AF/yr. The average storage content for Green Mountain Reservoir at the end of August is 129,000 AF. If a maximum exchange of 3,000 AF occurred, and if the exchanged water had not yet been released from Green Mountain Reservoir, the average storage contents of Green Mountain Reservoir would increase by an estimated 2.3 percent at the end of August.

Similarly, the average storage content of Green Mountain Reservoir at the end of September is 109,000 AF. If a maximum exchange of 3,000 AF occurred, the average storage contents of Green Mountain Reservoir would increase by 2.8 percent at the end of September. Both of these changes in storage would increase the reservoir elevation by about 1.8 feet.

Increased Releases from C-BT Replacement Pool and Effect on Other Contracted Uses

Additional releases from the C-BT replacement pool would occur to offset the amount of Redtop Valley Ditch water stored in Granby Reservoir whenever a mainstem river call was in place. These additional releases would often reduce reservoir carry-over storage into the following year. In certain dry years, Green Mountain Reservoir does not fill to capacity. The additional C-BT replacement releases from the prior year would increase the reservoir's fill deficit in dry years, which in turn may affect the amount of substitution water owed to Green Mountain Reservoir by Denver Water and by Colorado Springs Utilities. This deficit may affect the yield of the Green Mountain Reservoir power pool, including the contract and HUP allocations.

The potential impact to Green Mountain Reservoir would occur only in dry years when Green Mountain Reservoir did not fill. For example, if the additional C-BT replacement pool releases resulted in a lower end-of-year storage content in Green Mountain Reservoir, and the reservoir did not achieve a fill in the following year, the reservoir supply available to some water users may be reduced. The provision of the insurance pool would offset the potential reduction in water supply to Green Mountain Reservoir and is intended to

ensure that the substitution requirements of Denver Water and Colorado Springs Utilities do not increase.

Estimates of the amount of out-of-priority diversions in Granby Reservoir are based on historical diversions by the Redtop Valley Ditch and historical river calls. The actual increase in replacement releases from Green Mountain Reservoir in individual years would vary from a low of 0 AF to a high of 1,873 AF. From 2001 through 2004, the additional replacement release from Green Mountain Reservoir was a total of 5,651 AF, for an average of 1,413 AF/yr during that 4-year period. Under current water right administration, each year from 2001 through 2004 would have been a substitution year and would have required additional substitution by Denver Water and Colorado Springs Utilities.

The estimates of the amount of out-of-priority diversions in Granby Reservoir are based on the assumption that when a mainstem river call occurred, the storage of Redtop Valley Ditch water in Granby Reservoir would also be out-of-priority. This assumption represents a worst-case scenario and in actuality, the relatively senior water rights of Granby Reservoir would remain in-priority during some portion of a mainstem water right call. Accordingly, the out-of-priority diversion estimates may overstate the actual amount of additional replacement that would be required from Green Mountain Reservoir.

Reclamation recently modeled Green Mountain Reservoir operation for a 54-year period (water years 1952 to 2005). Two scenarios were modeled: current levels of contracting (9,644 AF) and full level of contracting (20,000 AF). The modeling did not include additional C-BT replacement releases due to the 10825 Project. If, and when, Green Mountain Reservoir contracts total the full 20,000 AF, contract deliveries can only be fully met if the reservoir fills to 149,680 AF. Without the additional C-BT Granby replacement releases and under the full contract condition, shortages to contract deliveries can be expected 4 of 54 years. Of those 4 years, in one year (2002) there is a 100 percent modeled shortage with or without the additional C-BT replacement releases and the other 3 years result in only partial shortages without the additional C-BT replacement releases. Therefore, to the extent that additional C-BT replacement releases in the preceding year resulted in a lower carryover storage (March 31) in the reservoir, the modeling indicated the amount of water available for contractors would be reduced by that amount in up to 3 out of 54 years, 1954, 1981 and 2004 under full contracting.

The modeling indicated that 8,176 AF was available for contracting in 1954. The shortage would have been equivalent to the 1953 additional C-BT replacement releases, which are not known. In 1981, the modeling indicated 13,445 AF was available for contracting. The total modeled contract delivery requirement for 1981 was 13,286 AF, leaving a balance of 157 AF. Therefore, the shortage would have been equivalent to the 1980 additional C-BT replacement releases (which is not known) minus 157 AF under full contracting. In 2004, the model indicated 8,937 AF was available. The shortage caused by the C-BT replacement release would have been equal to the 2003 release of 1,786 AF (Table 6), under full contracting. Reclamation recently began accepting requests for new Green Mountain Reservoir water service contracts. All new contracts likely will require a back-up source equivalent to the amount contracted for.

Historical vs. Current Reservoir Operations, and Discretionary Power Releases

Historical reservoir operations may not be indicative of current and future operations of Green Mountain Reservoir. In many past years, it was common that a portion of the 66,000 AF HUP allocation was not released during the irrigation season because of a lack of demand by HUP beneficiaries. In those historical years, the end-of-irrigation season storage content of the reservoir often was higher than the desired start-of-year reservoir content for the following year. In order to draw the reservoir down to a desired pre-snowmelt

runoff content, Reclamation commonly made discretionary power releases throughout the winter months.

With the settlement of the Orchard Mesa Check water right case, and the resulting use of the HUP allocation for the Recovery Program, the operation of Green Mountain Reservoir has changed. The entire 66,000 AF HUP allocation is now commonly released each year and the end-of-irrigation season content of Green Mountain Reservoir has declined in many instances. Reclamation (2011c) estimates that with the existing operational criteria for Green Mountain Reservoir, the end-of-irrigation season storage contents will be such that required winter releases will draw the reservoir down to less than the desired start-of-fill contents about two-thirds of the time. Accordingly, discretionary power releases during the winter months will not be as common as they have been historically, and they may not occur in about two-thirds of the years. The reduced start-of-year storage contents may increase the frequency that Green Mountain Reservoir has either a legal or physical fill deficit in subsequent dry years.

Change in Substitution Demands

If Green Mountain Reservoir does not achieve a fill in a given year, junior water diverters upstream of Green Mountain Reservoir (Denver Water and Colorado Springs Utilities) are required to provide "substitution water" to offset the impact of their upstream diversions on Green Mountain's ability to fill. These types of years are referred to as "substitution years." In substitution years, Denver Water and Colorado Springs Utilities must provide substitution water to Reclamation to the extent needed to allow Green Mountain Reservoir to fill. Denver Water typically replaces 90 percent of the substitution demand and Colorado Springs Utilities provides the remaining 10 percent. The amount owed to Green Mountain Reservoir is the minimum of 1) the shortage in the Green Mountain fill, or 2) the amount of water diverted by Denver Water and Colorado Springs Utilities.

The insurance pools in Green Mountain Reservoir, Wolford Mountain Reservoir, and Ruedi Reservoir would provide a supply of water equal to the increased amount of C-BT replacement pool releases, if such increased releases actually contribute to a lack of a reservoir fill in a following year. Reclamation would use water from the insurance pools to offset any reduction in water storage in Green Mountain Reservoir that occurs from the increased C-BT pool releases. This would avoid any losses in Green Mountain Reservoir water. The insurance pool water would also avoid an increase in substitution water requirements for Denver Water and Colorado Springs Utilities, because it would maintain the amount of Green Mountain Reservoir water that was available for authorized purposes. It would also avoid impacts to all water rights due to any changes in the pattern of return flows from Redtop Valley Ditch.

Exchange or Substitution of Environmental Water (Insurance Pool)

An element of the Proposed Action is the exchange or substitution of Grand County environmental water into Green Mountain Reservoir, and the subsequent release of this water from the reservoir. The specific operation of the exchange or substitution cannot be reliably quantified, given the many variables that influence the exchange or substitution into the reservoir.

The exchange or substitution of insurance pool water into Green Mountain Reservoir would offset changes in reservoir storage associated with the increased C-BT pool releases described above. If all of the insurance pool water was exchanged or substituted into Green Mountain Reservoir, the effect of the additional C-BT replacement pool releases would be entirely offset in the year following the additional replacement pool releases.

Wolford Mountain Reservoir

The Proposed Action includes the exchange or substitution of Grand County environmental water into Wolford Mountain Reservoir, and the subsequent release of this water from the reservoir. The specific operation of the exchange or

substitution cannot be reliably quantified, given the many variables that influence the exchange or substitution into the reservoir. The exchange or substitution would reduce streamflow of Muddy Creek at the time that the exchange was made. The exchange or substitution would occur only if excess capacity existed in Wolford Mountain Reservoir. Also, the exchange would occur only to the extent that outflow from the reservoir exceeds the adjudicated instream flow water rights below the reservoir.

Average storage contents at the end of September are 48,000 acre feet for Wolford Mountain Reservoir. If a maximum insurance pool exchange of 2,000 acre feet occurred, and if the exchanged water had not yet been released from the reservoir, average reservoir storage contents would increase by 4.2 percent at the end of September. This change in storage would result in an increase of reservoir elevation of 1.6 feet.

3.8.2.1.2 Hydroelectric Generation

Green Mountain Reservoir Power Plant

Hydroelectric production at the Green Mountain Reservoir power plant would be affected by the exchange or substitution of water into Green Mountain Reservoir and additional C-BT Project replacement releases.

Granby Reservoir to Green Mountain Reservoir Exchange

The Proposed Action would affect the timing of power production from the Green Mountain Reservoir power plant when an exchange of water from Granby Reservoir is implemented. During the infrequent periods when an exchange occurs, the Proposed Action may cause a minor change in the timing of reservoir releases, which would result in a minor change in the timing of a small portion of the power that was produced.

The maximum annual exchange of water to Green Mountain Reservoir is estimated to total 3,000 AF. This exchange would typically occur in August during wet years. The average discharge through the power plant is 36,600 AF during August. The exchange could reduce outflow (and power production) from the reservoir an average of 8.2 percent during August if the full 3,000 AF of water was exchanged. When the water exchanged into Green Mountain Reservoir was subsequently released from the reservoir for Recovery Program purposes (typically in September or October), the additional water would be discharged through the power plant and the prior loss in power production would be offset. This release would typically occur during the fall or in the spring of the following year.

Release of Additional Water from C-BT Replacement Pool

Additional C-BT replacement releases could occur in June and July of dry years when an exchange of water from Granby Reservoir is implemented (see prior discussion on Green Mountain Reservoir operations). Winter discretionary power releases from Green Mountain Reservoir may decline a like amount, and the annual change in power production would be negligible.

3.8.2.2 Cumulative Effects

3.8.2.2.1 Reservoir Operations

Ruedi Reservoir

The Proposed Action, in combination with the expiration of the 2012 Agreement, would increase summer reservoir levels in Ruedi Reservoir from current levels. The increase would be associated with a typical reduction in Ruedi Reservoir releases of 5,412.5 AF/yr.

The Proposed Action would result in an increase in the end-of-summer storage in Ruedi Reservoir. Reservoir storage would typically be 5,412.5 AF higher at the end of October. The reservoir water surface elevation would be 6.5 feet higher. The additional 5,412.5 AF in storage would be released to the Fryingpan River over the winter months in average and wetter than average years when Reclamation desires to reduce reservoir storage levels prior to the snowmelt runoff period. It is projected that reservoir levels prior to the

beginning of snowmelt runoff would generally be unaffected by the Proposed Action.

Reclamation previously estimated storage conditions for Ruedi Reservoir in the EA for the 2012 Agreement (Reclamation 2002). Alternative A from the 2012 EA is representative of typical existing conditions at Ruedi Reservoir in which 10,825 AF of water is released annually pursuant to the 2012 Agreement. Under the Proposed Action, and with the expiration of the 2012 Agreement, reservoir storage would typically increase by 5,412.5 AF from the storage projected in the EA for the 2012 Agreement. Based on this anticipated change, late summer reservoir storage in dry years would increase from 65,000 AF to 70,500 AF, or a 6.5 ft increase in average reservoir stage. In a moderate year, late summer reservoir storage would increase from 81,000 AF to 86,500 AF or 6.5 feet. In a wet year, late summer reservoir storage would increase from 83,000 AF to 88,500 AF or 6.5 feet (Grand River Consulting 2012).

Other Reasonably Foreseeable Actions

The provision of the Grand County environmental water will not alter storage conditions in any of the reservoirs studied, unless a portion of the water is exchanged into an insurance pool in either Green Mountain Reservoir or Wolford Mountain Reservoir. The potential effects of this exchange or substitution are discussed in the assessment of direct effects. For all reasonably foreseeable actions, the Proposed Action would likely result in the same volumetric change in storage as previously described in the direct effects analysis regardless of the future outcome of the reasonably foreseeable action (Grand River Consulting 2012).

3.8.2.2.2 Hydroelectric Generation

Cumulative effects on hydroelectric power generation at the Shoshone and Ruedi Reservoir power plants would be negligible. It is anticipated that the environmental water would typically be provided during July through October, during periods of low streamflow when the Shoshone Hydroelectric Plant is operating at less than capacity. If 2,000 AF of environmental water was made available, and this water was not exchanged into either Green Mountain Reservoir or Wolford Mountain Reservoir, power production at the Shoshone Hydroelectric plant may increase by about 0.3 percent. If the water was exchanged into Green Mountain Reservoir or Wolford Mountain Reservoir, no changes in power production are anticipated. For all reasonably foreseeable actions, the Proposed Action would likely result in the same volumetric change in hydroelectric generation as previously described regardless of the future outcome of the reasonably foreseeable action.

3.9 Aquatic Resources

3.9.1 Affected Environment

3.9.1.1 North Fork Colorado River to Shadow Mountain Reservoir

The segment of the North Fork Colorado River below the Redtop Valley Ditch diversion is classified as an Aquatic Life Cold 1 stream (CDPHE 2010a). At a sampling site in 1993, brown trout and mottled sculpin were common in this section of the river with low numbers of brook and rainbow trout (CDOW 2010b, unpublished data). No other data are available for this section of the river.

At sites upstream of the Redtop Valley Ditch sampled by USGS in 1996, 1997, and 1998, brown trout, brook trout, cutthroat trout, mottled sculpin, and longnose suckers were collected (Deacon et al. 1999). Community composition was similar among the 3 years with brown trout the dominant species each year and one cutthroat trout collected in 1996. Benthic macroinvertebrates were also sampled (Deacon et al. 1999). Overall, the data indicate healthy fish and benthic macroinvertebrate communities upstream of the ditch. Similar conditions are likely found in the section of the river downstream of the ditch, if sufficient water is present to support fish populations, based on the similarities in the fish data. The Redtop Valley Ditch often dries up the North Fork Colorado River

from late June through the end of the irrigation season in July (Grand River Consulting 2012), which would limit the fish population in this reach.

3.9.1.2 Shadow Mountain Reservoir

Shadow Mountain Reservoir is managed as a recreational fishery by CDOW to provide angling opportunities for coldwater game fish (Reclamation 2008a). Seven species were collected from Shadow Mountain Reservoir during the sampling events in 1995 through 2001. Five of the seven species are salmonid game species. The remaining two species collected were longnose suckers and white suckers, of which the white suckers comprised the greatest percentage of the fish community in each year. Brown trout or rainbow trout were the second and third most abundant species. Natural reproduction of game fish in Shadow Mountain Reservoir is inadequate to support the level of recreational fishing, thus fish are stocked by CDOW (Reclamation 2008a). Over the last 10 years, rainbow trout and kokanee salmon have been stocked annually, brown trout have been stocked in most years, and Snake River cutthroat trout have been stocked occasionally (CDOW 2010b, unpublished data).

3.9.1.3 Stillwater Creek-Redtop Valley Ditch to Granby Reservoir

No sampling data are available for Stillwater Creek downstream of the Redtop Ditch. Stillwater Creek is on private property and is not open to public access. This stream likely contains several species of trout, suckers, and mottled sculpin like other streams in the area. Cutthroat trout are found in the upper sections of Stillwater Creek (J. Ewert, CDOW, pers. comm. 2010), and it is not known if they are present in the section of the stream in the analysis area.

3.9.1.4 Granby Reservoir

Granby Reservoir provides recreational fishing opportunities for coldwater game species (Reclamation 2008a). Fish data from samples in 2001, 2007, and 2008 indicate white suckers and longnose suckers were the most abundant species sampled (CDOW 2010b, unpublished data). Kokanee salmon, brown trout, lake trout, and rainbow trout were each collected during all three sampling events and comprised 1 to 12 percent of the fish sampled at a site. In addition, brook trout, cutthroat x rainbow trout hybrids, Snake River cutthroat trout, and mottled sculpin were collected in low abundances in at least one of the samples.

The lake trout and brown trout populations in Granby Reservoir are maintained through natural reproduction (Reclamation 2008a). Rainbow trout are capable of some natural reproduction in Granby Reservoir and kokanee salmon exhibit little or no reproduction (Reclamation 2008a). The kokanee population in Granby Reservoir is used as a source for kokanee eggs in the CDOW hatchery program (Reclamation 2008a). A review of stocking records indicate rainbow trout and kokanee salmon have been stocked annually for at least the last 10 years (CDOW 2010b, unpublished data). Cutthroat x rainbow trout hybrids and Snake River cutthroat trout have also been stocked periodically.

Lake trout prey upon kokanee salmon and the balance between the two populations in Granby Reservoir is dependent upon water levels (Reclamation 2008a). The two species are thermally separated when water elevations are lower because kokanee are more tolerant of the warmer surface levels and lake trout are in the cooler lower levels (Reclamation 2008a). During periods of high reservoir levels, survival of lake trout is higher than at low reservoir levels and the two species are not as thermally separated, resulting in increased predation on kokanee and eventually a reduced lake trout population because of a limited kokanee prey base (Reclamation 2008a). The CDOW manages for balanced kokanee salmon and lake trout populations through stocking and angling regulations (Reclamation 2008a).

3.9.1.5 Willow Creek–Willow Creek Reservoir to Colorado River

The study reach of Willow Creek from Willow Creek Reservoir downstream to the Colorado River

is classified as an Aquatic Life Cold 1 stream (CDPHE 2010a). Fish data were available for three sites on Willow Creek, downstream of Willow Creek Reservoir. Eight species were collected at the three sites (CDOW 2010b, unpublished data). Brown trout were the dominant trout species at each site. Longnose suckers and white suckers were also abundant at one of the sampling sites. Rainbow trout, mottled sculpin, creek chub, fathead minnow, and longnose dace were present in at least one of the three sites at low densities. Chadwick Ecological Consultants, Inc. also sampled Willow Creek in this section for several years in the mid- to late 1990s with similar results (Chadwick Ecological Consultants, Inc. 1999).

Benthic macroinvertebrate samples were also collected and evaluated for the three sites downstream of Willow Creek Reservoir (Reclamation 2008a). Index values used to evaluate the health of the benthic macroinvertebrate community were calculated and indicated some stress to the aquatic benthic macroinvertebrate community. However, the high number of individuals, number of taxa, and presence of some pollution-intolerant taxa indicates that pollution was not the cause of the stress. Instead, the stress was more likely related to water temperature fluctuations and/or rapid changes in discharge because of releases from the upstream reservoir or local land use activities (Reclamation 2008a).

Miller Ecological Consultants (in Tetra Tech et al. 2010) developed PHABSIM habitat relationships for Willow Creek downstream of Willow Creek Reservoir as part of the Grand County Stream Management Plan. The relationship for adult brook trout indicates high levels of habitat occur between flows of 3 cfs and 20 cfs. Adult and juvenile brown trout habitat levels were highest from 25 cfs to 150 cfs. Environmental target flow ranges were developed based on adult habitat availability (weighted usable area [WUA]) for trout in summer (April through September) and trout spawning and incubation habitat availability in winter (October through March) in the Grand County Stream Management Plan (Tetra Tech et al. 2010). Recommended flows are 7 to 10 cfs in summer and winter for this reach (Tetra Tech et al. 2010). A flushing flow was recommended of at least 50 cfs for a three-day period and a recurrence of once every 2 years (Tetra Tech et al. 2010). Willow Creek has no CWCB minimum instream flow requirement.

3.9.1.6 Colorado River–Granby Reservoir to Windy Gap Reservoir

The Colorado River from Granby Reservoir downstream to Windy Gap Reservoir is classified as an Aquatic Life Cold 1 stream (CDPHE 2010a). This reach of the Colorado River is managed by CDOW as a trout fishery (CDOW 2009). Rainbow trout were the dominant species in 1999, 2000, and 2002. Cutthroat x rainbow trout hybrids were also abundant in 2000 and 2002. From 1994 through 1996, brown trout were the dominant species and rainbow trout comprised a small percentage of the fish sampled in each year. Mottled sculpin were also present in 1996. The rainbow trout collected in this reach from 1994 through 2002 are likely mostly stocked fish as this reach is stocked heavily with rainbow trout (CDOW 2010b, unpublished data).

PHABSIM habitat relationships were developed for rainbow trout, brown trout, and trout spawning for the Colorado River downstream of Granby Reservoir (Tetra Tech et al. 2010). The PHABSIM relationships indicate that habitat is at relatively high levels for all modeled life stages of trout from 75 to 300 cfs. The CWCB adopted minimum flows of 40 cfs in summer and 20 cfs in winter for this section of the Colorado River. Environmental flow target ranges were recommended at 90 to 160 cfs in summer and from 40 to 100 cfs in winter (Tetra Tech et al. 2010). A flushing flow of at least 200 cfs was recommended for a three-day period and a recurrence of once every 2 years (Tetra Tech et al. 2010).

3.9.1.7 Colorado River–Windy Gap Reservoir to Williams Fork River

The Colorado River from Windy Gap Reservoir downstream to the Williams Fork River is classified as Aquatic Life Cold 1 (CDPHE 2010a). This river segment is managed as a trout fishery and the entire segment is considered a Gold Medal Water (CDOW 2009). Fish data are available at a number of sites in this segment of the Colorado River. Brown trout were the dominant trout species in this reach of river from 2001 through 2008 (CDOW 2010b, unpublished data). Rainbow trout were collected at high densities in 2003, 2006, and 2007. However, this reach of stream is routinely stocked with rainbow trout and the high densities observed in these years are likely the result of collecting stocked rainbows (J. Ewert, CDOW, pers. comm. 2010).

Brook trout, Snake River cutthroat trout, cutthroat x rainbow hybrid trout, and kokanee salmon were collected only occasionally in low numbers from 2001 through 2008, generally representing less than 1 percent of the catch. Although density data were not always available for mottled sculpin and speckled dace, these species were collected frequently, sometimes at moderate to high abundances. Longnose suckers and white suckers were also collected frequently, but at low densities. Creek chub, longnose dace, and johnny darter were collected only occasionally at low abundances. Of all the species collected, only mottled sculpin and speckled dace are native to the Colorado River Basin (Nesler 1997).

Long-term research in this study segment has documented a shift from a trout population dominated by rainbow trout to a population dominated by brown trout. Whirling disease is considered the primary factor for the decline in the rainbow trout population from the levels observed in the 1980s (Nehring et al. 2000). There is some evidence that brown trout have also been affected by whirling disease (Nehring et al. 2000). Although the current trout population in this segment is dominated by brown trout, the total trout density remains high and is similar to densities prior to whirling disease. Overall, based on the high trout densities observed in recent years and the Colorado River's Gold Medal Water status, the current trout population appears healthy. Long-term research also indicates that mottled sculpins and salmon fly nymphs have been reduced in density in the first few miles of the river reach downstream of Windy Gap Reservoir in recent years (Nehring et al. 2010).

Three sets of PHABSIM relationships were available for this reach of the Colorado River based on information from 1985, 2006, and 2008 (Tetra Tech et al. 2010). The relationships indicate relatively high habitat availability for trout at flows ranging from 75 cfs up to 700 cfs, depending on the dataset and life stage of trout. The CWCB adopted minimum flows of 90 cfs year-round for this section of the river with a high flow target of 450 cfs for 50 hours once every 3 years. Environmental flow range targets were recommended at 200 to 400 cfs in summer and between 125 to 250 cfs in winter (Tetra Tech et al. 2010). A flushing flow of at least 600 cfs was recommended for a three-day period and a recurrence of once every 2 years (Tetra Tech et al. 2010).

3.9.1.8 Colorado River–Williams Fork River to Blue River

The Colorado River from the Williams Fork confluence downstream to the Blue River confluence is classified as an Aquatic Life Cold 1 river (CDPHE 2010a). This segment of the Colorado River is managed as a trout fishery and upstream of Troublesome Creek the Colorado River is classified as a Gold Medal Water (CDOW 2009). The current fish community is dominated by brown trout, as evidenced by data collected by CDOW from 1998 to 2008 at the Parshall-Sunset Site (CDOW 2010b, unpublished data). Rainbow trout were the next most abundant species in most years. Snake River cutthroat trout, mottled sculpin, longnose dace, speckled dace, longnose suckers, and white suckers were collected at low abundances in some years. CDOW has

stocked this reach with large numbers of 4- to 5-inch rainbow trout in recent years; however, successful survival and recruitment has been limited (J. Ewert, CDOW, unpublished report). Long-term research in this study segment has also documented a shift from a trout population dominated by rainbow trout to a population dominated by brown trout (Nehring et al. 2000).

Three sets of PHABSIM habitat relationships were available for this section of the Colorado River from the Grand County Stream Management Plan (Tetra Tech et al. 2010). The relationships indicate that habitat for several life stages of brown and rainbow trout is relatively high at flows of 200 cfs to 600 cfs. The CWCB adopted minimum flows of 135 cfs year-round for the section of the river upstream of the Troublesome Creek and 150 cfs downstream of the creek. Environmental flow range targets were recommended at 250 to 500 cfs in summer and from 150 to 250 cfs in winter (Tetra Tech et al. 2010). A flushing flow of at least 800 cfs was recommended upstream of the Troublesome Creek and at least 850 cfs downstream of the Troublesome Creek for a three-day period and a recurrence of once every 2 years (Tetra Tech et al. 2010).

3.9.1.9 Green Mountain Reservoir

Longnose suckers and white suckers were the dominant species in Green Mountain Reservoir of the fish sampled in 1995, 1998, and 2006. Kokanee salmon, brown trout, lake trout, and rainbow trout were the game fish present. The lake trout population in Green Mountain Reservoir is self-sustaining through natural reproduction, while the remaining game species are sustained through stocking (Reclamation 2007). Rainbow trout have been stocked annually for at least the last 10 years in Green Mountain Reservoir (CDOW 2010b, unpublished data). Kokanee salmon, Snake River cutthroat trout, and cutthroat x rainbow trout hybrids have been stocked frequently over the 10-year period.

3.9.1.10 Blue River–Green Mountain Reservoir to Colorado River

The Blue River study segment from the Green Mountain Reservoir downstream to the Colorado River is classified as Aquatic Life Cold 1 (CDPHE 2010a), is managed as a trout fishery, and is classified as a Gold Medal Water (CDOW 2009). Fish data were available for five locations from 2000 through 2006. Nine fish taxa were collected including one unknown warmwater species and one cutthroat x rainbow trout hybrid over the seven different sampling events. Brown trout were the dominant species in four of the seven samples and rainbow trout were the dominant species in the remaining three samples. The remaining species were collected only occasionally at low abundances. The relatively large proportions of rainbow trout collected are largely attributed to stocked fish as this reach is stocked annually with large numbers of rainbow trout (CDOW 2010b, unpublished data). Snake River cutthroat have also been stocked within this reach in the past (CDOW 2010b, unpublished data).

Benthic invertebrate data were available since 1993 and population numbers and diversity metrics were considered excellent during the early years of the time period (Reclamation 2007). In the last 6 years of the study period, the numbers and diversity were dramatically lower (Reclamation 2007). The cause of the decline is unknown; however, it may be related to an increase in the alga didymo, which can form continuous mats over the substrate and may increase with decreasing flushing flows (Reclamation 2007).

PHABSIM relationships were developed for the Blue River downstream of Green Mountain Reservoir at five sites in 2007, 2008, and 2009 (Tetra Tech et al. 2010). Habitat availability for brown and rainbow trout is relatively high at flows of 150 to 400 cfs. The CWCB adopted minimum flows of 85 cfs in summer and 60 cfs in winter for this section of the Blue River. Environmental flow range targets were recommended at 200 to 300 cfs in summer and winter (Tetra Tech et al. 2010). A flushing flow of at least 1,150 cfs was

recommended for a three-day period and a recurrence of once every 2 years (Tetra Tech et al. 2010).

3.9.1.11 Wolford Mountain Reservoir

White suckers are the dominant species in Wolford Mountain Reservoir, based on sampling in 2001, 2003, 2007, and 2008 (CDOW 2010, unpublished data). Roundtail chubs and rainbow trout were the second or third most abundant species sampled. The remaining species collected, including several varieties of trout, kokanee, several species of suckers, and a few northern pike, were only present during some of the sampling events and usually comprised less than five percent of the fish sampled. The reservoir is stocked with rainbow trout, cutbow trout, and splake (CRWCD 2012).

Roundtail chubs are a state species of special concern (CDOW 2007) and the population in the reservoir is a self-sustaining, reproducing population (Reclamation 2007). It is thought that the kokanee population may also be a self-sustaining, reproducing population, while the remaining game species are supplemented by stocking (Reclamation 2007). Rainbow trout have been stocked annually for at least the last 10 years (CDOW 2010, unpublished data). Kokanee, Snake River cutthroat trout, and brown trout have also been stocked frequently over this time period (CDOW 2010, unpublished data).

3.9.1.12 Muddy Creek–Wolford Mountain Reservoir to Colorado River

The Muddy Creek segment from Wolford Mountain Reservoir downstream to the confluence with the Colorado River is classified as an Aquatic Life Cold 1 (CDPHE 2008a). A variety of species of fish have been collected in this section of Muddy Creek (CDOW 2010, unpublished data). Brown trout, rainbow trout, white suckers, and speckled dace were usually most abundant. Both mottled and Paiute sculpins were commonly reported over these sampling events; however, probably one species or the other was likely collected as they appear similar. Several other species sampled in 1993 or 2000 each comprised less than or equal to 6 percent of the fish collected including brook trout, cutthroat x rainbow trout hybrids, kokanee salmon, and creek chubs. Some of these fish likely moved downstream from Wolford Mountain Reservoir.

Rainbow trout were stocked annually from 2001 through 2007 and again in 2009 (CDOW 2010, unpublished data). Previous studies have also documented brown trout as the primary species with rainbow trout being stocked occasionally (USDI BOR 2007). Roundtail chubs are a state species of special concern (CDOW 2007), are common in Wolford Mountain Reservoir, and are thought to be present in Muddy Creek; however, their presence has not been verified (USDI BOR 2007).

3.9.1.13 Colorado River–Blue River to Eagle River

The Colorado River from the Blue River downstream to the Eagle River is classified as Aquatic Life Cold 1 (CDPHE 2010a). This segment of the Colorado River is managed as a trout fishery (CDOW 2009). The current fish community in this reach of the Colorado River is dominated by brown trout, longnose suckers, and white suckers as shown by the data collected from 1982 through 2008 (CDOW 2010b, unpublished data). Fifteen species and three hybrids were collected from the six sampling events. Of the 15 species, 6 are native to the Colorado River drainage including the 2 species of concern, mountain sucker and roundtail chub, as well as speckled dace, bluehead sucker, flannelmouth sucker, and mottled sculpin (Nesler 1997). These species generally each comprised less than 10 percent of the fish collected at a site.

Overall, the fish community appears healthy with brown trout, white suckers, and longnose suckers dominating the community. In 2008, brown trout were the dominant species near the upstream end of this reach, while at the downstream end of the reach white suckers and longnose suckers were the dominant species (CDOW 2010b, unpublished

data). The trend in 2008 suggests a downstream longitudinal shift in the fish community from brown trout to suckers in this reach. Rainbow trout were relatively abundant during presence/absence surveys in the 1980s compared to their lower abundance during more recent surveys, suggesting a shift toward the current dominance by brown trout because of the impact on rainbow trout by whirling disease as documented in the upstream reaches.

PHABSIM habitat relationship curves were developed for this section of the Colorado River based on seven transects from Pumphouse downstream to OK Corral in Eagle County (Tetra Tech et al. 2010). The relationships indicate relatively high habitat availability for rainbow and brown trout adults and juveniles at flows ranging from about 400 cfs up to about 900 to 1,600 cfs, depending on the life stage. In 2011, the CWCB filed three applications for instream flow water rights for this section of the river (see Section 3.13.1.2.6). A flushing flow of at least 2,500 cfs was recommended for a three-day period and a recurrence of once every 2 years (Tetra Tech et al. 2010).

PHABSIM habitat relationships were also developed using River 2D methodology at three sites within this reach, located at Pumphouse, Rancho del Rio, and Lyons Gulch (Miller and Swaim 2011). Relatively high habitat availability was reported for rainbow trout and brown trout at 500 to 1,500 cfs, 500 to 2,500 cfs, and 750 to 2,000 cfs at the Pumphouse, Rancho del Rio, and Lyons Gulch sites, respectively (Miller and Swaim 2011). Adult flannelmouth sucker habitat was most abundant at 1,000 to 3,000 cfs and 500 to 2,200 cfs at the Rancho del Rio and Lyons Gulch sites, respectively (Miller and Swaim 2011).

3.9.1.14 Colorado River–Eagle River to Roaring Fork River

The Colorado River from the Eagle River downstream to the Roaring Fork is classified as Aquatic Life Cold 1 (CDPHE 2010a). This segment of the Colorado River is managed as a trout fishery (CDOW 2009). Nine species were collected by the USGS in 1997 and eight species were collected in 1996 (Deacon et al. 1999). Samples were also collected in 1983 and 1993 (CDOW 2010b, unpublished data). Overall, sucker species, including white suckers, flannelmouth suckers, and bluehead suckers, are common in this reach. In addition, the smaller-bodied mottled sculpin and speckled dace are common in this reach. Brown trout, and to a lesser extent rainbow trout, comprise a portion of the fish community in this reach. No PHABSIM habitat relationships have been developed for this reach and there are no CWCB minimum flows for this reach of the river.

Benthic macroinvertebrates were also collected during the USGS study. The number of Ephemeroptera, Plecoptera, and Trichoptera (EPT) taxa (common benthic macroinvertebrates), percentage of EPT taxa, and percentage of Chironomidae metrics at the USGS Dotsero site were similar to or sometimes higher than the other mixed land use sites on the Gunnison River (Deacon et al. 1999). This indicates that water quality is adequate to support some species of sensitive insects.

3.9.1.15 Colorado River–Roaring Fork River to the Upstream Boundary of the 15-Mile Reach

From the Roaring Fork River to Rifle Creek, the Colorado River is classified as Aquatic Life Cold 1 (CDPHE 2010b) and is managed as a trout fishery (CDOW 2009). The Colorado River downstream of Rifle Creek is classified as Aquatic Life Warm 1 (CDPHE 2010b) in this reach and is managed as a warmwater fishery (CDOW 2009). The data from the study sites sampled in this reach demonstrate the longitudinal shift from a coldwater fishery to a warmwater fishery (CDOW 2010b, unpublished data).

White suckers, brown trout, and rainbow trout were the dominant species collected in the upper portion of this section of the river. Many of the rainbow trout sampled were probably stocked fish, as CDOW stocks 30,000 rainbow trout annually

between Glenwood Springs and Rifle; however, some rainbow trout reproduce naturally in this reach (K. Ross, CDOW, pers. comm. 2010). The fish communities of these sites demonstrate a longitudinal shift from a coldwater community dominated by white suckers and trout in the upstream portion of the reach to a warmwater community dominated more by the native Colorado River suckers and chubs in the downstream portion of the reach. In the downstream reaches, three native species including flannelmouth suckers, bluehead suckers, and roundtail chub (a species of concern), were most abundant with small numbers of other native and nonnative species. No PHABSIM habitat relationship curves have been developed for this reach and there is no CWCB minimum flow for this section.

Three of the four federally listed endangered species in the Colorado River including the humpback chub, Colorado pikeminnow, and the razorback sucker have been collected within this reach according to the Service dataset through 2008 (Service 2010, unpublished data). Bonytail have not been collected. From 1983 through 2008, one humpback chub was collected in this reach at the Government Highline Canal fish ladder (193.7 RM [river mile, measured from the confluence with the Green River]) in 2005 (Service 2010, unpublished data). Colorado pikeminnows were collected more frequently in the study reach from 1998 through 2008, with 30 fish collected near the downstream boundary of this reach. From 1991 through 2008, two razorback suckers were collected in the study reach, both in 2008 and as far upstream as the Government Highline Canal fish ladder. Colorado pikeminnows have been stocked in the study reach in 2000, 2001, 2003, and 2004 as far upstream as Rifle, Colorado (240.7 RM). Razorback suckers have been stocked in this reach in 1999 through 2004 and in 2007 and 2008 as far upstream as Rifle (Service 2010, unpublished data). Humpback chubs and bonytail were not stocked in this reach (Service 2010, unpublished data).

3.9.1.16 Ruedi Reservoir

Fish data were available for Ruedi Reservoir 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 Reservoir 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 Reservoir 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 Reservoir is a self-sustaining, naturally reproducing population (K. Ross, CDOW, unpublished report). Ruedi Reservoir 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.

3.9.1.17 Fryingpan River–Ruedi Reservoir 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 2010a), 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 Reservoir (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 Reservoir, directly influences the benthic macroinvertebrate community in the Fryingpan River (Ptacek et al. 2003). Ruedi Reservoir 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).

A 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.

PHABSIM habitat relationships were developed for the Fryingpan River downstream of Ruedi Reservoir 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 no CWCB minimum flow requirement.

3.9.1.18 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 2010a). 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).

PHABSIM habitat relationships were developed for the Roaring Fork River downstream of the Fryingpan River confluence in 2001 at one site (Ptacek et al. 2003). Habitat availability for brown and rainbow trout were highest at flows from 150 cfs to 400 cfs. This section of the river has no CWCB minimum flow requirement.

3.9.1.19 Threatened and Endangered Species

Four federally listed endangered fish are present in the lower 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, 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 lower 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.

3.9.1.20 Nuisance Species

The Proposed Action has the potential to influence the distribution and prevalence of nuisance species. Below is a discussion of the major nuisance species that have been detected and are of concern in Colorado.

Myxobolus cerebralis, the causative agent of whirling disease, is prevalent in the Colorado River Basin. Extensive research during the 1990s demonstrated that whirling disease was the cause of major population declines in wild rainbow trout, which are particularly sensitive to whirling disease, in the Colorado, Fryingpan, and Roaring Fork rivers within the analysis area, as well as other rivers in Colorado (Nehring et al. 2000; Nehring 2006). *Myxobolus cerebralis* requires Tubifex worms to complete its life cycle (Markiw and Wolf 1983). Because *Tubifex tubifex* lives in fine sediments, sediment control is crucial in controlling production of triactinomyxons (TAMs), the infectious form of *M. cerebralis* (Nehring 2006). Windy Gap Reservoir, with its high proportion of fine sediments, has been a major source of TAMS to downstream reaches of the Colorado River (Nehring 2006). However, TAM production from Windy Gap Reservoir has been variable over time and has declined significantly due to changes in the dominant lineage of *T. tubifex* in the reservoir. Beginning in 2008 and continuing in 2009, a whirling disease-resistant strain of rainbow trout was stocked throughout the Colorado River Basin (CDOW 2010b), with the intent to increase survival and reproduction of this fish species in the future.

New Zealand mud snails (*Potamopyrgus antipodarum*), zebra mussels (*Dreissena polymorpha*), and quagga mussels (*Dreissena bugensis*) are invasive mollusks that each have the potential for detrimental ecological and economic effects. According to the USGS's nonindigenous aquatic species website (http://nas.er.usgs.gov), New Zealand mud snails have not been detected in the Colorado River Basin watershed (Benson 2011). Zebra mussel and quagga mussel veligers (larva) were collected in 2008 in Grand Lake in the Colorado River Basin, upstream of the analysis area (http://nas.er.usgs.gov). Quagga mussel veligers were also collected from Shadow

Mountain Reservoir, Granby Reservoir, and Willow Creek Reservoir in 2008. Zebra and quagga mussels have not been found in recent samplings.

Didymo (*Didymosphenia geminata*) is a stalked diatom that can form thick blooms that can affect the ecological function and aesthetic appeal of rivers (Spaulding and Elwell 2007). Didymo has been reported in the western U.S. for more than 100 years, but expansive nuisance blooms have become more common recently (Kumar et al. 2009). Several studies have documented the response of macroinvertebrate communities to didymo blooms, but the effects on fish communities have not been intensively studied. Macroinvertebrate community changes may include increases in oligochaetes and chironomids and decreases in EPT taxa (Gillis and Chalifour 2009; Kilroy et al. 2008). However, species richness response was varied between and within studies, suggesting that macroinvertebrate community response to didymo blooms is complex (Spaulding and Elwell 2007; Gillis and Chalifour 2009; Kilroy et al. 2008).

The conditions that result in nuisance level blooms of didymo are not well understood, but a recent review of the literature and unpublished data suggests that low water temperatures, high hydrologic and substrate stability, high light availability, and neutral to moderately alkaline waters were associated with didymo distribution and the ability to attain nuisance levels (Kilroy et al. 2008). However, the authors acknowledge that nuisance blooms have occurred outside of the ranges of these environmental characteristics described, including in warm waters. The most suitable habitats for didymo in the United States were predicted to occur in the western U.S., in relatively cool sites at high elevations, and with a high baseflow index (Kumar et al. 2009). Didymo has been documented in the Colorado River Basin, including the Colorado River mainstem, Williams Fork River, Blue River, and Fryingpan River, according to the most recent and extensive published dataset by Kumar et al. (2009).

The Asiatic clam (*Corbicula fluminea*) was first introduced purposely on the west coast of North America in the 1900s (Vaughn and Spooner 2006) and has been documented in Colorado in the Arkansas, Colorado, Platte, and San Juan river drainages (Cordeiro et al. 2007). The Asiatic clam has been found in the Colorado River Basin at five locations (Cordeiro et al. 2007), none of which are in the analysis area. However, the presence of this invasive species at multiple locations within the Colorado River Basin suggests it is likely the Asiatic clam is present or will be present within the analysis area in the future. The impact of Asiatic clams on native mussels in Colorado is not known; however, some studies suggest the species may compete for space and food (Strayer 1999; Cordeiro et al. 2007). These organisms are aggressive filter feeders that can reduce the amount of algae and other food needed by native organisms. They also have the potential to increase ammonia levels (Cordeiro et al. 2007), which can be detrimental to native organisms.

3.9.2 Environmental Consequences

3.9.2.1 Direct Effects

3.9.2.1.1 North Fork Colorado River–Redtop Valley Ditch to Shadow Mountain Reservoir

The Proposed Action would increase flow in the North Fork Colorado River downstream of the Redtop Valley Ditch in June of all years and in May and July in some years (Grand River Consulting 2012). The increases would usually be less than 20 cfs and less than 35 percent of historical flows. In average years, the increases in flow would be 5 percent in June and 19 percent in July. In the other months of the year, flow would not change from historical conditions. The Proposed Action would have a minor beneficial effect on water quality (Section 3.7.2) and a negligible beneficial effect on riparian vegetation (Section 3.10.2) in this section of river.

There are no PHABSIM habitat relationships available for this section of river. However, the

increases in flow would be minor in most years and of short duration. The North Fork Colorado River often dries up downstream of the Redtop Valley Ditch under the existing conditions in June and July (Grand River Consulting 2012). The Proposed Action would result in increased flows during these months. The North Fork Colorado River would sometimes still likely have no flow conditions downstream of the Redtop Valley Ditch under the Proposed Action, but these conditions would occur less often. The direct effect on game and nongame fish and macroinvertebrates would be a minor beneficial effect.

3.9.2.1.2 Shadow Mountain Reservoir

The Proposed Action would have a negligible change in storage contents with the Proposed Action in Shadow Mountain Reservoir. There likely would be a negligible effect on aquatic resources with the Proposed Action.

3.9.2.1.3 Stillwater Creek–Redtop Valley Ditch to Granby Reservoir

In Stillwater Creek, the Proposed Action would increase flows in June and July of all years and in May of some years (Grand River Consulting 2012). This would increase peak runoff flows up to 51 cfs in this small stream. During some years, mean monthly flows under the Proposed Action would be at least three times greater than during historical conditions. The Proposed Action would likely have slightly beneficial effects on water quality (Section 3.7.2) and a beneficial effect on riparian vegetation with an increase in wetlands (Section 3.10.2) in this section of stream.

There are no PHABSIM habitat relationships for this stream. Winter flows in this stream section are very low—2 to 3 cfs in January, February, and March of most years. This time of the year is likely more stressful on the fish and invertebrate community than the runoff period. Therefore, the increased flows during runoff under the Proposed Action would likely result in a negligible effect on the fish and invertebrate community of this section of Stillwater Creek.

3.9.2.1.4 Granby Reservoir

The Proposed Action would have increases in storage in Granby Reservoir of up to 3 percent in late spring and summer with the Proposed Action compared to historical conditions. By the end of September, water levels would return to historical conditions. The Proposed Action would have no changes in other times of the year. The Proposed Action would have a negligible change to water quality (Section 3.7.2) and riparian vegetation (Section 3.10.2). The increased water levels, about 1 foot during the growing season for many aquatic species in the reservoir, could be beneficial but the small magnitude indicates the effect would be negligible.

3.9.2.1.5 Willow Creek–Willow Creek Reservoir to Colorado River

The Proposed Action would reduce flows in Willow Creek throughout the year (Grand River Consulting 2012). In the winter months, flow reductions would be 2 to 3 cfs, which represents up to 25 to 35 percent of the flow in most years. In the runoff period, up to 20 cfs or 24 percent of the flow would be reduced in average years. During summer months, up to 58 percent of the flow would be reduced during July of average years. The Proposed Action would have minor changes in water quality in this section of Willow Creek and a negligible effect on riparian vegetation.

Based on the PHABSIM relationships for brown trout for this section of Willow Creek, the post-project flows would be in the flow range that would provide high habitat availability during runoff in May and June of most years. The spring runoff flows under the Proposed Action should still meet the suggested flushing flow target of 50 cfs once every 2 years (Tetra Tech et al. 2010) during average, above average, and wet flow years. However, the reductions in winter flows would further reduce historical low habitat availability for brown trout. The Proposed Action would have a minor to moderate adverse effect on the resident fish community and likely a similar effect on the macroinvertebrate community as well.

3.9.2.1.6 Colorado River–Granby Reservoir to Windy Gap Reservoir

Flows in late July, August, and September would increase up to 50 cfs in this section of the river with the Proposed Action (Grand River Consulting 2012). Flows would increase in August and September of all years, and in July of some years. The Proposed Action would have no changes in flow in other parts of the year. Increases in flow represent two to three times the historical flow in some months and years. The flow increases would increase the likelihood that CWCB minimum flows would be met in August and September.

Exceedances of temperature standards have occurred in this reach downstream of Granby Reservoir in past years during July and August (Section 3.7.2). The increased flows during summer and early fall from the hypolimnion (bottom-most layer) of Granby Reservoir should decrease the likelihood of future temperature exceedances in this reach in late summer. Slightly reduced flows in July are expected to have a negligible effect on temperatures (Section 3.7.2). The Proposed Action would have no adverse effects on riparian vegetation (Section 3.10.2) in this section of stream.

Based on PHABSIM relationships for brown and rainbow trout, the increased flows in late summer would result in substantially higher habitat availability compared to historical flows. This, along with the improvements in water temperatures in late summer, would have a minor to moderate beneficial effect of the Proposed Action on the resident fish and invertebrate communities in this section of the Colorado River.

Based on monthly average flows, the historical flow regime does not meet the suggested flushing flow target of at least 200 cfs once every 2 years; likely this target is met only in above average flow years. The Proposed Action would result in no changes to spring flushing flows.

3.9.2.1.7 Colorado River–Windy Gap Reservoir to Williams Fork River

Flows with the Proposed Action would be slightly reduced during most months and in most years and increased in late summer and early fall (Grand River Consulting 2012). In most months, the flow reductions would be minor, generally less than 5 percent. Flows during June would be reduced up to 17 percent of the historical flow during drought and below average flow years. Flows during August and September would increase from 24 to 59 percent during all flow year types. Flows during the rest of the year under all flow regimes would be reduced from 2 to 9 cfs, or less than 5 percent of the historical flow. The Proposed Action would have negligible changes to riparian vegetation (Section 3.10.2) in this section of stream.

The changes in flows in the runoff and late summer periods would occur at flows that are within the range that maintains high habitat availability for juvenile and adult trout, based on the PHABSIM relationships, and would not change habitat availability much. In below average and drought years, the reductions in flow in June would represent a larger portion of the flow. However, habitat availability would still be maintained and would be higher than during other parts of the year. Water temperatures during June should also meet standards and be suitable for fish and macroinvertebrates. The increased flows during summer and early fall from the hypolimnion (bottom-most layer) of Granby Reservoir would improve habitat conditions and may decrease the likelihood of future temperature exceedances in this reach of the Colorado River (Section 3.7.2). The very small reductions in flow of a few cfs the rest of the year would tend to result in a negligible decrease in habitat availability for juvenile and adult trout. Overall, the altered flow regime under the Proposed Action would result in a negligible effect on aquatic resources.

In most years, the increases in flow in September would increase the likelihood that flows would be above the CWCB minimum flow of 90 cfs. The Proposed Action would not change runoff flows

much and should not alter the frequency with which the suggested flushing flow of 600 cfs once every 2 years (Tetra Tech et al. 2010) is met. Under the historical and Proposed Action flow regimes, 600 cfs appears to be met in average, above average, and wet flow years.

3.9.2.1.8 Colorado River–Williams Fork River to the Upstream Boundary of the 15-Mile Reach

Based on the hydrology report (Grand River Consulting 2012), the Proposed Action would result in no direct effects on this section of the Colorado River. The hydrology with the Proposed Action would be the same as historical conditions.

3.9.2.1.9 Green Mountain Reservoir

The Proposed Action would have no change in storage contents with the Proposed Action in Green Mountain Reservoir most of the time. Infrequent changes would be minor. The Proposed Action would have negligible effects on water quality (Section 3.7.2) and riparian vegetation (Section 3.10.2). There likely would be a negligible effect on aquatic resources with the Proposed Action.

3.9.2.1.10 Blue River–Green Mountain Reservoir to Colorado River

There may be changes to hydrology in this section of the Blue River. However, the changes are expected to be infrequent, minor (typically less than 10 percent of historical flows), and unpredictable (Grand River Consulting 2012). Post-project hydrology was not simulated. The Proposed Action would have negligible effects on water quality (Section 3.7.2) and riparian vegetation (Section 3.10.2) in this reach. There would likely be negligible effects on aquatic resources in the lower Blue River with the Proposed Action.

3.9.2.1.11 Wolford Mountain Reservoir

The storage contents in Wolford Mountain Reservoir with the Proposed Action would not change most of the time. Infrequent changes would be minor and generally result in slightly more water in the reservoir. There likely would be a negligible effect on aquatic resources with the Proposed Action.

3.9.2.1.12 Muddy Creek

Changes to hydrology in this section of Muddy Creek are expected to be infrequent, minor (up to 10 percent of historical flows), and unpredictable (Grand River Consulting 2012). Post-project hydrology was not simulated but instream flow requirements would be met. The Proposed Action would have negligible effects on water quality (Section 3.7.2) and riparian vegetation (Section 3.10.2) in this reach. The Proposed Action would likely have negligible effects on aquatic resources in Muddy Creek with the Proposed Action.

3.9.2.1.13 Ruedi Reservoir, Fryingpan River, and Roaring Fork River

Because the Proposed Action would likely be implemented in the same year as the Interim 10825 Agreements and the 2012 Agreement, effects on Ruedi Reservoir and the Fryingpan and Roaring Fork rivers are discussed under *Cumulative Effects*.

3.9.2.1.14 Threatened and Endangered Species and Designated Critical Habitat

The Proposed Action would have no adverse effect on the four federally listed endangered fish and no adverse effect on designated critical habitat. The permanent 10,825 AF that would result from the Proposed Action would be provided in lieu of water now being provided under two interim agreements. Those interim agreement included shortage provisions that have resulted in an average annual delivery of 7,044 AF over the life of the interim agreements (Table 8). The 10,825 AF of water provided by the Proposed Action would be available for release every year. Flow in the reach of designated critical habitat would not be adversely affected by the Proposed Action. Reclamation's determination is that the Proposed Action would not adversely affect either the four endangered fish or their designated critical habitat.

3.9.2.1.15 Nuisance Species

Flow regime changes have the potential to impact the distribution and abundance of nuisance species.

Increased sedimentation could potentially result in an increased prevalence in whirling disease infections; flushing flows under the Proposed Action would remain similar to flows under historical conditions, indicating that sediment characteristics would also remain similar to historical conditions. Changes in flow regime are not expected to result in changes to sediment characteristics or affect the prevalence of whirling disease. Zebra mussels and quagga mussels have been collected in Grand Lake and quagga mussels have been collected in Shadow Mountain Reservoir and Granby Reservoir. Increased flows out of Granby Reservoir during summer months under the Proposed Action could increase the potential to transport these veligers downstream. However, the increased potential for transport downstream during summer months is minimal compared to the potential during the higher spring runoff flows out of the reservoir that remain the same between the historical and Proposed Action flow regimes. The Asiatic clam is present in the Colorado River Basin, but not in the analysis area, thus the Proposed Action should not influence the distribution of this nuisance species. The changes in the flow regime under the Proposed Action from historical conditions generally represent small changes in flow. These small changes are expected to have a negligible effect on nuisance species.

3.9.2.2 Cumulative Effects

3.9.2.2.1 Colorado River and Tributary Segments

The Proposed Action would have minor cumulative effects on hydrology in the analysis area upstream of the Blue River. Therefore, cumulative effects on the North Fork Colorado River, Stillwater Creek, Willow Creek, the Colorado River upstream of the Blue River, and Muddy Creek would be similar to the direct effects of the Proposed Action.

3.9.2.2.2 Shadow Mountain, Granby, Green Mountain, and Wolford Mountain Reservoirs

The Proposed Action would have no additional changes in storage contents in Shadow Mountain, Granby, Green Mountain, and Wolford Mountain reservoirs with cumulative conditions. Cumulative effects would be similar to direct effects.

3.9.2.2.3 Colorado River–Blue River to the Roaring Fork River

Flows with the Proposed Action and the expiration of the interim agreements would typically be reduced by less than 5 percent from historical conditions based on estimated changes in streamflow near Kremmling, downstream of the Blue River and Muddy Creek (Grand River Consulting 2012). Slight increases in flow, less than 5 percent, would occur in August and/or September of drought, average, and above average years. Slight reductions in flow, less than 5 percent of historical flows, and typically less than 1 percent of historical flows would occur the remainder of the time. The Proposed Action would have negligible to minor changes to water quality (Section 3.7.2) and negligible changes to riparian vegetation (Section 3.10.2) in this section of stream.

In most cases, the small changes in flow occur within the range that results in high habitat suitability for trout. The small increases and decreases in flows from historical conditions would result in negligible changes in the available habitat for trout. Overall, the altered flow regime under the Proposed Action and the expiration of the interim agreements would result in a negligible effect on the aquatic resources.

The Proposed Action should not alter the frequency with which the suggested flushing flow of 2,500 cfs once every 2 years (Tetra Tech et al. 2010) is met. Under the historical and Proposed Action flow regimes, 2,500 cfs apparently is met in average, above average, and wet flow years.

3.9.2.2.4 Colorado River–Roaring Fork River to the Upstream Boundary of the 15-Mile Reach

The Proposed Action would have no cumulative effect on the sections of the Colorado River downstream of the Roaring Fork River. The

cumulative effects on hydrology would be the same as direct effects.

3.9.2.2.5 Ruedi Reservoir

Cumulative effects would result in increased storage of water in Ruedi Reservoir in summer months. This is the growing season for aquatic organisms and the increased water levels, 6.5 feet, would be beneficial. Water quality, wetland habitat, and riparian vegetation are not expected to change appreciably (Sections 3.7.2 and 3.10.2). The Proposed Action would likely have a minor beneficial cumulative effect on aquatic resources in Ruedi Reservoir.

3.9.2.2.6 Fryingpan River–Ruedi Reservoir to Roaring Fork River

The total amount of water in this section of river would not change, but the seasonal rate of flow would be affected by a change in the amount of water released from Ruedi Reservoir for the Recovery Program. The changes would slightly reduce flow in the summer and slightly increase flow in the winter. Based on the PHABSIM relationships, the summer reductions would still result in flow in the river within the range of flows that provide high levels of habitat availability for trout. The winter increases in flow of up to 18 cfs would result in slightly higher levels of habitat availability than historical conditions. The increased winter flows with more relatively warm water from the reservoir may also help to alleviate icing conditions in the Fryingpan River (Section 3.7.2). The Proposed Action would have no adverse effects on wetlands and riparian vegetation during much of the growing season (Section 3.10.2). Changes in the latter part of the growing season could result in some stress to wetlands and riparian vegetation, but would not likely result in loss of wetlands or riparian habitat (Section 3.10.2). The improvements to habitat availability and icing in winter likely would have a minor beneficial cumulative effect on aquatic resources.

3.9.2.2.7 Roaring Fork River–Fryingpan River to Colorado River

The changes in flow in the Fryingpan River with reasonably foreseeable actions would also occur in the Roaring Fork River. Because the Roaring Fork River contains more water, the proportional change would be smaller. Therefore, the benefits of increased winter flows and reduced summer flows would be smaller. The changes in streamflow are not expected to adversely affect wetland or riparian vegetation (Section 3.10.2). The Proposed Action would likely have a negligible cumulative effect on aquatic resources in the Roaring Fork River.

3.10 Wetlands and Riparian Resources

3.10.1 Affected Environment

This section describes the existing wetlands and riparian resources in the analysis area. Wetland and riparian resources generally occur along streams and reservoir perimeters and other locations where surface or groundwater is sufficient to support the vegetation types. Wetlands and other waters identified in the analysis area are described in detail in the Wetlands, Waters, and Riparian Resources Technical Report (ERO 2010).

3.10.1.1 North Fork Colorado River

The North Fork Colorado River flows into Shadow Mountain Reservoir. Upstream of Shadow Mountain, riverine scrub-shrub and emergent wetlands occur along the banks. In areas where the channel is not confined by landforms, emergent wetlands occur along the channel and within abandoned channel meanders throughout the floodplain. Patches of scrub-shrub wetlands continue upstream along the channel and in areas with a broad floodplain.

3.10.1.2 Stillwater Creek

Stillwater Creek, a perennial tributary to Granby Reservoir, is a low gradient meandering channel bordered by riverine palustrine emergent and scrub-shrub wetlands. While overbank flows and a

stream-supported water table may provide supportive hydrology for wetlands adjacent to the channel, irrigation return flows likely create a high water table throughout the active floodplain, providing the supportive hydrology for many of the wetlands.

3.10.1.3 Area of Proposed Agricultural Dry-Up

The area proposed for agricultural dry-up consists mainly of flood-irrigated meadows bordered by areas of sagebrush shrublands and stands of lodgepole pine at higher elevations. Church Creek, a perennial stream, flows from north to south on the eastern side of the agricultural dry-up area into Willow Creek, a tributary to the Colorado River. About 62 acres of wetlands, which include about 4 acres of fens, occur within the agricultural dry-up area. Wetlands occur primarily along Church Creek and drainage swales and tributaries that flow into Church Creek. Wetlands within the agricultural dry-up area are classified as slope and riverine palustrine emergent, and slope and riverine palustrine scrub-shrub.

Fens are wetlands permanently saturated to or near the soil surface. In wetlands, including fens, influenced by surface irrigation, supporting hydrology is difficult to determine. Surface irrigation, leaking ditches, and ground water may contribute to maintenance of these fens. Fens take several thousands of years to develop, and those in the agricultural dry-up area preceded agricultural development. Streamflow in Church Creek is less likely to provide supporting hydrology for fens because the stream channel is incised for much of its length in the project area.

The agricultural dry-up study area has a long history of flood irrigation for hay production. Many of the wetlands are influenced by irrigation. Some of the wetlands are likely supported solely by the application of irrigation water. The wetland delineations did not attempt to separate wetlands that are supported solely by irrigation from wetlands that are supported by naturally occurring hydrology, or a combination of irrigation and natural hydrology. The Corps does not consider wetlands supported solely by the application of irrigation to be waters of the U.S. regulated under Section 404 of the Clean Water Act, and the proposed project would not require the discharge of dredged or fill material into wetlands in the agricultural dry-up areas.

3.10.1.4 Willow Creek

Willow Creek has a broad riparian corridor with a mix of wetlands, riparian areas, and uplands throughout the active floodplain. Riverine palustrine emergent and scrub-shrub wetlands occur and are supported by overbank flows and irrigation return flows. Fens are known to occur in the reach below Willow Creek Reservoir.

3.10.1.5 Granby, Green Mountain, and Ruedi Reservoirs

The vegetation associated with Granby, Green Mountain, and Ruedi reservoirs is typical of high elevation reservoirs. Often the banks are steep and the water level fluctuates, leaving a high water mark below which no vegetation occurs. Upland vegetation such as sagebrush and coniferous species often continues to the high water mark. Wetland and riparian vegetation consisting of willow shrublands and emergent wetlands is more likely to occur upstream of the reservoirs where water can back up because of the reservoir.

3.10.1.6 Upper Colorado River to the Head of the 15-Mile Reach

The upper Colorado River from Granby Reservoir to the head of the 15-Mile Reach changes in elevation from about 8,280 to 4,555 feet above sea level. Wetland and riparian vegetation communities along the Colorado River change according to the elevation, stream gradient, and landforms affecting the size of the active floodplain. Portions of the wetland and riparian vegetation along the Colorado River have been eliminated by roads, development, and agriculture.

Below Granby Reservoir, herbaceous and willow-dominated wetland and riparian vegetation occurs

along the Colorado River and throughout the active floodplain. Wetland and riparian vegetation may occur intermittently through canyons where the floodplain is narrow.

Downstream on the Colorado River, narrowleaf cottonwood remains common as an overstory species and can occur with boxelder and red-osier dogwood. Plains cottonwood becomes more dominant below 6,000 feet in elevation. Sandbar willow and saltcedar become dominant in the shrub stratum at lower elevations.

3.10.1.7 Blue, Fryingpan, and Roaring Fork Rivers

The Blue, Fryingpan, and Roaring Fork rivers are high-elevation tributaries to the Colorado River. The mountainous setting provides various landforms from broad floodplains to narrow canyons. Wetland and riparian vegetation communities are similar to those of the upper Colorado River.

3.10.2 Environmental Consequences

3.10.2.1 Direct and Indirect Effects

3.10.2.1.1 Agricultural Dry-Up Area

In the agricultural dry-up area, about 752 acres of irrigated meadow and 92 acres of subirrigated meadow would be permanently affected by the removal of irrigation. With the removal of irrigation, much of the agricultural dry-up area would be converted to upland grasslands. About 62 acres of wetlands occur within the agricultural dry-up area. Wetlands that are supported solely by irrigation would be permanently lost; wetlands supported by a naturally occurring high water table or streamflows that existed before development of irrigated agriculture would remain. The nature of the hydrologic support for wetlands and the areal extent of wetlands that existed before development of irrigated agriculture are unknown. Some wetlands supported by natural hydrology may transition from perennially saturated to periodically saturated when irrigation was removed. Species composition also may change.

3.10.2.1.2 North Fork Colorado River

Streamflow in the North Fork Colorado River could increase in May, June, or July depending on precipitation and runoff (Grand River Consulting 2012). Increases in streamflow would result in a slight increase in stage of 0 to 0.2 feet. The increase in stage during the growing season would continue to support existing wetland and riparian vegetation. Beneficial effects on wetland and riparian vegetation from stage increases would be negligible.

3.10.2.1.3 Stillwater Creek

Average monthly streamflow in Stillwater Creek below the Redtop Valley Ditch would increase by a maximum of 295 percent, resulting in a stage increase of 0 to 1.7 feet. Stage changes may raise the water table, which would benefit riparian areas and wetlands either by providing more water to existing riparian areas and wetlands or by creating supportive hydrology for new riparian areas and wetlands. The area of riparian and wetland vegetation may increase along Stillwater Creek as a result of diversion from the Redtop Valley Ditch.

3.10.2.1.4 Willow Creek

With the decrease of irrigation return flows into Willow Creek, the stream stage is expected to decrease by 0 to 0.5 feet. Because the change in stage would be variable throughout the growing season and not a permanent decrease, the effects on wetland and riparian vegetation would be negligible.

3.10.2.1.5 Granby and Green Mountain Reservoirs

Because of the high degree of existing fluctuation in reservoir levels and lack of significant vegetation cover, the Proposed Action would have no effect on wetland and riparian vegetation associated with Granby Reservoir or Green Mountain Reservoir.

3.10.2.1.6 Muddy Creek and Colorado and Blue Rivers

Wetland and riparian habitat along Muddy Creek and the Colorado and Blue rivers would not be

adversely affected by the Proposed Action. Stage changes on the Colorado River are expected to increase between 0 and 0.1 feet, which is a small enough increase to be within natural variability. The Blue River and Muddy Creek are not expected to experience stage changes in typical years. No adverse effects on wetland and riparian vegetation would occur.

3.10.2.2 Cumulative Effects

3.10.2.2.1 Colorado River near Kremmling

Slight changes in streamflow would result in changes in stream stage of less than 0.2 feet. The cumulative effect of the Proposed Action and other reasonably foreseeable actions on wetlands, and riparian vegetation on the Colorado River below Kremmling would be negligible.

3.10.2.2.2 Fryingpan River

The timing of releases from Ruedi Reservoir would alter flows in the Fryingpan River. Moderate decreases in flow on the Fryingpan River would occur from August through October but wintertime flows would increase. From May through July, which is much of the growing season for wetland and riparian vegetation, no changes in flow and no adverse effects on wetland and riparian vegetation are expected. Changes in flow in the latter part of the growing season could alter availability of surface or ground water for plants that may result in some stress but would not likely result in loss of wetland or riparian habitat.

3.10.2.2.3 Roaring Fork and 15-Mile Reach Colorado River

Minor decreases in flow on the Roaring Fork and the 15-Mile Reach Colorado River would occur from August through October and minor increases in wintertime flows would occur. These changes in streamflow are not expected to adversely affect wetland and riparian vegetation.

3.10.2.2.4 Ruedi Reservoir

Because of the high degree of existing fluctuation in reservoir levels and lack of significant vegetation cover, the Proposed Action and other reasonably foreseeable actions would have no effect on wetland and riparian vegetation associated with Ruedi Reservoir.

3.11 Vegetation and Wildlife Resources

This section describes the existing vegetation and wildlife habitat in the analysis area and the effects on these resources from the Proposed Action. Effects on wetland and riparian habitat are described in more detail in Section 3.10.2. Effects on aquatic habitat and species are described in Section 3.9.

3.11.1 Affected Environment

3.11.1.1 Vegetation Communities

Vegetation in the agricultural dry-up areas consists of grasslands (upland, irrigated meadows, and wetlands); willow shrubland; sagebrush shrubland; and lodgepole pine forest. Wetland and riparian habitat for streams and reservoirs in the analysis area is described in Section 3.10.2

3.11.1.1.1 Upland Grasslands and Sagebrush Shrublands

Upland grasslands in the agricultural dry-up areas are generally dominated by mountain brome, smooth brome, slender wheatgrass, Timothy, yarrow, dandelion, blue-eyed grass, mountain wormwood, green gentian, and Canada thistle. Common grasses and forbs in the sagebrush shrublands are blue grama, Idaho fescue, mutton-grass, cheatgrass, Indian paintbrush, pussy-toes, and yarrow. In the agricultural dry-up area, upland grasslands and sagebrush shrublands occur on the well-drained lower flanks of hillsides below the lodgepole pine woodlands.

3.11.1.1.2 Lodgepole Pine Forest

Lodgepole pine forest occurs on the slopes surrounding the agricultural dry-up areas. Common species in the lodgepole pine forest community include Engelmann spruce,

kinnikinnik, common juniper, buffaloberry, broom huckleberry, heartleaf arnica, and Idaho fescue.

3.11.1.1.3 Irrigated Meadows and Wetlands

Sedge-dominated wetlands occur along Stillwater Creek. In the agricultural dry-up area, irrigated meadows range from dry to mesic, and wetlands occur along Church Creek, ditches, and within drainage swales. Common species in the irrigated meadows are meadow foxtail, Kentucky bluegrass, Timothy, Northwest Territory sedge, and redtop. Northwest Territory sedge and other sedges are dominant in the wetlands.

3.11.1.1.4 Riparian Habitat

A description of wetland and riparian habitat associated with streams and reservoirs in the analysis area is in Section 3.10.2.

3.11.1.2 Federally Threatened and Endangered Plant Species

The Osterhout milkvetch and Penland beardtongue, two endangered species endemic to Grand County, occur on seleniferous clay-shales between 7,400 and 7,900 feet in elevation (Spackman et al. 1997). Because the agricultural dry-up areas are above the elevational range of these species, suitable habitat is not present (CNHP 2010; Spackman et al. 1997).

3.11.1.3 Plant Species of Concern

The Colorado Natural Heritage Program (CNHP) (2010) lists two state rare plants as occurring near the agricultural dry-up areas—Bodin milkvetch and nagoon berry. Bodin milkvetch has a state ranking of S2-imperiled in the state because of rarity (6 to 20 occurrences). The nagoon berry has a state ranking of S1-critically imperiled in the state because of extreme rarity (five or fewer occurrences). The Bodin milkvetch is found along sandy or gravelly streambanks and meadows, and the nagoon berry occurs within willow carrs and along mossy streamsides between 8,600 and 9,700 feet in elevation. Both species have potential habitat along Stillwater Creek from the Redtop Valley Ditch to Granby Reservoir and Church Creek in the agricultural dry-up areas. No occurrences of these species have been documented in these areas (CNHP 2010).

3.11.1.4 Federally Threatened and Endangered Wildlife Species

Most wildlife species listed as federally threatened, endangered, or as candidate species do not have suitable habitat within the agricultural dry-up areas or other parts of the analysis area. Canada lynx is shown in the Colorado Natural Diversity Information System (NDIS) NDIS database as having potential habitat in Grand County. Federally listed fish species are discussed in Section 3.9.

3.11.1.4.1 Canada Lynx

The lynx, a federally listed threatened species, is a secretive forest-dwelling cat of northern latitudes and high mountains. In early 1999, CDOW released lynx in Colorado in an effort to reestablish breeding populations in the state. No lynx were released within Grand County. The agricultural dry-up areas provide marginal lynx habitat because of fragmentation from other potential lynx habitat and the overall lack of forest cover. Open meadows and sagebrush habitats are typically unsuitable for lynx. Forested areas surrounding the agricultural dry-up areas are mapped as potential lynx habitat by the Colorado NDIS.

3.11.1.4.2 Yellow-billed Cuckoo

The yellow-billed cuckoo, a candidate species, nests in a variety of habitats including open woodlands, parks, and riparian woodlands (AOU 1998). The western subspecies is found primarily in riparian cottonwood/willow woodlands with a dense understory (Carter 1998; Franzreb and Laymon 1993). The species is usually found at elevations less than 6,600 feet (Service 2001). Suitable habitat for the yellow-billed cuckoo occurs on the lower reach of the Colorado River in the analysis area where cottonwood/willow habitat occurs.

3.11.1.5 State-Listed Species and Rare or Imperiled Wildlife Species

3.11.1.5.1 Bald Eagle

The bald eagle is a state-listed threatened species (also protected by the Bald and Golden Eagle Protection Act) that nests and overwinters in Colorado. In Colorado, nest trees are in various forest types, from old-growth ponderosa pine to linear groups of riparian woodland. An active bald eagle nest is at Granby Reservoir, and several active and inactive nests occur along the Colorado River from Granby Reservoir to the 15-Mile Reach. The segment of the Colorado River below Granby Reservoir is used by bald eagles during winter foraging and is shown as bald eagle winter range (NDIS 2010). The agricultural dry-up areas provide limited foraging habitat and no suitable nesting or roosting habitat. In the analysis area, riparian woodlands associated with streams and reservoirs affected by hydrologic changes provide suitable nesting and roosting habitat.

3.11.1.5.2 Barrow's Goldeneye

Barrow's goldeneye is listed by the CNHP as an S2 species for breeding populations and is listed as occurring near the agricultural dry-up areas. This small diving duck is a cavity nester that can nest more than 1 mile from water (Savard et al. 1991). In Colorado, this duck winters on a variety of reservoirs and rivers, and breeds near mountain reservoirs and ponds in forested areas (Andrews and Righter 1992). Barrow's goldeneye is rare within Grand County (NDIS 2010) and previous breeding bird atlas surveys from 1998 and currently ongoing did not record any breeding Barrow's goldeneye within Grand County (Kingery 1998; BBAII 2010), although open water in the agricultural dry-up area is potential habitat for this species.

3.11.1.5.3 Boreal Owl

The boreal owl is listed as an S2 species by the CNHP, is a rare to locally uncommon resident in higher mountains, and is an accidental resident in lower mountains (Andrews and Righter 1992). Habitat for the boreal owl includes mature spruce-fir or spruce-fir/lodgepole pine forest interspersed with meadows (Palmer and Ryder 1984; Ryder et al. 1987). The CNHP lists the boreal owl as occurring in forested areas near the agricultural dry-up areas. These areas lack suitable forest habitat, and riparian communities in the analysis area are not suitable habitat for this species.

3.11.1.5.4 Boreal Toad

The boreal toad, a state endangered species, is a fairly large toad known to inhabit mountain areas in Colorado at elevations between 8,500 and 11,500 feet. Boreal toad habitat includes wetland areas, beaver ponds, slow-moving creeks and streams, kettles, and wet meadows (Hammerson 1999). Seven known breeding populations of toads are recorded in Grand County (Jackson 2010). The agricultural dry-up areas are at the lower elevational range for the boreal toad; however, suitable habitat is available within wetlands along Stillwater and Church creeks and their tributaries, and throughout the agricultural dry-up area.

3.11.1.5.5 Greater Sage Grouse

The greater sage grouse is a state species of special concern. Sage grouse depend on sagebrush year-round for food and cover (Service 2004). Sage grouse breed in early spring in open areas within sagebrush habitats. Females build nests in areas with dense cover, typically dominated by big sagebrush. Shortly after hatching, hens move chicks to early brood-rearing areas, which are often in upland sagebrush habitats with abundant forbs and insects (Schroeder et al. 1999; Connelly et al. 2004). Depending on drought conditions, broods may move to more mesic areas, including agricultural and riparian areas adjacent to sagebrush habitats.

No sage grouse habitat mapped by CDOW (NDIS 2010) occurs in the agricultural dry-up areas. Sage grouse overall range and a production area (majority of important nesting habitat) are about 0.5 mile southwest of the agricultural dry-up area. Winter range and severe range are more than 1 mile southwest of the agricultural dry-up area while an area that supports broods is about 3.5 miles away

within the overall production area. Brood areas can be associated with wet areas such as meadows, springs, ponds, and streams. Suitable brood habitat is present in the agricultural dry-up area.

3.11.1.5.6 River Otter

River otters, listed as state threatened, inhabit high-quality, perennial rivers that support abundant fish or crustaceans within many habitats ranging from semidesert shrublands to montane and subalpine forests. No suitable otter habitat occurs in the agricultural dry-up area. A 0.5-mile reach of the Colorado River, 2 miles east of the town of Hot Sulphur Springs, is a river otter concentration area. Concentration areas are where otter sightings and signs of otter activity are higher than in the overall range (NDIS 2010). Streams in the analysis area, especially the Colorado River, provide suitable river otter habitat and overall range.

3.11.1.5.7 Sandhill Crane

Sandhill cranes, listed by the state as a candidate species, is a rare fall migrant in North, Middle, and South parks, and a rare summer resident in the parks of northwestern Grand County (Andrews and Righter 1992). Migrants occur on mudflats around reservoirs, in moist meadows, and in agricultural areas. The agricultural dry-up areas and reservoirs in the analysis area provide suitable foraging habitat for the sandhill crane.

3.11.1.5.8 Wood Frog

The wood frog is listed as a state candidate species and inhabits marshes, bogs, pothole ponds, beaver ponds, lakes, stream borders, wet meadows, willow thickets, and subalpine forests bordering these mesic habitats. Willow thickets and forest stream courses are inhabited primarily after frogs have dispersed from the breeding ponds. Potential wood frog habitat occurs in wetlands and the irrigated meadows in the agricultural dry-up areas, and along streams and reservoirs throughout the analysis area.

3.11.1.6 Migratory Birds

Most bird species present in the agricultural dry-up area and other parts of the analysis area are protected under the Migratory Bird Treaty Act (MBTA). Bird species use different habitat types in the analysis area for shelter, breeding, wintering, and foraging at various times during the year. Common bird species found in mountain grassland habitats include mountain bluebird, western meadowlark, Lincoln's sparrow, savannah sparrow, and vesper sparrow. Birds within the riparian and wetland areas include mountain chickadee, song sparrow, American dipper, Wilson's warbler, and western wood-pewee (Mutel and Emerick 1984; Kingery 1998).

The golden eagle, bald eagle, osprey, Swainson's hawk, red-tailed hawk, American kestrel, and great horned owl may forage in the agricultural dry-up areas. The riparian habitat along streams and reservoirs in the analysis area provide foraging and nesting habitat for many raptors.

3.11.1.7 Large Game

3.11.1.7.1 Mule Deer, Elk, and Moose

The agricultural dry-up areas provide overall mule deer range and mule deer summer range. Mule deer are common in relatively low numbers at the agricultural dry-up areas in summer, particularly in riparian areas along the creeks. In winter, most deer move to south-facing slopes northwest of the agricultural dry-up areas. Sagebrush-covered slopes south and west of the agricultural dry-up areas provide severe winter range and a winter concentration area for mule deer (NDIS 2010).

The agricultural dry-up areas are considered overall elk range, and forested and sagebrush areas northwest of the agricultural dry-up areas provide summer range for elk (NDIS 2010). Forested areas in portions of the agricultural dry-up area, and north and south of the agricultural dry-up areas provide winter range and winter concentration areas for elk. Elk severe winter range is on the northern periphery of the agricultural dry-up area,

and portions of this area are identified as elk migration corridors.

The agricultural dry-up areas are also mapped as overall range and summer range for moose. Portions of the agricultural dry-up areas also are a concentration area, priority habitat, and winter range for moose.

3.11.1.7.2 Pronghorn

Pronghorn is a grassland species adapted to wide-open habitats. Open sagebrush and irrigated meadows in the agricultural dry-up area provide overall range for pronghorn (NDIS 2010).

3.11.1.7.3 Mountain Lion

Mountain lions are considered a game species by the CDOW and typically inhabits rocky outcroppings and ridges near the foothill and mountain areas of the state. Mountain lions prey mainly on deer, as well as elk and other ungulates in North America, and their distribution and movements correspond to their ungulate prey (Fitzgerald et al. 1994). The Colorado NDIS maps the agricultural dry-up areas as overall range for mountain lions. Mountain lions could forage in the agricultural dry-up areas especially if large mammalian prey were in the area; however, this species typically favors rocky outcroppings, not the open meadow and sage habitat in the agricultural dry-up areas.

3.11.1.7.4 Black Bear

Black bears in Colorado are most common in montane shrublands and forests, and subalpine forests at moderate elevations, especially in areas with well-developed stands of oakbrush or berry-producing shrubs such as serviceberry and chokecherry. Black bears are omnivorous, eating vegetation as well as fish, carrion, and stream algae. Black bears need forest cover for concealment, escape, and travel. Black bears are likely to occasionally pass through the agricultural dry-up areas.

3.11.1.8 Other Wildlife

Other wildlife species likely to be present in the agricultural dry-up areas include smaller mammals such as the Nuttall's cottontail, red fox, coyote, mink, ermine, badger, American beaver, and muskrat (Fitzgerald et al. 1994). Rodents common to Grand County include northern pocket gopher, deer mouse, long-tailed vole, and montane vole (NDIS 2010; Fitzgerald et al. 1994). Waterfowl such as canvasback, eared grebe, mallard, and American widgeon are commonly found in open water habitats and wet meadows. The riparian and wetland areas in the analysis area provide potential habitat for the northern leopard frog, chorus frog, and tiger salamander (NDIS 2010; Hammerson 1999).

3.11.2 Environmental Consequences

3.11.2.1 Direct and Indirect Effects

No direct effects would occur on vegetation or wildlife. Indirect effects are discussed for the agricultural dry-up area and streams and reservoirs in the analysis area.

3.11.2.1.1 Vegetation Communities

The effects on vegetation in the agricultural dry-up area and along reservoirs and streams in the analysis area are discussed in the Section 3.10.2.1.1.

3.11.2.1.2 Federally Threatened and Endangered Plant Species

The agricultural dry-up areas are above the elevational range of Osterhout milkvetch and Penland beardtongue. The Proposed Action would have no effect on these species or their habitat.

3.11.2.1.3 Plant Species of Concern

No occurrences of the nagoon berry and Bodin milkvetch have been documented in the agricultural dry-up area (CNHP 2010). The agricultural dry-up areas are below the elevational range for the nagoon berry, and the Proposed Action would not directly or indirectly affect this species.

Wetlands and riparian habitat along Stillwater Creek and within the agricultural dry-up area that may provide suitable habitat for the Bodin milkvetch would not be directly affected by the Proposed Action. The addition of water to Stillwater Creek would likely have no effect or would have a beneficial effect on wetlands and riparian habitat. The removal of irrigation from the agricultural dry-up area would affect wetlands; this species, however, is not believed to be present and would not be adversely affected.

3.11.2.1.4 Federally Threatened and Endangered Wildlife Species

The Proposed Action would have no effect on lynx or areas that are mapped as lynx habitat (NDIS 2010). Suitable yellow-billed cuckoo riparian habitat along the lower Colorado River would not be adversely affected by the Proposed Action.

3.11.2.1.5 State Listed Species and Rare or Imperiled Wildlife Species

The Proposed Action would have no effect on nesting or roosting habitat for the bald eagle or overall habitat for Barrow's goldeneye, boreal owl, and river otter. Species associated with riparian habitat along streams and reservoirs in the analysis area (e.g., bald eagle, river otter, boreal toad, river otter, sandhill crane, and wood frog) would not be adversely affected by the Proposed Action. The Barrow's goldeneye and boreal owl would not be affected by the Proposed Action because of the lack of suitable habitat for either species within the agricultural dry-up areas and the analysis area. The change in vegetation communities in the irrigated meadows in the agricultural dry-up area might adversely affect suitable foraging habitat for the sandhill crane; however, foraging habitat would still be present in naturally occurring wetlands. Drier conditions in the agricultural dry-up area may cause a reduction in suitable greater sage grouse brood habitat.

Previous surveys within portions of the agricultural dry-up area following standard survey protocols found no signs of amphibians, including boreal toads and wood frogs. The Proposed Action would have no adverse effect on any known populations of boreal toads or wood frogs; however, the removal of irrigation in the agricultural dry-up area would decrease the amount of suitable habitat for the boreal toad and wood frog.

3.11.2.1.6 Migratory Birds

As the irrigated and subirrigated meadow habitat in the agricultural dry-up area slowly converted into upland habitat, avian populations would change to species adapted to upland communities and the populations of more mesic species would decline. Discontinuing periodic mowing and harvesting hay meadows would eliminate inadvertent destruction of grassland nests, resulting in decreased nestling mortality.

The Proposed Action would have a negligible effect on raptor foraging habitat and no effect on known raptor nests. Removal of irrigation in the agricultural dry-up area would have an indirect effect on raptor foraging habitat. The amount of foraging habitat would not be affected by project activities; however, portions of the foraging habitat may be converted from irrigated meadow to upland grassland. The change in vegetation communities may affect prey species composition, distribution, and abundance in the affected area. Upland adapted raptors, such as red-tailed hawk and golden eagle, would potentially benefit from the conversion of irrigated meadows dominated by tall herbaceous vegetation to a more upland shortgrass habitat. The existing tall vegetation provides dense cover that hinders raptor hunting, and the change to shortgrass and shrub vegetation may make prey species more available throughout the year to avian predators (Preston 1990).

3.11.2.1.7 Large Game

The Proposed Action would have no permanent effects on large game. Removal of irrigation water in the agricultural dry-up area would result in an eventual conversion to a drier, upland vegetation community. The agricultural dry-up area encroaches on the periphery of mule deer severe and critical winter range, and the conversion of irrigated meadows to upland vegetation would have

a negligible effect on mule deer. Mule deer may benefit over the long term as shrubs and other vegetation preferred by mule deer in winter increase after the removal of irrigation and livestock, which provide competition for mule deer.

The conversion of irrigated meadows to upland vegetation would alter the foraging habitat for elk. Removing irrigation water would likely slowly decrease available forage and alter vegetation composition to less preferred plant species within the irrigated meadows, which may result in slight adverse effects on elk. Adverse effects may be offset by the removal of haying, which will allow a higher biomass of grass.

Removal of irrigation in the agricultural dry-up area would cause a reduction in moose foraging habitat. The loss of wetland habitat would especially reduce the quality of moose summer foraging habitat. While moose would forage on upland grasses, the preferred forage species would be reduced, a negligible effect.

Suitable habitat for pronghorn is primarily associated with upland shrubland and grassland habitat in the agricultural dry-up areas. The Proposed Action would convert irrigated meadows to upland vegetation preferred by pronghorn, which would be a beneficial effect.

The Proposed Action is unlikely to significantly affect the black bear and mountain lion due to the small size of the affected area and the large amount of suitable habitat available in surrounding areas.

3.11.2.1.8 Other Wildlife

A portion of the irrigated and subirrigated meadow habitat in the agricultural dry-up area would slowly convert into upland habitat and would result in a corresponding change in the small mammal and furbearer communities. Upland species would benefit from the conversion of irrigated meadows, while populations of more mesic species would likely decline. The types of species and the local distribution of species in the agricultural dry-up area would likely change as the vegetation changes through the process of natural succession.

3.11.2.2 Cumulative Effects

The Proposed Action would result in cumulative effects on the Colorado River near Kremmling, Fryingpan River below Ruedi Reservoir, Roaring Fork River near Glenwood Springs, the 15-Mile Reach of the Colorado River, and Ruedi Reservoir. The effects on vegetation associated with these water bodies would be absent or negligible. The effects on wildlife associated with wetland and riparian vegetation would be absent or negligible.

3.12 Soils and Farmland

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops; and is also available for these uses. Farmland of statewide importance is land other than prime farmland that has a good combination of physical and chemical characteristics for the production of crops.

3.12.1 Affected Environment

3.12.1.1 Soil Types

Soils in the agricultural dry-up area are predominantly alluvial loams derived from shale or loams formed in glacial drift and colluvium. The Cimarron soils are deep (greater than 60 inches), well-drained soils found on mountainsides and fans. Permeability of Cimarron soils is slow and they have a low to moderate susceptibility to erosion. The Youga soils are deep, well-drained soils found on mountain fans, swales, and depressions. Permeability of Youga soils is moderately slow and they have a low to moderate susceptibility to erosion. The Leavitt soils are deep, well-drained soils found on fans and swales. The permeability of Leavitt soils is moderately slow and they have a moderate susceptibility to erosion. The remaining soils in the analysis area are generally not suitable for use as cropland because they are on steep slopes and have a high susceptibility to erosion (SCS 1983).

3.12.1.2 Important 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.

3.12.2 Environmental Consequences

3.12.2.1 Direct and Indirect Effects

The Proposed Action would result in a permanent loss of 479 acres of farmland of statewide importance with the removal of irrigation. Under the Farmland Protection Policy Act, any federal agency involved in a proposed project that may convert farmland to nonagricultural uses must complete U.S. Department of Agriculture Form AD-1006, Farmland Conversion Impact Rating. Reclamation will complete Form AD-1006 after this EA is completed. Changes in streamflow, stream stage, or reservoir levels would not affect soils.

3.12.2.2 Cumulative Effects

The Proposed Action, when combined with reasonably foreseeable actions, would not have any cumulative effects on soils or farmland in the analysis area.

3.13 Recreation

The primary issues related to recreation resources are concerns about impacts to water-based recreation (primarily boating and fishing) opportunities resulting from changes to reservoir levels or streamflow. Land-based recreation activities would not be affected by the Proposed Action and were not analyzed for effects.

3.13.1 Affected Environment

3.13.1.1 Reservoir Recreation

3.13.1.1.1 Granby Reservoir

Water-based recreation at Granby Reservoir primarily consists of boating and fishing during the summer recreation season. Powerboating and sailboating are popular, along with canoeing and kayaking. Boating activities are supported by three public boat ramps and several private docks and marinas. Both shore and boat fishing are popular activities at Granby Reservoir, which supports rainbow, brook, mackinaw, and cutthroat trout, as well as kokanee salmon.

3.13.1.1.2 Green Mountain Reservoir

Green Mountain Reservoir is used for boating (power boating and canoeing) and fishing. There are two boat ramps and a privately operated marina at Heeney. The McDonald Flats ramp is typically not open in the spring and fall due to low water levels (USFS undated). The lake supports brown and rainbow trout and kokanee salmon.

3.13.1.1.3 Wolford Mountain Reservoir

Wolford Mountain Reservoir is used for boating and fishing. In addition to boat ramps, the reservoir also has a campground, a picnic area, and trails. The reservoir is stocked with rainbow trout, cutbow trout, and splake (CRWCD 2012).

3.13.1.1.4 Ruedi Reservoir

Water-based recreation at Ruedi Reservoir is generally limited to boating and fishing. The reservoir supports brown, lake, and rainbow trout, as well as kokanee salmon. Boating is supported by two boat ramps and associated facilities (CDOW 2008a).

3.13.1.2 River Recreation

3.13.1.2.1 Colorado River

Granby Reservoir to Kremmling

River recreation along the Colorado River between Granby Reservoir and Kremmling are dominated by fishing on both private and public lands. Most of the Colorado River in this segment is designated as a Gold Medal Water for outstanding fishing opportunities.

This reach of the river is not known to be a major boating destination.

Kremmling to State Bridge

The section of the Colorado River downstream of Kremmling is a popular boating destination, characterized by the challenging Big Gore Canyon and the meandering Pumphouse reach.

While the Big Gore Canyon reach provides limited fishing opportunities due to fast water and limited streambank access, the Pumphouse reach is popular for both bank fishing and float fishing.

State Bridge to Dotsero

This 45-mile reach of the Colorado River is dominated by Class I and II water. This reach of the river is less popular than the upstream Pumphouse run, but is still well used by both private and commercial boaters. This reach provides both bank and floatfishing opportunities (BLM 2005).

Glenwood Canyon

The Colorado River between Dotsero and Glenwood Springs is dominated by Glenwood Canyon. This section of river has four distinct boating reaches, ranging from Class I flat water to advanced whitewater sections (Class II to V rapids) (Banks and Eckardt 1999; Canoe Colorado 2009; Stafford and McCutchen 2007; Eddy Flower 2009).

The Dotsero-Shoshone reach of this section provides both bank and float fishing, while the remainder of Glenwood Canyon provides bank fishing only. This section is not known to be a major fishing destination.

Below Glenwood Springs

The long section of the Colorado River between Glenwood Springs and the 15-Mile reach (near Palisade) provides a variety of general boating and fishing opportunities where access is available. The South Canyon section of the river between Glenwood Springs and Silt is considered an exceptional fishery, resulting from cold water from the Roaring Fork River and successful stocking efforts (Mowbray, pers. comm. 2009). While many river recreational opportunities are available in this section of the Colorado River, there are no other significant boating or fishing destinations (Banks and Eckardt 1999; Stafford and McCutchen 2007).

3.13.1.2.2 Blue River

The Blue River from Green Mountain Reservoir to its confluence with the Colorado River is designated as a Gold Medal Water for its excellent fishing opportunities, is also recognized as a Wild Trout water, and provides a Class II to III kayak run (Banks and Eckardt 1999; Stafford and McCutchen 2007).

3.13.1.2.3 Muddy Creek

The reach of Muddy Creek between Wolford Mountain Reservoir and its confluence with the Colorado River near Kremmling is a fishing destination, with several species of trout. Fishing access is available from the reservoir, from several BLM parcels, and a section of private land leased by the Rocky Mountain Angling Club (Colorado Fishing Network 2012).

3.13.1.2.4 Fryingpan River

With easy access and a high-quality fishery, the Fryingpan River downstream of Ruedi Reservoir is a popular fishing destination designated as a Gold Medal Water. This section of river supports a productive fishery due to coldwater temperatures and abundant aquatic food sources below the reservoir. A survey published in 2002 estimated about 34,000 visitors over a 12-month period, with most (71 percent) between May 1 and September 30 (Roaring Fork Conservancy [RFC] 2002). The USFS currently has four outfitters permitted to guide on this segment of the Fryingpan River, providing a total of 1,521 service days per year. 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).

3.13.1.2.5 Roaring Fork River

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 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).

3.13.1.2.6 Wild and Scenic River Evaluation

The BLM evaluated several reaches of the Colorado River and Blue River within the analysis area to identify river segments for possible designation under the National Wild and Scenic Rivers Act. Eligibility criteria included free-flowing streams with outstanding remarkable values for scenic, recreational, geologic, fish, wildlife, historic, cultural, and other similar values. Five segments of the Colorado River and three segments of the Blue River were determined eligible (BLM 2007). In 2011, the BLM issued a Draft Resource Management Plan and Draft Environmental Impact Statement for the Colorado River Valley Field Office for public comment. Alternative B, the BLM's preferred alternative, is divided into Alternative B1 and Alternative B2. Under Alternative B1, the BLM would find four segments suitable for inclusion in the National Wild and Scenic Rivers System, including two segments of the Colorado River between the Colorado River Valley Field Office boundary near State Bridge and Glenwood Springs. Under Alternative B2, the BLM would recommend adopting and implementing a Stakeholder Management Plan to protect the free-flowing nature, outstanding remarkable values, and tentative classifications on the Colorado River segments. Additionally, the Resource Management Plan would also include a suitability analysis for the Forest Service segments in Glenwood Canyon. If the Forest Service and the BLM decide to adopt the proposed Stakeholder Management Plan, the stakeholder group has requested that they delay the suitability decision on eligible Colorado River segments between Kremmling and Glenwood Springs (BLM 2011).

On November 30, 2011, the CWCB filed three applications for an instream flow water right in three segments of the Colorado River (Table 9). According to the applications, the appropriation is recommended by the consensus of a diverse

Table 9. CWCB's Instream Flow Water Right Applications for the Colorado River.

Segment	September 16 – May 14	May 15 – June 15	June 16 – July 31	August 1 – September 15
	(cfs)			
From the confluence with the Blue River extending to the confluence with the Piney River	500	600	600	750
From the confluence Piney River extending to the confluence with Cabin Creek	525	650	650	800
From the confluence with Cabin Creek extending to a point immediately upstream of confluence with the Eagle River	650	900	800	800

stakeholder group under a local management plan designed to help protect resources of "outstanding remarkable value" that have been identified by the Bureau of Land Management and the United States Forest Service.

3.13.2 Environmental Consequences

3.13.2.1 Direct and Indirect Effects

3.13.2.1.1 Reservoir Recreation

The Proposed Action is anticipated to increase surface water elevations in Granby Reservoir by up to 1.4 feet during the summer recreation season (May-September). Lake elevations in Green Mountain Reservoir are estimated to increase by up to 1.8 feet under the Proposed Action. These changes, combined with the negligible effects of exchanges or substitutions associated with an insurance pool in either Green Mountain or Wolford Mountain reservoirs, would have negligible effects on recreation in Granby Reservoir, Green Mountain Reservoir, and Wolford Mountain Reservoir.

3.13.2.1.2 River Recreation and Wild and Scenic River Designation

Aquatic habitat and river recreation in the Colorado River below Granby Reservoir would improve during late summer and early fall in all years as a result of the annual releases of 5,412.5 acre feet from Granby Reservoir. Streamflow changes in the Blue River and upper Colorado River resulting from the Proposed Action would not affect the outstandingly remarkable values of specific river segments or their eligibility for inclusion in the National Wild and Scenic River System.

3.13.2.2 Cumulative Effects

3.13.2.2.1 Reservoir Recreation

Under the Proposed Action, in combination with the expiration of the 2012 Agreement, water levels in Ruedi Reservoir would increase during the summer recreation season by up to 6.5 feet. This increase in water elevation would result in minor benefits to recreational opportunities in Ruedi Reservoir.

3.13.2.2.2 River Recreation and Wild and Scenic River Designation

Changes in streamflow in the Colorado River below Kremmling are associated with the Proposed Action and the expiration of the interim agreements. The overall cumulative effect of the Proposed Action on Colorado River recreation below Kremmling would be negligible. Changes in streamflow and aquatic habitat in the Blue River would have a negligible effect on river recreation.

On the Fryingpan River, the changes in streamflow under the Proposed Action, coupled with the expiration of the 2012 Agreement, would be variable based on immediate water needs. Recognizing that preferred flows for fishing are less than 250 cfs, the modeling predicts the Proposed Action would result in 11 fewer days when flows exceed 250 cfs in 9 out of 10 years. It is anticipated that insurance pool releases would be made at times when streamflow in the Fryingpan River was less than 250 cfs. Accordingly, the operation of the Ruedi Reservoir insurance pool is not expected to increase the number of days that Fryingpan River streamflow exceeds 250 cfs. In addition, the modeling predicts the Proposed Action would result in increased winter flows by about 18 cfs, which would improve low-flow conditions for the fishery. Overall, the Proposed Action would result in moderate cumulative benefits to fishing on the Fryingpan River due to an increase in preferred flow periods and improved winter fishery conditions.

Under the Proposed Action (combined with the expiration of the 2012 Agreement), flows in the Roaring Fork River would typically be reduced by about 3.4 percent (29 cfs) from August through October, while winter flows would increase by about 18 cfs. While these changes may result in a small impact to late-season boating opportunities, they would improve late-season fishing and over-winter fishery conditions. Overall, the Proposed Action would result in negligible to minor benefits to recreation on the Roaring Fork River.

Streamflow changes in the Colorado River resulting from the Proposed Action and other reasonably foreseeable actions would be minimal, and would not affect the outstandingly remarkable values of specific river segments or their eligibility for inclusion in the National Wild and Scenic River System.

3.14 Socioeconomics and Land Use

This section provides a brief overview of existing socioeconomic conditions and evaluates potential socioeconomic effects of the Proposed Action alternative.

3.14.1 Affected Environment

3.14.1.1 Socioeconomic Conditions

3.14.1.1.1 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).

3.14.1.1.2 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).

3.14.1.1.3 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).

3.14.1.1.4 Employment

About 159,000 residents of the analysis area were employed in 2010. This total includes 59,000 residents of the four resort counties and 100,000 residents of the two west slope counties (CDLE 2011).

As of 2010, the unemployment rate in the analysis area had risen to 9.8 percent versus 3.0 percent prior to the recession in 2007. The statewide unemployment rate in 2010 was 8.9 percent. Mesa County had the highest 2010 unemployment rate in the analysis area at 10.6 percent, while Summit County had the lowest unemployment rate at 7.8 percent (CDLE 2011).

The analysis area has more jobs than employed residents. This reflects both multiple job holding (the average Colorado resident held 1.12 jobs in

2009 and residents in the resort areas tend to have a higher rate of multiple job holding than the average) and the net inflow of workers residing outside the analysis area to work at jobs within the analysis area. A total of 197,000 jobs were located in the analysis area in 2009. From 1990 through 2009, the number of jobs in the analysis area increased at an average annual rate of 3.1 percent. However, every county in the analysis area lost jobs between 2007 and 2009. The total number of jobs in the analysis area declined by about 7 percent compared to a 5 percent decrease in statewide total jobs (SDO 2009; CDLE 2011). Based on the continuing increase in the number of unemployed persons, the total number of jobs in the analysis area likely continued to decline in 2010 (data on total jobs by place of work are not yet available for 2010).

3.14.1.1.5 Economic Base

The economic base of a local economy consists of the activities that bring money into the region from outside areas. These activities then lead to other jobs among firms that supply goods and services to the economic base industries and to the employees and other residents of the region. The economic base drives economic growth and is sometimes referred to as the "economic drivers" of the community.

Within the analysis area, tourism dominates the economic base of the resort counties and represents about 70 percent of all direct basic employment in Grand, Eagle, Summit, and Pitkin counties. The west slope counties are more diversified, with an economic base that includes significant contributions from mining and energy development; agriculture, regional, and national services; and federal and state government employment, as well as a more modest contribution from tourism (13 percent of the economic base). Direct basic employment due to the spending of resident wealth accumulated outside the analysis area (such as retirees and second home owners) comprises about 19 percent of the economic base across the analysis area as a whole. Manufacturing jobs represent only about 3 percent of the analysis area economic base, but about 4 percent of the economic base in the west slope counties (SDO 2011b).

3.14.1.1.6 Economic Contribution from Fishing and Rafting

While the tourism sector in the analysis area, and particularly the resort counties, has historically been dominated by winter sports (mostly downhill skiing), other activities such as fishing, rafting, hiking, mountain biking, and camping have become increasingly important in the past few decades. The resort counties now promote a year-round experience and lifestyle that has encouraged development of second homes as well as more traditional tourist visits throughout the year.

CDOW conducts periodic surveys of anglers in Colorado and maintains a model that estimates the economic contribution from hunting, fishing, and watching wildlife to each of the state's counties and the state as a whole. The 2007 CDOW angling survey indicates anglers spent 1.9 million fishing days (one angler for one day) in the analysis area in 2007, about 18 percent of all fishing days in the state of Colorado (CDOW 2007). Trip and equipment expenditures for fishing directly and indirectly contributed about $205 million to the analysis area economy in 2007, directly supported about 1,400 jobs, and indirectly supported about 1,100 additional jobs (CDOW 2008b). Comparing the estimated direct employment related to fishing to the 44,000 direct economic base jobs from tourism in the analysis area suggests that fishing makes up about 3 percent of the economic stimulus the analysis area receives from tourism as a whole.

A 2002 Fryingpan Valley Economic Study estimated 34,200 annual visitor days along the Fryingpan River below Ruedi Reservoir and 15,300 annual visitor days at Ruedi Reservoir. Expenditures by these visitors were estimated to produce about $3.9 million in annual economic output and to directly and indirectly support about 73 jobs in the Roaring Fork Valley (RFC 2002).

The 2010 Colorado River Outfitters Association (CROA) report indicated 113,000 commercial

rafting user days along the Colorado River, about 1,400 user days along the lower Roaring Fork River, and about 1,200 user days along the Blue River in 2010. Together, activity on these three rivers represented about 23 percent of all commercial rafting activity in Colorado. The estimated total economic impact of commercial rafting along the Colorado River, the lower Roaring Fork River, and the Blue River (including multiplier effects) was about $34 million in 2010. The 2010 CROA report indicated that commercial rafting activity was about 7 percent less than the peak number of user days in 2007, but the number of user days did increase from 2009 to 2010, particularly on the Colorado River and Arkansas River (CROA 2010). No data are reported on private rafting activity levels or economic effects.

3.14.1.1.7 Agriculture in Grand County

In 2009, agriculture made up about 5 percent of the economic base of Grand County (SDO 2011b). The estimated market value of agricultural products produced by Grand County farms was about $9.4 million. The majority of the market value (84 percent) was from livestock production (Census of Agriculture 2007).

Grand County had 229 farms in 2007 and 143 of these farms were irrigated on some portion of the land. In total, a little more than 43,000 acres in the county were irrigated, out of a total of more than 208,000 total acres of farmland (Census of Agriculture 2007).

3.14.1.2 Environmental Justice

As described in Section 3.14.1.1.2, the proportion of minority residents within the analysis area is generally less than in the State of Colorado as a whole—with the exception of the relatively high proportion of Hispanic residents in Eagle and Garfield counties. The incidence of poverty within the analysis area is generally less than or comparable to the State of Colorado as a whole (though the incidence of poverty in Mesa County, at 12.2 percent, is slightly greater than the average statewide incidence of 11.9 percent).

3.14.1.3 Land Use

Under the Proposed Action, ditch shares currently used to irrigate lands on two ranches west of Granby Reservoir in Grand County would be used to deliver water to the reservoir to provide part of the 10825 water supply. Irrigated agriculture on these ranches would cease. These ranches are known as the E Diamond H Ranch and the Miller-Hereford Ranch. The dry-up would affect about 843 acres of irrigated meadow and 92 acres of subirrigated meadow that have been historically irrigated (Grand River Consulting 2012).

The agricultural lands that would cease to be irrigated under the Proposed Action are zoned as Forestry and Open District, which is the predominant land use zoning category throughout Grand County. Portions of the E Diamond H Ranch are within 0.5 mile or less of the western edge of lands proximate to Granby Reservoir that are currently zoned for residential development (Grand County 2009).

3.14.2 Environmental Consequences

3.14.2.1 Direct and Indirect Effects

Changes in streamflow conditions along the Colorado River below Granby Reservoir and below Windy Gap would have negligible effects on recreation. The Proposed Action is also anticipated to have negligible effects on recreation at Granby Reservoir (Section 3.13).

The direct effect of the Proposed Action in increasing lake elevation at Green Mountain Reservoir is expected to have a negligible effect for recreation. Corresponding socioeconomic effects should also be negligible. The direct effect on recreation along the Blue River below the reservoir is also expected to be negligible.

The Proposed Action would dry up about 752 acres of irrigated meadow and 92 acres of subirrigated meadow in Grand County. Relative to the total of 43,000 irrigated acres in the county in 2007, this dry-up would affect about 2 percent of the county's

irrigated acreage. The dry-up would result in a negligible adverse effect on the agricultural portion of the Grand County economy.

The indirect effect of the Proposed Action on land use in Grand County would be to convert the use of the E Diamond H Ranch and the Miller-Hereford Ranch to uses other than irrigated agriculture. The properties are in prime locations for future development and the county would like development to proceed according to the county's Rural Land Use Plan (Plan). Under the Plan, two-thirds of the property would remain open space, while one-third could be developed at low density (two lots per 35 acres). Grand County has entered into communications with Northern Water regarding the future use of the Miller-Hereford ranch, but no agreement has been reached (Curran, pers. comm. 2009).

The Proposed Action would not have disproportionately high or adverse human health or environmental effects on minority and low-income populations.

3.14.2.2 Cumulative Effects

The Proposed Action would have a negligible cumulative effect on recreation along the Colorado River below Kremmling.

The cumulative effect on recreation at Ruedi Reservoir from the Proposed Action and the expiration of the interim agreements is expected to be a minor benefit due to higher water levels. The cumulative effect on flows in the Fryingpan River is expected to be a moderate benefit due to fewer days with high flows (>250 cfs) and increased flows during the winter. The cumulative effect on recreation in the Roaring Fork River is expected to be a negligible to minor benefit.

In combination, the minor cumulative benefit to recreation at Ruedi Reservoir coupled with the moderate cumulative benefit to recreation along the Fryingpan River and the negligible to minor benefit to recreation along the Roaring Fork River would be expected to lead to a minor benefit to the recreation economy in the area. The socioeconomic effects may be most noticeable for property owners along the Fryingpan River and recreation- and visitor-related businesses in the Town of Basalt.

4.0 Consultation and Coordination

4.1 Scoping Process

Reclamation engaged in a number of public scoping outreach activities to inform the public and solicit comments. Public scoping began October 28, 2009 when Reclamation placed newspaper advertisements regarding public scoping open houses in four local newspapers. Invitations to the open houses were emailed to known stakeholders. Two public scoping open houses were held in Basalt and Granby, Colorado on November 4 and 5, 2009, respectively, and were attended by about 35 people. Reclamation, through its contractors, also conducted telephone interviews with federal, state, and local agencies to review their needs and concerns.

Each of the 25 comment documents received during the three-week public scoping process was considered. These comments were grouped for consideration into relevant categories. Based on guidance for NEPA, key issues were determined. These key scoping issues were considered in this EA along with other important issues:

- Surface Water Hydrology (rivers and streams)–Changes in the quantity and timing of flows in the Colorado River from the Redtop Valley Ditch headgate to the 15-Mile Reach, Redtop Valley Ditch, Stillwater and Willow creeks, Blue River, Fryingpan River, and Roaring Fork River
- Surface Water Hydrology (reservoirs)–Changes in levels of Ruedi Reservoir and release schedules for reservoirs that would provide 10825 water
- Groundwater Hydrology–Anticipated yield of Redtop Valley Ditch agricultural dry-up and changes in groundwater accrual to Willow Creek
- Surface Water Quality–Effects on water quality, particularly in the Fryingpan River, Roaring Fork River, and Colorado River downstream of Glenwood Springs
- Reservoir Operations and Hydroelectric Generation–Effects on projected power production by the Ruedi and Green Mountain power plants
- Aquatic Life–Effects on game and nongame fish and macroinvertebrates in the Colorado River from the Redtop Valley Ditch headgate to the 15-Mile Reach, Stillwater and Willow creeks, Blue River, Fryingpan River, and Roaring Fork River; potential for spreading zebra and quagga mussels or whirling disease from affected reservoirs
- Wetlands, Flooding, and Riparian Resources–Effects on riparian communities due to changes in sediment transport, stream geomorphology, or recharge of alluvial aquifers along the Colorado River downstream of Granby Reservoir and along the Fryingpan River; potential for flooding along the Roaring Fork River near Basalt
- Wildlife and Vegetation–Effects on vegetation and habitat for deer, moose, elk, and greater sage grouse due to dry-up of irrigated land
- Recreation Resources–Effects on angling opportunities along the Fryingpan River; effects on angling and boating opportunities along the Colorado River; relationship to the Wild and Scenic River designation process; effects on shoreline fishing and boating opportunities at Ruedi Reservoir
- Socioeconomic and Land Use Resources–Effects on local economies due to changes in recreation resources such as angling, game populations, hunting, wildlife watching, and boating; effects on land use at the Miller-Hereford and E Diamond H ranches
- Cumulative Effects–Effects of the Proposed Action in conjunction with future Reclamation contracts, potential reduction

of Xcel's Shoshone Power Plant call, and other water development projects

- Alternatives Analysis–Potential alternatives or changes or refinements to the Proposed Action
- Mitigation–Potential mitigation of significant adverse effects
- Other–Disclosing anticipated contract types, durations, and signatories; and describing authority for operation and administration of the Proposed Action

4.2 Preparers

MWH Americas, Inc., in cooperation with ERO Resources Corporation, served as a third-party contractor and prepared this EA working under the direction of the lead agency for the project, Reclamation. Grand River Consulting Corporation conducted hydrologic analysis and modeling, surface water resources analyses, and hydroelectric generation analyses; GEI Consultants, Inc. conducted aquatic resource analyses; ERO Resources, Inc. Corporation conducted wetland, riparian, wildlife, vegetation, recreation, and cultural resource analyses; BBC Research and Consulting conducted socioeconomic and land use analyses. Table 10 provides the names of the individuals who were principally involved with preparing the EA.

Table 10. List of Preparers.

Name	Title/Role	Highest Education	Years of Experience
Bureau of Reclamation			
Carlie Ronca	Project Manager (2009)	M.S. Biology in Management of Environmental Resources	12
Lucy Maldonado	Project Manager (2011 to present)	B.S. Range-Forest Management	19
Will Tully	Project Manager (2009 to 2011)	B.S. Wildlife Management	37
Ron Thomasson	Hydrologic Engineer	B.S. Civil Engineering	22
Kara Lamb	Public Involvement Specialist	M.A. Environmental Ethics	13
MWH Americas, Inc.			
Bill Van Derveer	Project Manager (2009- 2010)	M.S. Applied Natural Science	21
Chip Paulson	Document review	M.S. Water Resource Engineering	33
Jerry Gibbens	Water resources, groundwater, and geomorphology	M.S. Civil Engineering	19
Lesley Siroky	Assistant project management, water quality, and document production (2009-2011)	B.S. Environmental Engineering	9
Tracy Kosloff	Water quality (2009-2010)	M.S. Environmental Engineering	9
Grand River Consulting Corporation			
Kerry Sundeen	Hydrologic modeling, water resources, and hydroelectric generation	M.S. Hydrology	32
Maria Pastore	Hydrologic modeling, water resources, and hydroelectric generation	M.S. Environmental Science / Ecology	10
ERO Resources Corporation			
Richard Trenholme	Natural Resources Lead and Project Manager (2010 to present)	B.S. Agronomy	32
Leigh Rouse	Wetlands and riparian resources	M.S. Botany	12
Bill Mangle	Recreation resources	M.S. Natural Resource Policy and Planning	12
Ron Beane	Wildlife	M.A. Biology	30
Moneka Worah	Vegetation	B.A. Environmental Science	7
Craig Sovka	Soil, geology, and farmland resources	B.A. Geology	18
Kay Wall	Technical editor	B.A. Behavioral Science	28
BBC Research & Consulting, Inc.			
Doug Jeavons	Socioeconomics and land use	M.A. Economics	39
GEI Consultants, Inc.			
Don Conklin	Aquatic Ecologist	M.S. Water Resource Management	29

5.0 References

AECOM. 2010. Colorado River Water Availability Study-Phase I Report-Draft. Prepared for Colorado Water Conservation Board. March 22.

American Community Survey (ACS). 2011. 2005-2009 American Community Survey 5-Year Estimates. Downloaded March.

American Ornithologists Union (AOU). 1998. Check-list of North American Birds. Seventh Edition. American Ornithologists Union, Washington, DC.

Andrews, R. and R. Righter. 1992. Colorado Birds. Denver Museum of Natural History. Denver.

Banks, G. and D. Eckardt. 1999. Colorado Rivers and Creeks. Second Edition.

Benson, A.J. 2011. New Zealand mudsnail sightings distribution. Available at: newzealandmudsnaildistribution.aspx. Last accessed: March 16.

Boyle/AECOM. 2003. Windy Gap Firming Project Alternative Plan Formulation Appendix D.

Boyle/AECOM. 2008. Historical Analysis of the Redtop Valley Ditch Use on the Miller Hereford Ranch. Prepared for Northern Colorado Water Conservancy District. Lakewood, CO. August 15.

Breeding Bird Atlas II. 2010. Colorado Breeding Bird Atlas II. Atlas 2007-2011. Available at: http://bird.atlasing.org/Atlas/CO/Main?viewResults=1. Last accessed: January 28.

Bureau of Land Management (BLM). 2005. The Upper Colorado River Recreation Area. Kremmling to Glenwood Canyon Visitor Guide and Map. Glenwood Springs Field Office and Kremmling Field Office.

Bureau of Land Management (BLM). 2007. Final Wild and Scenic River Eligibility Report. Kremmling and Glenwood Springs Field Offices. March.

Bureau of Land Management (BLM). 2011. Colorado River Valley Draft Resource Management Plan/Draft Environmental Impact Statement. September.

Canoe Colorado. 2009. Canoe Colorado's Trip Information for the Colorado River from Dotsero to Bair Ranch, CO. Available at: http://www.canoecolorado.com/trips/ColoradoRiver/Dotsero/. Last accessed: September 14.

Carter, M. 1998. Yellow Billed Cuckoo. *In* Colorado Breeding Bird Atlas (H. Kingery, ed.). Colorado Bird Atlas Partnership and Colorado Division of Wildlife.

Colorado Decision Support System (CDSS). 2009. CDSS Map Server. Available at: http://cdss.state.co.us/DNN/MapViewer/tabid/62/Default.aspx. Reviewed Well Applications, 2000 West Slope Irrigated Lands and 1993 Irrigated Lands Layers. Last accessed: December 16.

Census of Agriculture. 2007. USDA, National Agricultural Statistics Service. 2007 Census of Agriculture—County Data.

Chadwick Ecological Consultants, Inc. 1999. Fish population monitoring of an unnamed tributary to Willow Creek-Grand County, Colorado 1998-1999. Prepared for Three Lakes Water and Sanitation District.

Colorado Department of Labor and Employment (CDLE). 2011. Annual Not Seasonally Adjusted Labor Force, Employment and Unemployment Data for 2010. Last accessed: March.

Colorado Department of Public Health and Environment (CDPHE). 2009. Exhibit 4-Rationale for Segments and Parameters Proposed for Inclusion in Regulation No. 93. December-Upper Colorado River Basin.

Colorado Department of Public Health and Environment (CDPHE). 2010a. Colorado Department of Public Health and Environment Water Quality Control Commission Regulation No. 33: Classifications and Numeric Standards

for Upper Colorado River Basin and North Platte River (Planning Region 12) (5 CCR 1002-33).

Colorado Department of Public Health and Environment (CDPHE). 2010b. Colorado Department of Public Health and Environment Water Quality Control Commission Regulation No. 37: Classifications and Numeric Standards for Lower Colorado River Basin (5 CCR 1002-37).

Colorado Department of Public Health and Environment (CDPHE). 2010c. Regulation No. 93 Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List. Effective April 30, 2010.

Colorado Division of Wildlife (CDOW). 2006. Colorado's Comprehensive Wildlife Strategy and Wildlife Action Plans. State Wildlife Grants Program. Colorado Division of Wildlife.

Colorado Division of Wildlife (CDOW). 2007. Unpublished data from 2007 Survey of Angling in Colorado.

Colorado Division of Wildlife (CDOW). 2008a. Ruedi Reservoir Fish Survey and Management Data. Prepared by Kendall Ross, Aquatic Biologist, Glenwood Springs Service Center.

Colorado Division of Wildlife (CDOW). 2008b. The Economic Impacts of Hunting, Fishing and Watching Wildlife in Colorado. Supporting data and calculations. Prepared by BBC Research & Consulting.

Colorado Division of Wildlife (CDOW). 2009. Colorado Fishing, April 1, 2009-March 31, 2010.

Colorado Division of Wildlife (CDOW). 2010a. Colorado listing of endangered, threatened, and state species of special concern. Last revised: July.

Colorado Division of Wildlife (CDOW). 2010b. Unpublished fish survey and stocking data for tributaries, reservoirs, and the mainstem Colorado River from the Redtop Valley Ditch downstream to the upstream boundary of the 15-Mile Reach.

Colorado Fishing Network. 2012. Muddy Creek: Clearly a Good Trout Stream. By Al Marlowe. Available at: http://www.coloradofishing.net/ft_muddy.htm. Last Accessed February 10.

Colorado Natural Heritage Program (CNHP). 2010. Environmental Review of USGS 24K Trail Mountain Quadrangle. Report generated: January 15.

Colorado River Outfitters Association (CROA). 2009. Commercial River Use in the State of Colorado. 1998-2010.

Colorado River Outfitters Association (CROA). 2010. Colorado River Outfitters Association. Commercial River Use in the State of Colorado 1988-2010.

Colorado River Water Conservation District (CRWCD). 2012. Wolford Mountain Reservoir. Available at: http://www.crwcd.org/page_21. Last accessed February 10.

Colorado State Demography Office (SDO). 2009. Colorado Jobs and Labor Force Parameters. Last accessed: October.

Colorado State Demography Office (SDO). 2011a. Preliminary Population Forecasts by County, 2000-2040. Last accessed: March.

Colorado State Demography Office (SDO). 2011b. Regional Socio-Economic Profile: Region 11 and Region 12.

Connelly, J.W., S.T. Knick, M.A. Schroeder, and S.J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies, Cheyenne, WY, unpubl. report. Cheyenne, WY.

Cordeiro, J.R., A.P. Olivero, and J. Sovell. 2007. Corbicula fluminea (*Bivalvia: Sphaeriacea: Corbiculidae*) in Colorado. The Southwestern Naturalist 52(3):424-430.

Curran, L. 2009. Personal communication between Lurline Curran, Grand County

Manager, and Doug Jeavons, BBC Research & Consulting. December 17.

Deacon, J.R., S.V. Mize, and N.E. Spahr. 1999. Characterization of Selected Biological, Chemical, and Physical Conditions at Fixed Sites in the Upper Colorado River Basin, Colorado, 1995–98. Water Resources Investigations Report 99-4181. U.S. Geological Survey, Denver, CO.

Eddy Flower. 2009. Kayaking Information-Online River Guide. Available at: http://www.eddyflower.com/. Last accessed: September 15.

ERO Resources Corporation (ERO). 2010. Draft Wetlands, Other Waters of the U.S., and Riparian Resources Technical Report, Water Users' Commitment to Provide 10,825 Acre-Feet to the 15-Mile Reach of the Upper Colorado River. January 26.

ERO Resources Corporation and Harvey Economics. 2005. Windy Gap Firming Project: Purpose and Need Report. Prepared for Bureau of Reclamation, Eastern Colorado Area Office.

Ewert, J. 2010. Colorado River near Parshall-Fish Survey and Management Information. Colorado Division of Wildlife. Available at: http://wildlife.state.co.us/Fishing/Reports/FisherySurveySummaries/. January.

Ewert, J. 2010. Aquatic Biologist, CDOW. Personal communication with J. Mullen, Fisheries Ecologist, GEI Consultants. October.

Federal Register. 1994. Endangered and threatened wildlife and plants; determination of critical habitat for the Colorado River endangered fishes: razorback sucker, Colorado squawfish, humpback chub, and bonytail chub, final rule (50 CFR Part 17). Federal Register 59:54(21 March 1994):13374-13400.

Fitzgerald, J.P., C.A. Meaney, and D.M. Armstrong. 1994. Mammals of Colorado. Denver Museum of Natural History and University Press of Colorado, Niwot, CO.

Franzreb, K.E. and S.A. Laymon. 1993. A reassessment of the taxonomic status of the yellow billed cuckoo. Western Birds 24:17-28.

Gillis, C.A. and M. Chalifour. 2009. Changes in the macrobenthic community structure following the introduction of the invasive algae Didymosphenia geminata in the Matapedia River (Québec, Canada). Hydrobiologia DOI 10.1007/s10750-009-9832-7.

Grand County. 2009. Grand County Zoning Maps. Zone Map 06 and Zone Map 08. Last accessed: October.

Grand River Consulting Corporation. 2007. 10825 Water Supply Study Phase 1 Report: Screening of Water Supply Alternatives. July.

Grand River Consulting. 2008. OMID Efficiency Improvements, Operation and Allocation of Potential Water Savings. Prepared for 10825 Water Supply Stakeholders. November.

Grand River Consulting Corporation. 2009. 10825 Water Supply Study Phase 2 Report: Selected Alternative for 10825 Acre-Feet of Water per Year for the Upper Colorado River Endangered Fish Recovery Program. April.

Grand River Consulting Corporation. 2012. Water Resources Assessment of Proposed 10825 Alternative. Prepared for MWH Americas, Inc. Hammerson, G.A. 1999. Amphibians and Reptiles in Colorado. Second Edition. University Press of Colorado, Colorado Division of Wildlife, Denver, CO.

Hydrosphere Resource Consultants, Inc. (Hydrosphere). 2003. Upper Colorado River Basin Study Phase II Final Report. May.

Jackson, T. 2010. Herptile Coordinator, Colorado Division of Wildlife. Personal communication with Moneka Worah, ERO Resources Corporation. January 26.

Jones, A.L. and P.D. Vickery. 1997. Conserving Grassland Birds-Managing Agricultural Lands including Hayfields, Crop Fields, and Pastures for Grassland Birds. Massachusetts Audubon Society. Lincoln, MA.

Kilroy, C., T.H. Snelder, O. Floerl, C.C. Vieglais, and K.L. Dey. 2008. A rapid technique for assessing the suitability of areas for invasive species applied to New Zealand's rivers. Diversity and Distributions 14:262-272.

Kingery, H. (ed). 1998. Colorado Breeding Bird Atlas. Colorado Bird Atlas Partnership and Colorado Division of Wildlife.

Kumar, S., S.A. Spaulding, T. Stohlgren, K. Hermann, T. Schmidt, and L. Bahls. 2009. Potential habitat distribution for the freshwater diatom Didymosphenia geminata in the continental U.S. Frontiers in Ecology and the Environment 7(8):415-420.

Markiw, M.E. and K. Wolf. 1983. Myxosoma cerebralis (*Myxozoa: Myxosporea*) etiologic agent of salmonid whirling disease requires tubificid worm (*Annelida: Oligochaeta*) in its life cycle. Journal of Protozoology 37:2225-2227.

Miller, W.J. and K.M. Swaim. 2011. Final Instream Flow Report for the Colorado River from Kremmling Colorado downstream to Dotsero, Colorado. Prepared for Colorado River Water Conservation District and Colorado Water Conservation Board by Miller Ecological Consultants, Inc.

Moser, B.B. and D. Hicks. 1970. Fish population of the stilling basin below Canton reservoir. Proceedings of the Oklahoma Academy of Science 50:69-74.

Mowbray, W. 2009. Fryingpan Anglers, Basalt, Colorado. Personal communication with Bill Mangle, ERO Resources Corporation. September 16.

Mutel, C.F. and J.C. Emerick. 1984. From Grassland to Glacier: the Natural History of Colorado. Johnson Books, Boulder.

NDIS (Colorado Natural Diversity Information System). 2010. System for Conservation Planning. Available at: http://ndis.nrel.colostate.edu/escop/.

Nehring, R.B. 2006. Colorado's Cold Water Fisheries: Whirling Disease Case Histories and Insights for Risk Management. Colorado Division of Wildlife Special Report 79. 46 pp.

Nehring, R.B., J. Ewert, and S. Hebein. 2010. A review of aquatic invertebrate studies and fish population survey data for the Colorado River in Middle Park, Colorado from 1980 through 2009: what does it tell us? Colorado Division of Wildlife.

Nehring, R.B., K. Thompson, J. Padia, and B. Neuschwanger. 2000. Whirling Disease Investigations. Colorado Division of Wildlife, Federal Aid in Fish and Wildlife Restoration, Project F-237-R7, Fort Collins.

Nehring, R.B., K.G. Thompson, D. Chacon, J. Padia, and A. Nikirk. 2001. Whirling Disease Investigations. Colorado Division of Wildlife, Federal Aid in Fish and Wildlife Restoration, Project F-237-R8, Fort Collins.

Nesler, T.P. 1997. Native and Introduced Fish Species by Major River Basins in Colorado. Colorado Division of Wildlife, Nongame & Endangered Aquatic Wildlife Program.

Osmundson, D.B., P. Nelson, K. Fenton, and D.W. Ryden. 1995. Relationships Between Flow and Rare Fish Habitat in the 15-Mile Reach of the Upper Colorado River. Final Report to the Colorado River Recovery Implementation Program. U.S. Fish and Wildlife Service, Denver, CO.

Palmer, D.A. and R.A. Ryder. 1984. The First Documented Breeding of the Boreal Owl in Colorado. Condor 86:215-217.

Preston, C.R. 1990. Distribution of raptor foraging in relation to prey biomass and habitat structure. Condor 92:107-112.

Ptacek, J.A., D.E. Rees, and W.J. Miller. 2003. A study of the ecological processes on the Fryingpan and Roaring Fork rivers related to operation of Ruedi Reservoir-Final Report. Prepared for Roaring Fork Conservancy by Miller Ecological Consultants.

Rademacher, K. 2008. Memorandum to Alan Berryman and Jeff Drager, subject: Revisions to Redtop Ditch Analysis. Senior Water Resources

Engineer, Northern Colorado Water Conservancy District. December 5.

Rees, D.E., J.A. Ptacek, and W.J. Miller. 2003. A study of the ecological processes on the Fryingpan and Roaring Fork rivers related to operation of Ruedi Reservoir-Supplemental Report. Prepared for Roaring Fork Conservancy by Miller Ecological Consultants.

Roaring Fork Conservancy (RFC). 2002. Fryingpan Valley Economic Study. June 21.

Ross, K. 2010. Aquatic Biologist, CDOW. Personal communication with J. Mullen, Fisheries Ecologist, GEI Consultants. February 5.

Ross, K. 2010. Ruedi Reservoir-Fish Survey and Management Data. Colorado Division of Wildlife. Available at: http://wildlife.state.co.us/Fishing/Reports/FisherySurveySummaries/. January.

Ryder, R.A., D.A. Palmer, and J.J. Rawinski. 1987. Distribution and Status of the Boreal Owl in Colorado. In R.W. Nero et al. (eds). Biology and Conservation of Northern Forest Owls: Symposium Proceedings. General Technical Report RM-142. U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experimental Station. Fort Collins, CO.

Savard, J.L., G.E. Smith, and J.N. Smith. 1991. Duckling Mortality in Barrow's Goldeneye and Bufflehead Broods. Auk 108:568-577.

Schroeder, M.A., J.R. Young, and C.E. Braun. 1999. Sage Grouse (*Centrocercus urophasianus*). In: The Birds of North America, No. 425 (A. Poole and F. Gill, Eds.). The Birds of North America, Inc., Philadelphia, PA.

Soil Conservation Service (SCS). 1983. Soil Survey of Grand County Area, Colorado. June.

Spackman, S., B. Jennings, J. Coles, C. Dawson, M. Minton, A. Kratz, and C. Spurrier. 1997. Colorado Rare Plant Field Guide. Prepared for the Bureau of Land Management, the U.S. Forest Service, and the U.S. Fish and Wildlife Service by the Colorado Natural Heritage Program.

Spahr, N., L.E. Apodaca, J.R. Deacon, J.B. Bails, N.J. Bauch, C.M. Smith, and N.E. Driver. 2000. Water Quality in the Upper Colorado River Basin, Colorado, 1996-98. U.S. Geological Survey Circular 1214.

Spaulding, S. and L. Elwell. 2007. Increase in nuisance blooms and geographic expansion of the freshwater diatom Didymosphenia geminata: Recommendations for response. U.S. Environmental Protection Agency White Paper, 33 p.

Stafford, E. and K. McCutchen. 2007. Whitewater of the Southern Rockies. Wolverine Publishing, Silt, CO.

State of Colorado. 1996. Stipulation and Agreement, Water Court Case No. 91CW247, Water Division 5. October.

Stednick, J. and R. Jensen. 2007. Effects of Pine Beetle Infestations on Water Yield and Water Quality at the Watershed Scale in Northern Colorado. May/June issue of Colorado Water.

Stednick, J., R. Jensen, J. Cannon, E. Donnelly, and Fred the Field Truck. 2010. Water resource responses in beetle-killed catchments in north-central Colorado. Colorado State University. MPB Science Symposium: Impacts on the Hydrologic Cycle and Water Quality. NCAR Mesa Lab, Boulder, CO. April 8.

Strayer, D.L. 1999. Effects of alien species of freshwater mollusks in North America. Journal of the North American Benthological Society 18:74-98.

Summerfelt, R.C. 1999. Lake and reservoir habitat management. Pages 285-320 in C.C. Kohler and W.A. Hubert, eds. Inland fisheries management in North America, 2nd edition. American Fisheries Society, Bethesda, MD.

Tetra Tech, HabiTech, Inc., and Walsh Aquatic, Inc. 2010. Draft Report Grand County Stream Management Plan, Phase 3. Prepared for Grand County, CO.

U.S. Army Corps of Engineers (Corps). 2009. Moffat Firming Project Draft Environmental Impact Statement. October.

U.S. Department of Commerce, Bureau of Census (Census). 1990. Summary Tape File 1, 1990. Last accessed: October 2009.

U.S. Department of Commerce, Bureau of Census (Census). 2000a. Summary Tape File 1, 2000. Last accessed: October 2009.

U.S. Department of Commerce, Bureau of Census (Census). 2000b. Summary Tape File 3, 2000. Last accessed: October 2009.

U.S. Department of Commerce, Bureau of Census (Census). 2010. Census 2010 Redistricting Files, 2010. Last accessed: March 2011.

U.S. Department of the Interior (USDI). 1961. Principles to Govern the Release of Water at Granby Dam to Provide Fishery Flows Immediately Downstream in the Colorado River. Memorandum

U.S. Department of the Interior Bureau of Reclamation (Reclamation). 1983. Operating Policy for Green Mountain Reservoir; Colorado Big Thompson Project. Published in Federal Register. December 22.

U.S. Department of the Interior Bureau of Reclamation (Reclamation). 1989. Ruedi Reservoir, Colorado Round II Water Marketing Program Final Supplement to the Environmental Statement Fryingpan-Arkansas Project, Colorado. August 1.

U.S. Department of the Interior Bureau of Reclamation (Reclamation). 2002. Ruedi Reservoir 2012 Agreement, Final Environmental Assessment. March.

U.S. Department of the Interior Bureau of Reclamation (Reclamation). 2003. Memorandum of Agreement among the Colorado Water Conservation Board, the United States Fish and Wildlife Service and the United States Bureau of Reclamation for Water from Ruedi Reservoir, Colorado, Agreement No. 03XX6C0113.

U.S. Department of the Interior Bureau of Reclamation (Reclamation). 2007. Exhibit B-Agreement on Wolford Mountain Reservoir and Green Mountain Reservoir Exchanges Environmental Assessment.

U.S. Department of the Interior Bureau of Reclamation (Reclamation). 2008. Green Mountain Reservoir Substitution and Power Interface Agreements Final Environmental Assessment, Loveland, CO. December.

U.S. Department of the Interior Bureau of Reclamation (Reclamation). 2009. Scoping Report: Water Users' Commitment to Provide 10,825 AF to the 15-Mile Reach of the Upper Colorado River, Loveland, CO. December.

U.S. Department of the Interior Bureau of Reclamation (Reclamation). 2011a. Windy Gap Firming Project Final Environmental Impact Statement (FES 11-29). Bureau of Reclamation, Loveland, CO. November.

U.S. Department of the Interior Bureau of Reclamation (Reclamation). 2011b. SECURE Water Act Section 9503(c) – Reclamation Climate Change and Water 2011. April.

U.S. Department of the Interior Bureau of Reclamation (Reclamation). 2011c. Multiple personal communications between Grand River Consulting and Reclamation staff. January.

U.S. Department of the Interior Bureau of Reclamation. 2012. National Environmental Policy Act Handbook.

U.S. Fish and Wildlife Service (Service). 1999. Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions in the Upper Colorado River above the Confluence with the Gunnison River. December.

U.S. Fish and Wildlife Service (Service). 2001. 12-month finding for a petition to list the yellow-billed cuckoo (*Coccyzus americanus*) in the western United States, 66 FR 38611. July 25.

U.S. Fish and Wildlife Service (Service). 2004. Sage Grouse Fact Sheet. Last updated: January 5, 2004. Available at: http://www.fws.gov/endangered/esa-library/pdf/sage-grouse_fact_sheet-Aug06.pdf

U.S. Fish and Wildlife Service (Service). 2010. Unpublished fish survey data for bonytail chub (*Gila elegans*), humpback chub (*Gila cypha*), Colorado pikeminnow (*Ptychocheilus lucius*), and razorback sucker (*Xyrauchen texanus*) in the Colorado River drainage through 2008.

U.S. Geological Survey (USGS). 2011. Water Quality Data from National Water Information System. Available at: http://nwis.waterdata.usgs.gov/nwis. Last accessed: March 22.

U.S. House of Representatives. 1961. Operating Principles, Fryingpan-Arkansas Project, 87th Congress, 1st Session, House Document No. 130.

USDA Forest Service (USFS). Undated. Green Mountain Reservoir Campgrounds and Cataract Lake Area Trailheads. Informational brochure. Dillon Ranger District, White River National Forest.

USDA Forest Service (USFS). 2009. Scoping letter for 10825 Water Agreement EA. Prepared by William Knight, Acting District Ranger. Aspen-Sopris Ranger District, White River National Forest. November 18.

Vaughn, C.C. and D.E. Spooner. 2006. Scale-dependent associations between native freshwater mussels and invasive Corbicula. Hydrobiologia 568:331-339.

Western Engineering, Inc. 1983. Reconnaissance Level Engineering Studies at the Placita and Osgood Dam Sites. Prepared for Colorado River Water Conservation District.

Appendix A: Alternatives Analysis Results

This Appendix provides a summary on the alternatives evaluated prior to this EA. Further information is provided in the "Phase 1 Report" and "Phase 2 Assessment":

- *10825 Water Supply Study Phase 1 Report: Screening of Water Supply Alternatives* (Grand River Consulting 2007).
- *10825 Water Supply Study Phase 2 Assessment: Water Supply Alternatives Summary* (Grand River Consulting 2009)

1.1 15-Mile Reach Pumpback

This alternative would pump water from the Colorado River in Grand Junction, from a site below the confluence with the Gunnison River, upstream to the beginning of the 15-Mile Reach. Pumped water would be discharged to the Colorado River immediately downstream of the Grand Valley Irrigation Company diversion dam.

This alternative was eliminated from further consideration due to water quality concerns. Both the Gunnison River and the Colorado River downstream of the Gunnison River to the state line are on the EPA's list of impaired waters for selenium. If the pumped water has elevated concentrations of selenium, the impaired water quality may affect endangered fish and other aquatic life within the 15-Mile Reach. Additional information can be found in the Phase 1 Report (Grand River Consulting 2007).

1.2 Mt. Logan Reservoir

This 10,000 ac-ft reservoir site is located on an ephemeral tributary to Roan Creek near the Town of DeBeque. A pump station from the Colorado River would be required to provide an adequate yield of water for Recovery Program purposes.

This reservoir site was eliminated from further consideration because, when compared to other alternatives, a large embankment was required for a relatively small amount of storage. There is also a natural gas pipeline located beneath the proposed dam. The warm water reservoir may introduce non-native fish to the Colorado River, in competition with the endangered fish. Additional information can be found in the Phase 1 Report (Grand River Consulting 2007).

1.3 Yank Creek Reservoir

The 5,000 ac-ft Yank Creek Reservoir site is located on North Thompson Creek, a tributary to Crystal River in the Roaring Fork watershed near Carbondale. This alternative was eliminated from further consideration primarily because the reservoir cannot supply the full 10825 water demand. Additionally, land ownership and land use patterns conflict with reservoir construction. Additional information can be found in the Phase 1 Report (Grand River Consulting 2007).

1.4 Pipeline from Ruedi Reservoir to Basalt

This delivery facility would construct a 15-mile gravity pipeline from Ruedi Reservoir to the Roaring Fork River near Basalt. The pipeline would keep any 10825 water releases made from Ruedi Reservoir out of the Fryingpan River in order to facilitate sport fishing access. The pipeline would likely carry 10825 water only during isolated periods (perhaps several weeks per year) when 10825 releases may conflict with fisherman access.

This alternative was eliminated from further consideration because of the high cost (about $40 million) and consideration that sport fishing access can likely be resolved through continued reservoir management, without large scale construction of this major facility. Potential permitting concerns and a lengthy time for implementation (perhaps 5 to 10 years to permit and construct) were also noted. Additional information can be found in the Phase 1 Report (Grand River Consulting 2007).

1.5 Pipeline and Tunnel from Ruedi Reservoir to Roaring Fork

As with the Ruedi Reservoir to Basalt pipeline, this facility would keep 10825 water out of the Fryingpan River by delivering it to the upper Roaring Fork watershed instead of flowing down the Fryingpan River. Two tunnel configurations were considered: a 12-mile tunnel with a pressurized system to lift the water 500 feet to the Salvation Ditch above Aspen; and an 18-mile tunnel to the Twin Lakes Collection System with a pressurized system to lift the water 3,100 feet. The tunnel systems would likely carry 10825 water only during isolated periods (perhaps several weeks per year) when 10825 release objectives conflict with sport fisherman access.

These tunnels were eliminated from further consideration due to cost ($100 million or more). Further, sport fishing access issues associated with use of Ruedi Reservoir can likely be resolved through continued reservoir management. Additionally, permitting and construction of a tunnel system would take a decade or more. This implementation schedule would not meet 10825 water delivery needs. Additional information can be found in the Phase 1 Report (Grand River Consulting 2007).

1.6 Webster Hill Reservoir

This 28,900 ac-ft reservoir site is located on the mainstem of the Colorado River several miles downstream of the Town of Rifle. This alternative was eliminated from further consideration because of multiple construction obstacles. The reservoir would require relocation of Interstate 70, a railroad line, numerous natural gas wells, natural gas pipelines, and many other commercial facilities. In addition, the reservoir would inundate occupied habitat of several endangered fish species.

Additional information can be found in the Phase 1 Report (Grand River Consulting 2007).

1.7 Grand Valley Lake

The Grand Valley Lake is a large scale water development concept that would be located in the vicinity of Grand Junction. As proposed, this concept would include a 200,000 ac-ft off-channel reservoir on Sink Creek, south of the Colorado River near Palisade. The reservoir would be filled by a 60-mile aqueduct from the North Fork of the Gunnison River to the reservoir. Numerous improvements to local irrigation projects would also be required.

This alternative was eliminated from further consideration because permitting and construction of this concept is questionable. Even if it was possible to permit and construct the project, it would require several decades or more, given the large size of the project, federal issues, environmental issues, and the multi-purpose nature of the project. Additionally, diverting substantial amounts of dilution flows from the North Fork of the Gunnison River may have a significant negative effect on the concentrations of selenium in the lower Gunnison River. Additional information can be found in the Phase 1 Report (Grand River Consulting 2007).

1.8 Middle Fork Reservoir

The Middle Fork Reservoir site is located on the Middle Fork of Parachute Creek. This alternative was eliminated from further analysis due to insufficient water yield (likely much less than 1,000 ac-ft/yr, and perhaps nothing in drought years). Additionally, the high elevation of the site would not make it feasible to pump water to the reservoir site from the Colorado River. Because the Middle Fork Reservoir site had these fatal flaws, it was eliminated from detailed analysis prior to publication of the Phase I Report.

1.9 Roan Creek Reservoir

The Roan Creek Reservoir site is located about five miles north of the Town of DeBeque and Interstate 70. This alternative was eliminated from further consideration due to time required to permit and

construct the reservoir (likely more than 10 years). Additional information can be found in the Phase 1 Report (Grand River Consulting 2007).

1.10 Wolcott Reservoir

The Wolcott Reservoir site is located on Alkali Creek, an ephemeral tributary to the Eagle River. The site is located about 20 miles west of Vail in a large natural basin about one mile north of Interstate 70 near Wolcott. Wolcott Reservoir would not provide water solely for Recovery Program purposes. Instead, as proposed by Eagle River water providers to Denver Water, this facility would be developed as a multiple use reservoir that would supply additional water for other west slope and east slope purposes.

This alternative was eliminated from further consideration because permitting and construction of this alternative is likely to take a decade or more, given the large size of Wolcott Reservoir, headwater issues, and the multi-purpose nature of the project. The reservoir project is controversial; the outcome of any permitting process is uncertain. Few projects of this magnitude have avoided litigation, which often further delays project implementation. Additional information can be found in the Phase 1 Report (Grand River Consulting 2007).

1.11 Shoshone Call Subordination

This alternative would have subordinated the Shoshone Power Plant water right on the Colorado River. Subordination of the Shoshone call would require coordinated operation with one or more upstream reservoirs. The water users would subordinate the Shoshone call, store this water in an upstream reservoir, and release the water in late summer for the Recovery Program.

This alternative was eliminated from detailed analysis because of lack of stakeholder support. One reason the stakeholders did not support the alternative was because the required reservoir releases would reduce the yield of one of the stakeholders in all but the driest year. Because of the lack of stakeholder support, it was eliminated from detailed analysis prior to publication of the Phase I Report.

1.12 Upper Colorado River Reservoirs

Six small reservoirs in Grand County, Strawberry Creek, Orr, Haypark, East Troublesome, Rabbit Ears, and Ute Park reservoirs, were considered to store water for the Recovery Program. All of these sites were previously reviewed by Grand County or Northern Water, and it was determined that they could not provide sufficient water yield. These reservoirs were considered between the Phase 1 Report and Phase 2 Assessments, but were eliminated before publication due to this fatal flaw.

1.13 Ruedi Reservoir

In the year 2012, an existing obligation to temporarily release 10,825 ac-ft of Recovery Program water from Ruedi Reservoir will expire. At that time, less water will be released for the Recovery Program; summer releases from Ruedi Reservoir may decrease from existing conditions, and winter releases may increase a corresponding volume.

This alternative would permanently provide the 10825 water from Ruedi Reservoir starting in 2012, and would "back fill" the temporary water supply agreement. The volume of water released from Ruedi Reservoir would remain the same as under current conditions.

This alternative was eliminated from further analysis due to issues with sport fishing access along the Fryingpan River. High flows in the Fryingpan River make it difficult for sport fishermen to safely access the river. Sport fishing provides an important economic benefit in the Basalt area. It is possible that this alternative, coupled with other releases from Ruedi Reservoir could create high flow conditions on the Fryingpan River. Additional information can be found in the

Phase 2 Assessment (Grand River Consulting 2009).

1.14 Sulphur Gulch Reservoir

The 16,000 ac-ft Sulphur Gulch Reservoir site is located in Mesa County, approximately 12 miles upstream of the head of the 15-Mile Reach. The site is located on Sulphur Gulch, an ephemeral tributary to the Colorado River. Sulphur Gulch Reservoir was not eliminated from further analysis, but was not chosen as the proposed action because permitting and construction would take a decade or more. Additional information can be found in Comparison of Water Supply Alternatives (Grand River Consulting 2009)

1.15 Ruedi / Sulphur Gulch Reservoir Combination

This alternative pairs new reservoir construction at Sulphur Gulch with the existing Ruedi Reservoir. A total of 5,412 ac-ft would be delivered from each reservoir. The Ruedi/Sulphur Gulch Reservoir combination was eliminated from further analysis because permitting and construction would take a decade or more. Additionally, Sulphur Gulch Reservoir as a stand-alone alternative was a better alternative from an environmental standpoint.

1.16 Ruedi / Buzzard Creek Reservoirs Combination

This alternative provides 5,412 ac-ft of water from Ruedi Reservoir with 5,412 ac-ft of water from Buzzard Creek Reservoir in each and every year. This alternative was eliminated from further analysis primarily due to the more significant wetland impacts of Buzzard Creek Reservoir when compared to other structural alternatives. This element would likely not be the Least Environmentally Damaging Practicable Alternative (LEDPA) when compared to other alternatives. Additional information can be found in the Phase 2 Assessment (Grand River Consulting 2009).

1.17 Ruedi / Williams Fork Reservoirs Combination

This alternative would provide different amounts of water from Ruedi and Williams Fork Reservoirs from year to year, depending upon whether it was a drier than average or wetter than average year. In above average and wet years, 2,700 ac-ft of water would be released from Williams Fork Reservoir and 8,125 ac-ft of water would be released from Ruedi Reservoir. In dry and below average years, all 10825 water would be supplied from Ruedi Reservoir, along with the release of an additional 2,700 ac-ft to compensate Denver Water for past releases from Williams Fork Reservoir.

In below average and dry years, Ruedi Reservoir would release 13,525 ac-ft of water. Because of adverse impacts to the Fryingpan River due to the increased releases from Ruedi Reservoir, this alternative was eliminated from further consideration. Further, water currently released from Williams Fork Reservoir would be released from Ruedi Reservoir in these drier than average years, resulting in lower stream flows in the upper Colorado River than would otherwise exist.

Additional information can be found in the Phase 2 Assessment (Grand River Consulting 2009).

1.18 Sulphur Gulch / Williams Fork Reservoir Combination

This alternative would provide different amounts of water from Sulphur Gulch and Williams Fork reservoirs from year to year, depending upon whether it was a drier than average, or wetter than average year. It would operate the same as Ruedi / Williams Fork Reservoir Combination, only with Sulphur Gulch releases instead of Ruedi Reservoir releases.

This alternative would decrease the amount of water in the Colorado River below the confluence with Williams Fork by 2,700 ac-ft in below average and dry years, when releases would instead be made from Sulphur Gulch. This coincides with the

years that Williams Fork Reservoir does not fill. This alternative was eliminated from further consideration because changes below Williams Fork Reservoir would either have neutral or negative impacts to aquatic conditions when compared to other alternatives. It may also require the construction of a larger Sulphur Gulch Reservoir, in order to meet the increased dry year release demands. Additional information can be found in the Phase 2 Assessment (Grand River Consulting 2009).

1.19 Ruedi Reservoir and Wolford Mountain Reservoir Enlargement

This alternative would supply 5,412 ac-ft from an enlarged Wolford Mountain Reservoir and Ruedi Reservoir would supply the other 5,412 ac-ft in each and every year. The Wolford Mountain Reservoir enlargement would be filled by a pump station from the Colorado River.

This alternative was eliminated from further analysis for multiple reasons. First the alternative cannot supply 5,412 ac-ft in dry years (such as 1977) without impacting the marketable yield of the reservoir. Second, this alternative has more significant wetland impacts on Wolford Mountain Reservoir when compared to other structural alternatives. Any alternative that utilizes Wolford Mountain Reservoir enlargement would not likely be the LEDPA when compared to Sulphur Gulch Reservoir or to non-structural alternatives. Additional information can be found in the Phase 2 Assessment (Grand River Consulting 2009).

1.20 Buzzard Creek Reservoir and Wolford Mountain Reservoir Enlargement

This alternative would use an enlarged Wolford Mountain Reservoir with Buzzard Creek Reservoir.

The Buzzard Creek/Wolford Mountain Reservoir combination was eliminated from further analysis because permitting and construction would take a decade or more. Wolford Mountain Reservoir enlargement also would likely not be the LEDPA when compared to other alternatives. Further, this alternative would reduce the dry year yield of Colorado River Water Conservation District, and did not have stakeholder support. Additional information can be found in the Phase 2 Assessment (Grand River Consulting 2009).

1.21 Lake Granby (2,700 ac-ft and Ruedi Reservoir (8,125 ac-ft)

This alternative pairs releases from two existing reservoirs. Lake Granby releases of 2,700 ac-ft would occur in late summer each year. The remaining 8,125 ac-ft of Recovery Program water would be released from Ruedi Reservoir.

This alternative was eliminated from further analysis because concurrent releases of contract water and 8,125 ac-ft of Recovery Program water from Ruedi Reservoir could cause incremental negative impacts to recreation use and aquatic habitat of the Fryingpan River. For additional information, please see the Phase 2 Assessment (Grand River Consulting 2009).

1.22 Orchard Mesa Irrigation District Improvements with Ruedi Reservoir and Lake Granby

In this alternative, releases from three existing reservoirs would provide the 10825 water:

- Lake Granby would supply releases of 2,700 ac-ft in all years
- Green Mountain Reservoir Historic User Pool (HUP) surplus water available to the Recovery Program would increase with efficiency improvements to the Orchard Mesa Irrigation District system. About 5,412 ac-ft would be available almost every year.
- Ruedi Reservoir would provide the balance of the 10825 water.

This alternative was eliminated from further consideration because in dry years, up to 8,125 ac-ft of water would be released from Ruedi Reservoir, causing potential impacts to sport fishing in the Fryingpan River. For additional information, please see the Phase 2 Assessment (Grand River Consulting 2009).

1.23 Lake Granby (2,700 ac-ft) and Sulphur Gulch Reservoir (8,125 ac-ft)

This alternative pairs releases from existing Lake Granby with new construction of Sulphur Gulch Reservoir. The Lake Granby/Sulphur Gulch Reservoir combination was eliminated from further analysis because permitting and construction would take a decade or more. Additionally, Sulphur Gulch Reservoir as a stand-alone alternative was a better alternative from an environmental standpoint. For additional information, please see the Phase 2 Assessment (Grand River Consulting 2009).

1.24 References

Grand River Consulting Corporation. 2007. 10825 Water Supply Study Phase 1 Report: Screening of Water Supply Alternatives. July.

Grand River Consulting Corporation. 2009. 10825 Water Supply Study Phase 2 Report: Selected Alternative for 10825 Acre-Feet of Water per Year for the Upper Colorado River Endangered Fish Recovery Program. April.

Appendix B—Responses to Comment

During the public comment period during the 31-day comment period of September 23, 2011, to October 24, 2001, 36 commenters submitted comments on the draft Environmental Assessment (EA) and the draft Finding of No Significant Impact (FONSI). Each comment document was assigned a number from 1 to 36. Nine documents contained substantive comments. Substantive comments: (a) question, with reasonable basis, the accuracy of information in the EA; (b) question, with reasonable basis, the adequacy of environmental analysis; (c) present reasonable alternatives other than those presented in the EA; or (d) cause changes or revisions in the proposal. Comments in favor of or against the proposed action, or comments that only agree or disagree with Reclamation policy, are not considered substantive. Reclamation's responses to substantive comments are presented below for the following documents. References to section numbers in the responses are to the sections numbers in the final EA. Between the draft EA and the final EA, Reclamation added discussion of Wolford Mountain Reservoir and Muddy Creek to the final EA. Consequently, the section numbers between the draft EA and the final EA changed and section numbers in some comments may not match the section numbers in the response.

Commenter	Document Number	Document Date
John Stahl	12	10/17/2011
Ruedi Water and Power Authority	14	10/17/2011
Western Rivers Institute	25	10/22/2011
Blue River Valley Ranch	26	10/24/2011
Grand County	29	10/24/2011
Pitkin County	31	10/24/2011
Roaring Fork Conservancy	32	10/24/2011
Trout Unlimited	35	10/24/2011
Western Resource Advocates	36	10/24/2011

John Stahl, Document 12

Comment 12.1

I am writing to address an opportunity that is being missed in the proposed 10825 Environmental Assessment. The proposal to retain additional water in Granby reservoir to be released into the Colorado River to maintain a healthier river is commendable, and as a fisherman I support the concept but not in its entirety. There is a section of the North Fork of the Colorado River that could be simultaneously improved with no additional effort. As I understand the proposal, Northern Water is going to abandon their 51% share of water rights along the Red Top ditch, but Red Top will be kept flowing as if the Northern rights have been retained. In other words, the North Fork of the Colorado River which flows into Shadow Mountain reservoir below the Red Top ditch diversion will continue being depleted for no apparent reason. This impacts the health of the North Fork fishery, obviously, by lowering flows well below the natural state and warming the reduced flows unnecessarily.

Response 12.1

Water from agricultural dry-up not diverted by the Redtop Valley Ditch would increase streamflow in the North Fork Colorado River primarily in June, although increases in flow during May and July may also occur (Figure 15). With the assumed maximum Redtop Valley Ditch diversion of 80 cfs, an increase in streamflow of the North Fork up to 70 cfs would typically

occur during the height of snowmelt runoff when diversions by the ditch have historically exceeded 80 cfs. Changes in streamflow would not occur during August through April, which is outside of the irrigation season for the Redtop Valley Ditch. It is possible that minority shareholders in the ditch can receive a full supply of water with Redtop Valley Ditch diversions less than 80 cfs. Such operation would result in additional water remaining in the North Fork Colorado River during the irrigation season, and slightly higher streamflows than described. These effects are described in Section 3.5.2.1.1.

Comment 12.2

Shadow Mountain Reservoir is already suffering from warming in the summer, which in turn leads to algae and weed growth that affect not only the reservoir itself but also Grand Lake, since the warmer water, algae and weeds are subsequently pumped into Grand Lake. We have an opportunity to cede that 51% of Northern's Red Top ditch diversion and keep that water flowing in the North Fork above Shadow Mountain reservoir as part of the 10825 proposal. More water, and cooler water, will be a help not only to that section of the North Fork but also will provide greater flushing flows to Shadow Mountain reservoir keeping it cooler and healthier. That in turn will improve Grand Lake and also improve the section of the Colorado River below Shadow Mountain dam.

Response 12.2

See response to comment 12.1. Section 3.8.2.1.1 discusses that it is anticipated that a portion of the additional water available to Shadow Mountain Reservoir would be directly diverted through Grand Lake to the Adams Tunnel, thereby reducing the amount of water that would have to be pumped from Granby Reservoir to Shadow Mountain Reservoir (likely in July). For the month of July, inflow to the reservoir from the North Fork Colorado River would increase by 710 AF and the amount of water pumped to Shadow Mountain Reservoir from Granby Reservoir would decrease by a commensurate amount.

Comment 12.3

I see no downside to this, but there is another upside. If Northern's 51% share of Red Top ditch continues to flow through that ditch, eventually that water has to be pumped back up from Granby reservoir and there is a cost to that. Why not let the flows return more toward Nature's normal, instead of carrying on a practice that is more expensive, more harmful, and unnecessary? I respectfully request that the Bureau include a mandatory reduction of Red Top ditch diversions corresponding to Northern's abandoned rights and let that water flow through the North Fork instead.

Response 12.3

All return flows from water that was delivered through the Redtop Valley Ditch would continue to accrue to Granby Reservoir. See comment response 12.1.

Ruedi Water and Power Authority, Document 14

Comment 14.1

The Ruedi Water and Power Authority recognizes the long and difficult process that has led to the recommended action and the Authority endorses that action. We believe that the recommended action will, on balance, provide benefits to the Colorado River, the Fryingpan River and the endangered fish populations in comparison to the current status of those resources. We also

believe that the adverse consequences of the recommended action are not so severe that they should preclude the implementation of the recommended action. With that said, we wish to make the following points regarding the shortcomings of the EA that we think should be addressed more completely in the final Environmental Assessment document and FONSI.

Response 14.1

Thank you for your comment.

Comment 14.2

The EA makes clear that the reduction in Ruedi's current 10,825 af endangered species obligation from that amount to 5,412 AF annually will reduce the adverse impacts of endangered species releases on flows in the Fryingpan and Ruedi lake levels. What is less clear is the rationale for burdening Ruedi with a major obligation for endangered species flows. The 5,412 af addressed in this EA, on top of the "5+5" obligation associated with Round I water sales makes Ruedi's total contribution to endangered species flows 15,412 af, a significant amount considering that releases are concentrated during the 90-day period between Mid-July and Mid-October. Moreover, the EA does not address why the adverse impacts arising from providing endangered species flows seem to accrue only to the Western Slope. We understand the legal and logistical constraints which have led to the proposed action, and we recognize that the proposed action will be beneficial to local streamflows and fisheries but we feel obligated to point out (while not suggesting that this point invalidates the findings of the EA or negates our above-noted endorsement of the recommended action) that the proposed action also results in adverse impacts to the Western Slope (i.e., the dry-up of productive ranchland in Grand County) while the beneficiaries of diversion projects absorb no environmental impact whatsoever.

Response 14.2

Ruedi Reservoir would not be burdened with flows for endangered species. Ruedi Reservoir is not the primary source of water to meet flow targets in the 15-Mile Reach. In 2011, 66,208 AF of water was released to the 15-Mile Reach, of which 15,251 AF, or 23 percent, came from Ruedi Reservoir. Section 1.4.3.1 discusses that nonfederal water users agreed in the 1999 Programmatic Biological Opinion to provide 10,825 AF of water annually to the 15-Mile Reach from existing or new Colorado Water Division 5 (mainstem Colorado River Basin) facilities to benefit endangered fish (10825 water). Equal contributions of 5,412.5 AF/yr were to be provided by east and west slope water users. The EA discusses a Proposed Action to implement the 1999 Programmatic Biological Opinion requirement. The "5+5" commitment is associated with the Round II water marketing program.

Comment 14.3

The EA should include a more thorough discussion of the status of the endangered fish, the progress that has been made towards recovery over the life of the Recovery Program, and the value of flow maintenance in context with the other actions that have been taken to improve fish habitat. The opening of additional habitat through the installation of fish ladders, the efforts to reduce predation by introduced species, and efforts to create and maintain other critical habitat elements such as nursery backwaters, are not sufficiently acknowledged and evaluated in comparison to flow enhancement. Is it likely that progress in other elements of the recovery program will make flow enhancement less critical in the future? What are the anticipated flow enhancement benefits of improvements to the Orchard Mesa irrigation network and how might those benefits affect 10,825 releases? Might the improved status of the fish in terms of population, stability and available habitat justify a re-examination of the flow needs in the 15-

mile reach at some point? Answers to these questions and an indication of where the 10,825 water falls in the hierarchy of all recovery actions would provide a better picture of the value of the 10,825 water and how and when it will be used.

Response 14.3

Table 1 and Figure 1 in Section 1.2 show the benefits of ongoing augmentation relative to FWS' target flow. The Orchard Mesa improvements are discussed in Sections 3.2.1 and 3.5.2.2.5. Section 3.5.2.2.5 includes a discussion of how the Orchard Mesa Irrigation District efficiency improvements would affect flows in the analysis area. A thorough discussion of the status of the endangered fish, the progress that has been made toward recovery over the life of the Recovery Program, and the value of flow maintenance programs is not necessary to describe the Purpose and Need for or the anticipated effects of the Proposed Action.

Comment 14.4

The 2,000 af "insurance pool" is inadequately explained in the EA. Why that pool is necessary and what alternatives are available to provide for that pool needs to be clearly explained and evaluated. In addition, the protocol and criteria for when and how this water is released, and the potential additional impacts arising from that release, must be disclosed. Otherwise the 2,000 af pool becomes another open-ended and inadequately rationalized item on Ruedi's menu of obligations. Our hope has been that the 10,825 process would bring finality and predictability to Ruedi's endangered species releases. We know that delivery of contract water is a future impact that will bring its own challenges but until those releases occur, the endangered species releases are the most significant variable affecting the Fryingpan River, so achieving some certainty regarding those releases is an important outcome of this process for the Roaring Fork Valley. Addressing the "insurance pool" in a thorough fashion is essential to achieving that certainty.

Response 14.4

In response to this and other comments, Reclamation modified the Proposed Action to include the possible mitigation of an insurance pool discussed in the draft EA as part of the Proposed Action. Various sections of the EA, such as sections 1.1, 2.3, 3.5.2, and 3.8.2 were revised to describe the insurance pool and its effects. As discussed in the final EA, the Proposed Action would fulfill the commitments made by Reclamation and the water users in the 1999 Programmatic Biological Opinion and would bring finality and predictability to Ruedi Reservoir's endangered species releases.

Comment 14.5

Thanks for the opportunity to comment on the 10,825 EA and FONSI. We appreciate the effort that has been put forth by the Bureau, the U.S. Fish and Wildlife Service, the Northern Colorado Water Conservancy District, the Colorado River Water Conservation District, and many others to reach this conclusion. Implementation of the recommended action will be a step forward towards resolving the issues surrounding endangered species flows. Please contact me if you would like further detail on any aspect of this correspondence.

Response 14.5

Thank you for your comment.

Western Rivers Institute, Document 25

Comment 25.1

I appreciate the opportunity to comment on the Draft EA – Draft Finding of No Significant Impact.

Response 25.1

Thank you for your comment.

Comment 25.2

I have a number of concerns. First, the fact that Ruedi is to bear the lion's share of the water delivery once again seems unfair. With the 5+5 water and the 5,412.5 af the total contribution from the West Slope pool in Ruedi will be 15,412 af. These releases should be more equitably spread around to other West Slope water sources.

Response 25.2

See comment response 14.2; Ruedi Reservoir does not bear the lion's share of releases for endangered fish recovery purposes. Appendix A provides a summary of the alternatives Reclamation considered in developing the Proposed Action.

Comment 25.3

I am also very concerned about the timing of the released water from Ruedi for the 15-mile reach if Ruedi is to remain the primary West Slope source for the water. The Mid-July through mid-October window for these releases coincides with the most important time of the year for the recreational fishing economy in this area.

Response 25.3

See comment response 14.3. Section 1.4.3 was revised to provide additional information about the Recovery Program. Section 3.13.1.2.4 discusses that preferred flows for wade fishing are less than 250 cfs. Section 3.13.1.2.4 discusses the modeling of the Proposed Action, along with other reasonably foreseeable actions, predicts 11 fewer days when flow in the Fryingpan River exceeds 250 cfs in 9 out of 10 years. In addition, the modeling predicts the Proposed Action would result in increased winter flows by about 18 cfs, which would improve low-flow conditions for the fishery. Given the flexibility in Ruedi Reservoir insurance pool releases, it is anticipated that releases from the insurance pool would be made at times when streamflow in the Fryingpan River was less than 250 cfs. Accordingly, the operation of the Ruedi Reservoir insurance pool is not expected to increase the number of days that Fryingpan River streamflow would exceed 250 cfs.

Comment 25.4

The flows in the Fryingpan below Ruedi are critical for the economy of the Town of Basalt and the Roaring Fork Valley. The fishery of the Fryingpan is world-renowned and a great boon statewide as well. High late season flows can and have had a significant impact on that economy. Draft EA states that "Efforts will be made to limit cumulative flows to 250 cfs or less when consistent with the multiple Project purposes and reasonable to do so...". This is not very reassuring. This year flows were at 300 cfs for much of September and October. A much more detailed operation plan needs to be put in place.

Response 25.4

In 2011, releases from Ruedi were made between August 20 and October 15, for a total of 57 days. Flow in the Fryingpan River was between 300 and 316 cfs for 38 of the 57 days. Section 3.5.1.9 discloses the terms under which Reclamation makes Ruedi Reservoir releases.

Comment 25.5

Sharing the West Slope water burden for the 15-mile reach from other West Slope supplies could help this situation. The EA needs to make a stronger effort to examine and resolve this issue. Consultation with the Colorado Department of Parks and Wildlife, along with the local Roaring Fork recreational fishing industry must be done prior to any releases exceeding 200 cfs.

Response 25.5

See comment response 14.3 and 25.4

Comment 25.6

On top of that there is a 2,000 AF "insurance pool" from Ruedi if water from Wolford Mountain or Green Mountain reservoirs is not available. I worry that use of this insurance pool in Ruedi may become a preferred alternative in dry years. The EA needs to explain this better and provide more comprehensive guidelines for the use of this pool. Any addition water supplied from Ruedi must be a serious last resort.

Response 25.6

See comment response 14.4.

Comment 25.7

I am also concerned about the fact that the 5412 AF from Granby Reservoir is not from current supplies and thus a "fair share" of East Slope water. It comes again at the expense of the West Slope. Drying up agricultural lands in Grand County to supply this water in effect places the entire burden for supplying water to the 15-mile reach on the shoulders of the West Slope, with no real contribution of water from East Slope supplies. The Front Range entities simply are "buying" their way out. This is unfair and unacceptable.

Response 25.7

See comment response 14.2. Section 1.4.3.1 discusses nonfederal water users' agreement in the 1999 Programmatic Biological Opinion to provide 10,825 AF of water annually to the 15-Mile Reach from existing or new Colorado Water Division 5 (mainstem Colorado River Basin) facilities to benefit endangered fish (10825 water).

Comment 25.8

The report is deficient in analyzing the actual environmental and economic impacts to the West Slope. More detail should be provided on the impacts to the Fryingpan and Roaring Fork. The analysis of the impacts caused by the agricultural dry-up from water taken out of the Redtop Valley Ditch is also vague and incomplete. Finally, an agreement on the operation of the "insurance pool" should be crafted and finalized before this EA and the plan for the 15-mile reach is accepted.

Response 25.8

The EA discloses the cumulative effect on the Roaring Fork and Fryingpan rivers. Section 3.13.1.2.4 discusses the Proposed Action, along with other reasonably foreseeable actions, is modeled to result in 11 fewer days when flow in the Fryingpan River exceeds 250 cfs in 9 out of 10 years. See comment responses 14.4 and 25.3. The EA discloses the effect of agricultural dry-up of irrigated lands served by the Redtop Valley Ditch. For example, Section 3.10.2.1.1 discusses the effect of agricultural dry-up of irrigated lands on wetland and riparian areas; Section 3.12.2.1 discusses the effect on important farmland; and Section 3.14.2.1 discusses the socioeconomic effect. The effect on all resources would be negligible.

Comment 25.9

Given the inadequate analysis of these factors I find it hard to agree, at this point, that there is a valid Finding of No Significant Impact. Further analysis and other structural agreements should be undertaken before the FONSI can be deemed sufficient.

Response 25.9

See comment response 25.2 through 25.8.

Blue Valley Ranch, Document 26

Comment 26.1

This letter is sent to the Bureau of Reclamation ("BOR") by the Blue Valley Ranch ("BVR"), which is owned by Galloway, Inc. The ranch is located between the Green Mountain Reservoir and the confluence of the Colorado and Blue Rivers. Approximately 9.5 miles of the channel of the Blue River are located on or adjacent to the ranch in Grand and Summit Counties in Western Colorado ("Lower Blue River"). Blue Valley Ranch has worked cooperatively for many years with local, state, and federal agencies on fish and wildlife issues and we hope these comments are useful to you.

Response 26.1

Thank you for your comment.

Comment 26.2

Over the last 18 years, Blue Valley Ranch has worked hard and invested significant resources to enhance aquatic and terrestrial habitat. We have created wetlands. The Lower Blue River Valley is not only home to elk and mule deer, but, also river otters, White Pelicans, moose, Bald Eagles and Red Tail Hawks, as well as numerous migratory water fowl. Indigenous populations of wild Brown Trout live and reproduce in the river from Green Mountain Reservoir to the confluence with the Colorado River on both private and public lands. The ranch has conducted, as well as supported, research on wildlife and aquatic resources that inhabit the valley.

Response 26.2

Thank you for your comment.

Comment 26.3

The flows in the lower Blue River between the Green Mountain Reservoir and the Colorado River are heavily influenced by the operation of Green Mountain Reservoir. Therefore, Blue Valley Ranch appreciates the opportunity to evaluate the Draft FONSI and EA concerning the exchange contemplated which has the potential to impact to the Lower Blue River and its aquatic and other river-dependent resources.

Response 26.3

Thank you for your comment.

Comment 26.4

The Blue Valley Ranch is committed to maintaining and enhancing the aquatic and other river-dependent resources of the Lower Blue River. We understand and support the effective implementation of the Recovery Plan for the Endangered Fishes of the Upper Colorado River. Of concern is the fact that over the past several decades individual water decisions have been made by others that individually and cumulatively affect the Lower Blue River. Robust cumulative impacts analyses are important to understanding the role of past, present and future actions will have on this valuable resource. It is in this light that Blue Valley Ranch has reviewed and offers these comments the Draft FONSI and Draft Environmental Assessment associated with the Bureau of Reclamation's Proposed Action related to the Colorado Water Users' Commitment to Provide 10,825 acre-feet to the 15-Mile Reach of the Upper Colorado River ("Draft FONSI and EA for the 10,825 Water" or "Draft FONSI and EA")

Response 26.4

Thank you for your comment.

Comment 26.5

We note at the outset that the comment period for the Draft FONSI and EA for the 10,825 Water is too short in light of the complex and technical nature of the issues covered by the Draft FONSI and EA. But in order to comply with the comment period provided, the Blue Valley Ranch provides the following comments. Nevertheless, Blue Valley Ranch respectfully requests the opportunity to supplement these comments with contributions from technical experts in the next thirty days.

Response 26.5

Reclamation sent a letter on 11/18/11 to Blue Valley Ranch denying the request for a comment period extension. The draft EA was reviewed by all other commenters within 30 days.

Comment 26.6

The Lower Blue River is considered part of the analysis area in the Draft EA. See Figure 2 of the Draft EA. The Lower Blue River may be impacted because the preferred alternative in the Draft FONSI and EA for the 10,825 Water considers a water exchange by which there would be a periodic exchange of released water from Granby Reservoir into Green Mountain Reservoir. A subsequent release of that water from Green Mountain Reservoir would then be used to meet the requirements of the 10,825 water. Draft FONSI at p. 1, Draft EA at p. 9-10. These exchanges would alter the timing and quantity of releases from the Green Mountain Reservoir into the Lower Blue River. However, the exact nature of the change inflows (amount, time of year, and

duration when added to the then existing flows and operational assumptions) is not as clear as it should be for the reader to adequately understand the implications.

Response 26.6

Section 2.3.3 discusses the anticipated exchanges or substitutions into and releases from Green Mountain Reservoir and Section 3.5.2.1.6 discloses the anticipated effects on the Blue River. Table 2 provides the release schedule analyzed in the EA. Maximum releases analyzed were 55 cfs in a dry year, 50 cfs in an average year, and 70 cfs in a wet year. As Section 3.5.2.1.6 discloses, the flow in the Blue River below Green Mountain Reservoir has historically averaged 500 cfs during the potential exchange or substitution periods. Table 2, coupled with the historical flow data, is the basis for estimating a flow reduction of 10 percent or less due to exchanges or substitutions. Table 6 and the discussion in Section 3.5.2.1.6 discloses the effects of increased releases from the C-BT replacement pool on Blue River streamflow. The section was revised to better explain effects on Blue River flow. If the maximum out-of-priority diversion of 1,873 AF was released in June and July, the effect on the Blue River would be 15 cfs.

Comment 26.7

As written, the Draft EA indicates that the "if and when" contracts considering exchanges with the Green Mountain Reservoir would have negligible effects on the existing conditions of the Lower Blue River. The Draft EA and Draft FONSI still require certain clarifications, as outlined below, to fully comply with NEPA. These clarifications are primarily focuses on clarifying two issues: the full nature of the "insurance pool" as mitigation, including a description for the process a concerned stakeholder may use to become involved and the full nature of the cumulative impacts of the contemplated exchanges on the Lower Blue River in light of the proposed Moffat Expansion Project and the anticipated reductions in discretionary releases from the Green Mountain Reservoir.

Response 26.7

See response to 14.4. The EA discloses the anticipated cumulative effects of reasonably foreseeable actions, including Denver' proposed Moffat Project. For example, cumulative hydrologic effects are disclosed in Section 3.5.2.2. Based on Reclamation's consultation with the U.S. Army Corps of Engineers, the lead federal agency for the Moffat Project EIS, the hydrologic analysis in Moffat Project DEIS is appropriate to assess the cumulative effects of the Moffat Project and the 10825 Project.

Comment 26.8

As written, it is difficult to fully understand the cumulative impacts associated with the preferred alternative in the Draft FONSI and EA. Consequently, Blue Valley Ranch provides the following comments as requests for clarifications. These comments are meant to make the BOR aware of questions left unanswered by the Draft FONSI and Draft EA.

Response 26.8

Thank you for your comment.

Comment 26.9

1. Clarification is required as to the "insurance pool" as mitigation. See e.g. Draft FONSI at p. 2; Draft EA at p. 12-14. The Draft FONSI and EA indicate that in a "worst-case scenario" there would be a shortage in the Green Mountain Reservoir of up to 1,786 acre-feet. Draft

FONSI at p. 2; Draft EA at pp. 13-14. The Draft FONSI and EA go on to state that the impacts associated with this shortage would be mitigated by a "commitment to create and 'insurance pool' that would keep the Green Mountain Reservoir ['Contract'] and HUP pools whole and augment the substitution requirements of Denver Water and Colorado Springs Utilities." Draft FONSI at p. 2; Draft EA at p. 13-14. As written, it is unclear whether the Draft FONSI is a "mitigated FONSI," meaning that nay significant impacts are reduced to a level of insignificance vis-à-vis mitigation, or whether the BOR asserts there are no significant impacts on the environment whether or not there is an ultimate implementation of the "insurance pool." From a NEPA adequacy perspective this is an important distinction, as the requirements for mitigation vary greatly between a "mitigated FONSI" and a FONSI for a proposed action that has no significant impacts notwithstanding any mitigation. Further clarification would help the Blue Valley Ranch, and public at large, better understand the severity of impacts and how the "insurance pool" may ultimately be implemented to reduce such impacts.

Response 26.9

See comment response 14.4. The insurance pool was incorporated into the Proposed Action and the effects were analyzed in the final EA. Reclamation issued a Finding of No Significant Impact on the proposed action.

Comment 26.10

The creation of an "insurance pool" through cooperative efforts of the BOR, Northern Water, Denver Water, Colorado River Water Conservation District, and "possibly others" is the only mitigation discussed in the Draft FONSI and EA. The Draft FONSI and EA do not resolve how the "insurance pool" will be created, or how one might become involved in the cooperative efforts creating and managing it. As a concerned stakeholder whose interests are directly impacted by this contemplated process, the Blue Valley Ranch strongly requests that it be made a part of any cooperative efforts associated with the "insurance pool" or any other mitigation measures designed to mitigate impacts on the Green Mountain Reservoir or the Lower Blue River.

Response 26.10

See comment response 14.4 and 26.9.

Comment 26.11

2. Clarification is required as to when an exchange would occur with Green Mountain Reservoir and how such a change may ultimately impact the Lower Blue River. The Draft EA indicates that exchanges may occur in "wetter than average" years, assuming there is capacity in the Green Mountain Reservoir and any releases associated with its junior refill right exceed 85 cfs. The Draft EA goes on to state that "[t]he exchange would be operated to consider instream flow values in the Lower Blue River below Green Mountain Reservoir." It is also important to note that any exchanges would necessarily operate only pursuant to a decreed water right with a "junior" priority date (2011 or later). Consequently, exchanged water would have a priority right junior to not only the 85 cfs instream flow right on the Lower Blue River, but also to the senior water rights held by others for private, municipal, and agricultural uses in the Lower Blue River. For example, the BVR owns and uses water rights in the aggregate of approximately 240 cfs that would be more senior in priority to any future exchange water associated with the preferred alternative of the Draft FONSI and Draft EA. These more senior water rights are part of the environment affected by the preferred alternative, but currently the Draft FONSI and EA are silent as to whether impacts associated with the exchanges to Green Mountain Reservoir were

considered with respect to those with more senior water rights on the Lower Blue River. Clarification on the point would help those water rights holder understand the potential for impacts on their water rights and the severity of the same.

Response 26.11

Section 2.3.3 discusses the conditions under which exchanges or substitutions into and releases from Green Mountain Reservoir are anticipated. Neither the exchange or substitution into Green Mountain Reservoir nor subsequent release would affect the delivery of adjudicated water rights downstream of the reservoir. Section 3.5.2.1.6 was revised to disclose the anticipated effect on downstream water rights on the Blue River.

Comment 26.12

i. Finally, the Draft EA acknowledges that when an exchange takes place, releases to the Lower Blue River would be reduced by a corresponding amount. The Draft EA has some detail on the exchange, but there are some unanswered questions on this point:. What constitutes a "wetter than average" year? Is there a minimum or maximum exchange quantity? Is there a minimum or maximum rate associated with the exchanges? What are the "instream flow values" considered in the Draft EA? Is the EA referring to the Colorado Instream Flow Appropriation (owned by the Colorado Water Conservation Board), or the flows actually needed to optimize Brown trout and Rainbow trout life history stages as put forth by the Grand County Stream Management Plan? Are the proposed releases associated with the exchange at the time of realized minimum flows in addition to the instream flow requirements, or are they planned to be used to meet these requirements?

Response 26.12

As Section 3.5.2 discusses, a wetter than average year is a water year in which average annual precipitation is greater than average and results in greater than average streamflow. 1998 is an example of a wetter than average year and 2008 is representative of a wet year. Maximum and minimum exchange or substitution rates analyzed in the EA are shown in Table 2 in the EA. The release rates shown in Table 2 provide a reasonable basis for analysis. The EA was revised to indicate that the phrase "instream flow values" refers to the Colorado Instream Flow Appropriation (owned by the Colorado Water Conservation Board). Section 2.3.2 discusses that the release of exchanged or substituted water would likely occur in the late summer of the year (July through October) when streamflow in the 15-Mile Reach was low. Other releases out of Green Mountain Reservoir would likely be occurring at the same time. As a consequence, it is likely that the proposed releases would be in addition to the instream flow requirements. Section 3.5.2.1.6 was revised to provide additional discussion about release of exchanged or substituted water.

Comment 26.13

Addressing these questions would help to better apprise Blue Valley Ranch, as well as the public and BOR decision-makers, as to the nature of the proposed action. Without answering these questions, it is difficult for Blue Valley Ranch to fully understand the proposed action, and adequately assess if the impacts' analysis is accurate in light of the proposed action.

Response 26.13

See comment responses 26.6 and 26.11.

Comment 26.14

Another component of the Draft FONSI and EA that is unclear is how this "worst-case scenario" in the Green Mountain Reservoir translates to impacts on instream flow levels in the Lower Blue River. The Draft EA does state that changes in the Lower Blue River's flow levels would be less than 10% change from an overall average of historical flows, or, rather, it is a change from the historical flows for that month in that type of year (wet,, dry, average). Further clarification on this point may make it clear that the Blue Valley Ranch does not have concerns with respect to the exchanges at the Green Mountain Reservoir, but without more it is difficult to fully understand the impacts or assess the accuracy of the Draft FONSI and EA.

Response 26.14

See comment response 26.6 and 26.11.

Comment 26.15

3. Clarification with respect to impacts on the "Contract" pool in the Green Mountain Reservoir. In addition to the issue related to the proposed exchanges to Green Mountain Reservoir, the Draft FONSI and EA also recognize that "out-of-priority" storage of the Redtop Valley Ditch water in Granby Reservoir will increase the amount of water required to be released from the 52,000 acre-foot CBT Replacement Pool in Green Mountain Reservoir. The Draft FONSI and EA acknowledge that since the Replacement Pool fills first, the additional out-of-priority Redtop Ditch storage could impact or short the amount of water available to the Green Mountain "Contract" pool and HUP pool in subsequent years when the reservoir does not fill. This could also increase the substitution requirements of Denver Water and Colorado Springs. According to the Draft FONSI and EA, the "worst-case scenario" is that the storage would be short by 1,786 acre-feet. As written, the Draft FONSI and EA do an adequate job explaining why a shortage could occur, but they do not fully explain why the "worst-case scenario" is capped as a shortage of 1,786 acre-feet. Summarily, the Draft FONSI and EA correctly note that the exchanges with the Green Mountain Reservoir increase the risk in the future that the contract pool in Green Mountain Reservoir could be impacted; but the Draft FONSI and EA ultimately do not fully explain the nature and severity of such impacts, or how mitigation will ultimately be utilized to address such impacts.

Response 26.15

As section 3.5.2.1.6 discloses, the out-of-priority diversions shown in Table 6 are based on the assumption that whenever a river call occurred, the storage of Redtop Valley Ditch water in Granby Reservoir would also be out-of-priority. In actuality, the relatively senior water rights of Granby Reservoir would remain in-priority during some portion of a mainstem water right call. The values shown in Table 6 are based on hydrology modeling described in Section 3.5.2. See comment response 14.4 regarding the use of the insurance pool to mitigate for potential effects of the exchange or substitution.

Comment 26.16

If the Green Mountain Reservoir does not fill, then lessees of the contract pool water may not receive their leased water. The available contract pool is comprised of a maximum of 20,000 acre-feet, although currently only about 9,644 are-feet are leased. According to the Draft EA, the "worst-case scenario" contemplates a 1,786 acre-foot shortage from the water available to the contract pool, ostensibly reducing the full level of contract capability (20,000 acre-feet). But the draft EA is currently unclear what a "worst-case scenario" would look like in a year when less

than 20,000 acre-feet is available for contracting for reasons other than impacts associated with the exchanges at the Green Mountain Reservoir contemplated by the Draft FONSI and EA. Without further clarification, it is difficult to fully understand the nature of impacts the preferred action may have on the water available in the contract pool.

Response 26.16

See comment response 14.4. The insurance pool was incorporated into the Proposed Action and the effects were analyzed in the final EA. With the insurance pool, the Proposed Action would have no effect on the contract or HUP allocations in Green Mountain Reservoir, or substitution requirements, or reduced return flows.

Comment 26.17

Currently, the BVR is the largest lessee of the water in the contract pool, having leased nearly 2,000 acre-feet of contract pool water per year since 1999. The BVR uses its leased contract pool water for primarily non-consumptive uses, such as the continued restoration and enhancement of the Lower Blue River's aquatic conditions and resources. After the BVR utilizes its contract water it is generally returned to the Lower Blue River and ultimately flows into the Colorado River. If a shortage occurs in the Green Mountain Reservoir and the BVR does not receive its leased water, then the BVR may be unable to fully engage in its restoration and enhancement projects associated with the Lower Blue River for that particular year. The Draft FONSI and EA do not currently consider the impacts associated with such a scenario. Since such impacts could be significant and are caused by the preferred alternative they should be disclosed and analyzed in the draft FONSI and EA.

Response 26.17

See comment response 26.11. The Proposed Action would have no effect on any current lessee of Green Mountain Reservoir contract pool water.

Comment 26.18

Finally, the Draft FONSI and EA indicate that impacts to the contracting pool will be mitigated by an "insurance pool." But the "insurance pool" is not currently a mandatory form of mitigation, is not currently defined with specificity, and does not apprise the reader of who will ultimately be involved in finalizing the "insurance pool" and ensuring it mitigates impacts to the contract pool in the Green Mountain Reservoir. Without additional clarifications, it is difficult for the BVR to understand how leases of the contract pool water may ultimately be impacted by the preferred alternative, and how mitigation will ultimately address such impacts. Specifically, answers to the following could help provide the clarification needs identified herein:

Response 26.18

See comment responses 14.4, 26.11 and 26.17. The insurance pool was incorporated into the Proposed Action and the effects were analyzed in the final EA. The Proposed Action would have no effect on any current lessee of Green Mountain Reservoir contract water.

Comment 26.19

Specifically, answers to the following could help provide the clarification needs identified herein:. a. Is the 1,786 acre-feet "worst-case scenario" assuming that the contract pool water is fully available except for reductions caused by the preferred alternative? i. If less than 20,000 acre-feet is available for contracting because of reasons other than the exchanges with Green Mountain

Reservoir, would the amount of water available in the contract pool then be further reduced by 1,786 acre-feet?. b. Does the Draft EA's impact analysis consider the impacts associated with the lessees' inability to receive and use the leased contract pool water in the "worst case scenario"?. c. When will the "insurance pool" mitigation be finalized? i. Will it be mandatory? ii. Who will ultimately participate, and how will the participants be determined? Answering these questions and providing adequate clarification may be able to abate the lion's share of BVR's concerns under this section. But presently the text of the Draft FONSI and EA do not readily disclose the impacts of the preferred alternative on the contract pool.

Response 26.19

See comment responses 14.4 and 26.15 through 26.18. The insurance pool was proposed by the water users to eliminate the potential effects on the HUP and contract allocations in Green Mountain Reservoir, on the potential change in substitution requirements of Denver Water and Colorado Springs Utilities, and on Colorado River flow from reduced return flows. The insurance pool participants are the water users that proposed the 10825 Project listed in Section 1.1.

Comment 26.20

4. Clarification with respect to the cumulative impacts on the Lower Blue River. The Draft EA discusses several "reasonably foreseeable actions" which require analysis in the cumulative impacts of certain resources. See e.g. Draft EA at pp. 17-18. One of the "reasonably foreseeable actions" is the Denver Water-Moffat Collection System Project ("Moffat Project"). The Blue Valley Ranch has actively participated in the Moffat Project's NEPA process by providing comments during the relevant comment periods and sending extra comment period concerns through letters to the relevant agency decision-maker, Colonel Ruch of the Army Corps of Engineers. For ease of reference, Blue Valley Ranch's submittals to the Corps with respect to the Moffat Project have been included herewith. Summarily, the Blue Valley Ranch's concerns with respect to the Moffat Project are as follows: The Moffat Project utilizes a misleading baseline which assumes water usage of a maximum build-out scenario of the Denver Water systems in 2016. o Such a baseline ignores the measured historical conditions of the Lower Blue River. o Such a baseline ignores the incremental changes from the current conditions to the maximum build-out scenario, and consequently has a flawed cumulative effects' analysis. • The Moffat Project DEIS arbitrarily screens out impacts of the Moffat Project on the Lower Blue River even though 5,000 acre-feet of the Moffat Project's yield (30% of project yield plus/minus) is derived from the Lower Blue River. Such a screening method masks significant seasonal and periodic adverse impacts.

Response 26.20

See comment responses 14.4 and 26.7. The EA discloses the anticipated cumulative effects of reasonably foreseeable actions, including Denver' proposed Moffat Project.

Comment 26.21

The EPA also submitted comments on the Moffat Draft EIS. The EPA's general comments and concerns were similar to those expressed by the Ranch's comments and correspondences to the Corps. Blue Valley Ranch met with EPA to outline its concerns regarding the Moffat Project, the quality and diversity of the Lower Blue River's aquatic resources, and how the Moffat Project may impact the same. A copy of the EPA presentation was also provided to the Corps and to other interested stakeholders. Blue Valley Ranch also requested an opportunity to make its presentation to the Corps. While declining to meet with the Blue Valley Ranch, the Corps stated

in its response:. As you acknowledged, many of the concerns you have expressed regarding the Blue and Fraser Rivers parallel concerns expressed by Region 8 of the EPA when they commented on the Draft EIS. Over the last year, the Corps has been coordinating extensively with EPA Region 8, in their role as a cooperating agency, to address their, as well as others', concerns raised during review of the Draft EIS. Coincidentally, we believe that Blue Valley Ranch's concerns are being very thoroughly reviewed and addressed. Per comments received on the Draft EIS, changes incorporated in our preparation of a Final EIS include baseline hydrology, water quality, groundwater, aquatic resources, flow-related impact analyses, construction concerns, cumulative effects and mitigation of impacts. Through the NEPA process, we continue to evaluate the need for a Supplemental Draft EIS, and will communicate any Moffat schedule changes as appropriate. Email exchange of Timothy Carey of the Corps and James W. Sanderson (September 30, 2011).

Response 26.21

See comment responses 14.4 and 26.7.

Comment 26.22

The import of the Blue Valley Ranch's participation in and criticism of the Moffat Project's NEPA process, and the Corps response thereto, is that to the extent the BOR relies on the Moffat Project's DEIS, such an analysis suffers from the same flaws as the Moffat Project's DEIS. Even the Corps now acknowledges the many concerns expressed about the Moffat Project's characterization of baselines conditions. At this juncture, it may be premature and ultimately imprudent for the BOR to issue a Final EA and FONSI that relies in part upon a NEPA document, the Moffat DEIS, which is currently under a large amount of scrutiny and, as indicated by the Corps, is under significant review and revision.

Response 26.22

See comment responses 14.4 and 26.7.

Comment 26.23

And the Draft EA is currently silent as to whether any reductions in the flows of the Lower Blue River associated with the exchanges with Green Mountain Reservoir take into consideration the reduced water flows caused by the Moffat Project. The analysis of the Draft EA should be clear on this point, and advise the reader as to whether the impacts of the Moffat Project on the Lower Blue River were considered cumulatively with the impacts of the Green Mountain exchanges that may occur as part of the Draft EA. Thus, the following questions should be answered to help ensure the Draft EA complies with NEPA: How are reductions in flow in the Lower Blue River caused by the Moffat Project considered in the exchanges associated with the Green Mountain Reservoir? Would these new Green Mountain Reservoir operations lessen or worsen the impacts projected by the Moffat Project?

Response 26.23

See comment responses 14.4 and 26.7.

Comment 26.24

Finally, the Draft EA indicates that discretionary releases from the Green Mountain Reservoir may be reduced. In the past, The EA indicates these discretionary releases have helped maintain the instream flows of the Lower Blue River at a level higher than it would have otherwise have

been. The Draft EA indicates that in about 2/3 of the years going forward the Green Mountain Reservoir will have fewer discretionary releases of water during the winter months. Given the importance of winter month flow levels to successful Brown Trout reproduction, those changes would appear to cause adverse effects to Brown Trout. What is unclear is how reductions of discretionary releases in the winter months of a given year interact with the "if and when" contracts associated with the Green Mountain exchanges in the previous and subsequent years. Moreover, it is unclear what cumulative impacts may occur as part of reduced discretionary releases that may occur in conjunction with the Moffat Project and the Green Mountain exchanges.

Response 26.24

Section 3.8.2.1.1 (p. 56) of the draft EA discusses that discretionary power releases may change in the future. The volumes of water that may be exchanged or substituted into Green Mountain Reservoir (Table 6) would have a negligible effect on discretionary power releases.

Comment 26.25

While the Draft EA's analysis of the Lower Blue River's current conditions and the impacts thereon may be facially accurate, as far as the analysis goes, further clarifications with respect to the scope and nature of cumulative impacts are necessary to ensure the analysis meets the requirements of NEPA by being accurate, supported by the administrative record, and presented in a manner that allows the public to meaningfully participate in the NEPA process. Ultimately, further clarifications on these points would be useful to fully apprise the Blue Valley Ranch of the severity of impacts the Lower Blue River may ultimately suffer.

Response 26.25

See comment responses 26.5 through 26.24.

Comment 26.26

Thank you in advance for your consideration of these concerns. As indicated above, Blue Valley Ranch respectfully requests 30 days to supplement these comments. Finally, Blue Valley Ranch requests an opportunity to meet with the BOR to discuss these concerns and to ascertain the manner in which the BOR intends to proceed to address them.

Response 26.26

Thank you for your comment.

Grand County, Document 29

Comment 29.1

This letter has been prepared on behalf of our client, Grand County, and contains the County's comments on the Draft Environmental Assessment Draft Finding of No Significant Impact, Colorado Water Users' Commitment to Provide 10825 acre feet to the 15-Mile Reach of the Upper Colorado River ("Draft EA"). Grand County is in strong support of the Proposed Action and the Finding of No Significant Impact (FONSI). A FONSI is appropriate because the Proposed Action will not cause a significant impact to the environment. In fact, the Proposed Action satisfies the requirements of the 1999 Programmatic Biological Opinion to support recovery of endangered fish and also provides significant benefits to the aquatic environment of

the Colorado River from Granby Reservoir to the 15-Mile Reach. Please note that subject to the requirements of the 15-Mile Reach, Grand County and Northern Water agree that the use of the Granby Releases in Grand County will be for instream environmental purposes only. Further, when environmental conditions allow, Grand County will make water available for the insurance pool to mitigate impacts of the Proposed Action. A contract with Grand County will be required to accomplish this objective. The County's comments on the EA follow.

Response 29.1

Section 3.2.5 was revised to reflect that Grand County would make the environmental water available to the insurance pool when Grand County determines in its discretion that stream flows in the Upper Colorado River were sufficient for environmental or recreational purposes and that a contract with Grand County probably would be required to accomplish this objective.

Comment 29.2

Environmental Commitments: Option 1 and Option 2. Please revise to indicate that Grand County will make the environmental water available to the insurance pool when Grand County determines that stream flows in the Upper Colorado River are sufficient for environmental purposes.

Response 29.2

See comment response 29.1.

Comment 29.3

Table 1. Surface water - Add minor long term infrequent exchange in Muddy River Flow if an exchange was made from Granby Reservoir to Wolford Reservoir.

Response 29.3

Table 1 in the FONSI and Table 4 in the EA were revised to disclose the potential effects of the insurance pool on Muddy Creek.

Comment 29.4

Water quality/Aquatic resources – Please revise to note that the reduction in temperatures is a positive impact to water quality. Indicate that positive benefits to stream temperature and aquatic resources will occur below Granby Reservoir.

Response 29.4

Table 4 of the EA was revised to indicate reduced temperatures would be a beneficial effect.

Comment 29.5

Recreation – There should be some improvement to recreation and fishing in the Colorado River as a result of the Proposed Action.

Response 29.5

Section 3.9.2.2.1 discusses that higher late-summer flow in the Colorado River below Granby modeled in the Proposed Action would have a minor to moderate beneficial effect on the resident

fish and invertebrate communities. Section 3.13.2.2.1 was revised to disclose the beneficial effect on recreation in this river segment.

Comment 29.6

1.1 Introduction Add Bureau of Reclamation to list of water users. Reclamation holds some of the largest storage water rights on the West Slope, including the Granby Reservoir, Green Mountain Reservoir, and Ruedi Reservoir.

Response 29.6

The water users discussed in Section 1.1 are the water users that proposed the 10825 Project. Reclamation is responding to a request by Northern Water on the behalf of the water users listed in Section 1.1 for one or more contracting actions. It is not appropriate to describe Reclamation as one of the water users proposing the 10825 Project.

Comment 29.7

1.4.1 Green Mountain Reservoir The Draft EA states the C-BT project was designed to divert 310,000 acre feet annually. Please clarify that this was before construction, that all facilities were not constructed, and that there are additional requirements placed on the project that prevent 310,000 acre feet annually. Also please strike "primarily snowmelt" because the C-BT Project diverts more than snowmelt.

Response 29.7

Section 1.4.1 was revised to reflect this comment.

Comment 29.8

Page 4 In the paragraph about Green Mountain Reservoir, please add "on the West Slope" after "future water uses and interests", because Green Mountain Reservoir by law does not benefit the East Slope. Change "Spring runoff" to "water", because Green Mountain Reservoir stores water at other times of the year.

Response 29.8

Section 1.4.1 was revised to reflect this comment.

Comment 29.9

2.3.2 Granby Reservoir Note that Grand County and the Municipal Subdistrict are in discussions to protect open space by using Grand County's Rural Land Use Processes and cluster development on lands the Subdistrict and Northern own in Grand County.

Response 29.9

These discussions have not been completed, and it would be premature to revise Section 2.3.2 to reflect this comment.

Comment 29.10

First Bullet. Bypass of water at Red Top Ditch could help improve the aquatic environment at that reach of the North Fork of Colorado.

Response 29.10

Section 3.9.2.1.1 disclosed the beneficial effect of bypassing of water at the Redtop Valley Ditch on aquatic life.

Comment 29.11

Page 10 Add Grand County to the Operations Group. Add that releases from Granby Reservoir will be coordinated with the Learning by Doing/Cooperative Effort.

Response 29.11

Section 2.3 was revised to describe how Reclamation and the Service would manage releases. The purpose of the Proposed Action is to provide increased late summer flow to the 15-Mile Reach. The Service would meet with interested parties each spring to discuss a recommended release pattern for the 10825 water from Granby Reservoir. For Ruedi Reservoir releases, Reclamation and the Service would meet with interested parties to discuss Ruedi Reservoir operations, as they have in the past years. Under the Programmatic Biologic Opinion (PBO), the Service's goal is that the late summer and fall flow in the 15-Mile Reach be at the recommended flow targets. The Service would consider other resource values when determining a release pattern to meet this goal.

Comment 29.12

2.3.3 Green Mountain Reservoir Page 13 Add that an exchange to Green Mountain Reservoir will be coordinated with Learning by Doing/Cooperative Effort in the consideration of instream flow values on the Blue River.

Response 29.12

Section 2.3.3 discloses the conditions under which exchanges or substitutions into Green Mountain Reservoir would be made. Releases of 10825 water would be made to maximize benefit to endangered fish species in the 15-Mile Reach.

Comment 29.13

2.4 Alternatives Considered but Dismissed. Grand County's analysis of the Proposed Action show that it will provide a number of environmental benefits not possible from any of the other alternatives.

Response 29.13

Thank you for your comment. Section 2.4 and Appendix A describe the alternatives considered but eliminated from detailed analysis. Reclamation believes the Proposed Action best addresses the project's purpose and need.

Comment 29.14

3.2.2 Windy Gap Firming Project. The Final Environmental Impact Statement for this project will be released end of October/early November. Update this Draft EA accordingly.

Response 29.14

Section 3.2.2 was revised to reflect this comment.

Comment 29.15

Clarify that Fish and Wildlife Mitigation Plan and Enhancement Plan were submitted to the State of Colorado pursuant to requirements of Colorado law. Add any additional mitigation identified in the EIS for the Windy Gap Firming Project, and note that there may be additional mitigation imposed by the Bureau of Reclamation and/or the Army Corps of Engineers as part of the permitting and approval process for the project.

Response 29.15

The EA was revised to reflect this comment.

Comment 29.16

3.2.3. Moffat Collection System Project. Clarify that Fish and Wildlife Mitigation Plan and Enhancement Plan were submitted to the State of Colorado pursuant to requirements of Colorado law. Note that there may be additional mitigation imposed by the Army Corps of Engineers as part of the permitting and approval process for the project.

Response 29.16

Section 3.2.3 was revised to reflect this comment.

Comment 29.17

3.2.4 Colorado River Cooperative Agreement. Please rewrite first paragraph as follows: Denver Water and west slope interests have developed a proposed comprehensive agreement known as the Colorado River Cooperative Agreement (CRCA), that among other things, addresses some of the existing impacts to the aquatic environment and water users in Grand County caused by Denver Water's diversions. In the CRCA, Denver Water has committed to provide certain enhancements to the aquatic environment...upper Colorado rivers. Included in these enhancements is water made available by Denver Water to Grand County for the aquatic environment. The CRCA also establishes a cooperative process known as Learning By Doing/Cooperative Effort managed by Grand County, the Colorado River Water Conservation District, Colorado Division of Parks and Wildlife, Trout Unlimited, Middle Park Water Conservancy District, and Denver Water. The purpose of Learning By Doing is to utilize available resources to protect and where possible, enhance, the Upper Colorado River and Fraser Rivers. The Municipal Subdistrict also intends to participate in Learning By Doing. Denver Water also has agreed to study how to maintain the historical agricultural uses of the Big Lake Ditch to maximize the environmental benefits while substantially preserving the yield for Denver Water.

Response 29.17

The description of the Colorado River Cooperative Agreement in Section 3.2.4 was revised in response to this comment.

Comment 29.18

3.3 Issues Eliminated. Grand County agrees that these issues should be eliminated.

Response 29.18

Thank you for your comment.

Comment 29.19

Table 4. Summary of Environmental Effects. Please make the same changes to this Table 4, as those noted for Table 1 in the Executive Summary.

Response 29.19

Table 4 of the final EA was revised to reflect this comment.

Comment 29.20

3.5.1.4 Colorado River Below Granby Reservoir. Please add to the description of the 1961 Principles that they are intended as measures to benefit fisheries in the Colorado River required by Senate Document 80 as part of mitigation for the Colorado-Big Thompson Project. Add to the description the locations at where those bypass flows are measured.

Response 29.20

Section 3.5.1.4 was revised to reflect this comment.

Comment 29.21

3.5.1.8 Fryingpan River. Please provide complete citations for documents that establish bypass requirements. Also, points 4 and 5 are duplicative. One should be deleted.

Response 29.21

The complete citation for the bypass requirements (U.S. House of Representatives 1961) was in the draft EA and is in the final EA. It is operating principle 10. The terms of the 2012 Agreement in Section 3.5.1.4 was revised to reflect this comment.

Comment 29.22

3.5.2.1.1 North Fork of Colorado River below Redtop Valley Ditch. Operations of the Red Top Ditch can be coordinate with the Learning by Doing/Cooperative Effort to explore options to enhance flows in the North Fork of the Colorado River while providing the minority shareholders with a full water supply.

Response 29.22

See comment response 29.5.

Comment 29.23

3.1.2.1.3 Willow Creek. Any impacts that may result from less water in Willow Creek can be monitored as a part of the Learning by Doing/Cooperative Effort so that impacts from these reductions can be minimized.

Response 29.23

The adverse effects on Willow Creek flows and aquatic life from reduced irrigation return flows are disclosed in Sections 3.5.2.1.3 and 3.9.2.1.5. There are no options for minimizing or avoiding these effects. Reclamation does not believe that monitoring of these potential effects would be warranted.

Comment 29.24

3.5.2.1.4 Colorado River below Granby Reservoir and at Windy Gap. Increases in streamflow in the Colorado River from the Proposed Action will be a beneficial impact because they are likely to occur at times of year when additional depletions are caused by the Windy Gap Firming Project and Moffat Expansion Project.

Response 29.24

See comment response 29.5.

Comment 29.25

3.5.2.1.5 Blue River below Green Mountain Reservoir. Please provide a brief description/explanation of the purpose of the C-BT Replacement Pool or cross-reference section of EA that discusses replacement pool to better inform the public about the impacts of the Proposed Action and why increased releases from the replacement pool are relevant.

Response 29.25

Section 3.5.2.1.6 was revised to reflect this comment.

Comment 29.26

3.5.2.2.2 Fryingpan River below Ruedi. The section on increases to winter flows concludes that "additional reservoir drawdown may not be desired, even with the increase in reservoir storage that would occur with the Proposed Action." Also, it concludes that "following an exceptionally dry year probably would not be released, but carried over for winter release." Please explain the basis for these statements.

Response 29.26

Section 3.5.2.2.2 was revised to clarify the effect on Ruedi Reservoir and winter releases.

Comment 29.27

3.5.2.2.4 15-mile Reach. Please explain the clause "lesser increase in the amount of 10825 water available for release." Also, please better describe the streamflow changes that are anticipated in the 15-Mile Reach as well as the "complex and cooperative decision-making process that considers many variables."

Response 29.27

Section 3.5.2.2.4 was revised to reflect the first part of this comment. The section also discusses anticipated effects on the 15-Mile Reach: the Proposed Action, coupled with the expiration of the 2012 Agreement, would decrease July through October flow by about 6,340 AF (7,044 AF minus a 10% transit loss) to an average of 1,820 cfs (a decrease of 1.4 percent). Section 2.3 describes the Service's approach in making Recovery Program releases.

Comment 29.28

3.7.1 Affected Environment. Correct reference to Section 3.6. Surface Water Hydrology is Section 3.5.

Response 29.28

The cross reference was corrected.

Comment 29.29

3.8.1.1.3 Green Mountain Reservoir. Please expand the primary purposes of construction of Green Mountain Reservoir as set forth in Senate Document 80 to preserve existing and future water uses and interests on West Slope.

Response 29.29

The primary purposes of Green Mountain Reservoir described in Section 3.8.1.1.4 are accurate.

Comment 29.30

Page 56 Please provide the potential maximum amounts of substitutions for Denver and Colorado Springs.

Response 29.30

Table 6 provides the maximum potential substitution requirements and Section 3.8.2.1.1 discloses that Denver Water typically replaces 90 percent of the substitution demand and Colorado Springs Utilities replaces 10 percent. With the insurance pool incorporated into the Proposed Action, the Proposed Action would have no effect on substitution requirements.

Comment 29.31

Page 57 Please add into the discussions of exchanges to Wolford and Green Mountain Reservoir, the potential to do substitutions in addition to exchange.

Response 29.31

The description of the insurance pool was revised to reflect that Grand County environmental water may be stored in Wolford Mountain or Green Mountain reservoirs by exchange or substitution.

Comment 29.32

Page 57 Option 2. Explain that Grand County environmental water may be used as mitigation only when Grand County determines that it is not necessary for other environmental purposes.

Response 29.32

See comment response 29.1.

Comment 29.33

3.9.1.8. Colorado River-Williams Fork River to Blue River. Delete reference to KB Ditch and insert Troublesome Creek to appropriately reflect instream flow reach.

Response 29.33

Section 3.9.1.8 was revised to reflect this comment.

Comment 29.34

3.9.1.11 Colorado River-Blue River to Eagle River. Note that the CWCB has declared its intent to appropriate instream flows on the Colorado River from the Blue River to the Eagle River. Applications are anticipated to be filed by the end of 2011.

Response 29.34

Section 3.9.1.13 and 3.13.1.2.6 was revised to reflect this comment.

Comment 29.35

3.13.1.2.5 Wild and Scenic Study. Update with BLM Draft EIS for its Resources Management Plan.

Response 29.35

Section 3.13.1.2.6 was revised to reflect this comment.

Comment 29.36

Conclusion Thank you for the opportunity to provide comments on this draft Environmental Assessment. Grand County supports the Proposed Action because of its beneficial consequences to the 15-Mile Reach and in Grand County. The County is confident that the environmental consequences are not significant enough to require an Environmental Impact Statement and that therefore, a FONSI for the Proposed Action is appropriate. Please feel free to contact Lurline Curran, the Grand County Administrator, at 970 725 3347 or you can contact me directly with any questions that you have regarding these comments.

Response 29.36

Thank you for your comment.

Pitkin County, Document 31

Comment 31.1

Pitkin County believes the Draft Environmental Assessment is deficient as a result of internally inconsistent statements and omissions, its segmentation of the proposed action, and its failure to consider a reasonable range of alternatives. Pitkin County strongly urges the Bureau of Reclamation at a minimum, to reconsider the report so that Pitkin County can be assured that it contains adequate analysis with supportable conclusions for either the existing preferred alternative or a modified approach to deliver 10,825 AF to the 15-Mile Reach. In the alternative, Pitkin County strongly encourages the Bureau to prepare an Environmental Impact Statement on the proposed action, due to the fact that it meets the significance criteria in 40 CFR 1508.27.

Response 31.1

Reclamation considered a reasonable range of alternatives. Section 2.4 and Appendix A describe the alternatives considered but eliminated from detailed analysis. The alternatives were eliminated for a variety of logistical, environmental, and cost reasons. In response to this and other comments, Reclamation modified the Proposed Action to include measures to avoid and minimize effects on Green Mountain Reservoir's contract and HUP allocations. See comment response 14.2.

Reclamation believes that the anticipated direct, indirect, and cumulative effects of the Proposed Action are not significant, the significance criteria in 40 CFR 1508.27 are not met, and a Finding of No Significant Impact is the appropriate decision document.

Comment 31.2

The Assessment's initial statement within the introduction states that four contemplated contracting actions would allow sufficient (10,825 AF per year) water to benefit the recovery program for the endangered fish species. The implication is that the needs of the Programmatic Biologic Opinion ("PBO") will be satisfied through this preferred alternative. This is not the case and the anticipation contained within the Draft EA is that greater releases from Ruedi Reservoir will be needed to insure the delivery of 10,825 AF to the 15-Mile Reach. Of course, it is apparent from the Draft EA that expanded releases from Ruedi Reservoir are also needed to insure the Northern Colorado Conservancy District's ("Northern Water") yield on the Big Thompson Project ("C-BT") and to protect Denver Water and Colorado Springs Utilities' interests on the Blue River. It is clear also from the Draft EA that further action will be necessary in the form of an adjudicated exchange between the Colorado River and Green Mountain Reservoir and a further or supplemental NEPA review regarding additional releases from Ruedi Reservoir. The PBO is not satisfied through the proposed four contracting actions of the Bureau and these above-mentioned additional actions will be required before the PBO is satisfied. Therefore, the proposed action and Draft EA violate the prohibition on segmenting federal actions into two or more smaller pieces as a way of avoiding analysis of the entire action, its impacts, and a reasonable range of alternatives.

Response 31.2

See comment response 14.4. The insurance pool was incorporated into the Proposed Action and the effects were analyzed in the final EA. The final EA was revised to clarify that the EA covers the actions required to avoid adversely affecting Green Mountain Reservoir contract and HUP allocations, or increasing substitution demands, and additional NEPA review is not anticipated.

Comment 31.3

The preferred alternative and Draft EA do not present a solution to the PBO with finality, it continues the uncertainty of whether or not the recovery effort and its requirement for the delivery of 10,825 AF will be accomplished and without such a demonstration there is no justification for the proposed contracting actions of the Bureau described within the preferred alternative. The draft EA fails to adequately describe the uncertainty associated with finalizing the proposed contracting actions or the impacts of not finalizing those actions. 40 CFR 1502.22.

Response 31.3

See comment responses 14.2 and 36.9.

Comment 31.4

The Bureau's solicitation of scoping comments two years ago presented a preferred alternative whereby the recovery effort would be satisfied through equal releases from Granby Reservoir and Ruedi Reservoir. The comments provided by Pitkin County focused on the potential environmental and economic impacts the alternative would visit upon the gold medal fishery thriving in the lower reach of the Frying Pan River.

Response 31.4

The Proposed Action presented to the public during scoping was identified as Reclamation's preferred alternative in the draft EA. The Proposed Action would include equal releases of 5,412.5 AF from Ruedi and Granby reservoirs. The final EA was revised to indicate that the Proposed Action also would include releases of up to 2,000 AF from Wolford Mountain, Green Mountain, or Ruedi reservoirs when exchanges or substitutions into Green Mountain Reservoir could reduce contract and HUP allocations or increase substitution demands.

Comment 31.5

The preferred alternative leaves unanswered the timing and coordination between recovery releases and other Ruedi Reservoir contract releases to safeguard against detrimental impacts to the Frying Pan River. Recognizing that the release of water for the recovery effort is not an event solely within the discretion of the Bureau, the preferred alternative fails to recognize the potential impacts to the gold medal fishery in the Frying Pan River and to the Frying Pan River economy, from a large amount of water released to maintain the recovery program that would occur in the future. These excessive releases would occur at irregular and infrequent times but will certainly occur nonetheless, with the probable effect of destroying fish habitat, recruitment of fry, or the fishing season and associated economic benefits for an unknown period of time. These impacts meet the criteria for significance, 40 CFR 1508.27, and require an Environmental Impact Statement, for the following reasons. (1) Context. In a regional or statewide context, the Recovery Program and its effect on water users is highly controversial, complex and significant. (2) Intensity. The proposed releases have impacts that are both beneficial (for endangered fish) and adverse (to the trout fishery, habitat, anglers, and the economy). The adverse impacts will be visited upon a gold medal trout fishery. (3) The sources of water, timing and effects of releases are uncertain and involve risks either unknown or not disclosed. (4) The action represents a decision in principle about future considerations or future sources of releases without satisfactory disclosure and analysis. (5) The action is related to other actions, including impacts to the Frying Pan River from the Fryingpan Arkansas project and potential expansion thereof. There are cumulative effects from using Ruedi Reservoir as mitigation of these actions. (6) The significance of the proposed action cannot be avoided by breaking it down into smaller component parts, with some parts remaining to be analyzed in later NEPA documents. (7) Releases from Ruedi for endangered fish may cause loss or destruction of the special resource, the gold medal trout fishery, in the Fryi!1g Pan River. (8) The proposed action will affect endangered species; the failure to analyze all sources of releases and an adequate range of alternatives thereto poses a risk to the integrity of the recovery program. The importance of the Frying Pan River from a resource standpoint and an economic standpoint is recognized by the Colorado Division of Parks and Wildlife and by the reports of the Roaring Fork Conservancy, available for download at http://www.roaringfork.org/sitepages/pid64.php and incorporated by reference into this letter.

Response 31.5

The cumulative effects on the Fryingpan River are discussed in the EA, primarily Sections 3.5.2.2.2 and 3.9.2.2.6. These sections were modified to include the possible releases of up to 2,000 AF to avoid effects on Green Mountain Reservoir contract and HUP allocations, increased substitution demands, and reduced return flows in the Colorado River. The cumulative effect on the Fryingpan River of all possible releases would be to reduce flows and improve fishing conditions in the river. The cumulative effect would not be significant or adverse, but insignificant and beneficial.

Comment 31.6

The danger of this preferred alternative is that it recognizes Ruedi Reservoir as the ultimate guarantor of the recovery program, without alternative discussion of the implications of that result.

Response 31.6

Ruedi Reservoir would not be the ultimate guarantor of the recovery program. See comment response 14.2.

Comment 31.7

Since the scoping comments, the preferred alternative has changed in scope in significant ways that underscore Pitkin County's concern for the health of the Frying Pan River, both ecologically and economically, and renders the scoping effort flawed and moot.

Response 31.7

The Proposed Action identified during scoping has not changed in significant ways. The insurance pool, described as possible mitigation in the draft EA, was available for public comment when the draft EA was issued in September 2011. In compliance with 40 CFR 1503.4(a), Reclamation modified the Proposed Action to reduce or eliminate adverse effects of the Proposed Action. See comment response 31.4.

Comment 31.8

The initial plan called for release of 5,412 acre feet from Granby Reservoir. This amount of water was assumed to be realized from the dry-up of agricultural land located on the west slope. Apparently, the Northern Colorado Water Conservancy District does not want to prosecute a change case to utilize this irrigation water for the recovery program but would rather sacrifice this pre-1922 water right in order to collect this water supply under the C-BT's 1935 priority. This agricultural water then goes not so much for the recovery effort but to increase the yield of the C-BT project. This point should be disclosed and discussed, as it is integral to the choice among alternatives.

Response 31.8

Section 2.3.2 discloses that water obtained from agricultural dry-up would be stored in Shadow Mountain and Granby reservoirs under existing C-BT water rights.

Comment 31.9

As a consequence of this unexplained action, certain other consequences are now present affecting the Historic Users Pool ("HUP") of Green Mountain Reservoir and by extension the obligations of Denver Water and Colorado Springs Utilities on the Blue River. In order to alleviate Denver Water and Colorado Springs Utilities' substitute water obligations and to protect Northern Water's yield in the C-BT project, by covering Northern Water's impact to the HUP at Green Mountain Reservoir, further releases will be needed from Ruedi Reservoir above the originally contemplated 5,412 AF. These releases will be infrequent but required nonetheless, with impacts as explained above. The releases will require further NEPA review, whose outcome, if the process is assumed to be legitimate, cannot be guaranteed, causing the NEPA process to be improperly segmented. It would appear this complication occurs because of a decision not to

pursue an appropriate change case concerning the Redtop Valley irrigation water to attribute that historic consumptive use to the recovery effort.

Response 31.9

See comment response 14.2 and 31.2.

Comment 31.10

Additionally, an exchange is contemplated using recovery water released from Granby into the Colorado River and Green Mountain Reservoir. This exchange would be utilized in wet years. This exchanged water will ultimately be used for recovery purposes at different times of the year or in other years. However, this component is not related back to the Ruedi Reservoir releases such that this exchange would or could relieve pressure on the Frying Pan from those Ruedi releases.

Response 31.10

Section 2.3.3 discloses the rationale for exchanges or substitutions into Green Mountain Reservoir. The exchange or substitution may reduce Ruedi Reservoir releases by storing water released from Granby Reservoir in Green Mountain Reservoir for subsequent release to the 15-Mile Reach. Section 2.3.3 was revised to describe the relationship between the exchanges or substitution and other possible releases to the 15-Mile Reach.

Comment 31.11

Against the additional 2,000 acre feet of contribution from Ruedi Reservoir, all the preferred alternative offers is that the total releases from Ruedi are still less than the allowable releases under the interim plan or that permitted by the 2012 Agreement. However, the Draft EA fails to realize and explain that these additional releases increase the possibility of excessive and destructive flows in the lower Frying Pan River. The Draft EA briefly mentions the economic study conducted by the Roaring Fork Conservancy concerning the lower Frying Pan River region but does not utilize this study or expand upon it to fully explain and account for the potentially detrimental economic consequences of excessive releases from Ruedi Reservoir (Fryingpan Valley Economic Study, Kristine Crandall, Roaring Fork Conservancy, June 21,2002, available for viewing at http://www.roaringfork.org/images/other/FPV%20Economic%20Report.pdf).

Response 31.11

The release of up to 2,000 AF would not result in excessive or destructive impacts to the aquatic habitat in the Fryingpan River. Cumulatively, the Proposed Action would have a minor beneficial effect on aquatic habitat in the Fryingpan River (Section 3.9.2.2.6), moderate beneficial effect on fishing in the Fryingpan River (Section 3.13.2.2.4), and minor beneficial effect on the recreational economy (Section 3.14.2.2). The 2,000 AF of contracted water for the insurance pool would not be available for future contracting envisioned by the Round II marketing EIS (see comment response 33.9).

Comment 31.12

Of equal importance, the Draft EA fails to realize that this additional commitment of the water resources of Ruedi Reservoir to guarantee the objectives of the recovery program and to protect front range water interests limits the future contracts that can be executed to accommodate western slope growth and is likewise economically destructive to the Frying Pan River region and the Roaring Fork River drainage. By requiring another 2,000 AF contribution from Ruedi

Reservoir, that amount of water is now not available for future growth and continued economic vitality on the west slope.

Response 31.12

The primary purpose of Ruedi Reservoir is to furnish water required for the protection of western Colorado water users, including present water rights and prospective uses of water. Use of 7,412.5 AF of Ruedi Reservoir storage to benefit endangered fish species in the 15-Mile Reach would meet this purpose.

Comment 31.13

The fatal flaw in the preferred alternative is that it relies too heavily on Ruedi Reservoir such that the impacts of the releases required to satisfy the recovery plan are not distributed more broadly to include other storage facilities. The preferred alternative fails to adequately address and plan for the mitigation of the environmental and economic impacts that the plan visits upon the Frying Pan River.

Response 31.13

See comment response 14.2 and 31.5.

Comment 31.14

The preferred alternative fails to consider changed circumstances that could easily render the four contemplated contracting actions ineffective to supply sufficient water to the recovery effort. Among these circumstances are; climate change and reduced flows in the upper Colorado River, continued demand for water for the front range as a consequence of population growth, the completion of a variety of different IPPs identified by the Interbasin Compact Committee and the vulnerability of the Shoshone Call and that effect on the future administration of the Colorado River. As such, the Draft EA is based on incomplete or inadequate information, rendering it insufficient.

Response 31.14

The EA discloses the cumulative effect on the Roaring Fork and Fryingpan rivers of the actions described in this comment. Section 3.5.2.2 discusses cumulative effects on streamflow.

Comment 31.15

The preferred alternative fails to address the need to coordinate releases from Ruedi in a definitive and predictable manner such that the citizens and natural environment that depend on stable flows are not constantly exposed to the potential of detrimentally impactive releases.

Response 31.15

Section 3.5.1.8 discusses the manner in which Ruedi releases would be made.

Comment 31.16

The preferred alternative fails to address how 5,412 AF in releases from Granby Reservoir and Ruedi Reservoir will result in 10,825 AF actually being delivered to the 15-Mile Reach. Transit losses and evaporation are not discussed, nor if water is needed to be released in greater amounts to insure the delivery of the required amount of water to the recovery effort, how this will be accomplished.

Response 31.16

The Proposed Action is the release of 10,825 AF collectively from Ruedi and Granby reservoirs. The Fish and Wildlife Service considers transit losses in evaluating flow conditions in the 15-Mile Reach.

Comment 31.17

Finally, the preferred alternative fails to present a resolution to the delivery of 10,825 AF to the 15-Mile Reach with certainty and finality without the need of further action.

Response 31.17

See comment response 31.2.

Comment 31.18

Pitkin County now believes that because the Draft EA concerns the recovery effort of several endangered species and now has become an even more complicated process involving several steps beyond the four contracting actions actually contemplated within the Draft EA, the environmental assessment itself as a process is insufficient to consider all of the effects and potential mitigations. Pitkin County believes that an Environmental Impact Statement is the only appropriate level of analysis under which to review the contemplated action. Pitkin County believes that an Environmental Impact Statement should re-examine the previously dismissed alternatives as representing methodologies to reduce heightened impacts of compliance with the recovery effort on any single west slope river system and to increase the availability of water to the United States Fish and Wildlife Service as needed to maintain and insure the success of the recovery effort. Only by so doing will the resultant NEPA document consider a legally adequate range of alternatives, as required by 40 CFR 1502.14.

Response 31.18

See comment response 31.1.

Roaring Fork Conservancy, Document 31

Comment 33.1

This is to provide comments on the Draft 10825 Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) whereby Ruedi Reservoir would supply 5,412.5 acre· feet of water annually to endangered species in the 15-mile reach of the Colorado River. The following concerns regarding the EA that should be addressed more completely in the final Environmental Assessment document and FONSI.

Response 33.1

Thank you for your comment.

Comment 33.2

Our concerns are: I) the adverse impacts from providing endangered species flows are shouldered by the West Slope, 2) the total reliance on Ruedi Reservoir for the West Slope's obligation, 3) the use of the Lower Fryingpan River as a delivery conveyance for all current, proposed, and potential Ruedi Reservoir water contracts and agreements, and 4) the lack of guidance for the

obligation of future water developments or storage projects to provide supplemental endangered species flows.

Response 33.2

Responses to these comments are detailed below.

Comment 33.3

The proposed action fulfilling the "East Slope Commitment" dries-up productive ranchland in Grand County. This also results in adverse impacts to the West Slope.

Response 33.3

The EA discloses the anticipated effects of the agricultural dry-up. Section 3.14.2.1 discusses the agricultural dry-up would have a negligible adverse effect on the agricultural portion of the Grand County economy. See comment response 25.8.

Comment 33.4

The total contribution from the West Slope pool in Ruedi will be 15,412 af concentrated during the 90-day period between Mid-July and Mid-October. The fact that this is less than the current is not relevant. Additionally, the EA states that Ruedi Reservoir releases will be based on the terms of the 2012 Agreement (Reclamation 2003). These terms do not offer any assurances and vague phrases in the following terms need to be strengthened to ensure that they have some teeth.

Response 33.4

The existing or current condition of a resource is relevant to the analysis of impacts. Section 2.2 discusses that the effects of the Proposed Action are compared to existing conditions to determine their significance. The cumulative effect on the Fryingpan River of all possible releases would be to reduce flows and improve fishing conditions in the river. Section 3.5.1.8 discusses the manner in which Ruedi Reservoir releases would be made.

Comment 33.5

5. Reclamation will continue to attempt to make release adjustments of no more than 50 cfs increments when feasible and consistent with multiple Fry-Ark Project purposes.

6. Efforts will be made to limit cumulative flows to 250 cfs or less when consistent with the multiple Project purposes and reasonable to do so, and so long as future fishery research does not indicate that flows in excess of250 cfs are important for Fryingpan or Roaring Fork River fishery maintenance or enhancement.

The planned summer and fall releases occur at the height of the recreational fishing season, a major economic driver for the area. Consultation with the Colorado Department of Parks and Wildlife and the local angling industry should be done prior to any releases exceeding 250 cfs.

Response 33.5

See comment response 31.11.

Comment 33.6

The 2,000 af "insurance pool" could also be added to the list of Ruedi Reservoir obligations. The rationale for and the use of the pool needs to be more clearly explained in the EA and once again the Fryingpan River would be impacted.

Response 33.6

See comment response 14.4. The insurance pool was incorporated into the Proposed Action and the effects were analyzed in the final EA. Section 2.3 was revised to explain the rationale for the exchange or substitution into Green Mountain and the need for the insurance pool.

Comment 33.7

The use of the lower Fryingpan River as a conduit for all contracted Ruedi Reservoir releases will increase the hydrologic alteration in both the Lower Fryingpan and Roaring Fork Rivers. Because most of these releases will occur from mid-July to Mid-October we suggest mitigation measures are taken with this agreement and imposed on all future sales to ensure they continue to function as rivers and the economic value derived from angling is not impacted.

Response 33.7

Mitigation for water available for contracting in Ruedi Reservoir was provided in the 1989 Ruedi Reservoir, Colorado Round II Water Marketing Program Final Supplement to the Environmental Statement Fryingpan-Arkansas Project, Colorado. The cumulative effect on the Fryingpan River would beneficial and mitigation measures would not be necessary.

Comment 33.8

Thank you for the opportunity to comment on the 10,825 EA and FONSI. We understand the legal and logistical constraints which have led to the proposed action and appreciate the effort that has been put into this EA. Please contact me if you would like further detail on any aspect of this correspondence.

Response 33.8

Thank you for your comment.

Trout Unlimited, Document 31

Comment 35.1

I am writing on behalf of Trout Unlimited to provide our comments on the above referenced matter. Trout Unlimited is a non-profit organization with over 140,000 members nationwide. Our mission is to conserve, protect and restore coldwater fisheries and their habitat. Trout Unlimited has dedicated significant resources on the protection and restoration of the headwaters of the Colorado River.

Response 35.1

Thank you for your comment.

Comment 35.2

Trout Unlimited supports both the permanent dedication of the "10,825" water for the benefit of endangered fish in the 15-mile reach and the use of Granby Reservoir as one of the two sources for said water. Located high in the headwaters of the Colorado River, increased releases from Granby can benefit not only the endangered fish in the 15-mile reach, but also the riparian environment in between. Given our mission, we are particularly interested in the benefits releases from Granby Reservoir could provide to the Colorado River's coldwater fisheries. Portions of the river downstream of the reservoir have been significantly impacted by transmountain water diversions, including Reclamation's Colorado-Big Thompson (C-BT) Project. Diversions from the Redtop Valley Ditch have historically dried up portions of the North Fork of the Colorado River upstream of the reservoir. The retirement of Redtop Valley Ditch shares and use of Granby Reservoir as a source of "10825" water presents a unique opportunity for restoration of these impacted streams. We realize that the primary purpose of the Proposed Action is to benefit the endangered fish in the 15-mile reach and agree that such is indeed the highest priority. However, the Proposed Action has the potential to either benefit the impacted cold water fisheries of the Colorado River or further impact them. We urge Reclamation to take steps to maximize benefits for both fisheries. Our suggestions and recommendations follow.

Response 35.2

Thank you for your comment. The EA discloses the beneficial effect the project would have on upper Colorado River flow and aquatic habitat.

Comment 35.3

Decisions Regarding Granby 10825 Releases. According to the draft EA, the pattern of release of "10825" water would be dictated by an "Operations Group" consisting of "representatives from the water users, the Service, Reclamation, and the State Division Engineer." Draft EA at 12. Such stakeholder approach to decision-making makes sense. However, the proposed group omits key stakeholders, including local governments affected by management decisions, such as Grand County, local Division of Parks and Wildlife biologists, conservation interests and affected land owners. Such interests should be added to any stakeholder, advisory group.

Response 35.3

See comment response 29.11.

Comment 35.4

In addition, while the primary purpose and need is delivery of water to the 15-mile reach for the benefit of the endangered fish, a secondary purpose of benefiting the Colorado River headwaters' cold water fisheries should be recognized in the final EA and FONSI. In making decisions regarding pattern of release for the year, the Operations Group should be directed to take into account potential impacts and benefits to the cold water fisheries and operate the system in a manner that is helpful, not detrimental to the fisheries. Input from stakeholder groups active in the watershed should also be sought (e.g., HUP, Upper Colorado Wild and Scenic Stakeholder Group, Learning by Doing Committee, etc.).

Response 35.4

See comment response 29.11.

Comment 35.5

Trout Unlimited applauds Reclamation's decision to retain ultimate approval of "muni-rec" contracts to deliver Granby water to the 15-mile reach and to subject such approval to public review under NEPA.

Response 35.5

Section 1.1 discusses that even though Reclamation would not be a party to the municipal recreation contract between Northern Water and a Grand Valley entity, Reclamation's written concurrence to the contract would be required before it would become effective.

Comment 35.6

To ensure such deliveries actually add the promised flows, Reclamation must ensure that released Granby flows are not offset by increased diversions by other parties. For example, Reclamation should clarify that Granby "10825" releases are in addition to releases required under SD 80. Such releases should also be added to the threshold minimum flows to which Windy Gap Reservoir diversions are subject (i.e., added to the 90 cfs threshold). Failure to do so could result in a significant reduction in 10825 water deliveries.

Response 35.6

Section 1.1 discusses the contract or similar agreement between Northern Water and an entity in the Grand Valley to release 5,412.5 AF of water from Granby Reservoir, which would allow the state to protect the water during conveyance to and through the 15-Mile Reach of the upper Colorado River. Section 2.3 was revised to indicate the Granby releases would be in addition to the releases required under SD 80 and the minimum flows to which Windy Gap Reservoir diversions are subject.

Comment 35.7

North Fork of the Colorado. Redtop Valley Ditch diversions should be restricted to ensure no net increase in depletions to the North Fork. According to the EA, the source of "10825" water to be released from Granby Reservoir is increased storage made possible by NCWCD's relinquishment of its shares in the Redtop Valley Ditch and dry up of lands formerly irrigated by those shares. Usually, this sort of change in water rights use is accomplished through a formal change decree which includes terms and conditions to ensure that the new use will not result in an enlargement of the water right or injury to other water right holders. The Proposed Action takes a different approach. In essence, the water rights attributable to NCWCD's shares would be abandoned, enabling the C-BT water rights, apparently next in priority, to store water that will no longer be diverted by NCWCD. It is this approach that would enable Reclamation to store the full amount of water formerly diverted for irrigation purposes - consumptive use plus irrigation return flows.

Response 35.7

See comment responses 12.1 and 35.8. Flow in the North Fork Colorado River below the Redtop Valley Ditch would increase.

Comment 35.8

Because the portion of Ditch water rights associated with NCWCD's shares is being abandoned, they can no longer be diverted. Ditch diversions must in the future be restricted to the amount attributable to the remaining shares. Otherwise, an enlargement in net diversions would result in

violation of Colorado water law and detriment to the Colorado River. Reclamation must ensure that such restrictions are imposed and administered.

Response 35.8

Section 2.3.2 was revised to indicate that Northern Water would not abandon its water right. Northern Water would surrender its shares to the remaining shareholders in exchange for a written commitment that the amount of irrigated lands not be increased. Water in the North Fork Colorado River would either not be diverted or irrigation return flows would flow to Granby Reservoir via Stillwater Creek. Section 2.3.2 discusses assumption that the total amount of diversion from the North Fork Colorado River would be limited to a maximum of 80 cfs. Actual maximum diversions needed to serve remaining ditch shareholders may be higher or lower than this amount.

Comment 35.9

The Proposed Action should not result in continued dry up of the North Fork. According to the EA, the Proposed Action would "increase flow in the North Fork of the Colorado River downstream of the Redtop Valley Ditch in June of all years and in May and July in some years." However, increases "would usually be less than...35 percent of historical flows." EA at p. 68. Moreover, the North Fork is still expected to completely dry up below the Redtop Valley Ditch diversion, although less often than under existing conditions. Id. Given that NCWCD owns 50.5% of the Redtop Valley Ditch shares that can no longer be diverted, this outcome is difficult to understand. Ditch diversions should be proportionately reduced and historical flows proportionately increased. The stream should no longer dry up.

Response 35.9

See comment response 12.1 and 35.8. Section 3.9.2.1.1 discloses the likely effects on the North Fork Colorado River. In some years, the North Fork Colorado River may continue to have no flow conditions under the Proposed Action.

Comment 35.10

According to the draft EA, the source of the majority of "10825" water to be released from Granby is historical return flows which used to accrue to the Colorado River through Willow Creek and will now be stored in Granby Reservoir. The benefit of this approach is that water will be made available both to the 15-mile reach and to this Colorado River reach at times when it is critically needed. The potential downside to the Colorado River reach is that historical flows may not be available at other critical times – particularly in July and in the winter. For example, the draft EA indicates that flows below Windy Gap will decrease in July because the average reduction in delayed irrigation return flows from Willow Creek would be greater than the average increase associated with the release of "10825" water. Draft EA at 36. This is likely to be the case in the reach of the Colorado above Windy Gap and below the confluence with Willow Creek. This finding is concerning as violation of state stream temperature standards are often recorded in the Colorado River downstream of Windy Gap in July. In addition, winter ice has been reported as a problem both upstream and downstream of Windy Gap Reservoir. It appears from the information provided in the EA that winter flows below Windy Gap will also be reduced by the proposed elimination of historical lagged irrigation return flows. Draft EA, Figure 18. And while information regarding winter impacts in the Colorado River upstream of Windy Gap indicates no change in winter flows, it appears such calculations are based on measurements upstream of the confluence with Willow Creek and, therefore, do not measure downstream impacts.

Response 35.10

Section, 3.7.2.1 (water quality) was revised to describe the effects of decreased flow in the Colorado River below Willow Creek in October through July.

Comment 35.11

The draft EA does not adequately analyze the potential for increased stream temperature standard violations or worsening of winter conditions. These are matters that should be monitored and actively avoided by adjusting "10825" releases and operations.

Response 35.11

See comment responses 29.23 and 35.10.

Comment 35.12

The draft EA evaluates the cumulative effects of the Proposed Action and the expiration of the interim agreements on a number of affected streams and reservoirs. However, the draft EA does not evaluate such cumulative impacts on the reach of the Colorado River between its confluence with Williams Fork and Kremmling. The nearest evaluation is in the Colorado at Kremmling, a gage which includes large inflows from tributaries such as Muddy Creek and the Blue River. The omitted reach is immediately below Williams Fork Reservoir, a major component of the interim agreement supply and should be analyzed. Such analysis should take into account both flow and temperature, as releases from Williams Fork reservoir are instrumental in cooling this reach of the river.

Response 35.12

The Below Kremmling location integrates cessation of Williams Fork and Wolford Mountain releases and all other reasonably foreseeable actions.

Comment 35.13

Blue River below Green Mountain Reservoir. Like the Colorado River, the segment of the Blue River downstream of Green Mountain Reservoir stands to be negatively impacted by the Proposed Action. The EA offers little information on the extent of those impacts. As such the river should be monitored and potential impacts avoided in the context of the Operations Group's decisions.

Response 35.13

The anticipated effects on Blue River flow are disclosed in Section 3.5.2.1.6.

Comment 35.14

Conclusion. Trout Unlimited strongly supports the use of Granby Reservoir as a source of "10825" water. However, we urge Reclamation to take measures, as suggested above, to ensure that such releases will benefit rather than impair headwater streams and their fisheries. Thank you for the opportunity to comment. Do not hesitate to contact me with questions.

Response 35.14

Thank you for your comment.

Western Resource Advocates, Document 31

Comment 36.1

Please accept the following comments on the Draft Environmental Assessment ("Draft EA") and Finding of No Significant Impact ("FONSI") related to providing 10,825 acre-feet per year of water for the benefit of endangered fish in the 15-Mile reach of the Colorado River. Western Resource Advocates ("WRA") is a regional non-profit organization—with a staff of natural resource analysts, attorneys, economists, and others—working to protect the West's land, air, and water resources. WRA's Water Program promotes a sustainable water future and works to restore flows on critical river reaches throughout the West. WRA also is a long-time member of the Upper Colorado River Endangered Fish Recovery Program ("Recovery Program" or "Program").

Response 36.1

Thank you for your comment.

Comment 36.2

WRA supports the dedication of the 10,825 water to benefit flows for endangered fish in the 15-Mile Reach. It constitutes an essential element of the Recovery Program's Recovery Implementation Plan and fulfillment of the U.S. Fish & Wildlife Service ("USFWS") 1999 Biological Opinion for the Colorado mainstem. The Proposed Action also has the potential to benefit flows in the upper reaches of the Colorado River (e.g., below Granby Reservoir) for cold water fisheries; we support these secondary benefits. We appreciate the extensive level of analysis that went into development of the Draft EA.

Response 36.2

Thank you for your comment.

Comment 36.3

Our comments below cover the following topics: 1. NEPA and Next Steps. 2. Permanency and Volume of Water Supply. 3. Contract Provisions. 4. Impact on Other Reservoirs

Response 36.3

Thank you for your comment.

Comment 36.4

1. NEPA and Next Steps. WRA supports a Finding of No Significant Impact ("FONSI"). However, we feel there are several issues—noted below—that require resolution before issuance of a Final EA and FONSI.

Response 36.4

Thank you for your comment.

Comment 36.5

2. Permanency and Volume of Water Supply. WRA's scoping comments submitted in November 2009 [attached to this comment letter] suggested NEPA analysis consider means to release water in perpetuity, so releases can continue even if the endangered fish are, in the future,

down-listed or de-listed. We noted this is of heightened importance because any decision by USFWS to down-list or de-list will rely, in part, on the adequacy of other mechanisms to protect the listed fish, including flow commitments.

Response 36.5

The contracts would be for a period of up to 40 years; Reclamation would include a renewal clause in the proposed contracts (Section 1.2).

Comment 36.6

We see that language in the Draft EA formalizes a commitment to have contracts to deliver water be "up to" 40 years in duration with a presumption of contract renewal for another maximum contract period. We recommend the Final EA and FONSI clarify exactly what conditions would lead contracts to expire in less than 40 years or, in the alternative, clarify a presumption that contacts would last for 40 years.

Response 36.6

The contract term would be finalized at the time of the contract negotiations described in comment response 36.8.

Comment 36.7

We also have a question about the volume of water to be committed to the 15-Mile reach from retiring irrigation on lands served by the Red Top Valley Ditch. The Draft EA (see §2.3.2, p. 10) notes that 752 acres would be permanently taken out of irrigation. It appears historical consumptive use and return flows under this right would be added to status quo flows below Granby. Since this differs from a typical change of use situation (where only the consumptive use would be available for downstream delivery), we believe the specifics of how retirement of 752 acres translates into at least 5,412.5 AF for the 15-Mile Reach must be more thoroughly explained in the Final EA and FONSI.

Response 36.7

Section 2.3.2 discloses that the average annual increase in flow to Granby and Shadow Mountain Reservoirs would be sufficient to provide 5,412.5 acre-feet required by the Proposed Action. See comment response 12.1.

Comment 36.8

3. Contract Provisions The Draft EA clarifies that four separate contracts are anticipated to implement the Preferred Alternative. We have reason to believe that—if history is a guide—development and finalization of these contracts will support the old adage that "the devil is in the details." Thus, we feel it is imperative that members of the Recovery Program—including WRA—be part of the team that develops these anticipated contracts.

Response 36.8

The proposed contracts are negotiated in a public forum pursuant to Reclamation's April 26, 1982 policy instructions and the Federal Register notice published February 22, 1982 (47 FR 7763). The public will be given an opportunity to comment on the proposed contract. Both verbal and written comments will be accepted. Once the final contracts are negotiated but prior to execution of the contracts, they will be made available for a 60-day public review.

Comment 36.9

Since the existing, temporary arrangements for providing 10,825 water are set to expire in 2015, the FONSI should clarify what will happen if the four contracts are not yet in place by 2015.

Response 36.9

Section 2.2, No Action Alternative, discusses what may occur if contracts were not in place.

Comment 36.10

According to the Draft EA, the pattern of release of 10,825 water would be governed by an "Operations Group" consisting of "representatives from the water users, the Service, Reclamation, and the State Division Engineer." [Draft EA, p. 12] However, elsewhere, the Draft EA indicates that the USFWS will determine the timing and magnitude of releases of 10,825 water. We believe the proposed Operations Group should include other obvious stakeholders, including local governments (e.g., Grand County) and conservation interests. And we believe ultimate decision-making authority resides in USFWS (with advisement from the Operations Groups). This language should be expressly spelled-out in the contracts.

Response 36.10

See comment response 29.11.

Comment 36.11

4. Impact on Other Reservoirs. In WRA's November 2009 comments, we articulated a concern that: Use of the 10825 water should not detrimentally impact the volume of water from other reservoirs that contribute non-10825 water to the 15-Mile Reach in any given year type. Thus, the NEPA analysis for the10825 water should avoid proposals that would add administrative burdens to entities that are not parties to 10825 agreements or impact (decrease) releases from other sources of Recovery Program water for the 15-Mile Reach. The Draft EA explains in detail ways use of Red Top Valley Ditch water could impact operations and storage of water in Granby, Green Mountain, and Wolford Mountain reservoirs. It then suggests a commitment to provide mitigation for these impacts in the form of a yet-to-be-determined "insurance pool." [Draft EA section 3.8.2.1, including pp. 56-57; see also section 2.3.4] The Draft EA does not yet have a formal plan, but instead a plan to develop a plan: The mitigation commitment is to develop a plan to mitigate the adverse effects of storing Redtop Valley Ditch water out of priority in the C-BT Project system. The mitigation plan will be developed through the cooperative efforts of Reclamation, Northern Water, Denver Water, the CRWCD and possibly others. [Draft EA, p. 57]. Similar to our comments on "Contract Provisions", supra, we believe there are many details that will need to be resolved. We believe that Recovery Program partners—including WRA—must have the opportunity to participate in finalizing these details.

Response 36.11

See comment response 14.4. The insurance pool was incorporated into the Proposed Action and the effects were analyzed in the final EA.