JUN 11 2012
BY:

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June 11, 2012

Lurline Underbrink Curran,
County Manager
PO Box 264
308 Byers Ave.
Hot Sulphur Springs, CO 80451

RE: Application for 1041 Permit

Dear Ms. Underbrink Curran,

The enclosed notebooks contain an application for a 1041 Permit (§24-65.1-101(2) C.R.S.) for the Windy Gap Firming Project. I am enclosing 15 copies of the Application and all of its attachments together with 15 copies of the November 2011 Final Environmental Impact Statement and its technical appendices on two compact discs. The Subdistrict will pay the actual cost of processing the Permit Applications and hearings held in connection therewith. Please indicate how this payment should be made. Jeff Drager, Project Manager, and I expect to present this Application at the Grand County Planning Commission on July 11, 2012 and thereafter at the Board of County Commissioners on August 1 and 2, 2012.

While no land use or construction for the Windy Gap Firming Project will occur in Grand County and the dam and reservoir will be located in Larimer County, the Municipal Subdistrict, Northern Colorado Water Conservancy District, ("Subdistrict") has agreed, subject to a reservation of rights as set forth in the Application Section 12, to submit this Application for a 1041 Permit from Grand County. The Subdistrict is in the final stages of the federal process and expects a Record of Decision from the Bureau of Reclamation in late 2012. We anticipate that this submittal should provide sufficient time for the County to hear and determine the Permit.

The Application follows the structure of the Grand County 1041 Submittal Requirements for Municipal and Industrial Water Projects as those are set out in 5-303 to 5-306. We have endeavored to specify the actions proposed by the Subdistrict which address the effects set out in

EXHIBIT 1

the County Regulations which are the result of the Windy Gap Firming Project and not effects of other water projects. The record will clearly show the mitigation proposed by the Subdistrict addresses those effects. The Subdistrict has also put forth additional measures in other processes which are the enhancement measures which reach beyond the effects of the Windy Gap Firming Project. To complicate matters further, other entities proposals in the Upper Colorado River, such as Denver Water's Moffat Expansion Project, are relevant in context of additional commitments and are discussed in this Application in order to provide a complete picture to Grand County of the activities surrounding the Windy Gap Firming Project.

We look forward to presenting this Application to you.

Respectfully Submitted,

Peggy E. Montaño
for
Trout, Raley Montaño
Witwer & Freeman P.C.

cc: Jeff Drager
Eric Wilkinson
Bennett W. Raley
Rebecca Mitchell

BOARD OF COMMISSIONERS

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BY:.....

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County Manager
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County Attorney

June 21, 2012

Peggy E. Montaño
Trout Raley Montaño Witwer & Freeman P.C.
1120 Lincoln Street, suite 1600
Denver Colorado, 80203

Dear Peggy,

As I told you last week, the staff has found your 1041 application to be complete. The County will charge the applicant its actual costs in connection with the permit. At this time, Lurline estimates that cost to be $10,000.00. As we discussed, would you please have your client send a check for that amount to Kris Manguso in the planning department. When you get back in town, please give me a call so that we can discuss the planning commission hearing and the schedule for the actual 1041 hearing before the commissioners.

Very Truly Yours,

Anthony J. DiCola
Grand County Attorney

Grand County 1041 Application

of

Municipal Subdistrict, Northern Colorado Water Conservancy District, acting by and through the

Windy Gap Firming Project Water Activity Enterprise

JUNE 11, 2012

EXHIBIT 1

Grand County 1041 Application of Municipal Subdistrict, Northern Colorado Water Conservancy District, acting by and through the Windy Gap Firming Project Water Activity Enterprise

Application Overview and Cover Page

Applicant: Municipal Subdistrict, Northern Colorado Water Conservancy District, acting by and through the Windy Gap Firming Project Water Activity Enterprise (Subdistrict).

The 2012 1041 permit (2012 Permit) for the Windy Gap Firming Project will be held by the Subdistrict on behalf of the Project Participants. The current Participants are Platte River Power Authority, Broomfield, Erie, Greeley, Longmont, Louisville, Loveland, Superior, Central Weld County Water District, Evans, Little Thompson Water District, Lafayette and Fort Lupton. Middle Park Water Conservancy District will also receive water from the Project under an agreement with the Subdistrict. The 2012 Permit will be transferrable to all successors and assigns of the Subdistrict and the Project Participants may change in the future through purchase, sale or other transfer of Windy Gap Firming units. Any successor Participants will be required to accept all conditions of the 2012 Permit.

New 2012 Permit Sought: Applicant seeks a new and independent 2012 Permit for the Windy Gap Firming Project ("WGFP") and not an amendment of the existing 1980 Windy Gap Permit, which is recognized as a vested right and will remain intact with no changes. In the event provisions of the 2012 Permit for the WGFP conflict with the provisions of the existing 1980 permit, the 2012 Permit provisions will control. The 2012 Permit will cover operation of the WGFP, with up to 90,000 acre feet of storage on the East Slope in the proposed Chimney Hollow Reservoir or a combination of East Slope reservoirs. The current Windy Gap Participants own allotment contracts with the Subdistrict for 440 of the total of 480 units (shares) of the Windy Gap Project. The WGFP Participants will be allowed to sell or obtain WGFP units and sell or lease any or all of their capacity in the proposed East Slope reservoir (s), provided that the maximum amount of storage in the East Slope reservoir(s) is limited to a maximum of 90,000 acre feet. This 2012 Permit will allow construction of the full 90,000 acre feet of storage on the East Slope in one or more stages in the future. If the Subdistrict accepts this 2012 Permit, mitigation will be provided for the full 90,000 acre feet of storage, regardless of the initially constructed capacity. It will also cover future construction in Grand County, if warranted in the future as discussed herein, of mitigation or enhancement structures such as a bypass or pass-through Windy Gap Reservoir.

Time Period of Permit Sought: Applicant requests the 2012 Permit be issued for the life of the WGFP.

Beginning of Construction: The 2012 Permit will be deemed to be effective upon execution of construction contracts for the WGFP, but no later than 10 years from issuance of a 404 permit by USACE.

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6. Reclamation Executive Summary FES, Windy Gap Firming Project Final Environmental Impact Statement, November 2011
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9. 10,825 FONSI
10. Proposed Intergovernmental Agreement (IGA) between Northern Water, Grand County, Middle Park Water Conservancy District, and Colorado River water Conservation District

ABSTRACT PROPOSAL INDICATING THE SCOPE OF NEED FOR THE DEVELOPMENT – Grand County 5-3033a:

The Municipal Subdistrict, Northern Colorado Water Conservancy District (Subdistrict), acting by and through the Windy Gap Firming Project Water Activity Enterprise, the "Project Proponent," is proposing to improve the firm yield from the existing Windy Gap Project water supply. The Subdistrict's proposal is the construction of Chimney Hollow Reservoir to store WGFP water. To improve yield, the Subdistrict also is requesting integration of the Colorado-Big Thompson Project (C–BT) and Windy Gap Project operations so that C–BT water can be stored in Chimney Hollow Reservoir. This is known as prepositioning. This integration would require new connections to C–BT East Slope facilities and continued use of C–BT storage and conveyance systems and other existing pipelines, canals, and diversions to deliver WGFP water to Project Participants. The proposed project will increase the amount of WGFP water delivered to the East Slope, but will not change the amount of C–BT water delivered to the East Slope. Without the proposed project, WGFP diversions and deliveries to the East Slope will continue to increase as East Slope demands increase. However, reliability of deliveries to the East Slope will be greater with the proposed project than without.

The original Windy Gap Project was completed by the Subdistrict in 1985. Since that time, the Windy Gap Project has not been able to reliably deliver water supplies to Windy Gap Project unit holders (allottees). In addition, the Windy Gap Project does not currently provide annual carry-over water storage for the Middle Park Water Conservancy District (MPWCD) on the West Slope. Because of the deficiency in water deliveries and lack of storage, the Windy Gap Project allottees and MPWCD have not been able to fully rely on Windy Gap water for meeting a portion of their annual water demand. As a result, a group of the Windy Gap Project unit holders, working through the Subdistrict, have initiated the proposed WGFP, which would firm all or a portion of their individual Windy Gap units to meet a portion of existing and future municipal and industrial water requirements. MPWCD will receive benefits under contract to firm its Windy Gap water, and hence improve the reliability of its Windy Gap water supply for users in Grand and Summit counties, Colorado.

The WGFP is a collaborative effort among 13 East Slope water providers and users (Participants) facilitated by the Municipal Subdistrict, Northern Colorado Water Conservancy District. The improved yield from the WGFP would provide Project Participants with additional water supplies to meet a portion of their existing and future water demands. By 2030, the cumulative water demand for all East Slope Project Participants is projected to reach about 205,000 AF, which would result in a shortage in firm yield of about 64,000 AF. Water demand for East Slope Participants is projected to increase to about 251,000 AF by 2050 and shortages in firm yield at that time would increase to more than 110,000 AF. Additional details regarding need for the Project is contained in Section 2.

SUMMARY OF MITIGATION AND ENHANCEMENT MEASURES

The Subdistrict has made a concerted effort to provide mitigation for direct impacts of the WGFP and to address concerns expressed by West Slope stakeholders regarding the current condition of aquatic resources in the Upper Colorado River and water quality in Grand Lake. This section summarizes mitigation and enhancement measures that have been proposed by the Subdistrict. Concurrent with the Subdistrict proposal for the WGFP, Denver Water has proposed a Moffat Reservoir expansion which is also an Upper Colorado River water project. In addition, concerns regarding various environmental impacts of existing water projects to the Upper Colorado River system have been raised by various stakeholders. Over the past several years various processes have been put in place which has resulted in a series of agreements which appear to be culminating for signature at about the same time as this 2012 Permit Application. While existing river conditions and many of the environmental concerns raised are temporally related to this application, the negative effects they seek to address are not and cannot be a result of the WGFP as the conditions currently exist and operation of the WGFP has not begun. Because the mitigation and enhancement provisions of the various parties such as Denver Water, Northern Colorado Water Conservancy District and others impact the same resource, that is the Upper Colorado River and its tributaries, those agreements are listed here for context and completeness. However, listing does not imply that the Subdistrict has any authority to seek a permit for those entities, any authority to take any action on behalf of those entities and none of those entities are before Grand County in this application. The attachments to this Application, which are agreements or commitments of Northern Water, are not incorporated as part of this Application.

Windy Gap Firming Project Impact Mitigation – Approved by the Colorado Wildlife Commission and anticipated to be included in the Record of Decision issued by Reclamation and 404 Permit issued by the Corps of Engineers

a. Colorado River Impact Mitigation:
   - Stream temperatures – Reduced or curtailed river diversions when stream temperature standards are exceeded (with some limitations), with installation of real-time temperature monitoring devices
   - Flushing flows – Required flushing flows increased from 450 cfs to 600 cfs, and increased even more when project water supply exceeds 2/3 capacity

b. Three Lakes Water Quality and Grand Lake Clarity Impact Mitigation:
   - Provide funding (estimated to be $4.3 million) to reduce nutrient inflow to three lakes to "neutralize" effects of WGFP on Three Lakes water quality and Grand Lake clarity (includes improvements to wastewater treatment facilities and non-point source nutrient reduction)

c. Other Mitigation Measures:
   - Colorado River Endangered Species - $405,000 funding for Upper Colorado River Recovery Program
   - $105,000 for Wetland Mitigation Bank plus revegetation and enhancement of disturbed areas

- Habitat mitigation at Chimney Hollow site

Windy Gap Firming Project Voluntary Enhancement Measures – Provided in various enforceable agreements

a. Colorado River Enhancements:
   i. Water for streamflow enhancement – provided in WGFP Agreement (IGA):
      - Grand County ability to use unused Middle Park WCD supplies– up to 2,300 AF per year
      - Grand County share of Windy Gap pumping– 500 AF per year on average
      - Grand County ability to pump additional Windy Gap water – up to 3,000 AF per year, when available
   ii. Aquatic habitat enhancement – provided in Fish and Wildlife Enhancement Plan authorized by the Colorado Wildlife Commission:
      - $4 million to restore aquatic habitat in Colorado River from Windy Gap to Kemp-Breeze State Wildlife Area
      - Funding for study of bypass around Windy Gap Reservoir - $250,000
   iii. Other Colorado River Enhancement Measures
      - Participation in Learning by Doing Cooperative Effort with Denver Water and West Slope entities to coordinate mitigation, streamflow enhancements and stream restoration work
      - Provide $500,000 to Grand County for irrigation pump maintenance fund and funding for water measurement devices on Colorado River diversions

b. Three Lakes Water Quality and Grand Lake Clarity Enhancements:
   i. Provide funding and active participation in U.S. Bureau of Reclamation's Appraisal Study for improvement in Three Lakes water quality – provided in Appraisal Study MOU
   ii. Long-term Commitment of Northern Water to work with Reclamation and Grand County on Grand Lake clarity issues – Provided in Grand Lake Clarity MOU
   iii. Northern Water's Water Quality Program, including over $1 million in water quality monitoring and studies to better understand water quality issues in the C–BT and Windy Gap projects – on-going process formalized in Grand Lake Clarity MOU

c. Water Supply for West Slope:
   - Firm annual water supply for MPWCD – 2,300 AF/year
   - Additional pumping for MPWCD providing an average annual supply of 700 AF

Other Cooperative Efforts by the Subdistrict and Northern Water on West Slope

a. Developed plan and led efforts to provide releases of 5,412.5 AF/year from Granby Reservoir which will improve streamflow conditions in Grand County and provide water to the Upper Colorado River Recovery Program in the 15-Mile Reach.

b. Participation in Wild and Scenic Rivers Stakeholder Plan.

c. Northern Water, Reclamation and Grand County have entered into a separate MOU to finance and participate in the Appraisal Study for improved clarity in Grand Lake.

d. Northern Water, Reclamation and Grand County intend to continue moving ahead with Reclamation's planning process by initiating the development of a Statement of Work for a Feasibility Study Plan.

e. Proposed Grand Lake Clarity MOU – Northern Water, Reclamation and Grand County agreement to pursue actions with a goal of attaining the CDPHE Clarity Standard.

1. Proponents of Proposal – Grand County 5-304 1a, 1b

i. Names, addresses and businesses of all interests proposing the development of a municipal or industrial water project: Subdistrict on behalf of:

Name of Entity:	**Address:**
Platte River Power Authority	Platte River Power Authority 2000 East Horsetooth Road Fort Collins, CO 80525-5721
City and County of Broomfield	City and County of Broomfield One DesCombes Drive Broomfield, Colorado 80020
City of Erie	City of Erie 645 Holbrook Street PO Box 750 Erie, CO 80516
City of Greeley	City of Greeley 1100 - 10th Street Greeley, Colorado 80631
City of Longmont	City of Longmont 1100 South Sherman Street Longmont, Colorado 80501
City of Louisville	City of Louisville 749 Main Street Louisville, CO 80027
City of Loveland	City of Loveland 200 North Wilson Avenue Loveland, Colorado 80537
Town of Superior	Town of Superior 124 E. Coal Creek Drive Superior, CO 80027
Central Weld County Water District	Central Weld County Water District 2235 - 2nd Avenue Greeley, Colorado 80631
City of Evans	City of Evans 1100 37th Street Evans CO 80620-2036
Little Thompson Water District	Little Thompson Water District 835 E Hwy 56 Berthoud, CO 80534
City of Lafayette	City of Lafayette 1290 South Public Road Lafayette, CO 80026
City of Fort Lupton	City of Fort Lupton 130 South McKinley Street Fort Lupton, CO 80621

ii. Name and qualification of persons responding to the requirements of this regulation:

Peggy E. Montaño and
Bennett W. Raley
Trout, Raley, Montaño, Witwer and Freeman
P. C.
1120 Lincoln Street, suite 1600
Denver Co. 80203

Jeff Drager, Deputy Manager, Engineering
Division and Project Manager
Eric W. Wilkinson, General Manager
Northern Colorado Water Conservancy
District, 220 Water Avenue,
Berthoud Co. 80513

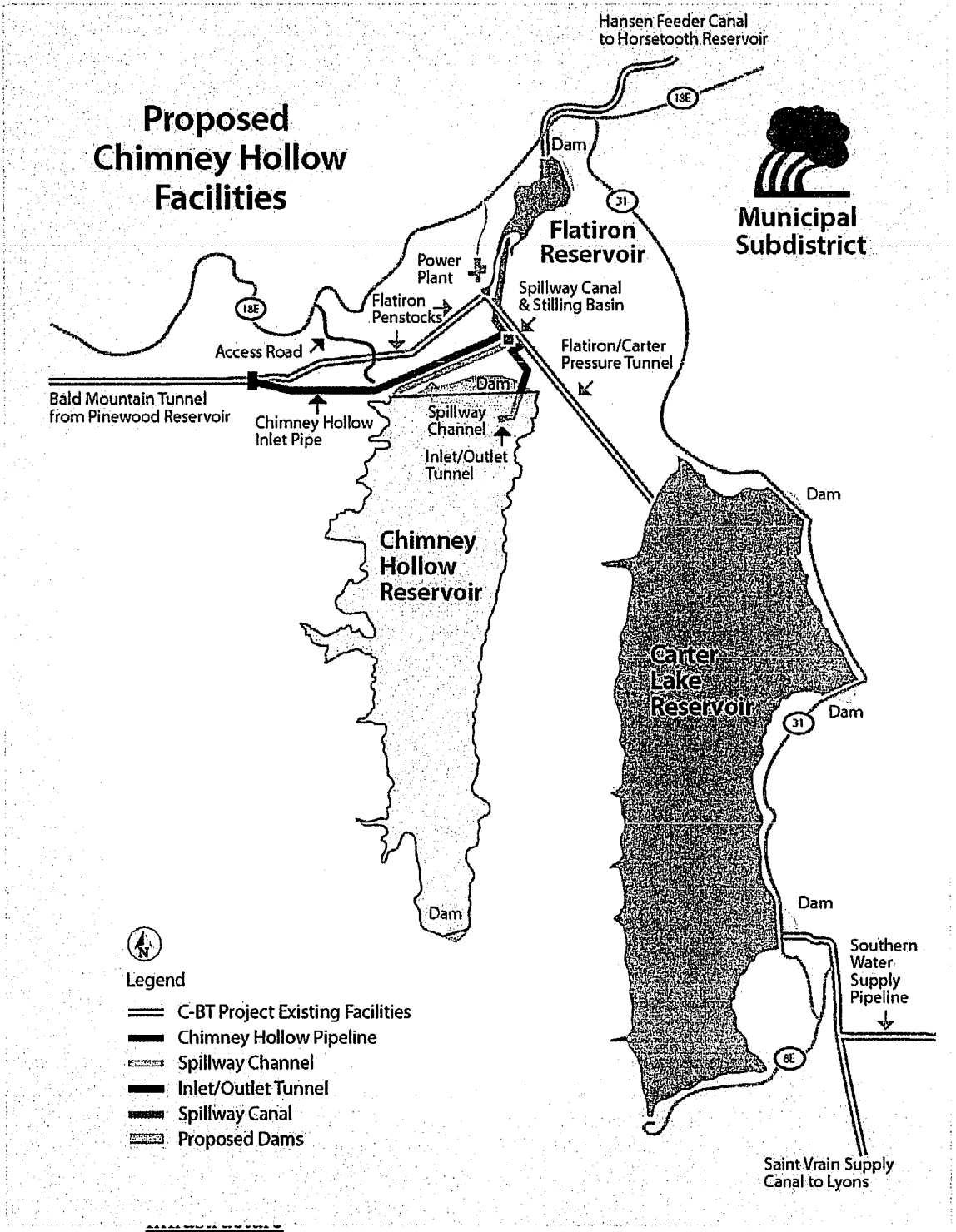
2. A detailed report on the proposed municipal or industrial water project to include – Grand County 5-304 2a through 2e:

a. Location and scope of the proposed project:
The Subdistrict will construct Chimney Hollow Reservoir in Larimer County to store WGFP water. To improve yield, the Subdistrict also is requesting integration of the Colorado–Big Thompson Project (C–BT) and Windy Gap Project operations so that C–BT water can be stored in Chimney Hollow Reservoir. The Proposed Action would require new connections to C–BT East Slope facilities and continued use of C–BT storage and conveyance systems and other existing pipelines, canals, and diversions to deliver Windy Gap water to Project Participants.

The Subdistrict proposes construction of a 90,000 AF Chimney Hollow Reservoir, along with the ability to store or preposition C–BT water in the new reservoir, which is identified in the Final EIS as Reclamation's Preferred Alternative. Water would be conveyed to Chimney Hollow Reservoir via a new pipeline connection to existing East Slope C–BT facilities. Connections between Chimney Hollow Reservoir and Carter Lake would allow delivery of water to Project Participants using existing infrastructure.

The Chimney Hollow Reservoir site is in Larimer County about 8 miles southwest of the Loveland, Colorado and ½ mile west of Carter Lake. The reservoir would be built in a hogback valley along an intermittent drainage at an elevation of about 5,600 feet.

Proposed reservoir site



Chimney Hollow Reservoir would require construction of a 346-foot-high dam to impound about 90,000 AF of water. The maximum normal pool elevation would

be 5,866 feet. The reservoir at the maximum water surface elevation would inundate about 742 acres. Preliminary design indicates a rockfill dam type would be appropriate, but the specific type of rockfill dam would not be determined until final design. Appurtenances to the dam would include a spillway to convey a peak discharge of about 2,100 cfs. A 36-foot-high saddle dam would be required at the southern end of the reservoir.

Water would be conveyed to the East Slope via existing C–BT facilities. Water would be conveyed to Chimney Hollow Reservoir using a new buried pipeline that would connect to existing C–BT facilities upstream of the Flatiron Power Plant. New conveyance facilities would include pipelines and an energy dissipation facility from the Flatiron Penstocks to the Chimney Hollow inlet/outlet along with connections to the existing Carter Lake pressure conduit. Modifications in the various pipeline connections may be made during final design. No project facilities would be constructed in Grand County. The only construction and facilities in Grand County will be for mitigation and enhancement plans. This 2012 1041 Permit is to cover both the WGFP and the mitigation and enhancement plans.

Operations

Windy Gap water would be diverted from the existing point of diversion at Windy Gap Reservoir and Pump Plant located below the confluence of the Fraser and Colorado Rivers, near the Town of Granby. The existing Windy Gap pipeline would pump water to Granby Reservoir, which would then be delivered to the East Slope using existing C–BT facilities. Water would be routed to Chimney Hollow Reservoir using new pipeline connections discussed previously. No new West Slope infrastructure is needed to divert or convey water to the East Slope. In addition to storage in Chimney Hollow, Windy Gap water will also be stored in Granby Reservoir when unused capacity is available as is currently done.

The delivery of Windy Gap water to the East Slope, either for storage or to meet Participant demand depends on several factors including the physical and legal availability of water for diversion, storage space in Granby Reservoir, capacity in the Adams Tunnel, and space in Chimney Hollow Reservoir. Prepositioning would be used to facilitate delivery of Windy Gap water and increase yield. Prepositioning would involve the use of available Adams Tunnel capacity to deliver C–BT water into Chimney Hollow to occupy storage space that is not occupied by Windy Gap water. Delivery of C–BT water to Chimney Hollow in this manner would maintain Chimney Hollow full most of the time. The delivery of C–BT water from Granby Reservoir into Chimney Hollow would create space for Windy Gap water in Granby Reservoir. When Windy Gap water is diverted into Granby Reservoir, the C–BT water in Chimney Hollow would be exchanged for a like amount of Windy Gap water in Granby Reservoir. To maintain higher water levels in Granby Reservoir, prepositioning would not occur at times that the water level is projected to fall below 8,250 feet. Prepositioning would not require any additional structural facilities to operate and would not change the storage or yield of C–BT Project water. The total amount of C–BT water stored in either

Granby Reservoir and/or Chimney Hollow Reservoir would be limited to a combined maximum of 465,568 acre feet of active, usable storage.

Project Participants would take delivery of Windy Gap water from Chimney Hollow Reservoir via releases through existing C–BT facilities. MPWCD would use its Windy Gap water as a source of augmentation water to replace out-of-priority depletions in Grand or Summit Counties. Contractees who benefit are most major water providers in Grand and Summit Counties, including: Grand County Water and Sanitation District No. 1, the Town of Fraser, and the Winter Park Water and Sanitation District. Additional information regarding proposed WGFP facilities and operation is included in Section 2.4 of the FEIS.

b. Current and future needs for such development:
The purpose of the WGFP is to deliver a firm annual yield of about 30,000 AF of water from the existing Windy Gap Project to meet a portion of the water deliveries anticipated from the original Windy Gap Project and to provide up to 3,000 AF of storage to firm water deliveries for the MPWCD. Firm water deliveries from the WGFP are needed to meet a portion of the existing and future demands of the Project Participants. Boulder and Estes Park also own allotment contracts for the Windy Gap Project, but neither are Project Participants in the WGFP.

As part of a proposed agreement with the Subdistrict, MPWCD will receive water from the WGFP, but will not be provided with ownership of storage in Chimney Hollow Reservoir.

Windy Gap Project water is currently diverted from the Colorado River just downstream of the confluence of the Colorado and Fraser rivers at Windy Gap Reservoir. Once collected, it is pumped to Granby Reservoir for storage and conveyance through C–BT Project facilities and ultimate delivery to Windy Gap project allottees on the East Slope.

In the original Windy Gap EIS, firm annual deliveries to the allottees of the Windy Gap Project were estimated to be about 48,000 AF, following conveyance and evaporation losses and allocations to the MPWCD. Because each unit of Windy Gap water is entitled to 1/480th of the annual yield of the Windy Gap Project, a unit was expected to produce a yield of 100 AF per year. Actual Windy Gap yield between 1985 and 2004 averaged less than 10,000 AF per year, which is an average annual yield to the Project Participants of about 20 AF/unit, or about 20 percent of the anticipated deliveries. As discussed in Section 3.5.1.4 of the FEIS, Windy Gap pumping from 2005 to 2008 has increased the average annual yield to about 14,700 AF. Windy Gap diversions were less than allowable immediately following construction because demand was less than available supplies. Had Windy Gap unit holders used all available Windy Gap water, the average long-term yield (using hydrology from 1950 to 1996) would have been about 55 to 60 AF per unit.

No Windy Gap water was diverted in 7 of the 23 years between 1985 and 2008 because of either a lack of available storage space in Granby Reservoir or Windy Gap water rights were not in priority during dry years. During this period, no Windy Gap pumping occurred in 1986; 1996 through 2000; or in 2002; and only 300 AF were pumped in 2004. The lack of pumping, with the exception of 2002 and 2004, was due to a lack of available storage space in Granby Reservoir and/or limited demand for Windy Gap water. No Windy Gap water was diverted in 2002 because the Windy Gap Project's junior water right never came into priority and a dry year in 2004 also limited pumping. Because of the inability of the Windy Gap Project to provide reliable yields in both wet and dry years, the current firm yield is zero. Firm yield is generally defined as the amount of water that can be delivered on a reliable basis in all years and is typically determined by yield in dry years. For the Windy Gap Project, lack of available storage space in wet years also affects yield.

A similar evaluation of the firm annual water storage and yield available for use by the MPWCD indicates its firm yield is zero. Although water may be available for diversion for MPWCD in the early spring, there are a number of years when storage in Granby Reservoir is not available to hold its supplies. Because MPWCD uses its Windy Gap water to augment or replace previous water diversions, releases from Granby Reservoir typically do not occur until September or October. Consequently, Windy Gap water stored for the MPWCD during spring runoff in wet years is often spilled prior to its release for augmentation later in the year.

Windy Gap allottees and the MPWCD have not been able to rely on Windy Gap water for water deliveries in some dry or wet years. A summary of the reasons why the annual firm yield and deliveries from the Windy Gap Project have been substantially less than 48,000 AF are as follows:

- In dry years, the Windy Gap Project has not been able to divert water because more senior water rights upstream and downstream have a higher priority to divert water and "call out" the more junior Windy Gap Project water right. In addition, the Windy Gap Project is required to bypass water to maintain certain minimum streamflows downstream of the Windy Gap diversion dam. Thus, the Windy Gap Project cannot divert if streamflows immediately below the diversion dam on the Colorado River are less than 90 cfs, if flows at the Williams Fork confluence are less than 135 cfs, or if flows at the Troublesome Creek confluence are less than 150 cfs.
- Under the contract between the Subdistrict, Northern Water, and Reclamation, water conveyed and stored for the C–BT Project has priority over water conveyed and stored for the Windy Gap Project. In wet years when the C–BT system is full, there is no conveyance or storage capacity in the C–BT system for Windy Gap Project water. Windy Gap Project water stored in the C–BT system is sometimes spilled from the system to make room for C–BT Project water. Thus, Windy Gap Project water cannot be stored or carried over in some wet years.

- The Windy Gap Project was built to meet both current and future needs of the Project allottees. During the years immediately after construction, some of the allottees' demands did not require the full use of their Windy Gap Project water, so not all available water was diverted. As demand increased, the need for Windy Gap Project water also increased.

While the inability to divert water in dry years was anticipated when the Windy Gap Project was constructed, the inability to divert and store during an extended set of wet years, such as the late 1990s, was not. Because of the deficiency in deliveries, Project Participants requested that the Subdistrict pursue measures through a joint project to firm Windy Gap water deliveries. Project Participants determined that a cooperative project was the most efficient means to firm Windy Gap water deliveries rather than each entity developing separate storage for its own share of Windy Gap water.

c. Inventory of existing water projects presently serving the municipality or area in question and excess service capacity of each project:

Reclamation conducted an independent evaluation of the estimated current and future water requirements for each of the Project Participants to determine the need for the proposed project. The following discussion provides an overview of the existing water supplies, projected water demand, and the need for the proposed WGFP. Additional information on the Project Participants water supply and projected demand is included in the *Windy Gap Firming Project Purpose and Need Report*, which was prepared as part of the NEPA/EIS process.

Each Project Participant has developed a unique portfolio of water supply sources to meet existing and anticipated water needs. A diversity of water supply sources is generally preferred to ensure reliable deliveries. Water supplies for East Slope Project Participants generally include multiple sources, such as direct flow diversion rights from the Big Thompson River, St. Vrain River, and Cache la Poudre River, ownership of shares of ditch water from various irrigation companies, storage rights in existing reservoirs, ground water, and transbasin water imported from the West Slope.

Firm yield, also referred to as the dry year yield, is an estimate of the amount of water that is available during a defined period or condition. The definition period often encompasses a 50-year historical record that includes several dry years. Firm yield planning typically does not include extreme drought events such as a 1 in 100 year drought because securing this amount of water and the associated cost is often not feasible. Because water yield from the various water supply sources can fluctuate substantially from year to year, water providers require adequate storage to capture flows during wet years to meet their dry year water needs. The table below provides a compilation of the 2005 annual firm water supplies available for each Project Participant.

Summary of Participant 2005 annual firm water supply (potable and nonpotable).

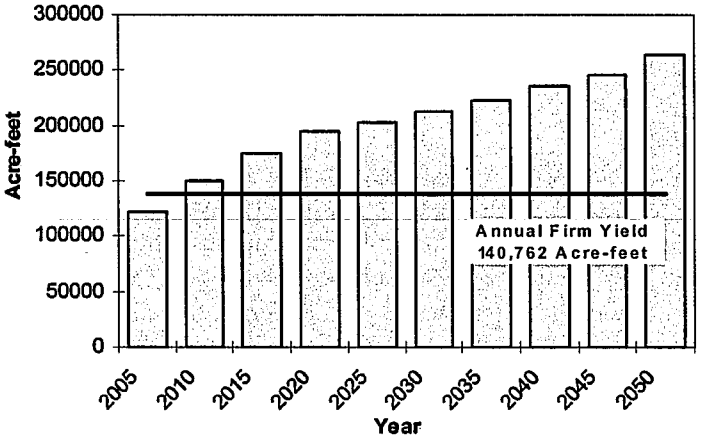
Participant	Annual Firm Yield (AF)	Participant	Annual Firm Yield (AF)
Broomfield	13,739	LTWD	5,510
CWCWD	2,786	Longmont	30,963
Erie	2,145	Louisville	5,063
Evans	9,298	Loveland	17,792
Fort Lupton	3,538	MPWCD	0
Greeley	43,850	Platte River	0
Lafayette	4,534	Superior	1,544
TOTAL			**140,762**

Additional information about individual Participant water supplies is available in the FEIS, Section 1.7 and the Purpose and Need Report, Section 9 and Appendices available on CD with this Application

Projected Shortages in Firm Yield

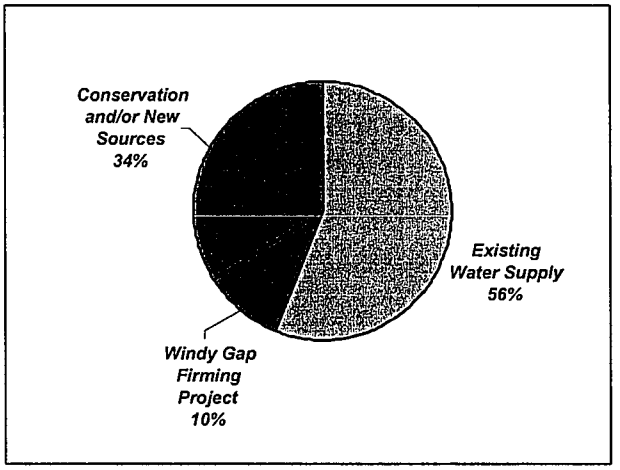
The evaluation of the water supplies and demands for each Project Participant indicates that projected water demand would exceed available firm yield in the near future. Project Participants have a firm water supply of about 141,000 AF and a demand of about 120,000 AF in 2005. By 2030, the cumulative water demand for all East Slope Project Participants is projected to reach about 205,000 AF, which would result in a shortage in firm yield of about 64,000 AF. Water demand for East Slope Participants is projected to increase to about 251,000 AF by 2050 and shortages in firm yield at that time would increase to more than 110,000 AF. An additional water demand of up to 17,000 AF by 2030 is projected for West Slope water users partially served by the MPWCD. The economic downturn experienced from approximately 2008-2012 does not reduce the long term water supply demands of the Participants. The lack of a reliable firm water supply would affect the ability of all of these entities to meet anticipated water needs in dry years. The projected shortages in firm water supply over the 2005 to 2050 period are shown in the following bar chart.

Combined future total water raw water requirements and current annual firm yield for WGFP Participants.



Existing water supplies will meet the current water needs for most Project Participants during average years of precipitation, but supply shortages in dry years are expected to occur within the next 20 years for all of the Project Participants.

Summary of projected 2050 Participant water supply sources.



Conservation

Project Participants have implemented a variety of effective conservation measures to reduce water demand. Additional improvements in water use efficiency and delivery systems are expected to continue in the future and are an important component in meeting future water supply requirements. While continued conservation is necessary, it does not eliminate the need for the proposed WGFP. Conservation measures may delay the timing for additional water deliveries, but would not change the ultimate need for additional water

supplies. The above chart shows that even with the WGFP, a 34% shortage exists which will be met with a combination of conservation and new supplies. Projected future water requirements indicate that even with the WGFP, Project Participants will need additional conservation savings, or for some Project Participants, additional sources of water to meet from about 10 to 65 percent of 2050 future water needs.

Summary

Projected water demands indicate that the Project Participants individually and collectively will have a shortage in annual firm yield in the near future. The projected shortage in firm water supply supports the need for the WGFP to firm about 30,000 AF of WGFP water for East Slope Project Participants. The WGFP would provide about 10 percent of the cumulative water supply needs for the Project Participants in 2050. Other new sources of water including conservation measures would be needed to meet projected shortfalls.

Firm yield for the WGFP also depends on future water development in the Colorado River basin and its effect on Windy Gap water rights; thus, actual firm yield may differ from firm yield goals.

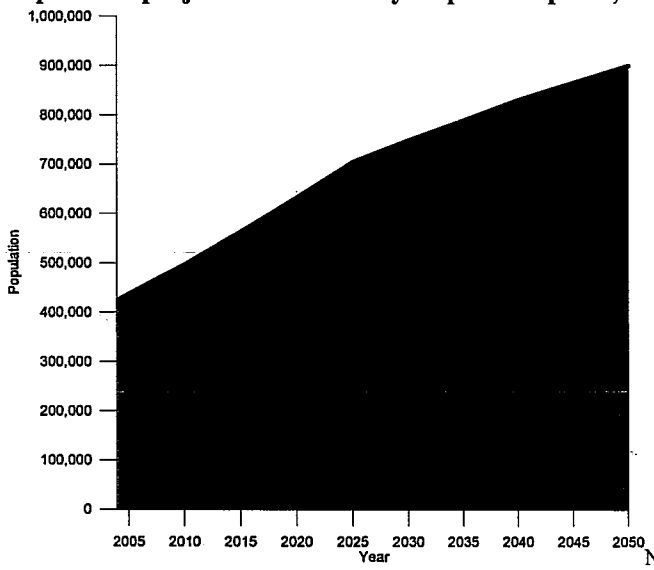
d. Population trends, projections, and growth rates (if a municipal project):

The combined population for East Slope Project Participants (excluding Platte River) is projected to increase from about 426,000 in 2004 to about 750,000 by 2030 and 901,000 by 2050. The projected population increase of the combined Project Participants indicates an increase of 324,000 persons, or 76 percent through 2030. This is equivalent to an average annual growth rate of about 2.2 percent per year during this period, which is comparable to the projected average annual growth rate of 2.1 percent by the Colorado State Demographer through 2030 for counties within which these Project Participants are located.

Population growth rate projections for Project Participants, excluding Platte River, are estimated at 1.6 percent from 2004 through 2050, which is less than the 2.2 percent from 2004 through 2030. This indicates a slowdown in growth rates as the Project Participants get larger and as some approach build-out. Half the Project Participants are predicted to reach residential population build-out before 2050, although commercial and industrial growth is predicted to continue for these communities beyond 2050. The following figure depicts 2003 through 2050 population projections for the Project Participants, excluding Platte River because it is a power utility. Although population growth rates fluctuate over time and have slowed due to economic conditions in 2009-2010, it is reasonable to anticipate that the population of the areas serviced by Project Participants will continue to grow in the future. The Colorado Demographic Office October 2009 population projections for the counties where the Project Participants are located projected average annual growth rates ranging from 1.0 percent to 3.3 percent between 2010 and 2030. These recently projected rates are similar to those projected for the Project Participants.

The projected water supply shortages are based on these population projections.

Population projections for Windy Gap Participants, 2004 to 2050.



Note: Platte River is excluded from the figure.

e. Primary source of proposed water resource: The Upper Colorado River at Windy Gap Dam and Pumping Plant.

3. Verification that the proposed water project will not conflict with Federal, State, regional or County planning policies or regulations applicable to land or water resources – Grand County 5-304 (3):

The Subdistrict is required by various laws and regulations to comply with the following regulations. It is anticipated that the 1041 Permit will be contingent upon compliance with these regulations.

- Bureau of Reclamation – Record of Decision
- Corps of Engineers – Record of Decision, 404 Permit
- State of Colorado – Fish and Wildlife Mitigation Plan (approved) and CDPHE 401 certification
- Northwest Colorado Council of Governments Clean Water Act 208 Plan

4. Detail proposed methods of insuring efficient use of water resources within the municipality or industrial area and the source development area. Such methods should consider metering of all users, examination of rate structures to discourage waste and recycling of water for reuse where permissible by Colorado water law – Grand County5-304 (4):

Water conservation is an important strategy used by the Project Participants to improve the efficiency of water use and delivery to reduce overall demand. All Project Participants have an incentive to use water efficiently, which leads to reduced costs associated with the supply, treatment, and distribution of water. Common measures by Project Participants to reduce household water use include requirements and rebates for water efficient fixtures and appliances, regulations or incentives to reduce outdoor water use, including limits on the number of watering days and the times of the day, use of Xeriscaping™, and educational programs. All of the municipal Project Participants are 100 percent metered to encourage reduced water use. Most Project Participants use an increasing block or tiered rate structure to promote conservation. Other Project Participants have found that a uniform water rate in combination with other conservation measures effectively reduces water use. Industrial water users served by municipalities and water districts are likewise encouraged to implement measures to reduce demand. Platte River's conservation effort includes use of effluent for all of its cooling needs and the reuse and recycling of water to extinction. A summary overview of conservation measures used by Project Participants is shown in the following chart.

WGFP Participant water conservation practices.

PARTICIPANT	Education	Rebates or Incentives	Water Efficient Fixture/Appliance Requirements	Universal Metering	Water Audits	Retrofitting Old Mains and Meters; Pipe Replacement	Landscape Ordinance/Guidelines	Outdoor Watering Restrictions	Xeriscape Planning on City/Town Lands	Water Reuse	Increasing Block Rates Pricing	Leak Detection	Rainfall/wind Sensors	Nonpotable Irrigation	Soil Amendments on New Lawns
Broomfield	E	P	X	X	P	X	X	X	X	E		X	I	X	X
CWCWD[1]	E		X	X		X				X	X	X			
Erie[1]	E	X	I	X	X	I	X	X	X	I	X	X	X	E	
Evans[1]	E	I	I	X	I	I	E	X	I		X	X	E	E	E
Fort Lupton[1]	E	I		X				E		I	X	E	I	X	
Greeley[1]	E	E	X	X	X	X	E	X	X	E	[3]	X	I	X	X
Lafayette[1]	E	I	I	X	E	X	X		X		X	X	E	X	X
Longmont[1]	E	X	X	X	X	E	X	X	X	X	X	E	X	X	I
Louisville	X	X	X	X	I/E	X	X		X	X	X	X	X	X	
Loveland	X	X	X	X	X	X	X	X	X	I		X	X	X	X
LTWD[1]	X	X		X		X		X		X	X	X		I	
MPWCD[2]	X	X	X	X			X	X			X	X			
Platte River			X		X	X				X		X			
Superior	X		X	X						X	X	X			

Note: X = Already implemented; I = Implementation in progress; E = Expanding the program; P = Proposed.
[1] State-approved water conservation plan.
[2] Not all of these programs are used by all of the water providers in MPWCD.
[3] Greeley is currently examining a custom tiered rate structure.

Project Participants also have implemented various measures to improve the efficiency and delivery of water supplies. A number of the Project Participants have experienced rapid expansion of their systems in recent years; therefore, because the majority of their transmission and distribution systems are new, system losses are minimal. Supply-side measures used by Project Participants include leak detection, pipe replacement and lining, and monitoring. Technological improvements at water treatment and wastewater facilities also contribute to water savings.

Project Participants are involved in a number of programs to reduce water use and improve conservation measures. The Subdistrict is a raw water provider and cannot enforce water conservation through its water allotment contracts. However, to assure that water from the Colorado River is used as efficiently as possible, Reclamation has included a requirement in the FEIS that all Project Participants have water conservation plans in accordance with the requirements of CRS § 37-60-126 prior to the initial delivery of any water after construction of the WGFP (see item 1b in Table 3-164 of the FEIS). This requires that entities consider a number of water-saving measures and programs, including water rate structures and other incentives to encourage water use efficiency. Nine of the Participants—Broomfield, Erie, Greeley, Evans, Fort Lupton, Central Weld, Lafayette, Little Thompson Water District, and Longmont—have approved Colorado Water Conservation Board (CWCB) conservation plans since the passage of the Water Conservation Act of 2004 (Colorado House Bill 04-1365). Louisville anticipates completing its plan in 2012. Platte River is an industrial water user not covered by HB 04-1365, but implements measures for efficient use and reuses its water supply to extinction. The municipalities served by the MPWCD are not required to have a state-approved conservation plan, but most entities practice a variety of conservation measures. As a component of the Water Conservation Act, Project Participants would update their conservation plans approximately every seven years and thus, water conservation measures will continue to be refined in the future. For those Project Participants with state-approved water conservation plans, projected conservation savings within the next 10 years range from about 6 to 17 percent.

In 2005, the cities and towns of Broomfield, Lafayette, Longmont, Louisville, and Superior signed the Denver Metropolitan Local Governments' Water Stewards Memorandum of Understanding, a commitment to water conservation and stewardship. The Boulder-based Center for Resource Conservation offers a water conservation program that includes an irrigation audit program and suggestions for irrigation improvements. Erie, Lafayette, Greeley, Longmont, and Louisville participate in this program. In addition, the Water Efficiency Grant Program Act of 2005 (Colorado House Bill 1254) created a grant program to provide entities with financial assistance to implement water conservation measures and promote water conservation education and public outreach to assist with reductions in water use.

Many of the Project Participants successively use, or are planning to successively use, Windy Gap supplies to minimize the acquisition of new supplies. Colorado water law allows for the reuse and successive use of transbasin imports such as Windy Gap water, and requires that East Slope importers should, to the maximum extent feasible, reuse and make successive use of foreign water to minimize the amount of water removed from Western Colorado.

Water reuse includes the subsequent use of imported water for the same purpose as the original use, such as the treatment of sewage to potable water standards for redistribution into the treated

water system. Successive use refers to a subsequent use of imported water for a different purpose. For example, successive use may involve diversion from a wastewater treatment plant, and then conveyance to storage or distribution as nonpotable water for irrigation of parks, golf courses, and landscaping. Successive use allows a portion of outdoor water uses to be met without using raw water treated to drinking water standards (potable water). Project Participants also have the right to sell, lease, or exchange effluent-containing imported water after distribution through their water system and treatment. Several Project Participants, including Broomfield, Louisville, and Superior, have developed nonpotable irrigation systems, including conveyance and storage, to successively use their Windy Gap supplies. The Platte River Power Authority successively uses Windy Gap water to meet the cooling needs of the Rawhide Energy Station. Some Participants successively use Windy Gap water to meet augmentation or return flow obligations. Successive use of Windy Gap supplies for these purposes does not directly satisfy potable demands identified for a Project Participant, but it helps meet other legal or contractual needs of the Project Participant and results in efficient use of Windy Gap water.

Some entities have raised concerns regarding the use of WGFP water for hydraulic fracturing (fracking) of oil and gas wells on the East Slope. Windy Gap water rights and the allotment contracts allow use of Windy Gap water for domestic, irrigation, municipal and industrial use provided that the first use of the water is made within the boundaries of the Subdistrict. Fracking of wells is considered industrial use under Colorado law and Subdistrict policies. Reuse of Windy Gap water may be made outside of the Subdistrict boundaries as allowed by Colorado law. The WGFP Purpose and Need statement, and the analysis of water demand and use in the FEIS, is based on water demand projections by each Project Participant which does not include the newly developed demand for water for fracking of wells. In other words, even without the newly developed demand for fracking water, the Participants have demonstrated a clear need for the WGFP.

More details about Project Participant's reuse of Windy Gap water is available in the FEIS and the Purpose and Need Report.

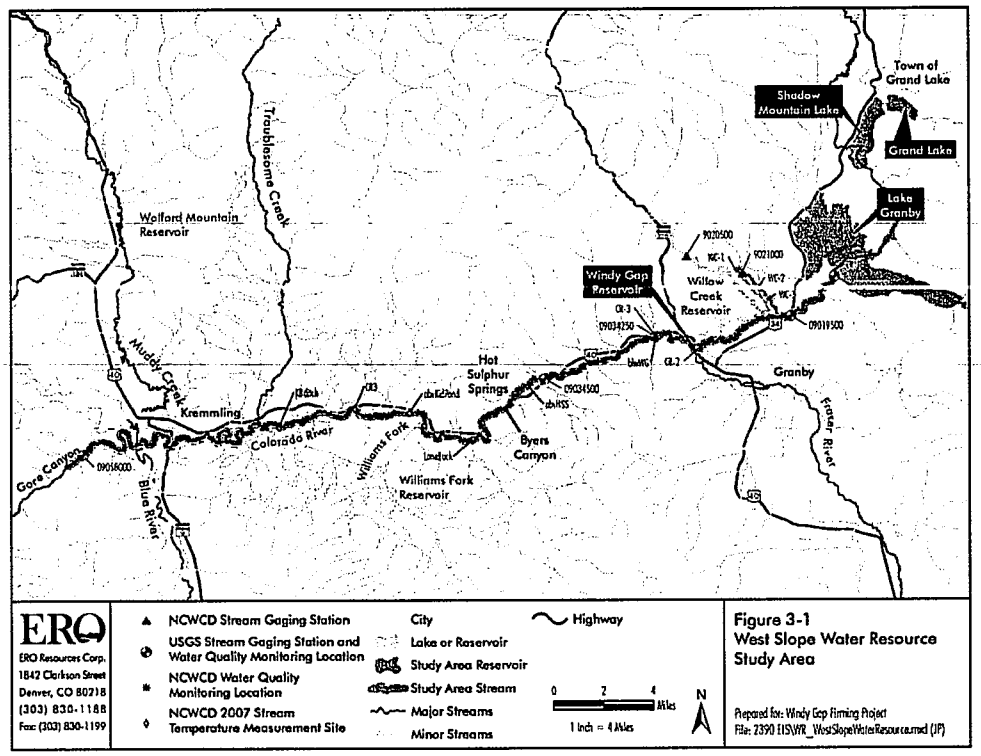
5. In instances where municipal or industrial wastewaters or stormwater disposal methods are not subject to and regulated by other State and/or Federal statutes or regulations, detail the proposed methods by which stormwaters or wastewaters will be prevented from contaminating aquifers – Grand County 5-304 (5):

All construction activity of the WGFP will occur in Larimer County therefore this regulation is not applicable in Grand County. Applicant will comply with all Larimer County regulatory requirements.

6. Provide assurance that the proposed municipal or industrial water project is capable of supplying water of a quality to be determined by the Colorado Department of Health – Grand County 5-305 (6):

CDPHE issues 401 certification which is a certification under the Clean Water Act of compliance with State law. The Applicant is seeking 401 Certification. The 2012 Permit can be issued conditioned upon receipt of the 401 Certification.

7. Identify and locate on a map of an appropriate scale the juxtaposition of any of the following features present in the source development area and detail the potential impact of the municipal or industrial water project upon each [of the following] feature[s] – Grand County 5-305 (7a through g):



a. Marshlands and wetlands: FEIS, Section 3.11.2.4:
In Larimer County about 1.6 acres of wetlands would be permanently impacted and about 0.1 acre of wetlands would be temporarily disturbed, none in Grand County, from construction of a 90,000 AF Chimney Hollow Reservoir and facilities. Wetlands that could be indirectly affected by changing hydrologic conditions along streams and surrounding reservoirs are discussed in *Effects to Riparian Vegetation* (FEIS, Section 3.10.2.10, which is summarized below:

Colorado River. The FEIS found that projected changes in channel maintenance flows and the slight reduction in the percentage of time that flows exceed bankfull discharge compared to existing conditions are not expected to alter channel morphology or sediment movement on the Colorado River. No aggradation or degradation of the stream channel is predicted. As a result, the conditions for growth, establishment, maintenance, and periodic scouring of riparian vegetation

below Granby Reservoir or the Windy Gap diversion are not expected to change substantially.

The FEIS found that the projected magnitude of changes in stream stage is unlikely to adversely affect riparian and wetland vegetation along the Colorado River. In the study area, most of the Colorado River is a gaining stream; thus, contributions from adjacent lands likely play an important role in supporting riparian vegetation. Riparian vegetation adjacent to the river would continue to be supported by streamflow, ground water discharge, and irrigation return flows. Existing instream flow requirements below Granby Reservoir and below the Windy Gap diversion that contribute to supporting riparian vegetation would not change.

Willow Creek. Examination of bankfull discharge indicates that the 2-year peak discharge would decrease by less than 1 percent. It is unlikely that there would be a significant effect to stream morphology or change in sediment transport or deposition that would affect maintenance of riparian vegetation. (Stream stage data are not available for Willow Creek but average monthly streamflow during the growing season would decrease from 0 to 19 percent under No Action compared to existing conditions and from about 0 to 36 percent. These changes are not expected to substantially affect alluvial ground water.) It is unlikely that riparian vegetation along Willow Creek would be adversely affected by the projected changes in streamflow given the natural contribution from ground water discharge, irrigation return flows, and continued Willow Creek Reservoir minimum releases of at least 7 cfs.

Additional information regarding effects on wetlands and riparian vegetation is available in the FEIS (sections 3.10 and 3.11).

b. Groundwater recharge areas: Refer to FEIS Section 3.6 – no effects on groundwater levels and groundwater quality are anticipated in Grand County.

c. Potential natural hazards: There will be no impacts to natural hazards in Grand County.

d. Forests and woodlands: There will be no impacts to forests and woodlands in Grand County.

e. Critical wildlife habitat:

The only critical habitat affected by the Project is the 15 Mile Reach of the Colorado River near Grand Junction. This impact is addressed with participation in the Upper Colorado River Recovery Program. The 15 Mile Reach will benefit from the additional water provided under the mitigation and enhancement provisions.

f. Public, outdoor recreation areas:

Grand Lake water quality which affects recreation at Grand Lake has been the focus of concern under existing conditions. The Project is designed to offset all identified impacts of the WGFP. Concerns with the existing conditions in Grand Lake are addressed by participation of Northern Water and the Subdistrict in several ongoing processes, which are described below.

WGFP FEIS Evaluation of Three Lakes Water Quality

Potential effects to water quality were evaluated for the Three Lakes system (Granby Reservoir, Shadow Mountain Reservoir, and Grand Lake), using reservoir water quality models to estimate the water quality effects.

While it is recognized that Grand Lake water quality is the primary concern related to recreation, the predicted impacts on the Three Lakes system without the proposed mitigation measures are summarized below.

- **Granby Reservoir:** Total phosphorus concentrations are predicted to increase under all alternatives and total nitrogen concentrations would increase under the No Action Alternative and Proposed Action. Chlorophyll a concentrations (algae) are predicted to increase under the Proposed Action, but there would be no change in water clarity as measured by the Secchi-disk depth for any of the alternatives.

Granby Reservoir predicted water quality changes (on an average annual basis) compared to existing conditions.

Parameter	Alternative 1 No Action	Alternative 2 Proposed Action
Total phosphorus (µg/L)	+6.3%	+12.7%
Total nitrogen (µg/L)	+0.3%	+0.7%
Chlorophyll a (µg/L)	No Change	+2.4%
Peak chlorophyll a (µg/L)	No Change	-1.5%
Secchi-disk depth (m)	No Change	No Change
Trophic state	No Change	No Change
Minimum DO (mg/L)	-2.2%	-4.4%
TSS (mg/L)	No Change	+4.3%

- **Shadow Mountain Reservoir:** All alternatives would increase phosphorus concentrations and total nitrogen would increase in Alternatives 1 and 2. Chlorophyll a concentrations would increase in Alternatives 1 and 2. Water clarity would not change in any alternative. Dissolved oxygen would decrease under the Proposed Action and would not change in other alternatives.

Shadow Mountain Reservoir predicted water quality changes (on an average annual basis) compared to existing conditions.

Parameter	Alternative 1 No Action	Alternative 2 Proposed Action
Total phosphorus (µg/L)	+5.6%	+11.3%
Total nitrogen (µg/L)	+1.1%	+1.8%
Chlorophyll a (µg/L)	+1.8%	+1.8%
Peak chlorophyll a (µg/L)	+3.4%	+6.8%
Secchi-disk depth (m)	No Change	No Change
Trophic state	No Change	No Change
Minimum DO (mg/L)	No Change	-1.4%
TSS (mg/L)	+5.0%	+5.0%

- **Grand Lake:** Total phosphorus concentrations are predicted to increase under both and total nitrogen is predicted to increase under the No Action Alternative and Proposed Action. Chlorophyll a concentrations would increase under both alternatives and Secchi-disk depth would decrease under both alternatives. Dissolved oxygen concentrations would decrease under all alternatives.

Grand Lake predicted water quality changes (on an average annual basis) compared to existing conditions.

Parameter	Alternative 1 No Action	Alternative 2 Proposed Action
Total phosphorus (µg/L)	+6.0%	+12.0%
Total nitrogen (µg/L)	+0.4%	+1.6%
Chlorophyll a (µg/L)	+4.2%	+6.1%
Peak chlorophyll a (µg/L)	+4.1%	+5.4%
Secchi-disk depth (m)	-3.8%	-3.8%
Trophic state	No Change	No Change
Minimum DO (mg/L)	-11.1%	-7.4%
TSS (mg/L)	No Change	+5.6%

- No additional water quality standards would be exceeded at the Three Lakes. Lower DO levels would contribute to continued exceedance of the manganese standard in the Three Lakes.

The primary concern related to recreation in Grand Lake is related to clarity in the reservoir. In 2008, the Colorado Water Quality Control Commission adopted a narrative water quality standard for clarity in Grand Lake consisting of "the highest level of clarity attainable, consistent with the exercise of established water rights and the protection of aquatic life." The Commission also adopted a numeric standard, with an effective date of January 1, 2015, of 4 meter Secchi disk depth with 85% compliance of measurements in any given year for the

months of July, August, and September. Other recreational concerns include growth of aquatic weeds in Shadow Mountain Reservoir.

The WGFP would result in additional pumping from the Colorado River at Windy Gap Reservoir with deliveries to Granby Reservoir and subsequent pumping and conveyance through Shadow Mountain Reservoir and Grand Lake prior to delivery through the Adams Tunnel to the East Slope.

The WGFP does not introduce or directly contribute to the nutrients in the Colorado River that are pumped into the Three Lakes system. There are a number of sources that affect the nutrient concentrations in the Colorado and Fraser Rivers, including, waste water treatment plant discharges, livestock, agricultural runoff, and other nonpoint sources such as stormwater runoff from roads and developed areas. Water quality modeling of the Proposed Action predicts that the WGFP would deliver an additional 6,128 kg/year of total nitrogen and 778 kg/year of total phosphorus compared to existing conditions into the Three Lakes on an average annual basis.

Nutrient concentrations are of concern in the Three Lakes system because of the role they play in increasing algae growth (measured as chlorophyll *a*), reducing clarity (Secchi disk depth), and increasing lake productivity (trophic level). Nutrients in the reservoir also affect dissolved oxygen concentrations and the concentrations of metals such as manganese.

Proposed Mitigation Measures

To mitigate nutrient loading to the Three Lakes associated with WGFP pumping, the Subdistrict would be required to submit a nutrient reduction plan to Reclamation and the Corps that will result in a reduction in nutrient loading to the three lakes, equal to or greater than, the increase in nutrient loading from the WGFP. The plan must be in place prior to the construction and operation of the WGFP. To offset the predicted nutrient loadings into the Three Lakes and reduce the associated water quality effects, the Subdistrict plans to implement both point source and nonpoint source nutrient reduction measures upstream from the Windy Gap Reservoir diversion point. The following sections provide an overview of the currently planned point and nonpoint source nutrient reduction measures the Subdistrict has identified.

Point Source Nutrient Reduction. Improvements to the three largest waste water treatment plants operations—Granby Sanitation District, Fraser Sanitation District, and Three Lakes Sanitation District, were evaluated to determine potential treatment process upgrades that would reduce nutrient discharges. Modeling of operations and upgrades determined that the most cost effective and efficient method for reducing nutrient discharges would be a series of improvements to the Fraser Sanitation District plant located just north of the Town of Fraser.

Proposed Fraser Sanitation District plant improvements are estimated to reduce annual total nitrogen discharges to the Fraser River by 5,076 kg/year and total phosphorus loading by 6,566 kg/year. Because the WGFP only pumps a few months out of the year and does not pump all of the water in the river, the reduction in nutrient loading to the Three Lakes was based on projected WGFP pumping volumes from April to August. Thus, the actual reduction in nutrient loading to the Three Lakes is about 10 to 15 percent of total nutrient reductions from plant improvements, or 822 kg/year of total nitrogen and 774 kg/year of total phosphorus. The Fraser River below the plant and the Colorado River downstream from the Fraser River confluence would benefit from the year-round reduction in nutrient discharges and the Three Lakes would benefit from reduced nutrient delivery when the WGFP is pumping. Point source nutrient reduction measures would offset about 13 percent of the projected WGFP nitrogen loadings into the Three Lakes and about 99 percent of the phosphorus loadings.

Summary of nutrient reductions to Three Lakes with mitigation measures.

Nutrient Loading and Reduction Sources	Total Nitrogen	Total Phosphorus
	kg/year	
Nutrient Reduction Target = Projected increase in nutrient loading to the Three Lakes from the WGFP as compared to existing conditions	**6,128**	**778**
—Point source nutrient reduction – Fraser WWTP	822	774
—Nonpoint source nutrient reduction – E Diamond H Ranch	684	117
—Nonpoint source nutrient reduction – C-Lazy-U Ranch	1,836	237
Total identified nutrient reduction to Three Lakes	**3,343**	**1,128**
Additional nutrient reduction needed to offset loading to Three Lakes	**2,785**	**(350)**
Future nutrient reduction projects to be identified prior to construction of WGFP in cooperation with Reclamation and Corps of Engineers.	**2,785**	**0**
Total Change in Nutrient Load to Three Lakes from WGFP	**0**	**(350)**

To implement these improvements, the Subdistrict and Fraser Sanitation District would enter into an agreement specifying the improvements and Subdistrict funding. Capital costs for improvements are estimated at about $3.3 million and annual operating costs would increase about $120,000 to $230,000. The improvements would be implemented prior to completion of Chimney Hollow Reservoir and operation of the WGFP.

Nonpoint Source Nutrient Reduction. The Subdistrict has identified several nonpoint source nutrient reduction measures to further reduce nutrient loadings from the WGFP. Nonpoint nutrient reduction measures focused on improved agricultural practices and reduced fertilizer application for several parcels of land in the Willow Creek watershed, which is tributary to the Colorado River above Windy Gap Reservoir as described below. Like point source nutrient reduction measures, the watersheds would see a greater reduction in nutrients than the actual nutrient reduction to the Three Lakes. Thus, there are beneficial effects to a broader geographic area than just the nutrient reduction to the Three Lakes.

E-Diamond H Ranch—This 265-acre ranch located on Church Creek, a tributary to Willow Creek, is currently irrigated from the Red Top Ditch and periodically fertilized for hay production. To reduce nutrient discharges from runoff, the land would no longer be irrigated and all fertilizer application would cease. These measures are predicted to reduce total nitrogen loading to the Three Lakes by 685 kg/year and total phosphorus by 117 kg/year. The Subdistrict would enter into an agreement with the E-Diamond H Ranch to implement the changes in land management for this property prior to implementation of the WGFP.

C-Lazy-U Ranch — Several ranch management practices and best management practices (BMPs) would be implemented on the 300 acre C-Lazy-U Ranch located immediately upstream of Willow Creek Reservoir to reduce nutrient discharges. Primary improvements include a reduction in chemical fertilizer application, better manure management, use of vegetated buffer strips adjacent to Willow Creek to capture nutrients in surface water runoff, and streambank restoration to reduce erosion. A reduction in nutrient loadings from the C-Lazy-U Ranch would reduce direct nutrient loadings into Granby Reservoir via the Willow Creek Feeder Canal deliveries from Willow Creek Reservoir as well as releases from the reservoir that are pumped to Granby Reservoir from Windy Gap Reservoir. Implementation of these improvements would reduce total nitrogen loading to the Three Lakes by 1,836 kg/year and total phosphorus by 237 kg/year from the C-BT deliveries from Willow Creek Reservoir to Granby Reservoir. The Subdistrict has entered into an agreement with the C-Lazy-U Ranch to implement the changes in land management for this property.

Total Nutrient Reductions. The incremental nutrient loadings from the Proposed Action compared to existing conditions would be an additional 6,128 kg/year of total nitrogen and 778 kg/year of total phosphorus. Currently identified nutrient reduction measures would offset about 54 percent of the WGFP total nitrogen loadings to the Three Lakes or 3,343 kg/year. Thus, about 2,785 kg/yr of additional nitrogen reduction measures need to be identified. The Subdistrict will be responsible for developing other nonpoint source nutrient reduction measures or other actions elsewhere in the watersheds upstream of Windy Gap Reservoir to meet the total nitrogen reduction levels needed to provide at least a 1:1 reduction in total nitrogen and total phosphorus loadings to the Three Lakes. Implementation of point source and nonpoint source nutrient reduction measures would offset WGFP total phosphorus loadings to the Three

Lakes by 350 kg/year more than projected WGFP loading. While additional phosphorus reduction measures are not needed to offset WGFP loadings, any additional nutrient reduction measures to reduce nitrogen are also likely to further reduce phosphorus loading.

Monitoring. The Subdistrict will submit to Reclamation and the Corps for approval a monitoring program and annual results to ensure that proposed nutrient reduction measures and any additional unidentified point and nonpoint source mitigation measures are effective in offsetting all of the nitrogen and phosphorus loading to the Three Lakes attributable to the WGFP. Nutrient reduction measures would be implemented in an adaptive management approach with the results of monitoring used to demonstrate the effectiveness and need for additional or less mitigation.

The estimates of nutrient reduction from Fraser Sanitation District WWTP improvements are believed to be reasonably accurate because of the controlled environment associated with operation of a closed system. However, the effectiveness of WWTP improvements on nutrient reduction would be monitored at the discharge outlet. The monitoring program would include appropriate sampling parameters and frequency to calculate actual nutrient reduction.

Nonpoint source nutrient reductions are more difficult to predict because of the large geographic area, uncertainties in the interaction of biological, chemical, and physical processes in the watershed, and outside variables. To measure the effectiveness of nonpoint source mitigation measures, a monitoring program would be developed for the E-Diamond H Ranch and C-Lazy-U Ranch. The Subdistrict initiated water quality monitoring on Willow Creek near the C-Lazy-U Ranch and on Church Creek near the E-Diamond H Ranch in 2010 to begin establishing a baseline for water quality prior to implementing nonpoint source mitigation measures. Similar monitoring would be established for other locations where nonpoint source nutrient reduction measures are identified.

Other Ongoing Studies and Processes Related to Three Lakes Water Quality and Recreation. The Subdistrict has participated with Northern Water, Grand County, and other entities in a variety of studies related to water quality of the Three Lakes system since the beginning of the Nutrient Study in 2006. These studies are an ongoing process, but generally focus on issues related to nutrients and water quality in the Three Lakes, particularly the clarity in Grand Lake. As the studies progress, the general understanding of the system is improved and areas for additional studies are identified. Recent studies have identified particulate matter as a component of reduced clarity in Grand Lake (in addition to nutrient-related algae issues). The source of the particulates is not well understood and studies are underway to determine the composition and source of particles. Current studies indicate that non-algal organic particles (detritus) which may derive from dead and decaying macrophytes (aquatic weeds) in Shadow Mountain Reservoir could be a large factor in water clarity. There is also some question regarding inorganic (mineral) particles that may come from inflowing

water, shoreline erosion, or resuspension of bed materials in Shadow Mountain Reservoir. The impact of WGFP on the particles that may impact clarity is not currently known, but the relative magnitude of flows through the Three Lakes system caused by WGFP is small The physical mechanisms for re-suspension and transfer of organic and inorganic particles has not been studied. The quantity of material that could be entrained at different pumping rates could affect the impacts of WGFP on clarity but these incremental changes are expected to be very small and likely not detectable. In addition, it is possible that much movement of particles could occur during the "first flush" of pumping, and/or from natural runoff into the lakes, in which case there would be no additional effect from WGFP.

Because there are many unknowns regarding the sources of reduced clarity and the issues are recognized to be existing problems, related to the C–BT, which has led to a planning process led by Reclamation to study the causes of reduced clarity with a goal of attaining the clarity standard set by the Water Quality Control Commission. The process has included the following elements:

- Reclamation, Grand County and Northern Water have entered into a separate MOU to begin and finance the Appraisal Study Process;
- Grand County and Northern Water intend to continue moving ahead with Reclamation's planning process by initiating the development of a Statement of Work for a Feasibility Study Plan; and
- Grand County and Northern Water have agreed to enter into the Memorandum of Understanding, known as the Grand Lake Clarity Project, which is attached as an appendix to this report.

The Subdistrict has participated in funding of these studies to date, and will continue to participate as a result of their ongoing contractual relationship with Northern Water and Reclamation.

g. Unique areas of geologic, historic and archaeological importance:

The Project will have no impact on areas of geologic or archeological importance in Grand County. To the extent Grand Lake is considered an historic area; it is addressed in section f above.

8. Describe the potential adverse effects of the diversions of water from the source development area upon plant and animal life dependant upon the water resources in question – Grand County 5-304-8:

The WGFP FEIS contains a detailed analysis aquatic life in the Colorado River, including a discussion of the historical and current conditions and expected impacts of the WGFP, which is briefly summarized below:

a. Historical Perspective

The aquatic environment in the Colorado River below Granby Reservoir is the result of more than a century of human-induced changes to the stream ecosystem. These changes include introduction of nonnative species, management of fish for commercial harvest, sport fishing harvest and catch and release regulations, diversion of water for human use, and habitat fragmentation caused by dams and diversions. The aggregate of these multiple influences implemented over a long period have contributed to the current condition of the stream ecosystem.

It is reported that the native fish community in the upper Colorado River consisted of four species: Colorado River cutthroat trout (*Onchoryncus clarki pleuriticus*), speckled dace (*Rhinichthys osculus*), mottled sculpin (*Cottus bairdi*), and mountain whitefish (*Prosopium williamsoni*). Nonnative species introductions began in the late 1800s as game management agencies stocked species for sport fishing opportunities for residents and tourists. All of these nonnative species would have increased the competition with and possibly predation on the native species, including Colorado River cutthroat trout. Over time, the native species, especially cutthroat trout, have declined and the nonnative trout have increased. The result is the current fish community in the upper Colorado River basin.

Sport fish management has had a major impact on the makeup of the fish community in the Colorado River near Windy Gap. Most trout stocking in the last 50 years consisted of introducing the desired nonnative trout species, rainbow, brown, and cutthroat trout for sport catch rather than stocking native Colorado River cutthroat species. Those stocking efforts resulted in the reduction in the native cutthroat populations due to competition and predation from other species.

Other biotic factors also can impact the fish community. These factors include changes to the primary and secondary producers upon which the fish community depends and the introduction of parasites, in particular, whirling disease. Whirling disease was present in many Colorado rivers by the mid-1990s including the Colorado River near Windy Gap. Whirling disease resulted in a severe reduction in rainbow trout populations in many of the infected river systems. The Colorado River at Windy Gap, dominated by rainbow trout in the 1980s, is now

dominated by brown trout. The decline of rainbow trout provided an opportunity for the increase in brown trout populations. Brown trout are managed for sport fishing by the CDPW. The current number of brown trout in the Colorado River makes reestablishment of other salmonids, either rainbow trout or cutthroat trout, difficult.

The first streamflow alterations on the Colorado River occurred with diversions for agricultural use and municipal and industrial water supplies. Those alterations have continued for more than 100 years and include transbasin diversions from the Colorado River basin to the South Platte River basin for use on the Colorado Front Range. The transbasin diversions began in the 1890s with the Grand River ditch and continued in the 1900s with Moffat in 1937, C-BT in 1947, and Windy Gap in 1985. Irrigation diversion began in Grand County in the 1890s. These incremental flow diversions have occurred for more than 100 years. As a result, the native flow volume has been reduced by approximately 70 percent by these diversions and off-stream uses. The flow pattern is still shaped by snowmelt runoff but at a reduced magnitude and duration. Approximately 33 percent of the current annual volume occurs in June compared to 36 percent of the native June annual volume. The large reservoirs and headwater transbasin diversions have the ability to reduce the peak river flows in most years. In years with high snowpack, such as the winter of 2010-2011, long duration, high flows still occur. The summer and fall low flows also are reduced from native flow conditions. The lower summer flows may result in less area of suitable habitat and elevated stream temperatures than native conditions.

The combination of the above conditions provides the habitat for the existing fish and macroinvertebrate populations in the Colorado River near Windy Gap Reservoir. Trout populations continue to fluctuate from year to year, but the cause for the fluctuations are undetermined and likely a combination of multiple factors. Overall, the trout populations in the upper Colorado River are relatively high and comparable to other similar rivers in the state. While the macroinvertebrate community is diverse, one species, *Pteronarcys californica,* has declined in the Colorado River both upstream and downstream of Windy Gap Reservoir since the 1980s.

b. Current Conditions

The following discussion excerpted from the Final EIS provides additional background on the current condition of aquatic life in the project area.

Colorado River
The Colorado River between Windy Gap Reservoir and Kremmling, Colorado is managed by CDPW as a sport fishery. The primary games species are brown trout and rainbow trout. Special regulations include a two-fish bag and possession limit from Granby Dam downstream to the lower boundary of Byers Canyon, and from the Troublesome Creek confluence downstream to Rifle,

Colorado. The section between the lower boundary of Byers Canyon and the Troublesome Creek confluence is a catch and release Gold Medal-designated stream, allowing fishing with artificial flies and lures only. This designation is limited to "waters of the State accessible for fishing to the general angling public." Only public waters are designated as Gold Medal; private waters are excluded by the above requirement.

A 2002 CDPW fish survey in the Colorado River from Windy Gap Reservoir downstream to Kremmling indicated that brown trout and rainbow trout, both introduced species, were two of the dominant fish species at each sampling location. Recent surveys of fish populations in the Colorado River downstream of Windy Gap show that abundance of fish greater than 6 inches long has ranged from a high of 11,255 fish/mile in 2003 to a low of 3,441 fish/mile in 2010, with an average of 7,740 fish/mile over the 8-year period. It is undetermined why the highest numbers were collected after one of the driest hydrologic years on record and the lower numbers were collected recently. While species composition and streamflow has changed substantially from pre-settlement conditions, the trout populations in the Colorado River are very high and comparable to the best fisheries in the state. Other rivers in Colorado have populations in the same range as the Colorado River downstream of Windy Gap. Prior to European settlement, Colorado River cutthroat trout was the only native trout species in the Colorado River. The existing habitat conditions are generally favorable for all the fish species collected.

Quantitative macroinvertebrate (aquatic insects) sampling was conducted at two sites (Lone Buck and Breeze) on the Colorado River to characterize the composition and health of the benthic community. Ecological parameters such as diversity, evenness, biotic indices, taxa richness, biomass, and functional feeding groups were used to evaluate the existing condition of macroinvertebrate populations. Results of these evaluations indicated that aquatic conditions were excellent at both study areas, with the best metric values occurring at the Breeze site. Aquatic invertebrates in the Colorado River near Windy Gap have a high diversity with numerous species present. Both of these samples indicate a healthy macroinvertebrate community. However, although studies in 2004 found the *Pteronarcys* stonefly downstream of Windy Gap, surveys in 2009 did not find *Pteronarcys* stoneflies upstream or downstream of Windy Gap. CDPW also reported a decrease in the abundance and distribution of both the stonefly *Pteronarcys* and mottled sculpin since Windy Gap Reservoir was constructed (Nehring et al. 2010).

c. WGFP Impact Analysis

Key aquatic resource concerns identified during scoping were potential impacts to fish and other aquatic life from changes in streamflow, water quality, and temperature in the Colorado River and lakes and reservoirs. Also of concern was the potential for the spread or increase of whirling disease.

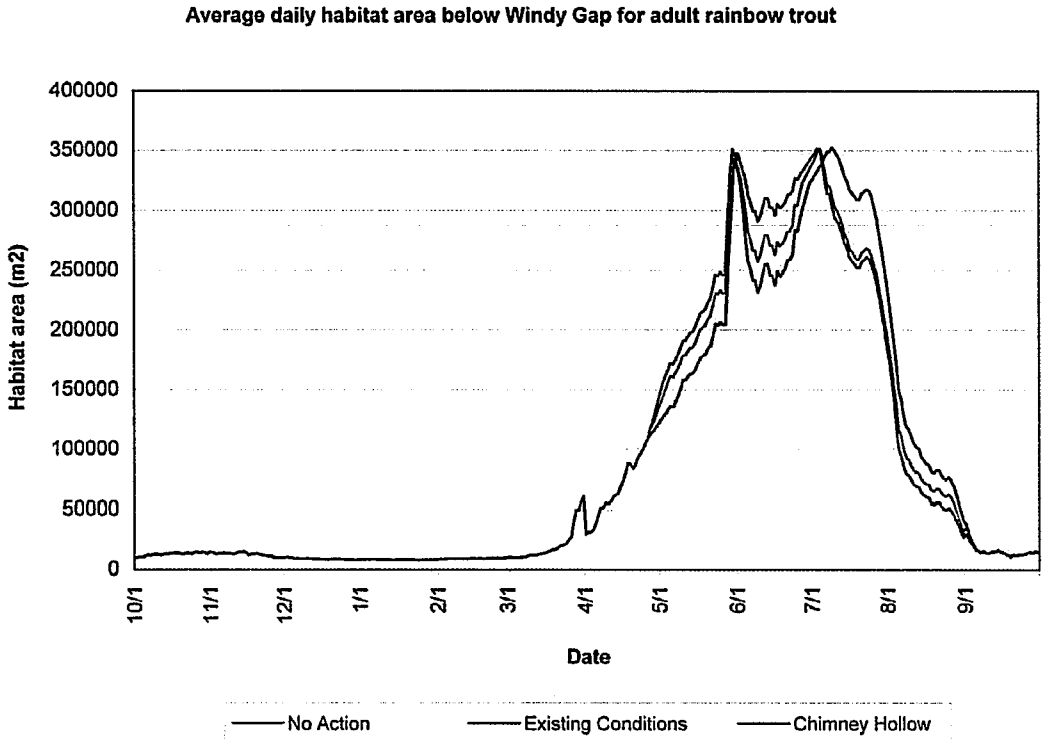
The assessment of effects to fish habitat along the Colorado River was conducted using the River2D Model. Fish habitat in Willow Creek was assessed using Physical Habitat Simulation (PHABSIM). Data from a previous study (Miller Ecological Consultants 1997) was used to develop the habitat flow relationships. The approach used in the EIS follows the concepts of the Instream Flow Incremental Methodology (IFIM) (Bovee 1982; Bovee et al. 1998). IFIM is an analysis framework that combines stream hydraulics, habitat use criteria, and hydrology to predict fish habitat as a function of streamflow. Existing unpublished CDPW habitat suitability data were used for the target fish species. The analysis focused on juvenile and adult life stages of rainbow trout and brown trout. The species modeled at each site were determined in consultation with CDPW biologists at the initiation of the study during study site selection.

d. Fish Habitat.

Hydrologic conditions at seven locations from Windy Gap downstream to the Kremmling Gage (downstream of the Blue River) were combined with the habitat data to determine quantitative changes in fish habitat for the alternative actions over time. Daily flows for average, wet, and dry year flow conditions were modeled under the various WGFP alternatives.

Daily habitat data, based on daily flows, were estimated for each alternative. The results of fish habitat modeling for the Colorado River provided information on the changes in fish habitat and the season when those changes would occur. Typically, a reduction in streamflow reduces available fish habitat; however, when flows exceed the flow at which the highest habitat occurs, as during periods of high runoff, a reduction in flow can increase available fish habitat. This occurs occasionally under all alternatives as a result of Windy Gap diversions during peak flows.

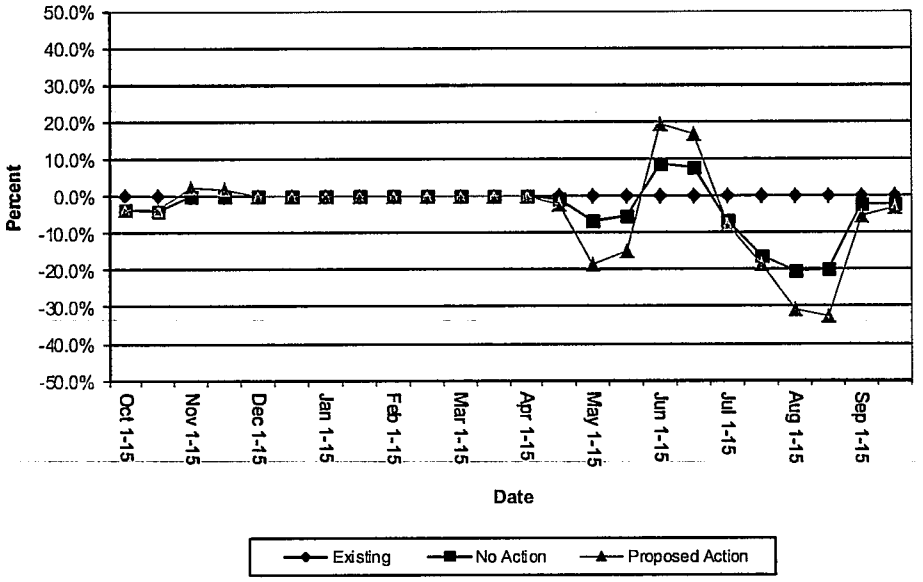
The habitats versus discharge functions are used in conjunction with daily hydrology to determine habitat over time. Daily hydrology data for all alternatives were used to evaluate impacts to aquatic habitat. The daily flow data, combined with the habitat function, result in the amount of daily habitat for each species and life stage. Examples of the daily habitat area for adult rainbow trout downstream of Windy Gap Reservoir which are depicted on the following graph show how the amount of habitat changes in response to daily flows. At the locations analyzed, winter is when flow and habitat is least abundant and most likely to control the size of the fish population.



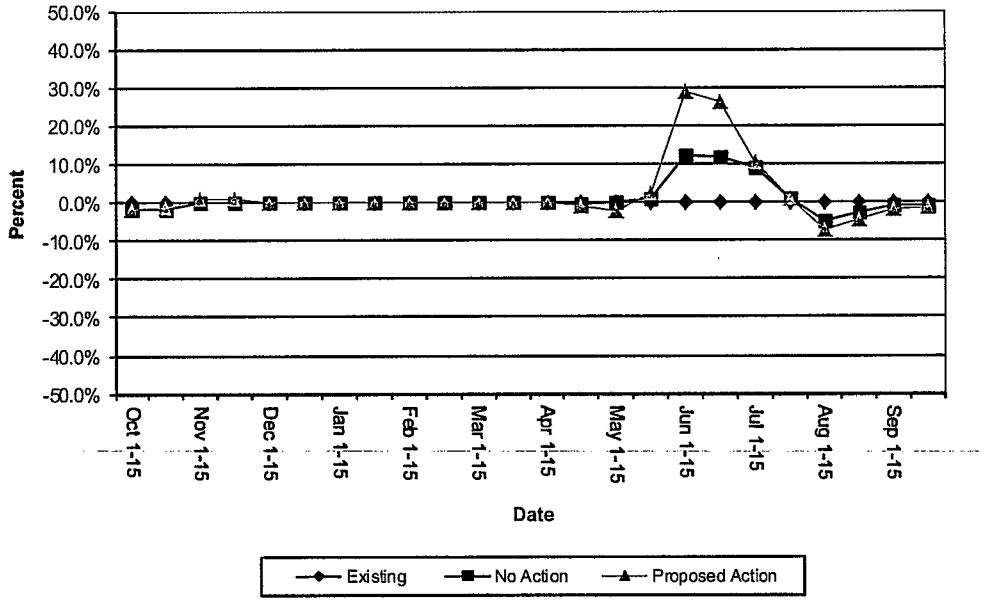
Rainbow trout (adult) average daily habitat area on the Colorado River below Windy Gap Reservoir.

The following two graphs are from models concerning brown and rainbow trout habitat. The habitat time series model output generates information on the amount of habitat available over time. The largest decrease in adult rainbow trout habitat during average flow conditions on the Colorado River occurs in the reach immediately downstream from Windy Gap Reservoir. On this graph, the left axis indicates the percent change in habitat from existing conditions, where the 0 line is existing conditions. Values above the 0 line indicate an increase in habitat and values below the 0 line indicate a decrease in habitat. The bottom axis indicates the time during the year when habitat changes. The second graph illustrates the effect to adult brown trout habitat at the same location below Windy Gap Reservoir during average years. WGFP diversions during high runoff result in an increase of brown trout habitat. Both increases and decreases in adult brown trout habitat of about 10 percent occur under the No Action Alternative below.

Percent change in adult rainbow trout habitat from existing conditions on the Colorado River below Windy Gap for an average water year.



Percent change in adult brown trout habitat from existing conditions on the Colorado River below Windy Gap for an average water year.



Overall, the modeled changes in fish habitat in the Colorado River for all alternatives indicate the most substantial changes in habitat would occur between Windy Gap Reservoir and the confluence with the Williams Fork River in both average and wet years. For the remainder of the Colorado River downstream of the Williams Fork, a reduction in habitat also would occur in average or wet years, but would not result in a substantial change (<15 percent) from existing conditions.

The largest reductions in fish habitat would occur during August of average and wet years when Windy Gap diversions occur. The hydrologic model indicates that WGFP diversions of more than 100 AF in August would increase from 6 times in the 47-year hydrologic modeling period to 15 times. Actual WGFP pumping in August is likely to be less because new reservoirs would typically be close to full in years when the WGFP diversions are in priority in August and the cost of pumping is high for the limited water that is available. Adult rainbow trout would have the largest reduction of all species and life stages. During the remainder of the year (September through April of average years), flow and available habitat are lower than during the time Windy Gap diversions occur. Habitat area available during the low-flow periods from fall to early spring is likely a more controlling factor that influences the size of the fish population than diversions that occur when more abundant habitat is present in late spring and summer. Therefore, even though the maximum percent reduction in habitat is large from Windy Gap diversions in the spring, diversions occur when habitat is greater than during the majority of the year. Because fish habitat can be less available at high flows, diversions that reduce high flow can result in increased available habitat during runoff. Habitat time series output indicates Windy Gap diversions from the Colorado River, in average and wet years, would result in increases in habitat in June and July. The more important factor during peak runoff is the flows that create and maintain the aquatic habitat as discussed below in the *Channel Morphology* section.

Trout in the study area have a maximum age of approximately 6 or 7 years; therefore, impacts to trout habitat that occur often during their life span (e.g., several times during a lifetime) may affect populations. Impacts to trout habitat that occur less frequently are less likely to affect populations. Trout populations would have multiple years of spawning and recruitment between the less frequent events of reduced flow, which is the reason these events would have less effect on the populations. The predicted maximum periodic decreases and short duration of the decrease in fish habitat are unlikely to substantially impact fish populations at most locations. The greater than 15 percent habitat reductions above the Williams Fork confluence could result in a slight decrease in adult rainbow trout population. The small changes in adult brown trout habitat and the frequency of those changes are unlikely to impact current populations. The short duration increase in habitat may be beneficial but the baseflow habitat is likely the controlling factor for populations. These changes are not expected to affect the

Gold Medal Designation for the Colorado River downstream of Windy Gap Reservoir.

Fall spawning brown trout would not be affected by Windy Gap diversions. Rainbow trout spawning occurs from mid-April through May, with hatching in June and July. Rainbow fry emerge from the gravel in July into the first of August (Nehring and Anderson 1993). With rainbow trout spawning occurring on the lower portion of the ascending limb of the hydrograph and an increase in flow after spawning, the redds would be covered by water through egg hatch and emergence. Since the eggs and fry would not be dewatered, an impact to these life stages is not likely for any of the alternatives.

e. Channel Morphology.

In addition to hydrology and water quality, channel morphology is an important physical component of the riverine systems that affects the aquatic environment. The channel geometry and plan form of the channel and the biota within the channel are all affected by the volume and timing of annual discharges. Physical features of the stream channel change as a result of peak flows and the biota respond to those physical changes. During peak runoff, two factors that affect the physical conditions within the stream are the magnitude and duration of the peak runoff. Differing flow magnitudes and duration are required to move sediment, initiate channel migration, create and maintain habitat, and incorporate organic material in the form of woody debris and other plant material into the system. The amount of change in physical habitat from year to year is determined during the annual runoff cycle that shapes new habitats and maintains the current habitat.

The No Action and Proposed Action alternatives would result in a reduced frequency and duration of channel maintenance flows on the Colorado River below Windy Gap. However, hydrology data for the alternatives indicate the magnitude and recurrence intervals for bankfull flows and other channel maintenance flows would continue to occur regularly. The maximum Windy Gap diversion of 600 cfs would reduce flows available for channel maintenance, but large flows would still occur. The predicted changes in channel maintenance and peak flow characteristics are not expected to result in substantial changes to the existing habitats that are created and maintained by the existing flow regime. The range in channel maintenance flows under all alternatives would continue to provide sufficient flows to maintain channel capacity, provide periodic scouring of the channel, maintain riparian habitat, and create habitat suitable for fish and macroinvertebrates. In addition, no substantial change in stream productivity is anticipated from flow changes. Therefore, the current channel type and habitat characteristics are expected to be maintained with all alternatives.

Sediment transport is another important component of channel maintenance flows that is necessary to maintain the conditions needed to create fish spawning habitat and macroinvertebrate habitat. Colorado River flows under all of the alternatives

would continue to have more than adequate capacity to transport the sediment supply without aggradation or degradation. Channel maintenance flows under all alternatives would continue to provide flow sufficient to move medium to coarse gravel that is used as substrate by spawning trout. Flow magnitude and duration to flush fine material from spawning substrate would continue to occur under the Proposed Action and other alternatives. No impact to spawning habitat is expected due to changes in channel maintenance flows and peak flows.

The Subdistrict has agreed to provide the following mitigation measures to address impacts associated with channel morphology, which were included in the Fish and Wildlife Mitigation Plan approved by the Colorado Wildlife Commission and are anticipated to be included in the Record of Decision issued by Reclamation and 404 Permit issued by the Corps of Engineers.

Improvements to Flushing Flows in the Colorado River

The Windy Gap Project is currently required to bypass 450 cfs for 50 hours once in every 3 years, if such flows are naturally available in accordance with the Memorandum of Understanding Between Municipal Subdistrict, Northern Colorado Water Conservancy District and Division of Wildlife, Colorado Department of Natural Resources, Relating to Minimum Stream Flow in Association with the Windy Gap Diversion Project, dated June 23, 1980. The Subdistrict will modify project operations as follows:

- The flushing flow provision of the 1980 MOU will be modified to increase the required flushing flow from 450 cfs to 600 cfs.
- In any year when flows below Windy Gap have not exceed 600 cfs for at least 50 consecutive hours in the previous two years, and total Subdistrict water supplies in Chimney Hollow and Granby Reservoirs exceed 60,000 AF on April 1, the Subdistrict will cease all Windy Gap pumping for at least 50 consecutive hours to enhance peak flows below Windy Gap.

The intent of this measure is to enhance peak flows below Windy Gap. The Subdistrict will coordinate with CDOW and other water suppliers, including Denver Water, to maximize benefits of the higher flows and minimize any potential negative impacts to aquatic resources.

It should be noted that the increase in flushing flows from 450 to 600 cfs is not dependent upon storage levels in Chimney Hollow Reservoir. The commitment to cease all pumping for at least 50 hours is contingent upon levels of Windy Gap water in storage in Chimney Hollow and Granby Reservoirs.

f. Stream Temperature and Water Quality.

Results of water quality modeling also were used to evaluate potential effects to aquatic life. The current water temperature standards include both a numeric and narrative standard. The Colorado River near Windy Gap is classified as Cold Water Tier II. The water temperature standards are set to protect cold water species in the river from both chronic (sublethal) and acute (lethal) effects of temperature changes. The narrative standard is: "Temperature shall maintain a normal pattern of diel and seasonal fluctuations and spatial diversity with no abrupt changes and shall have no increase in temperature of a magnitude, rate, and duration deleterious to the resident aquatic life" (CDPHE Regulation 33, 33.5 (1)).

A dynamic temperature model was used in the Final EIS to better evaluate potential daily changes in stream temperature in the Colorado River. Water temperature simulations show that diurnal and seasonal water temperature patterns are similar to the existing conditions. Modeled water temperatures with the WGFP show a diurnal fluctuation change with warming during the day and cooling at night, which is similar to the pattern found under existing conditions. Currently, the highest observed seasonal temperatures in the Colorado River occur in July and August. The water temperature simulations show this same seasonal pattern. Thus, the narrative water quality standard for stream temperature would be met under all alternatives.

Dynamic temperature modeling of the Colorado River using 2007 meteorological data, which included the hottest August on record and the sixth hottest July on record, predict that primary increases in stream temperature would occur in the reach between Windy Gap Reservoir and the Williams Fork. In the 15 years of hydrology modeled, 4 years showed simulated temperature impacts under the Proposed Action that resulted in increased exceedances of chronic and acute standards. Although exceedance of the maximum weekly average temperature (MWAT) and daily maximum (DM) standard were predicted for several years under existing conditions, the No Action and action alternatives would increase the number of exceedances. While both MWAT and DM are a concern, the increased number of DM exceedances may have the greatest impact. Downstream of the Williams Fork, no exceedance of temperature standards is expected as a result of the WGFP.

The Subdistrict has agreed to provide the following mitigation measures to address impacts associated with stream temperatures, which were included in the Fish and Wildlife Mitigation Plan approved by the Colorado Wildlife Commission and are anticipated to be included in the Record of Decision issued by Reclamation and 404 Permit issued by the Corps of Engineers.

Temperature Mitigation

- Monitoring Stations. The Subdistrict will work with Denver Water to install, operate and maintain two continuous real-time temperature-monitoring stations on the Colorado River; one at the Windy Gap gage and one upstream of the confluence with the Williams Fork River.

- Temperature Thresholds. For the purposes of this mitigation plan, the threshold temperatures will be the following, as measured at the temperature monitoring stations identified above:

    1. MWAT Chronic Threshold: 18.2°C (64.8° F), based on current Maximum Weekly Average Temperature (MWAT) Chronic Standard.
    2. DM Acute Threshold: 23.8°C (74.8° F), based on current Daily Maximum (DM) Acute Standard.

- MWAT Chronic Threshold Exceedances - Reduction or Curtailment of WGFP Pumping. For the period after July 15th of each year:

    1. At such times as the Weekly Average Temperature (WAT) exceeds the MWAT Chronic Threshold,, the Subdistrict will reduce or curtail WGFP pumping at the Windy Gap diversion to the extent necessary to maintain temperatures within the MWAT Threshold. Reduced pumping may not be sufficient to maintain temperatures below the threshold.

    2. Pumping for the original Windy Gap Project, now and after the WGFP is in operation, may occur at any time that the Windy Gap water rights are in priority and sufficient space is available in Lake Granby that such water pumped will not be reasonably expected to spill from the reservoir. Therefore, WGFP pumping will be defined as pumping that occurs at such times as the Northern Colorado Water Conservancy District determines, based on its most probable forecasts of inflows to Lake Granby, that a spill of water from Lake Granby is reasonably foreseeable. All other pumping will be considered to be for the original Windy Gap Project.

- DM Acute Threshold Exceedances - Reduction or Curtailment of Pumping for the WGFP and the original Windy Gap Project.

    1. At such times as the Daily Maximum temperature is within 1°C of the DM Acute Threshold, the Subdistrict will reduce or curtail pumping for the original Windy Gap Project or the WGFP at the Windy Gap diversion to the extent necessary to maintain temperatures within the DM Threshold. Reduced pumping may not be sufficient to maintain temperatures below the threshold. In the future, the 1 degree buffer may be altered, based on experience, to maintain compliance with the DM Threshold.

- Limitations on Reduction or Curtailment of Windy Gap pumping. The temperature mitigation measures identified above will be suspended in the event that and at such times as there is no material causal relationship between Windy Gap Project or Windy Gap Firming Project operations and any exceedance of the MWAT Chronic threshold or DM Acute threshold at the monitoring stations identified above. For the purposes of this Paragraph a "material causal relationship" is defined as either an actual measureable impact on temperature using readily available monitoring technology or a modeled impact on temperature that is not de minimus and is based on a computer model or studies accepted by the Colorado Division of Wildlife. The Subdistrict will cooperate with future studies to determine what factors, other than flow changes, have effects on water temperatures in the Colorado River below Windy Gap.

- Use of the Windy Gap Bypass Valve and Auxiliary Outlet. The Subdistrict will use the Windy Gap Project Bypass Valve and Auxiliary Outlet to the maximum extent practicable, without causing adverse effects to the Windy Gap Project facilities or operations for the bypass of water that is otherwise bypassed from the Windy Gap Project. This measure is intended to make releases of water from these outlets deeper in the reservoir that may be colder than water bypassed over the spillway.

Modeling of water quality parameters for the Colorado River predicted a slight decrease of 0.1 to 0.6 mg/L in DO. Average DO concentrations for existing conditions are 8.3 mg/L or higher. The DO concentration for all alternatives is within the range required by trout and other cold water species and does not drop below the nonspawning aquatic life water quality standard. However, the DO concentration may be slightly lower (6.9 mg/L predicted) than the spawning standard (7.0 mg/L) in late summer if flows drop to 90 cfs downstream of Windy Gap Reservoir, although this is not in the normal spawning period for trout and only occurs in a short reach of the river. DO levels in the Colorado River under all modeled conditions would be above the 5.0 mg/L required for lethal effects to trout and would not impact trout in this section of the river. DO levels would not violate the state standard, which is designed to protect all aquatic life, including non-trout species.

g. Summary.

Four ecosystem components were evaluated as a part of the impacts to the aquatic environment for the WGFP in the FEIS: 1) fish habitat, 2) water quality), 3) riparian vegetation, and 4) channel maintenance.

The FEIS found that an unmitigated WGFP would cause a reduction in Colorado River flows and would reduce fishery habitat primarily for rainbow trout, but many of the impacts occur in the spring when flows are high or in August when WGFP diversions are infrequent. Minimal impacts to stream morphology, water

quality (except water temperature) and riparian vegetation are predicted for WGFP. Increased stream temperature has the greatest potential for affecting trout species in the Colorado River between Windy Gap Reservoir and the Williams Fork.

Due to these evaluations and findings, a robust mitigation and enhancement package has been developed to directly address the findings in the DEIS. The FEIS findings are made without consideration of any off setting or mitigation measures. This 1041 Permit Application is inclusive of the mitigation and enhancement package as described in this Application.

h. Other Studies.
Other studies of aquatic life conditions on the Colorado River are available. These studies primarily focus on the existing condition of the river, and do not evaluate the incremental impacts of the WGFP. However, these studies have raised concerns with current conditions and identified potential areas for improvements.

i. Grand County Stream Management Plan.
Grand County prepared a three-phase SMP for approximately 80 miles of streams in Grand County (TetraTech et al. 2008, 2010). The SMP focuses on the Colorado River, Fraser River, and seven tributaries—Williams Fork, Blue River, Muddy Creek, and Willow Creek (tributaries to the Colorado River) and Vasquez, St. Louis, and Ranch Creek (tributaries to the Fraser River). The objective of the SMP is to develop flow recommendations to maximize available habitat for various life stages of rainbow and brown trout and other nonconsumptive water uses based on existing stream morphology.

The first phase of the SMP was an inventory of existing information in the upper Colorado River and Fraser River basins. The second phase of the SMP developed flow recommendations for aquatic life habitat and water users. Environmental flows were defined in the SMP as those necessary to best maintain the ecological needs of the stream in relation to its fisheries. The environmental flow analysis considered flow-habitat relationships for several life stages of rainbow and brown trout at multiple stream locations within the study area. Other environmental parameters included an assessment of the flow requirements to maintain stream morphology and aquatic habitat, stream temperature, and water quality. The preferred flow regimes recommended in the SMP are estimates of optimum flows to meet fisheries and water user needs in a given reach without consideration of whether water is available to meet the recommended flows.

The SMP also considered the flow regimes necessary to support water use requirements for irrigators, municipalities, industry, and recreation.

Streamflow management for water users focused on the ability of water users to physically retrieve water from the stream and the water user's impact on flows in the stream relative to maintaining recommended flows. The SMP considered recreational flow requirements by identifying preferred flows for rafting, kayaking, and angling.

The SMP recognized that not all recommended flows for all uses on all reaches can be achieved at all times. Thus, the third phase of the SMP includes recommended target flows for the protection and enhancement of aquatic habitat, while at the same time protecting local water uses and retaining flexibility for future water operations. Phase 3 of the SMP also included an analysis of environmental flows, restoration opportunities (both physical and flow enhancements), and monitoring recommendations (TetraTech et al. 2010).

ii. 2011 Nehring Report.
A June 2011 report prepared by Barry Nehring, a fisheries biologist at the Colorado Parks and Wildlife (formerly Colorado Division of Wildlife), entitled Colorado River Aquatic Resources Investigations, Federal Aid Project F-237R-18, has been referenced in several letters regarding the Windy Gap Firming Project. The report is a study of macro-invertebrate density and spatial occurrence, and mottled sculpin abundance, biomass and spatial occurrence in the Upper Colorado River basin above and below Windy Gap Dam and in tributary streams. The report highlights concerns related to the current condition of aquatic life in the Colorado River, including the decline in populations of the *Pteronarcys* stonefly and mottled sculpin below Windy Gap dam. It is important to recognize that the report focused on past and current conditions, not impacts of the WGFP. The report recommends a "bypass channel" around Windy Gap dam to improve conditions for aquatic life in the Colorado River.

i. Proposed Enhancement Measures.
As a result of concerns with current conditions in the Colorado River, the Subdistrict has agreed to provide enhancement measures to improve aquatic life conditions in the Colorado River above those which currently exist. The enhancement measures are provided through several agreements and are not part of the 1041 permit requirements. This information is provided to allow the 1041 permit application to be evaluated in context with other related activities.

i. WGFP IGA.

The Subdistrict has also been working cooperatively with Grand County and other West Slope stakeholders to develop an IGA regarding additional enhancements to existing conditions in Grand County. This IGA will provide numerous benefits to Grand County, including several that will enhance conditions in the Colorado River over current levels. The primary enhancement will be in the form of water supplies provided to Middle Park Water Conservancy District and Grand County that can be used to enhance flows in the Colorado River at critical times. Water supplies provided are summarized below, with details in the attached WGFP IGA.

Middle Park Water Conservancy District:

- 2,300 acre feet of annual water supply available each year
- 700 acre feet of variable water supply (long-term annual average)
- Ability to carry over up to 3,000 acre feet of variable supply in storage

Grand County:

- 500 acre feet of variable water supply (long-term annual average)
- Ability to use up to 2,300 acre feet of Middle Park annual water supply that is unused at end of water year
- Up to 3,000 acre feet of water supply per year in years that Subdistrict water needs are satisfied
- Ability to carry over up to 3,000 acre feet of variable supply in storage

ii. Learning by Doing Cooperative Effort.

The Subdistrict has committed to participate in the proposed LBD Cooperative Effort, which is a cooperative, iterative and ongoing process to maintain, and when reasonably possible, restore or enhance the stream environment in the Fraser and Williams Fork river basins, and in the mainstem of the Colorado River from the outflow of Granby Reservoir to its confluence with the Blue River.

The Grand County Stream Management Plan (SMP) is the framework for the overall LBD Cooperative Effort. The SMP will be used as a "living" document that will be revised as additional monitoring data are gathered and as management goals for each stream reach are agreed upon. Types of restoration opportunities include channel bank revegetation, enhancing fish passage, applying enhancement flows to existing low and/or high flow conditions, and in-stream habitat restoration.

iii. Fish and Wildlife Enhancement Plan.

In cooperation with Denver Water, the Subdistrict worked with CPW to develop a voluntary plan to enhance existing conditions on the Colorado River in addition to the Fish and Wildlife Mitigation Plan that addresses the incremental impacts of the WGFP. This plan is attached and provides

for funding ($4 million from the Subdistrict and $3million from Denver Water) and a management structure to restore and improve habitat in 14.4 miles of the Colorado River from the Windy Gap dam through the Kemp-Breeze State Wildlife Area. In addition, the Subdistrict agreed to provide up to $250,000 to fund detailed studies of methods for bypass of flows, sediment, and/or fish around Windy Gap Reservoir. CDOW would direct these studies to identify potential modifications that would provide tangible benefits to aquatic resources below Windy Gap Reservoir. Issues to be studied include sediment transport, water quality (effects on temperature and/or nutrients) and fish passage. If studies identify significant, measurable benefits and there is stakeholder consensus to pursue the project, the Subdistrict will provide site access, in-kind service for design and construction of any facilities, and long-term operation and maintenance of the facility. All stakeholders will be responsible for investigation of potential sources of funding and procurement of funding for any identified improvements.

j. Other Related Actions.

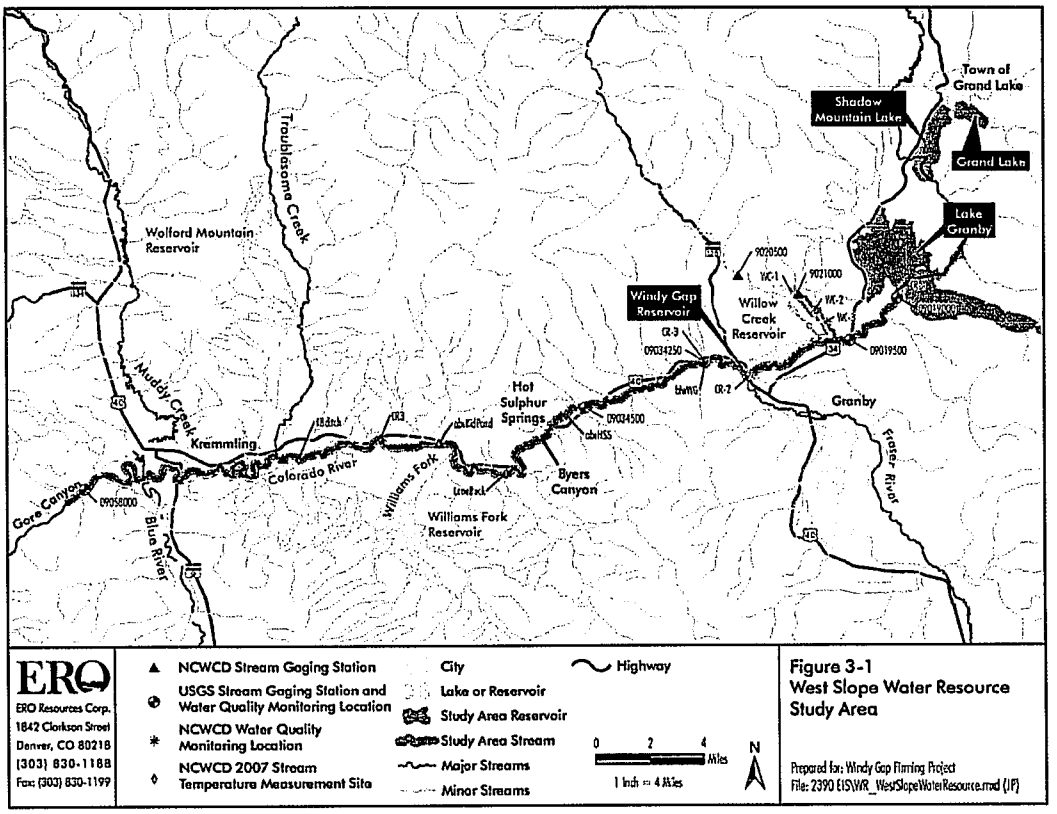
The Subdistrict and Northern Water are also involved on several other activities that provide benefits to the Colorado River in Grand County. These actions include:

i. Upper Colorado River Recovery Program (10825 Project).

The 10825 Project will 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 permanently available for release to augment baseflow in the 15-Mile Reach of the upper Colorado River (near Grand Junction) in late summer and early fall in support of the recovery of endangered fish species.

Northern Water and the Subdistrict have helped to facilitate the approved plan that calls for one-half of the water, or 5,412.5 AF, to be released each year from Granby Reservoir. The water will be released to benefit the 15-Mile Reach on a fixed delivery schedule to be agreed upon by the parties in the future, that will be based on the target stream flow in the Colorado River between Lake Granby and Kremmling during late summer and early fall.

9. Describe and indicate on an appropriate map relevant surface water bodies (streams, lakes, reservoirs, etc.) and groundwater aquifers in the source development area and their uses. Describe the affects of the diversion of water for the municipal or industrial water project on the above-detailed water feature(s) including the effects on present water quality, current and foreseeable uses – Grand County 5-304(9):



The groundwater aquifers in the study area are primarily located in the alluvium adjacent to streams and lakes and bedrock aquifers discharging to the alluvium. Section 3.6 of the FEIS evaluates the effects of the proposed WGFP on groundwater and makes the following general conclusions:

- Because the average change in streamflows would result in very small changes in water depth of affected streams (reductions in stream stage of less than 3.4 inches), and these changes are small in relation to the natural variability of stream depth, it is unlikely that small changes in stream stage would measurably affect alluvial ground water levels or impact water production from nearby alluvial aquifers or wells.
- Reduced water levels in Granby Reservoir as a result of WGFP operations, including prepositioning, are within the natural variability of reservoir water levels. There are no published reports of low water levels affecting water wells during recent droughts and,

therefore, while the WGFP may result in temporary reductions of water levels in wells it is not expected to affect production of wells near the reservoir.

- There would be no change in water surface elevations in Grand Lake, Shadow Mountain Reservoir, or Willow Creek Reservoir so ground water near those reservoirs would not be affected.

It is expected that any changes to alluvial water quality as a result of reduced stream levels during Windy Gap diversions would not be measurable.

10. Detail the present zoning of the land in the source development area – Grand County 5-304(10):

No construction will occur in Grand County therefore, no zoning approval or special use permit is required.

11. Detail the agricultural productivity capability of the land in the source development area (SCS classification) and describe the potential effects of the diversion of water for the municipal or industrial water project on the agricultural productivity capability – Grand County 5-304(11):

The WGFP does not alter or effect any preexisting legal obligation of the C–BT or original Windy Gap Project. The WGFP is primarily limited to diversion of water on the rising limb of the hydrograph due it its junior status to agricultural producers downstream of the point of diversion at Windy Gap Reservoir. The agricultural producers have the right to call for their water in priority and curtail water diversions under this Project. For this reason there will be no effects on the agricultural productivity because the agricultural diverters will exercise their call rights under Colorado law.

12. Reservation of Rights.

The Subdistrict disagrees with Grand County concerning the requirement for Subdistrict to obtain a Grand County 1041 permit for the WGFP, C.R.S. § 24-65.1-101(2). This disagreement has not been litigated. The Parties agree that the Application by the Subdistrict for a 1041 Permit shall never give rise to any claim, defense, or theory of acquiescence, bar, merger, issue or claim a preclusion, promissory estoppel, equitable estoppel, waiver, laches, unclean hands or any other similar claim or defense concerning the application of Grand County Guidelines and Regulations for Areas and Activities of State Interest to the Windy Gap Project or the WGFP, including, without limitation, the existence and extent of Grand County jurisdiction regarding either WGFP or the status and scope of existing agreements. The Parties further agree that this Application for a Permit will not have the affect of precedent or preclusion on any factual or legal issue in any other matter. The Parties both reserve their rights to assert any legal issue in any other matter. The Parties both reserve their rights to assert any legal or factual position or challenge the legal or factual position taken by the other party concerning the applicability of Grand County 1041 authority over the WGFP. Notwithstanding these disagreements, the Subdistrict will not object to, litigate, or otherwise dispute in any forum the authority of Grand County to require a permit for the WGFP issued by Grand County pursuant to C.R.S. § 24-6.1-101, *et seq.* (1041 Permit), including any terms and conditions thereof once said permit has been accepted by the Subdistrict.

After acceptance of the WGFP 1041 Permit, the Subdistrict does not waive or relinquish its rights to assert in any forum at any time that it has fully complied with and is not in violation of the WGFP 1041 Permit, and does not waive or relinquish its rights to object to, litigate, or otherwise dispute in any forum the authority of Grand County to modify or amend the WGFP 1041 Permit or to require a 1041 Permit or other Grand County permit or authorization for any other existing or future project, action, or other activity of the Subdistrict.

13. Waiver of Submission Requirements – Grand County 5-305

All submission requirements have been met by the Applicant and to the extent a financial bond might be contemplated by these regulations, it is waived.

14. Approval of Permit Application – Grand County 5-306

a. A permit application for development of a municipal or industrial water project shall be approved if the proposed development complies with the following criteria:

i. The need for the proposed water project can be substantiated.

Section 2 of this application clearly demonstrates that the Project Participants individually, and as a whole, have a water supply deficit and need this water for their supplies. Based on Reclamation's independent evaluation, a future 34% deficit exists. Reclamation's Final EIS requires that all Project Participants have approved conservation plans in accordance with state law. Even with significant conservation, they still need new supplies to meet their need. The need is clearly substantiated and this criterion is satisfied.

ii. Assurance of compatibility of the proposed water project with federal, state, regional, and County planning policies regarding land use and water resources.

- Federal – All federal permits have been applied for including the Clean Water Act 404 permit which is the core permit requirement. The Bureau of Reclamation is the lead federal agency and has issued its final Environmental Impact Statement dated November 30, 2011, as published in the Federal Register. A Record of Decision is expected to be issued in the near future. Applicant has expended approximately $11 million in compliance with federal permitting requirements. This 1041 permit can be issued contingent upon final approval of all federal permits, in particular the Record of Decision on the Clean Water Act § 404 permit.
- State – The Applicant has received the official approval of the State of Colorado under C. R. S. § 37-6-122.2 the fish and wildlife mitigation plan. CDPHE 401 certification is a requirement of the Clean Water Act § 404 permit and the Grand County 1041 Permit can be issued contingent upon receipt of the Clean Water Act 401 certification.
- The Water Conservancy Act (WCA) (C.R.S. § 37-45-101 *et seq.*) requirements have been met through the IGA and all parties to the IGA agree that these measures meet the requirements of the WCA. The 1041 permit can be issued contingent upon signature of the IGA by all parties.
- Regional – Northwest Colorado Council of Governments Clean Water Act 208 Plan (NWCOG 208 Plan). The 2012 Permit can be issued contingent upon receipt of approval and compliance with the NWCOG 208 Plan.

- County Planning Policies. No Grand County land use regulations are applicable as no construction occurs within Grand County. The applicable water resource policies are the 1041 Permit and the Grand County Stream Management Plan. Part of the Learning By Doing Cooperative effort is tied to the Stream Management Plan which is a living document capable of changing the actions of the parties to the cooperative effort in response to future monitoring and studies. The Colorado River stream reaches below Windy Gap dam are those most affected by WGFP, including, issues of temperature, stream morphology and the magnitude and frequency of flushing flows. Learning By Doing includes Grand County and other stakeholders and looks year by year at these and other stream health concerns including using water availability and snowmelt forecasts. Denver's Cooperative Agreement includes the Learning By Doing effort to which the Applicant is also a party. The 1041 Permit can be issued contingent upon the Learning By Doing Agreement being in place.

iii. Municipal and industrial water projects shall emphasize the most efficient use of water, including, to the extent permissible under existing law, the recycling and reuse of water. Urban development, population densities, and site layout and design of storm water and sanitation systems shall be accomplished in a manner that will prevent the pollution of aquifer recharge areas.

The most efficient use of water includes recycling and reuse. Windy Gap water is by law fully reusable to extinction due to its character as imported water on the East Slope which is why it is a valuable source of water supply and most Project Participants have plans to use and reuse Windy Gap water to extinction (see Section 4 of this application). PRPA use is a good example—PRPA uses Windy Gap water in its cooling of the power plant. It is then recycled and sent back to the onsite reservoir and used again for cooling to extinction. The other indicative example of reuse is Broomfield, which has developed a water reuse system to capture and reuse effluent, including Windy Gap water, to meet nonpotable irrigation needs. Some Participants also use Windy Gap effluent to meet augmentation and return flow obligations. By doing this they make more efficient use and maximize use of their native supplies and reduce the need for additional transbasin sources.

In addition, the WGFP Agreement (IGA) provides a more reliable supply of water to Middle Park Water Conservancy District. This supply will help improve the reliability and efficiency of supplies for in-basin water users that rely upon Middle Park water.

iv. Aquifer recharge areas in Grand County are not affected as no construction will occur in Grand County. Provisions to insure that the proposed water project will not contaminate surface water resources.

The proposed WGFP will not contaminate surface water resources as the water will be transported through existing facilities. No pollutants or contaminants are added to this water as it moves through the water conveyance system. As described in Section 7f of this application, the Applicant is required, as a condition of the federal permit, to off set and remove nutrients so there is no net increase in nutrient loading through the Three Lakes system. That is being done by improvements to water treatment plants in the Fraser River upstream of Windy Gap Reservoir and under an agreement with C Lazy U Ranch to reduce the nutrient inputs to Willow Creek which water is also pumped into Lake Granby. C Lazy U Ranch will be under enforceable contract to apply much less fertilizer to its fields and will use manure management, specifically, livestock will be fenced off from the stream corridors, and measures will be taken to address horse manure in a corral which is very close to Willow Creek. In this way a buffer zone is established beyond Willow Creek which restricts access of livestock to the stream. These efforts reduce nutrient loading in the waters of Grand County.

Although not specifically related to the WGFP, Northern Water and Grand County have agreed to enter into an agreement with Reclamation (Grand Lake Clarity MOU, which is included as Attachment 4) to identify causes and potential solutions to Grand Lake clarity issues.

v. The proposed water project is capable of providing water pursuant to standards of the Colorado Department of Health.

The WGFP is a raw water project in Grand County and all water treatment occurs on the East Slope in a series of state permitted treatment plants owned by the Project Participants. Therefore, this criteria is met.

vi. The proposed diversion of water from the source development area will not decrease the quality of peripheral or downstream surface and subsurface water resources in the source development area below that designated by the Colorado Water Quality Control Division on January 15, 1974 and effective by June 19, 1974 or below stricter standards subsequently adopted.

Granby Reservoir is currently on the 303(d) list of impaired waters due to mercury deposition likely from atmospheric deposition due to coal fired power plants. WGFP does not affect this impairment.
Two temperature standards are applicable here and will be met by the terms of required federal mitigation. The two standards are a chronic

standard, based on a weekly average which affects fish growth and health, and an acute standard which is a lethal standard for fish. Two monitoring stations are being installed in the Colorado River below Windy Gap Reservoir to provide real time temperature data. These mitigation measures are that pumping of WGFP water will be restricted at most times when temperature standards will be exceeded. This will be a 404 permit condition and a requirement of the USBR Record of Decision. The monitoring stations are required by the federal permit before WGF can begin pumping water into Chimney Hollow Reservoir. For the chronic standard, if a 7 day running average hits 18.2 degrees centigrade after July 15, the WGFP will cease pumping. If the river temperature gets within one degree of the acute standard, the Applicant will cut off all pumping of both Windy Gap Projects- the original project and the WGFP. This is a new action which addresses concerns about existing conditions. This is an improvement that is only in place because of the WGFP. Cooler water discharged below the dam at Windy Gap Reservoir will also be provided under an additional agreement to use a bypass valve or auxiliary outlets, which are located lower in the reservoir than the spillway and which should provide cooler water below the dam in comparison to water which passes over the spillway.

An additional requirement is applicable to nutrients. The state standard for nutrients is applicable. The WGFP will offset all nutrients as described in 5-306 (1)(d) above. Nutrient mitigation provided as part of the WGFP will reduce the likelihood of violations of the nutrients standards over the current condition and the dissolved oxygen standard as well.

vii. The proposed development and the potential diversions of water from the source development area will not significantly deteriorate aquatic habitats, marshlands and wetlands, groundwater recharge areas, steeply sloping or unstable terrain, forests and woodlands, critical wildlife habitat, big game migratory routes, calving grounds, migratory ponds, nesting areas and the habitats of rate and endangered species, public outdoor recreational areas, and unique areas of geologic, historic or archaeological importance.

This criterion provides a particular focus on aquatic habitat in the affected streams and the effects of the WGFP on water quality in Grand Lake as a part of the focus on public outdoor recreation under the criteria.

The criteria also lists groundwater recharge areas, steeply sloping or unstable terrain, forests and woodlands, critical wildlife habitat, big game migratory routes, calving grounds and unique areas of geologic or historic archeological importance. Impacts are expected to be minimal or non-existent and are not discussed here.

Migratory ponds (other than Windy Gap Reservoir), nesting areas and the habitats of rare and endangered species are also listed in the criteria. Aquatic habitats for fisheries are a large focus of the WGFP and a large focus of the mitigation and enhancements actions as are effects on Grand Lake to the extent that is considered by the Board as a public outdoor recreation area under the criteria. Marshlands and wetlands potential impacts are very small and unlikely to affect either marshlands or wetlands. The changes in stream flow are very small and unlikely to affect riparian marshlands and wetlands. The only affected endangered species are fish in the 15 mile reach near Grand Junction. The 15 mile reach is addressed and fully mitigated under the Federal Fish Recovery Program. There will be no effect on migratory ponds unless the Windy Gap Reservoir is drained by a bypass or through pass being studied and considered by the parties as a possible future change in physical structure at Windy Gap Reservoir. The possible bypass or through-pass is specifically addressed in the state-approved Fish and Wildlife Mitigation Plan. The benefits to the steam corridor of a bypass or though pass, if it is determined to construct such a feature after a comprehensive study and evaluation, will more than offset the loss of the migratory ponds. This is a net benefit to Grand County.

Aquatic habitat—Four ecosystem components, (1) fish habitat, (2) water quality, (3) riparian vegetation, and (4) channel maintenance were evaluated as part of the analysis of the impacts to the aquatic environment. The conclusion was that a reduction in Colorado River flows would reduce fishery habitat primarily for rainbow trout, but many of the impacts occur in the spring when flows are high or in August when diversions are infrequent. Minimal impacts to stream morphology, water quality (except water temperature which is addressed in 5-306(1)(f) above, and riparian vegetation are predicted. Increased stream temperature, has the greatest potential for affecting trout species in the Colorado River between Windy Gap Reservoir and the Williams Fork; however, robust mitigation and other firm commitments to off set these impacts have been made by the Applicant. These include all of the measures listed in Section8 of this Application. This criteria, 5-306 (1) g, has clearly been met and a permit can be issued.

Additional Consideration:

The Applicant has also agreed to act, and recognizes the concern with the current condition of the stream which is not an effect of the WGFP and could not be, as the effects are existing effects and the WGFP operation has not yet begun. In recognition of these concerns, prior to the WGFP coming online, the Applicant has agreed to numerous enhancements to improve the existing conditions, including the Approved Fish and Wildlife Enhancement Plan, habitat improvements, additional water committed to Grand County under the IGA, the Learning By Doing effort in coordination with Denver Water. In addition, the

Applicant has worked to make 5412.5 acre feet of water a year available from Lake Granby for the Endangered Species Recovery Program which will also benefit aquatic conditions in Grand County.

b. The permit shall be denied if the applicant fails to satisfy all the criteria outlined above.

All permit criteria are satisfied.

Conclusion

Benefits of Mitigation Measures, Enhancement Measures, and Other Related Actions.

The combined effect of additional water in the Colorado River in Grand County and habitat improvements provided by the enhancement measures and other related actions will improve conditions in the Colorado River over current levels. Coupled with the mitigation measures provided for the direct impacts of the WGFP, the conditions in the river with the WGFP in operation will be better than current conditions.

15. Definitions

"Bureau of Reclamation" Federal water development agency within the U.S. Department of Interior.

"CDPW" Colorado Department of Parks and Wildlife.

"Clean Water Act (CWA)" the federal law that sets forth how the United States will restore and maintain the chemical, physical, and biological integrity of the country's waters (oceans, lakes, streams and rivers, ground water and wetlands). The law provides protection to the country's surface waters from both point and nonpoint sources of pollution.

"Colorado Big Thompson Project (C-BT)" Colorado-Big Thompson Project" a project owned by the U.S. Bureau of Reclamation that collects water in the headwaters of the Colorado River and delivers it to water users on the northern Front Range of Colorado. The Northern Colorado Water Conservancy District is the local agency that was established to administer delivery of C-BT water to local water users.

"DM" daily maximum.

"DO" dissolved oxygen.

"Firm yield" the yearly amount of water that can be dependably supplied from the raw water sources of a given water supply system.

"Hydraulic fracturing (fracking)" is the propagation of fractures in a rock layer caused by the presence of a pressurized fluid.

"Mitigation measures" measures taken to avoid or offset the adverse impacts resulting from an action or activity.

"Municipal Subdistrict, Northern Colorado Water Conservancy District" a water conservancy district organized under the Water Conservancy Act that developed, owns, and operates the Windy Gap Project.

"MWAT" maximum weekly average temperature.

"Potable Water" water considered safe for domestic consumption; drinkable.

"Project Participants" Municipalities, water districts, and entities in the Windy Gap Firming Project including the cities of Broomfield, Evans, Fort Lupton, Greeley, Lafayette, Longmont, Louisville, Loveland, the towns of Erie and Superior, Central Weld County Water District, Little Thompson Water District, Middle Park Water Conservancy District, and the Platte River Power Authority.

"Raw water" untreated water.

"Reuse" to use water again; to intercept for subsequent beneficial use either directly or by exchange water that would otherwise return to the stream system.

"Riparian" relating to the bank of a natural watercourse (as a river) or sometimes a lake or a tidewater.

"SMP" Grand County Stream Management Plan.

"Water and sanitation districts" a special taxing district formed by the residents of the district for the combined purpose of providing potable water and sanitary wastewater services.

"Water demand" the amount of water that municipalities or regions require for everyday functioning.

"Water quality" refers to the physical, chemical and biological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose.

"Windy Gap Firming Project" a project proposed by the Subdistrict to firm the yield from the Windy Gap Project.

Proposed Intergovernmental Agreement (IGA)

ATTACHED DOCUMENT IS CURRENT AS OF DATE OF APPLICATION – JUNE 11, 2012.

DOCUMENT IS CURRENTLY IN NEGOTIATIONS AND IS NOT A FINALIZED DOCUMENT

[Draft]
[Intergovernmental Agreement]

The Municipal Subdistrict, Northern Colorado Water Conservancy District and its Windy Gap Firming Project Water Activity Enterprise, Board of County Commissioners of Grand County, Colorado, Middle Park Water Conservancy District, Colorado River Water Conservation District and Northwest Colorado Council of Governments enter into this Windy Gap Firming Project Agreement ("WGFP Agreement") as of the latest date of execution of this WGFP Agreement by the Parties.

I) Definitions.

A. Municipal Subdistrict, Northern Colorado Water Conservancy District, ("Subdistrict") is a political subdivision of the State of Colorado, and formed under the provisions of C.R.S. §§ 37-45-101, et seq., for the purposes stated therein and as created by the Decree dated July 6, 1970, Weld County District Court, State of Colorado.

B. Municipal Subdistrict, Northern Colorado Water Conservancy District, Windy Gap Firming Project Water Activity Enterprise ("WGFP Enterprise") is a water activity enterprise of the Subdistrict organized under and pursuant to Article X, Section 20 of the Colorado Constitution and C.R.S. §§ 37-45.1-101 et seq.

C. Grand County – ("Grand County") is a county of the State of Colorado created by Article XIV of the Colorado Constitution and C.R.S. § 30-5-128, for the purposes stated therein.

D. Middle Park Water Conservancy District ("Middle Park") is a political subdivision of the State of Colorado, created under the provisions of C.R.S. §§ 37-45-101, et seq., for the purposes stated therein.

E. Colorado River Water Conservation District, ("River District") is a political subdivision of and a body corporate under the laws of Colorado, created by the provisions of C.R.S. §§ 37-46-101, et seq., for the purposes stated therein.

F. Northwest Colorado Council of Governments ("NWCCOG") is a regional planning commission organized pursuant to C.R.S. § 30-28-105, and an association of local governments contracting pursuant to Article XIV, Section 18 of the Colorado Constitution and C.R.S. §§ 29-1-201, et seq., comprising municipalities and counties within the geographic boundaries of the Colorado counties of Grand, Eagle, Summit, Jackson, Routt, and Pitkin.

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G. "West Slope Parties" are Grand County, Middle Park, the River District, and NWCCOG.

H. United States Bureau of Reclamation, Department of the Interior ("Reclamation") is referenced in but not a party to this WGFP Agreement.

I. United States Army Corps of Engineers ("USACE") is referenced in but not a party to this WGFP Agreement.

J. Northern Colorado Water Conservancy District ("Northern Water") is a political subdivision of the State of Colorado, created under the provisions of C.R.S. §§ 37-45-101, et seq., for the purposes stated therein, and is referenced in but not a party to this WGFP Agreement.

K. "Windy Gap Project" is an existing water supply system that diverts Windy Gap Project Water from the Colorado River just below its confluence with the Fraser River.

L. "Windy Gap Water Rights" are the water rights for the Windy Gap Project as defined in the Decrees entered on October 27, 1980 in Civil Action No. 1768, District Court, Grand County, State of Colorado and Case Nos. W-4001, 80CW108, and 85CW135, District Court, Water Division No. 5; [*add recent diligence cases?] the Decree entered on February 6, 1989 in Case No. 88CW169, District Court, Water Division No. 5, State of Colorado, and the Decree entered on July 19, 1990, in Case No. 89CW298, District Court, Water Division No. 5, State of Colorado ("Windy Gap Decrees") and any amendments thereto.

M. "Amendatory Contract" is the Amendatory Contract for the Introduction, Storage, Carriage, and Delivery of Water for Municipal Subdistrict, Northern Colorado Water Conservancy District, Colorado-Big Thompson Project, Colorado, dated March 1, 1990 among Reclamation, the Subdistrict and Northern Water and any amendments, replacements, or supplements thereto necessary to implement the WGFP.

N. "Windy Gap Project Water" is any water stored or diverted pursuant to the Windy Gap Water Rights.

O. "1980 and 1985 Agreements" are the April 30, 1980 "Agreement Concerning the Windy Gap Project and the Azure Reservoir and Power Project" ("1980 Agreement") and the March 29, 1985 "Supplement to Agreement of April 30, 1980" ("1985 Agreement").

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P. Windy Gap Firming Project ("WGFP") is a proposed project that is described in the Final Environmental Impact Statement and Record(s) of Decision.

Q. WGFP Participants ("WGFP Participants") are those entities identified in the Final Environmental Impact Statement for the Windy Gap Firming Project, and also their successors and assigns, that hold a water allotment contract for the Windy Gap Project and own or are otherwise allocated a portion of the storage capacity of Chimney Hollow Reservoir.

R. "Windy Gap Project Participants" are those entities that hold a water allotment contract for the Windy Gap Project.

S. "Net Credited Storage," is the amount of Windy Gap Project Water pumped at the Windy Gap Pumping Plant and conveyed to Granby Reservoir less any losses charged pursuant to the Amendatory Contract.

T. Chimney Hollow Reservoir ("Chimney Hollow Reservoir") is that reservoir located on the East Slope identified in the Final Environmental Impact Statement for the Windy Gap Firming Project as the proposed action and any reservoir or reservoirs on the East Slope that are constructed as an alternative or in addition to the reservoir identified in the Final Environmental Impact Statement ("Alternative Reservoir"), provided that the cumulative active storage capacity of Chimney Hollow Reservoir and any Alternative Reservoirs does not exceed 90,000 acre feet.

U. "Pumping Costs" incurred by Middle Park or Grand County pursuant to this Agreement are 110% of the average electrical power costs of pumping for the Windy Gap Project for that year on a per acre-foot basis for Net Credited Storage.

V. "Active Storage" for Chimney Hollow Reservoir is that reservoir capacity contained between the invert of the reservoir outlet works and the normal high water line in Chimney Hollow Reservoir, or in the case of Alternative Reservoirs, the total capacity available for storage and release for the benefit of the WGFP.

W. "Prepositioning" is the manner of integrated operations of the C-BT Project and WGFP described in the Final Environmental Impact Statement for the WGFP and as may be authorized by Reclamation in the Amendatory Contract and/or Reclamation's Record of Decision for the WGFP.

X. "WGFP Completion" is the first time that the combined volume of Windy Gap Project water stored in Chimney Hollow Reservoir and Windy Gap

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Project water stored on behalf of WGFP Participants in Granby Reservoir is equal to 32% of the Active Storage of the constructed capacity of Chimney Hollow Reservoir.

Y. The "WG Volumetric Limits" shall be those limitations set forth in Paragraph 34 of the 1980 Agreement, as modified by Paragraph 2 of the 1985 Supplemental Agreement. The WG Volumetric Limits are not affected or modified by this WGFP Agreement.

Z. "Water Apportionment" is Windy Gap Project Water that is made available for use by West Slope Parties pursuant to this WGFP Agreement.

AA. "Carryover Balance" is a portion of a Water Apportionment that is available for use pursuant to this WGFP Agreement that can be stored for multiple years.

BB. "Carryover Balance Limitation" is the maximum total Carryover Balance that can be credited to Middle Park or Grand County at any point in time.

CC. "Accounting Year" for the Middle Park Water Apportionment will begin on August 1st and end on July 31st the following calendar year. Middle Park's Accounting Year shall become effective on August 1 following execution of this WGFP Agreement.

II) Relationship to 1980 and 1985 Agreements. This Agreement supplements and partially amends the 1980 Agreement and the 1985 Agreement. The 1980 and 1985 Agreements remain valid and enforceable except as explicitly modified by this WGFP Agreement and noting that the 1985 Agreement deletes and supersedes Paragraphs 6, 7, 8, 9, 10, 11, 12, 17, 29, 30, 31, 33, 34, 35 and 39 of the 1980 Agreement. The specific provisions of the 1980 and 1985 Agreements that are modified by the WGFP Agreement are [This section needs to be verified]:

A. Paragraph 2 of the 1985 Agreement is superseded and replaced, in party by III.3.E.(1)(c), (2), 3(a)(b)(c)(d)(e), 4, 5; F(1)(2); H
B. Paragraph 25 of the 1980 Agreement is superseded and replaced by Paragraph IV.B.
C. Paragraph 34 of the 1980 Agreement is superseded and replaced by IV.E, but only to the extent of Jasper Reservoir;
D. Paragraph V.C. supersedes and replaces in part Paragraph 41(f) of the 1980 Agreement;
E. Paragraph VI.D. replaces Paragraph 2 of the 1980 Agreement; and,
F. Paragraph IV.E. replaces Paragraph 14 of the 1980 Agreement.

III) Terms of the Agreement

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A. Enhancements. The benefits provided in this WGFP Agreement are in addition to and are not a substitute for the mitigation required by governmental agencies with jurisdiction over the WGFP.

B. Notification of Intent to Proceed with Windy Gap Firming Project.

1) The Subdistrict will proceed as expeditiously as reasonably possible using its best efforts to cause the construction of Chimney Hollow Reservoir. The Subdistrict shall notify the West Slope Parties in writing whether or not it intends to proceed with the Windy Gap Firming Project within 10 years of the issuance of the 404 Permit for the WGFP by the United States Army Corps of Engineers ("USACE") or upon execution of construction contracts for Chimney Hollow Reservoir, whichever occurs first.

2) This Agreement shall terminate upon written notice to the West Slope Parties that the Subdistrict does not intend to proceed with the WGFP.

3) If the Subdistrict notifies the West Slope Parties that it intends to proceed with the WGFP, then it shall have the right under this Agreement, but not the obligation, to construct and operate a total of 90,000 acre feet of storage on the Front Range. If the Subdistrict proceeds with the WGFP, then it shall provide all of the West Slope mitigation required by the Records of Decision for the WGFP and satisfy all of the obligations set forth in this WGFP Agreement, regardless of the storage capacity that is authorized by the 404 Permit issued by the USACE, or the storage capacity that is ultimately constructed or utilized for the WGFP.

C. Except as necessary to ensure compliance with this WGFP Agreement, all parties agree not to take any official action that results in a restriction of the right of the Subdistrict to construct, operate and use the full 90,000 acre feet of storage capacity of the Chimney Hollow Reservoir or Alternative Reservoir.

1) In the event of a breach of this obligation by Grand County, Paragraph IV. J. 2) of this Agreement shall terminate and be of no further force or effect and the benefits provided to Grand County pursuant to Paragraph III.F. of this WGFP Agreement and to Middle Park pursuant to Paragraph III.E. of this WGFP Agreement shall be subject to the proportional reduction determined using the methods described in III.D.1.

2) In the event of a breach of this obligation by the River District, Paragraph IV. J. 2) of this Agreement shall terminate and be of no further force or effect and the benefits provided to Grand County pursuant to Paragraph III.F. of this WGFP Agreement and to Middle Park pursuant to Paragraph

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III.E. of this WGFP Agreement shall be subject to the proportional reduction determined using the methods described in III.D.1.

3) In the event of a breach of this obligation by Middle Park, Paragraphs III.E. of this Agreement shall terminate and Middle Park shall receive water pursuant to the 1980 and 1985 Agreements, and the benefits provided to Grand County pursuant to Paragraph III.F. of this WGFP Agreement shall be subject to the proportional reduction determined using the methods described in III.D.1 .

4) In the event of a breach of this obligation by NWCOG, Paragraph IV. J. 2) of this Agreement shall terminate and be of no further force or affect and the benefits provided to Grand County pursuant to Paragraph III.F. of this WGFP Agreement and to Middle Park pursuant to Paragraph III.E. of this WGFP Agreement shall be subject to the proportional reduction determined using the methods described in III.D.1.

5) The consequences provided for in Paragraphs III.C.1), III.C.2), III.C.3), and III.C.4) shall be suspended in the event that the Subdistrict later obtains the right to construct, operate, and use the full 90,000 acre feet of storage capacity of the Chimney Hollow Reservoir or Alternative Reservoir.

D. Proportional Reduction.

1) If a binding regulatory event, judicial determination, other implementation of existing or future legal requirements or restrictions, or other formal action of any entity causes or results in a permanent reduction in firm yield of the WGFP, other than a prohibition on prepositioning, then the West Slope Parties agree that the amount of water they receive pursuant to Paragraph III of this Agreement will be subject to proportional reduction. The Parties agree to jointly determine the amount of said proportional reduction at the time the event takes effect or, as an alternative to the proportional reduction, identify measures that can be implemented to mitigate the reduction in firm yield of the WGFP. A proportional reduction shall be made to the Middle Park Water Apportionment and in the Grand County Water Apportionment under this Agreement. In the event that the Parties cannot jointly determine what the proportional reduction should be, the issue of what constitutes a proportional reduction shall be resolved by a panel of three experts, one selected by the West Slope Parties, one selected by the WGFP Enterprise, and the third selected by the experts selected by the West Slope Parties and the WGFP Enterprise. If the determination of the expert panel is not acceptable, any Party may pursue any available judicial remedies.

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2) If a binding regulatory event, judicial determination, other implementation of existing or future legal requirements or restrictions, or other formal action of any entity causes or results in a prohibition of prepositioning , then the West Slope Parties agree that the amount of water they receive pursuant to Paragraph III of this Agreement shall be reduced in accordance with this Paragraph III.D.2).

(a) Middle Park Variable Water Supply will be reduced by reducing the 700 acre-feet option in spill years in proportion to the amount of Windy Gap water stored on August 1 in Chimney Hollow and Granby Reservoir, combined, as compared to the full storage capacity of Chimney Hollow Reservoir. If Middle Park elects to receive its portion of pumping in spill years, there shall be no reductions.

(b) Grand County Variable Water Supply shall not be subject to reductions.

(c) Middle Park Annual Water Supply shall not be subject to reductions.

(d) Grand County annual amount of Transfer Water shall be reduced by 15%.

E. Middle Park Water Apportionment.

1) Middle Park Election to Receive Water.

(a) Middle Park shall continue to receive water pursuant to the 1980 and 1985 Agreements until WGFP Completion. Middle Park shall have the right, within 1 year of WGFP Completion, to make a one-time and irrevocable election as to whether it will receive water pursuant to this WGFP Agreement or receive water pursuant to the 1980 and 1985 Agreements.

(b) If a binding regulatory event, judicial determination, or other implementation of existing or future legal requirements or restrictions occurs as provided in Paragraph III. D. then Middle Park shall have the right to make an election as to whether it will receive water pursuant to this WGFP Agreement, or receive water pursuant to the 1980 and 1985 Agreements. Subdistrict shall notify Middle Park within 60 days of each event or determination and shall explain to Middle Park its effect on water available to Middle Park pursuant to this WGFP Agreement. If Middle Park has not made this election pursuant to a previous event, this election will be made by Middle Park within one year after written notification of each event.

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(c) In the event that Middle Park elects to continue to receive water pursuant to the 1980 and 1985 Agreements following WGFP Completion, such water shall be available for use on August 1 of the Accounting Year immediately following pumping (except that any water pumped in August will be credited to the current Accounting Year), and any such water, which is unused on July 31st of that Accounting Year shall be transferred to Grand County on August 1st for use in accordance with Paragraph III. F. 2) and Paragraph III.F.4).

2) If Middle Park elects to receive water in accordance with this WGFP Agreement, its apportionment will consist of the Middle Park Annual Water Supply and the Middle Park Variable Water Supply.

3) Middle Park Annual Water Supply.

(a) For the purposes of this WGFP Agreement, Middle Park's Annual Water Supply is the combination of the 850 Acre Feet of Water defined in Section III.E.3)(b) and the 1450 Acre Feet of Water defined in Section III.E.3)(c). Middle Park Annual Water Supply is not eligible to become a part of or contribute to the Middle Park Carryover Balance.

(b) 850 Acre Feet of Water. The Subdistrict and WGFP Enterprise will dedicate and set aside annually, but not cumulatively, at no cost to Middle Park, 850 acre-feet of Windy Gap Project Water, which shall be available each and every year.

(c) 1450 Acre Feet of Water.

(i) If the combined amount of Windy Gap Project Water stored in Chimney Hollow Reservoir and Windy Gap Project Water stored on behalf of WGFP Participants in Granby Reservoir at any time between the start of pumping of the Windy Gap Project and August 1st of any year is equal to or greater than 32% of the constructed capacity of Chimney Hollow Reservoir, the Subdistrict and WGFP Enterprise will dedicate and set aside at no cost 1450 Acre Feet of Water for Middle Park.

(ii) If the combined amount of Windy Gap Project Water stored in Chimney Hollow Reservoir and Windy Gap Project water stored on behalf of WGFP Participants in Granby Reservoir at any time between the start of pumping of the Windy Gap Project and August 1st of any year does not equal or exceed 32% of the constructed capacity of Chimney Hollow Reservoir, the 1450 Acre Feet of Water will be reduced at the same proportion as the maximum amount of storage of Windy Gap

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Project Water stored in Chimney Hollow Reservoir and Windy Gap Project Water stored on behalf of the WGFP Participants in Granby Reservoir during the period between the start of pumping and August 1 is to 32% of the constructed capacity of Chimney Hollow Reservoir.

(iii) The Subdistrict and WGFP Enterprise shall provide Middle Park with the April 1st water supply forecast and any subsequent forecasts, which shall be used for planning purposes to estimate the amount, if any, of the reduction in the 1450 Acre Feet of Water.

(iv) In the event that Middle Park receives less than 1450 Acre Feet of Water pursuant to paragraph III.E.3)(c)(ii), Middle Park may retain and use any unused Annual Water Supply from the prior Accounting Year to make up the difference between the amount which it receives pursuant to paragraph III.E.3)(c)(ii) and 1450 Acre Feet of Water.

(d) The Middle Park Annual Water Supply is available to Middle Park during the Accounting Year. Unused water from the Middle Park Annual Water Supply from the prior Accounting Year will transfer on August 1st to Grand County pursuant to Paragraph III.F.2) unless some portion of the water from the prior year is required to make up for the reduction in the 1450 Acre Feet of Water pursuant to Paragraph III.E.3)(c)(iv). Grand County shall, subject to the limitations in Paragraph III.E.4), have the right to use Middle Park Annual Water Supply transferred from Middle Park to Grand County in accordance with this Paragraph III.E.3)(d).

(e) Middle Park's Annual Water Supply will not be reduced by any losses charged pursuant to the Amendatory Contract.

4) Middle Park Variable Water Supply.

(a) Middle Park's Variable Water Supply is the water supply defined in this Paragraph III.E.4). Only Middle Park's Variable Water Supply is eligible to become part of or contribute to Middle Park's Carryover Balance and will be credited immediately upon pumping.

(b) The Subdistrict and WGFP Enterprise will provide a water supply forecast to Middle Park on April 1st.

(c) If the April 1st forecast does not anticipate a spill of Windy Gap Project Water, Middle Park may, on May 1st of that year, elect to receive 3.8% of the Windy Gap Project Water that will be diverted in

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the current water year in excess of 15,000 acre-feet Net Credited Storage, up to a maximum of 1,500 acre-feet Net Credited Storage as further limited by Middle Park's Carryover Balance Limitation. If the Windy Gap Project Participants have a need for additional water but do not wish to pay for the costs of additional pumping prior to such time as Middle Park has received 1,500 acre feet of Variable Water Supply, and the Windy Gap water rights are still in priority, Middle Park may request that the Subdistrict continue diversions of Windy Gap Project Water up to the 1,500 acre feet maximum, as limited by Middle Park's available Carryover Balance Limitation.

(d) If the April 1st forecast anticipates a spill of Windy Gap Project Water or if a spill has actually occurred, Middle Park shall, by May 1st, elect whether it will:

(i) Receive 3.8% of the Windy Gap Project Water diverted and stored in the current water year in excess of 15,000 acre-feet Net Credited Storage, up to a maximum of 1,500 acre-feet of Net Credited Storage, and as further limited by Middle Park's available Carryover Balance Limitation. If the Windy Gap Project Participants have a need for additional water but do not wish to pay for the costs of additional pumping prior to such time as Middle Park has received 1,500 acre feet of Variable Water Supply, and the Windy Gap water rights are still in priority, Middle Park may request that the Subdistrict continue diversions of Windy Gap Project Water up to 1,500 acre feet maximum, as limited by Middle Park's Carryover Balance Limitation; or

(ii) Receive from the Subdistrict and WGFP Enterprise by substitution such additional amount of Windy Gap Project Water stored in Chimney Hollow Reservoir as is required to result in a total Carryover Balance of 700 acre feet of Middle Park Variable Water Supply, which 700 acre feet shall not be subject to spill; or

(iii) Middle Park may elect to not receive any Middle Park Variable Water Supply.

(e) Middle Park shall pay to the Subdistrict the Pumping Costs for pumping the Middle Park Variable Water Supply which it elects to receive pursuant to Paragraph III.E.4).

5) The Subdistrict will release Middle Park Annual Water Supply and Middle Park Variable Water Supply at the request of Middle Park for all beneficial uses allowed by the 1980 Agreement and 1985 Agreement.

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Such uses shall include direct use or use by substitution, augmentation, or exchange, including but not limited to, exchange into Wolford Mountain Reservoir or replacement to Denver Water by entities that have Middle Park Contracts, and any other use authorized in a subsequent written agreement between Middle Park, the Subdistrict, and WGFP Enterprise.

F. Grand County Water Apportionment.

1) For the purposes of this WGFP Agreement, the Grand County Water Apportionment consists of the Grand County Transfer Water, the Grand County Interim Transfer Water, and the Grand County Variable Water Supply described in this Paragraph III.F. The Grand County Water Apportionment shall be used as directed by Grand County and consistent with this WGFP Agreement.

2) Grand County Transfer Water.

(a) Grand County Transfer Water is any of the Middle Park Water Apportionment received by Middle Park which is transferred to Grand County on August 1st of each year pursuant to Paragraph III.E.1)(c) and Paragraph III.E.3)(d).

(b) Commencing on the first day of August, but no less than 12 months after the execution of this WGFP Agreement, the Subdistrict shall make available for Grand County's use 50% of any of Middle Park's unused water from the previous year (the "Grand County Interim Transfer Water"). Upon WGFP Completion, the Grand County Interim Transfer Water shall vest as 100% of the water provided by Paragraph III.E.1)(c) and Paragraph III.E.3)(d). In the alternative, the Subdistrict's provision of the Grand County Interim Transfer Water will cease upon notice pursuant to III.B.2) that the Municipal Subdistrict does not intend to proceed with the WGFP.

(c) Grand County Transfer Water must be either: (1) used between August 1st and October 15th of the then current water year, or (2) on October 15th become Grand County Carryover Balance, as limited by Grand County's available Carryover Balance Limitation.

(d) Grand County's Transfer Water shall not be subject to any losses charged pursuant to the Amendatory Contract until such water is transferred to Grand County's Carryover Balance, at which time it will be assessed the appropriate losses, if any, specified in the Amendatory Contract.

3) Grand County Variable Water Supply shall include the following elements:

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(a) Concurrent Pumping.

(i) Grand County Concurrent Pumping shall become available at WGFP Completion.

(ii) Grand County may, by May 1st of each year, elect to receive 3.8% of the Windy Gap Project Water diverted and stored in the current water year in excess of 15,000 acre-feet Net Credited Storage, up to a maximum of 1,500 acre-feet Net Credited Storage, and as further limited by Grand County's available Carryover Balance Limitation.

(b) Additional Pumping.

(i) Grand County Additional Pumping shall become available at WGFP Completion.

(ii) If Windy Gap Project Participants and WGFP Participants have a need for additional water but do not wish to pay for the costs of additional pumping prior to such time as Grand County has received 1,500 acre-feet of water from Concurrent Pumping and the Windy Gap Water Rights are still in priority, Grand County may request that the Subdistrict continue Windy Gap Project Water diversions up to a combined maximum of 1,500 acre-feet of Concurrent and Additional Pumping, as further limited by the available Grand County Carryover Balance Limitation. The Subdistrict and WGFP Enterprise will make best efforts to provide five (5) days advance notice of the anticipated end of pumping for Windy Gap Project Participants and WGFP Participants.

(c) End of Year Pumping.

(i) Prior to WGFP Completion, Grand County may request that the Subdistrict continue Windy Gap Project Water diversions if the Windy Gap Project Participants have a need for additional water but do not wish to pay for the costs of additional pumping and the Windy Gap Project Water Rights are in priority, as limited by the Grand County Carryover Balance Limitation.

(ii) After WGFP Completion, Grand County may request that the Subdistrict continue Windy Gap Project Water diversions if the Windy Gap Project Participants, WGFP Participants, and Middle Park have a need for additional water but do not wish

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to pay for the costs of additional pumping and the Windy Gap Project Water Rights are in priority, as limited by the Grand County Carryover Balance Limitation.

(d) Grand County's Variable Water Supply shall be credited to Grand County's Carryover Balance immediately upon pumping.

(e) Grand County shall pay pumping costs for the Grand County Variable Water Supply provided pursuant to Paragraph III.F.3).

4). The Subdistrict will release the Grand County Water Apportionment from Granby Reservoir at the request of Grand County or its designee for diversion for irrigation, domestic, municipal or industrial uses on the West Slope allowed under the Windy Gap Water Rights provided that such uses will not require a change of water rights. The Parties acknowledge that Grand County intends to time such releases for beneficial use in a manner that results in optimizing the benefits to aquatic and recreation resources within the County and furthering the goals of the Learning by Doing Cooperative Effort (Attachment__). The Parties intend that the Grand County Water Apportionment not be diverted for irrigation, domestic, municipal or industrial uses upstream of the confluence of the Colorado River and Blue River by any person.

(a) The Parties intend for the reservoir releases of the Grand County Water Apportionment to increase the flow of water through the County above flows that would otherwise exist. To accomplish these objectives, the River District will make good faith efforts to arrange for the delivery of the Grand County Water Apportionment for diversion and beneficial use for irrigation, domestic, municipal or industrial uses on the Colorado River or its tributaries, below the confluence of the Blue and Colorado Rivers. Unless otherwise directed by Grand County, the River District's efforts will be focused on diversion and beneficial use downstream of the confluence of the Colorado and Roaring Fork Rivers but upstream of the Utah State Line.

(b) Grand County and the Subdistrict may request annual reports of the beneficial use made of the Grand County Water Apportionment. Any dispute regarding such use will be resolved in accordance with the Conflict Resolution provisions of this WGFP Agreement (Paragraph VI.L.). Regardless of the outcome of any dispute regarding this paragraph, the Parties agree that the River District shall not bear any liability regarding the beneficial use of, or the failure to arrange for the beneficial use any of, the Grand County Water Apportionment.

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(i) Following is a list of representative, but not exclusive, beneficial uses that the Parties agree satisfy the intent of this paragraph III.F.4):

Diversion for irrigation (including agriculture, lawn watering, parks, and stock-water), domestic, municipal, or industrial uses by: the Grand Valley Irrigation Company (irrigation, including uses incident of irrigation); Grand Valley Water Users Association (including irrigation, power generation, and uses incident to those uses); Orchard Mesa Irrigation District (irrigation, irrigation lift/pumping, power generation, and exchanges incident to such uses); Palisade Irrigation District (irrigation); Mesa County Irrigation District (irrigation); Ute Water Conservancy District (including municipal); Town of Clifton (municipal); Silt Water Conservancy District (irrigation and domestic); Town of Silt (municipal); Town of New Castle (municipal); City of Rifle (municipal); Battlement Mesa (municipal); diversions at the Bluestone or Town of Debeque intakes (municipal, irrigation, and industrial); substitutions in lieu of releases from Wolford Mountain Reservoir or Ruedi Reservoir for municipal, irrigation or industrial uses under the River District's water marketing program; substitutions in lieu of releases from, or exchanges into, Williams Fork Reservoir to increase the amount of, or flexibility of use, of water in Grand County's account in Williams Fork Reservoir; transit losses attributable to such uses as may be assessed by the State Engineer.

5) The Parties agree that, if Grand County determines then-current stream flow conditions in the County are sufficient to satisfy the purposes of the releases of water as described in Paragraph III.F.4), including downstream of the confluence of the Colorado and Blue Rivers, then the Grand County Water Apportionment may be exchanged or substituted for water that otherwise would be released from Wolford Mountain Reservoir, Green Mountain Reservoir or Williams Fork Reservoir in order to assist Front Range and West Slope water users in managing limited water supplies for use in the upper Colorado River basin.

G. Priority of Pumping. The right of Middle Park and Grand County to pump additional water pursuant to Paragraphs III.E.4)(c), III.E.4)(d)(i) and III.F.3)(b)(ii) shall be shared on an equal basis between Middle Park and Grand County.

H. Middle Park and Grand County Water Apportionments, Carryover Balances, and Carryover Balance Limitations.

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1) Subject to the provisions of this Paragraph III.H., Middle Park and Grand County may each have a Carryover Balance derived from Water Apportionments made available pursuant to Paragraphs III.E.4), III.F.2) and III.F.3). The maximum Carryover Balance available to Middle Park and Grand County shall not exceed their respective Carryover Balance Limitation.

2) Middle Park shall have the right to a Carryover Balance Limitation of 3,000 acre feet for its Variable Water Supply for use in the then current or subsequent water years.

3) Grand County Carryover Balance Limitations.

   (a) Upon execution of this WGFP Agreement and until WGFP Completion, Grand County shall have the right to accrue a maximum of 7,500 acre feet of Carryover Balance for use in the then current or subsequent water years.

   (b) Grand County's Carryover Balance Limitation shall be reduced to 6,000 acre feet upon WGFP Completion.

   (c) Grand County's Carryover Balance Limitation shall be reduced to 4,500 acre feet at such time as the Windy Gap Project Water stored in Chimney Hollow Reservoir has reached at any point in time, 85% of the constructed active storage capacity of Chimney Hollow Reservoir.

   (d) The permanent Grand County Carryover Balance Limitation shall be 4,500 acre feet. If Chimney Hollow Reservoir construction begins but is not completed as a result of actions by the West Slope Parties, any water stored in this account will revert to the Subdistrict.

4) Except during the first fill of Chimney Hollow, during which Paragraphs III.H.3) controls, Middle Park and Grand County can share a combined Carryover Balance Limitation of 7,500 acre feet. Middle Park and Grand County shall notify the Subdistrict before or during pumping of their intent to share the Carryover Balances and the respective amounts of water to be stored for each.

5) Any Carryover Balance of Middle Park or Grand County shall be reduced by any losses, if any, charged pursuant to the Amendatory Contract. Middle Park and Grand County shall be provided with documentation of such charges before any such reductions.

6) Any Variable Water Apportionment and any Carryover Balance made available to Middle Park or Grand County pursuant to this WGFP Agreement shall be subject to a pro rata share of monetary charges,

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payable by Middle Park or Grand County as applicable, for storage of Windy Gap Project Water in Granby Reservoir, if any, assessed pursuant to the Amendatory Contract. The Parties will advocate to Reclamation that no monetary charges be assessed for storage of Windy Gap Project Water in Granby Reservoir.

7) The Parties will advocate that Reclamation adopt specific and different shrink charges for introduction and storage of Windy Gap Project Water on the West Slope and conveyance and delivery of Windy Gap Project Water to the east slope.

8) All Carryover Balances referred to in this paragraph III.H. shall be Net Credited Storage.

I. Spill Criteria:

1) 1st to spill - Grand County Carryover Balance over 1,500 acre feet.

2) 2nd to spill - Any remaining Grand County Carryover Balance, any Middle Park Carryover Balance, and any Windy Gap Project Water stored on behalf of the WGFP Participants proportionally, based on Carryover Balances and Windy Gap Project Water in storage on behalf of the WGFP Participants as of the date(s) of spill.

3) 3rd to spill – Windy Gap Project Water stored on behalf of Windy Gap Project Participants that are not WGFP Participants.

J. No Paper Spills. In the event that Middle Park or Grand County have a Carryover Balance and the total amount of C-BT water in active storage in Granby Reservoir and Chimney Hollow Reservoir, combined, reaches 465,568 acre feet, Middle Park's and Grand County's Water Apportionments will only spill in the event of a physical spill from Granby Reservoir. Any physical spill will be allocated between WGFP Participants, Middle Park, and Grand County in accordance with Paragraph III.I.

K. Minimum Pumping. If the Windy Gap Project Water is not already being pumped, the Subdistrict shall not be required to pump Variable Water Supply for any party unless the Subdistrict's water supply forecasts predict that there will be a minimum of 1,000 acre feet of water available for diversion and storage under the Windy Gap Water Rights at the time of the proposed pumping during the current pumping season.

L. Pumping Costs. Pumping Costs shall be payable 30 days after the submission of an invoice by the Subdistrict at the end of the then current pumping season to the appropriate entity. The invoice shall include the actual bills from the power provider. In the event of a delinquency or failure to pay Pumping

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Costs by Middle Park or Grand County, the Subdistrict shall suspend release of any Variable Water Supply held by the Subdistrict for that entity and all future pumping for the delinquent Party pursuant to this WGFP Agreement until any delinquent payments have been made in full.

IV) Additional Provisions

A. Wolford Protection. The Subdistrict, and the WGFP Enterprise agree that the Windy Gap Project and the WGFP will be operated in a manner that does not diminish the ability of the Colorado River Water Conservation District to capture the natural flow of Muddy Creek up to a maximum of 65,998 acre-feet pursuant to the water rights, applicable permits, and operating criteria for Wolford Mountain Reservoir.

B. Future Uses. The Subdistrict and WGFP Enterprise agree to not place a call under the Windy Gap Decrees on any present or future water rights on the Colorado and Fraser Rivers and their tributaries above Windy Gap Reservoir; Provided, however, the Windy Gap Project and WGFP may divert any water which can be diverted in priority at the decreed point of diversion without placing a call as described above except for water provided as described in paragraph IV. O. of this Agreement.

C. Open Space. Upon execution of this WGFP Agreement, the Subdistrict agrees to negotiate with Grand County in good faith regarding the protection of open space on Subdistrict lands, including compliance with the existing Grand County Rural Land Use Process that allows cluster development in conformance with C.R.S. § 30-28-403, as exists now or may be amended in the future; provided, however, that nothing in this Agreement or in the deed restriction shall affect or preclude the sale or development of such parcel(s) pursuant to provisions of existing or future law that allow the sale or development of lands in a manner that is not within the definition of a "subdivision" or "subdivided land".

D. Public Access. Upon execution of this WGFP Agreement, the Subdistrict will make arrangements with Northern Water to provide public access to that portion of Willow Creek located on Northern Water's lands for as long as Northern Water owns the lands adjacent to Willow Creek, if and to the extent that the public access will be managed by the Colorado Division of Parks and Wildlife or other entity acceptable to Northern Water.

E. Jasper Reservoir Conditional Water right. The Subdistrict will abandon the conditional water right for Jasper Reservoir upon WGFP Completion.

F. Grand County Pump Fund. Although the Subdistrict and Grand County have no existing obligation to do so, upon execution of this WGFP Agreement, the

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WGFP Enterprise will establish a $120,000 fund for the repair, maintenance or replacement of the following pumps and related equipment:

Table A
ELIGIBLE PUMPS AND MEADOW PUMPERS

Eligible Pump/Water Right	Structure ID	Location (roughly Upstream to Down)	Meadow Pumper/Current Owner
1.Ennis Pump Ditch System	566		Carol Petersen Art Bruchez??
2. Holdcroft Pump No. 2	1275		Grady Culbreath??
3. Holdcroft Pump No. 2	1274		Carol Petersen
4. Thompson Pump No. 2	1149		BLM
5.TA Engle Ditch No. 3	927		BLM
6. McElroy State Pump	755		Sammons
7. McElroy No. 2 Ditch	613		Sammons
8.Thompson Pump No. 1	1148		Thompson
9.TAEngle Ditch No. 2	926		Thompson
10.TA Engle Ditch No. 1	651		Thompson
11.TA Engle Ditch No. 1	925		Thompson
12.McElroy Ditch No. 1	612		Sammons
13 .Martin Pump No. 1 Ditch	694		Sammons 2 cfs Grand River 6 cfs??
14. McElroy Ditch No. 3	614	On Muddy Creek	Sammons

WGFP Enterprise will administer the fund with payments to, or as directed by, Grand County. Once the fund has been depleted for its purpose, the Subdistrict, WGFP Enterprise, and Grand County have no further responsibility for claims for maintenance, replacement, or rehabilitation of pumps.

G. Flow Measuring Device Fund. The Upon execution of this Agreement the WGFP Enterprise will establish a $380,000 fund for the reimbursement of the costs of installation of flow measuring devices on all surface water diversions capable of diverting 5 c.f.s. or more from the main stem of the Colorado River between Granby Reservoir and the confluence of the Colorado and Blue Rivers. The WGFP Enterprise shall use this fund to reimburse costs incurred for such purposes if and at such time as measuring devices have been installed, and approved by the Colorado State Engineer in writing, on all surface water diversions capable of diverting 5 c.f.s or more from the mainstem of the Colorado River below Granby Reservoir to the confluence of the Colorado and Blue Rivers, and Grand County has obtained the necessary permanent access agreements for installation, operation, maintenance, and replacement of the recording and telemetry devices.

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1) If measuring devices have not been installed pursuant to the necessary permanent access agreements and approved in writing by the Colorado State Engineer on all such surface water diversions within 10 years of the date of this WGFP IGA, one-half of the funds shall be transferred for use in the Learning by Doing Cooperative Effort and one-half of the funds shall be returned to WGFP Enterprise.

2) If measuring devices have been installed pursuant to the necessary permanent access agreements and approved in writing by the Colorado State Engineer on all such surface water diversions within 10 years of the date of this WGFP IGA and there are funds which remain in the Flow Measuring Device Fund, one-half of the funds shall be transferred for use in the Learning by Doing Cooperative Effort and one-half of the funds shall be returned to WGFP Enterprise.

H. Recording and Telemetry Devices. Recording and telemetry devices for flow measuring devices approved by the Colorado State Engineer pursuant to Paragraph IV.G. will be acquired, installed, operated, maintained and replaced by and at the expense of the WGFP Enterprise pursuant to permanent access agreements obtained by Grand County, as described in Paragraph IV.G. above.

I. Water Accounting. The Subdistrict agrees to submit detailed daily water accounting to the State of Colorado Division Engineer as required by the Division Engineer and provide copies to the West Slope Parties.

J. Future Water Development.

1) Compact Curtailment Plan. The Signatories agree to cooperate in good faith toward the development of a plan to avoid and address a potential curtailment of existing Colorado water rights under the provisions of the 1922 Colorado River Compact and the 1948 Upper Colorado River Compact. The Signatories agree to meet and confer before the Municipal Subdistrict or WGFP Enterprise take any action pursuant to Paragraph IV.J.3. of this WGFP Agreement.

2) The Subdistrict and WGFP Enterprise agree that, without the prior express written consent of Grand County and the Colorado River Water Conservation District, they will not (a) acquire any existing water rights in Grand County; (b) construct additional water supply facilities in Grand County, (c) appropriate new water rights in Grand County; or (d) appropriate any new water rights in Water Division No. 5 that will result in depletions of water from Grand County.

3) Compact Curtailment Actions.

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(a) To the extent, and during such time that the operation of the Windy Gap Project or WGFP, or the exercise of the Windy Gap Project Water Rights, is or may in the future be curtailed, limited, or otherwise restricted as the result of, or for the purpose of, compliance with the 1922 Colorado River Compact or 1948 Upper Colorado River Compact ("Compact Curtailment"), the Municipal Subdistrict or WGFP Enterprise may take any actions or use any existing or future facilities as may be required to provide a water supply to the Municipal Subdistrict or WGFP Enterprise, as limited by and subject to the WG Volumetric Limits ("Compact Curtailment Actions") and the express obligations of the Subdistrict and WGFP Enterprise under this WGFP Agreement. The Municipal Subdistrict or WGFP Enterprise may undertake such Compact Curtailment Actions as may be necessary to prudently plan and prepare in advance of any potential Compact Curtailment; Provided however, that any such advance Compact Curtailment Actions will be implemented only during such time that the quantity of water that would otherwise be diverted under the Windy Gap Water Rights is reduced as the result of a Compact Curtailment. The West Slope Parties may oppose any Compact Curtailment Actions in any forum. Nothing in this Paragraph IV.J.3 shall affect the obligations of the Subdistrict and WGFP Enterprise under this Agreement.

(b) Nothing in this WGFP Agreement, including without limitation Paragraphs IV.J.1) and IV.J.2) above, shall affect, limit, or otherwise restrict the right of the Municipal Subdistrict or WGFP Enterprise to take any actions or to use any existing or future facilities as required to provide a water supply to the Municipal Subdistrict or WGFP Enterprise, as limited by and subject to the WG Volumetric Limits, in the event, to the extent, and during such time that the operation of the Windy Gap Project or WGFP, or the exercise of the Windy Gap Project Water Rights, is or may in the future be curtailed, limited, or otherwise restricted as the result of or for the purpose of compliance with the 1922 Colorado River Compact or 1948 Upper Colorado River Compact. Nothing in this WGFP Agreement shall limit or restrict the right of West Slope Parties to oppose any such actions or use of any such existing or future facilities.

(c) Nothing in this Paragraph IV.J.3 shall be construed to 1) allow the Subdistrict or WGFP Enterprise to increase the yield of the WG Project or WGFP at times other than when the quantity of water that would otherwise be diverted under the Windy Gap Water Rights is reduced as the result of the enforcement of the 1922 Colorado River Compact or 1948 Upper Colorado River Compact, or 2) use any banked or stored water in a manner that causes an increase in the yield of the Windy Gap Project or WGFP at times other than when the

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quantity of water that would otherwise be diverted under the Windy Gap Water Rights is reduced as the result of the enforcement of the 1922 Colorado River Compact or 1948 Upper Colorado River Compact. Nothing in this Paragraph IV.J.3) shall affect the obligations of the Subdistrict and WGFP Enterprise under Paragraphs III.D, III.E. and III.F. of this WGFP Agreement.

4) Nothing in this Agreement shall affect, limit, or otherwise restrict the right of the Municipal Subdistrict to fully utilize the Windy Gap Water Rights and associated existing facilities in Grand County or any existing or future facilities on the East Slope, or existing or future water rights in Water Division No. 1 in a manner that will not exceed the WG Volumetric Limits. The West Slope Parties reserve the right to oppose any actions taken by the Subdistrict intended to achieve the WG Volumetric Limits using existing or future facilities or water rights that are not expressly authorized by the 1980 Agreement, the 1985 Supplemental Agreement, and this WGFP Agreement.

5) Any consent of Grand County under Paragraph IV.J.2) shall not be construed as a limitation on or waiver of any review, approval, or permit authority, or a predetermination of any action to be taken thereunder by Grand County.

6) Nothing in this Agreement shall affect, limit, or otherwise restrict the maintenance, repair, replacement or rehabilitation of the existing Windy Gap Project facilities, replacement facilities, or rehabilitated facilities located in Grand County.

K. CWCB Instream Flow. The Subdistrict and WGFP Enterprise will support the entry of a decree in accordance with applicable law for a CWCB instream flow on the Colorado River mainstem from the confluence of the Blue and Colorado Rivers to a point immediately upstream of the confluence of the Eagle and Colorado Rivers if a)the CWCB instream flow is not used as a basis for imposing restrictions or limitations on the WGFP, b) the West Slope Parties agree that they will never assert in any forum that the CWCB Instream flow be used as a basis for restrictions or limitations on the WGP or WGFP, and c) the right is subject to substantively the same terms and conditions as are set forth in the Findings of the CWCB in declaring its intent to appropriate dated _____, 2011.

L. Grand County RICD. Subdistrict and WGFP Enterprise will not oppose the entry of a decree in Case No. 10CW298 consistent with the draft decree dated _____2012 and stipulation attached as Exhibit * to this Agreement.

M. Shoshone Outage Protocol.

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1) For purposes of this Agreement, the Shoshone Outage Protocol means that the Windy Gap Project will operate as described in this paragraph IV.M.1), IV.M.2), and IV.M.3) during periods when the Shoshone Power Plant is shutdown or otherwise not able to divert the full amount of its 1,250 cfs senior water right due to repair, maintenance, or other reasons ("Shoshone Outage"). When the Windy Gap Project's participation in the Shoshone Outage Protocol is in effect pursuant to this WGFP Agreement, the Windy Gap Project will bypass the amount of water that the Windy Gap Project would have been required to bypass if the Senior Shoshone Call had been in effect in order to result in a flow of not more than 1250 cfs at the Dotsero gage on the Colorado River (not including any water released for endangered fish species purposes). For purposes of this WGFP Agreement, a Shoshone Outage does not include a shutdown of the Shoshone Power Plant for regularly scheduled maintenance for a cumulative period of 17-days during the period of November 1 through March 15.

2) The Windy Gap Project will operate in accordance with the Shoshone Outage Protocol from July 16-April 14th. Prior to WGFP Completion, the Windy Gap Project may operate in accordance with the Shoshone Outage Protocol during the period of April 15-July 15 on a voluntary cooperative basis. Following WGFP Completion, the Windy Gap Project will operate in accordance with the Shoshone Outage Protocol during the period April 15 – July 15 at any time during this period when the combined amount of Windy Gap Project Water stored in Chimney Hollow Reservoir and Windy Gap Project water stored on behalf of WGFP Participants in Granby Reservoir is greater than 50% of the Active Capacity of Chimney Hollow Reservoir.

3) Participation in the Shoshone Outage Protocol by the Windy Gap Project during the period of April 15-July 15 will be limited to a total maximum volume of foregone pumping equal to 10,000 acre feet (30 days with one pump running) in one year, a total of 20,000 acre feet (60 days with one pump running) in any 3 consecutive year period, and a total of 30,000 acre feet (90 days with one pump running) in any 5 consecutive year period.

4) The Subdistrict agrees that it will participate in good faith in negotiations to achieve permanent management of the flow of the Colorado River to address certain flow changes that result during a Shoshone Outage.

N. Cooperative Effort for Aquatic Environment. The Subdistrict and the WGFP Enterprise, Grand County, Middle Park, and the River District agree to participate in the Learning by Doing Cooperative Agreement ("Cooperative Agreement") as defined in the Intergovernmental Agreement for The Learning by, Doing Cooperative Effort which is attached as Exhibit * but which is not a part of or incorporated within this WGFP Agreement. The Cooperative Effort

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may be amended by and with the mutual consent of all parties thereto. Any such amendments shall not require amendment or modification of this WGFP Agreement.

O. Colorado River Cooperative Agreement. The Subdistrict and the WGFP Enterprise agree not to oppose or otherwise interfere with the efforts to obtain such court decrees and approvals as are necessary for the Colorado River Cooperative Agreement to the extent that the court decrees and approvals do not adversely affect the WGFP or Windy Gap Project. The Subdistrict further agrees that it will not divert water that would not have been available but for the actions of the Management Committee or Grand County pursuant to the Learning by Doing process.

P. Wild and Scenic. Within one year of issuance of an acceptable permit for the WGFP, the Subdistrict shall pay $50,000 and the River District shall pay $25,000 to the Endowment Fund of the Upper Colorado River Wild and Scenic Stakeholder Group for use to protect Wild and Scenic resources identified in the Colorado River from Kremmling downstream to No Name. The Subdistrict's contribution provided herein shall satisfy the obligation of the Subdistrict and WGFP Enterprise to contribute endowment funds for Wild and Scenic purposes under this WGFP Agreement. The Subdistrict agrees that the River District's contribution provided herein shall satisfy the obligation of the River District to contribute endowment funds for Wild and Scenic purposes under the WGFP Agreement. The Subdistrict will contribute 20% of the amount contributed by the River District, not to exceed $5,000 annually adjusted annually by the Denver-Boulder-Greely CPI-U, for annual operating costs of the Upper Colorado River Wild and Scenic Stakeholder Group.

Q. Windy Gap Water Right Diversion at Granby Reservoir. Absent the express written consent of Grand County and the River District, the Subdistrict and WGFP Enterprise agree that neither will divert water at Granby Reservoir under the priority of the Windy Gap Decrees or during free-river conditions.

R. Bypass of Windy Gap Reservoir. The Subdistrict will enter into an agreement with Colorado Division of Parks and Wildlife to provide up to $250,000 to study methods for bypass of flows, sediment, and/or fish around or through Windy Gap Reservoir and identify potential modifications that would provide tangible benefits to aquatic resources below Windy Gap Reservoir. Issues to be studied include, but are not limited to sediment transport, water quality (effects on temperature and/or nutrients) and fish passage. The Subdistrict and the WGFP Enterprise will participate with all stakeholders in securing funding from other sources for any solution identified by the study, provided, however, that this WGFP IGA does not require any funding for such solutions. The study will be conducted as the first phase of the Upper Colorado River Habitat Project. The implementation of recommendations

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resulting from the study will not constitute a violation of or require amendment of this WGFP Agreement or the 1980 and 1985 Agreements.

V) West Slope Parties' Commitments

A. No Opposition to WGFP. The West Slope Parties will not oppose final state and federal approvals of the WGFP, subject to performance of this WGFP Agreement by the Subdistrict and WGFP Enterprise and the performance of such mitigation, requirements, and conditions as are required in those approvals, including but not limited to the Records of Decision by Reclamation and USACE, the Amendatory Contract, 401 Certification, or the 404 Permit. Nothing herein shall affect any 1041 authority of Grand County.

B. Reopen Approvals or Authorizations. The West Slope Parties will not request that any governmental approval or authorization of the Windy Gap Project or the WGFP be subject to provisions that have the effect of reopening the governmental approval or authorization. For a period of five years from the date of the first diversions into the constructed Chimney Hollow Reservoir, no party will unilaterally request, or cause others to request, that the United States Army Corps of Engineers or other regulatory agency with jurisdiction and authority over the WGFP, reopen a permit or license for the Windy Gap Project or WGFP for any reason except as may be necessary to preserve any right to undertake such action prior to expiration of any applicable legal deadline or statute of limitation. Each party reserves the right to oppose any such efforts to reopen the permits or licenses for the Windy Gap Project or WGFP. This Paragraph V.B. is not intended to prevent the West Slope Parties from commencing any legal action to enforce this WGFP Agreement or to request enforcement of specific terms of federal permits.

C. Windy Gap Reservoir Conditional Storage Right. The West Slope Parties will not oppose future applications to make the remaining conditional portion (1,101.14 acre feet) of the existing Windy Gap Reservoir storage right absolute.

D. Modification of Windy Gap Decree. The West Slope Parties will consent to the entry of a Decree consistent with the draft decree attached as Attachment * to this Agreement, modifying the existing Windy Gap Decrees to incorporate this WGFP Agreement and will not assert that a change of the water rights for the Windy Gap Project is required for the operations of the Windy Gap Project or WGFP in a manner consistent with this Agreement.

VI) Further Agreements of the Parties

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A. The Parties reaffirm the validity of the 1980 and 1985 Agreements, agree that those Agreements remain in place except as explicitly modified by this WGFP Agreement, and that in the event of a determination by a governmental entity with jurisdiction that this WGFP Agreement or any provision is invalid or inadequate in any regard, the 1980 and 1985 Agreements shall remain valid and enforceable as if this WGFP Agreement did not exist. The provisions of the 1980 and 1985 Agreements which relate to the operation of the Windy Gap Project and the rights and interests of Middle Park shall remain in place until such time as WGFP Completion, and the approval of this Agreement by the Water Court, Water Division No. 5 by Decree not subject to appeal.

B. No Party will oppose final state, local and federal approvals of the WGFP, subject to performance of this WGFP Agreement by the Subdistrict and WGFP Enterprise and the performance of such mitigation, requirements, and conditions as are required in those approvals, including but not limited to the Records of Decision by Reclamation and USACE, the WGFP Amendatory Contract, 401 Certification, or the 404 Permit. Nothing herein shall affect any 1041 authority of Grand County.

C. The Subdistrict agrees that conditions of the federal authorization for the WGFP will include provisions that substantially conform to the following:

1. the total volume of C-BT Project water stored in the combination of Granby and Chimney Hollow Reservoirs will not exceed 465,568 acre-feet. For the purposes of this Paragraph of the WGFP Agreement, the amount of C-BT Project water in storage in Granby Reservoir shall be the amount of C-BT Project water stored above the invert of the Farr Pumping Plant Intake and below the normal high water line; and

2. In any year in which the April 1st or subsequent projection by Northern Water anticipates a spill at Granby Reservoir, C-BT Project water then in storage in Chimney Hollow Reservoir shall not be released to satisfy delivery requirements to Colorado-Big Thompson Project Allottees if such release would allow the capture and storage of additional C-BT Project water in Granby Reservoir.

D. Nothing in this WGFP Agreement shall be construed to limit the discretion of the Northern Colorado Water Conservancy District or Reclamation regarding the operation of the Colorado-Big Thompson Project, including, without limitation the pre-emptive release of Windy Gap Project water from Granby Reservoir that may increase the risk of or result in a spill of water provided to Middle Park or Grand County (any such spill in accordance with Paragraph III.I of this WGFP Agreement).

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E. Except as necessary to comply with the express terms of this WGFP Agreement, nothing in this WGFP Agreement shall be construed to limit the discretion of the Subdistrict or WGFP Enterprise regarding the operation of the Windy Gap Project or Windy Gap Firming Project, including, without limitation, the pre-emptive release of Windy Gap Project Water from Granby Reservoir that may increase the risk of or result in a spill of water provided to Middle Park or Grand County in accordance with Paragraph III.I of this Agreement (any such spill in accordance with Paragraph III.I of this WGFP Agreement).

F. The Parties agree that performance of this Agreement, compliance with any mitigation requirements for the WGFP imposed by a federal or state agency, and compliance with the requirements of a Grand County 1041 permit for the WGFP shall constitute full and complete satisfaction of the obligations of the Subdistrict and WGFP Enterprise to set forth and complete a plan which satisfies 37-45-118(1)(b)(II) of the Water Conservancy Act.

G. This Agreement does not limit, change or expand the role of or protections afforded to all Parties with interests in the Colorado-Big Thompson Project as described in the Manner of Operation provisions of Senate Document No. 80, the 1961 Principles to Govern the Release of Water at Granby Dam To Provide Fishery Flows Immediately Downstream In The Colorado River ("1961 Principles"), and the Blue River Decrees. Water released from Granby Reservoir pursuant to this WGFP Agreement shall be in addition to the then current bypass of water under the 1961 Principles.

H. The obligations of the Parties to this WGFP Agreement shall exist upon execution of this Agreement unless otherwise specified in this Agreement.

I. This WGFP Agreement shall be incorporated within and be a non-severable part of the Windy Gap Decrees.

J. The West Slope Parties agree to not assert that the WGFP and Moffat Collection System Project are interdependent or interrelated.

K. This WGFP Agreement is an agreement between the Parties and does not bind or limit the authority or jurisdiction of agencies of the United States of America.

L. Performance of the portions of this WGFP Agreement that require the expenditure of funds are subject to future budgeting and appropriation of funds by the governing bodies of the Subdistrict, WGFP Enterprise, Middle Park, Grand County, and the River District. The Parties agree to make good faith efforts to appropriate such funds.

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M. The Parties agree that this Agreement is an intergovernmental agreement pursuant to Article XIV, Sec. 18 of the Colorado Constitution and C.R.S. § 29-1-201 et. Seq. inclusive, among all governmental entities hereto. The Parties further agree that the terms and conditions of this Agreement are enforceable by specific performance and agree not to bring any defense to specific performance based on the doctrine of governmental immunity. The Parties also agree that a breach of this Agreement will cause irreparable harm sufficient for injunctive relief.

N. The Parties agree to work cooperatively to implement a stipulated resolution of the Green Mountain Reservoir Administrative Fill dispute.

O. The Parties agree that if a dispute arises on any matter covered by this WGFP Agreement, the Parties will confer in good faith and endeavor to resolve the concern. If the Parties reach an impasse, they will select a neutral third party mediator who would seek an acceptable voluntary solution to the conflict. For conflicts that involve a technical or scientific matter, the neutral third party mediator may select an independent technical or scientific expert, acceptable to the Parties involved in the mediation, to review and make a recommendation on the matter. If the conflict cannot be resolved through the efforts of the mediator, then the affected Parties may pursue any available legal or administrative recourse. Nothing herein shall preclude the commencement of any action that would otherwise be barred by a statute of limitations or the timely participation in any judicial or administrative process.

P. This WGFP Agreement is the result of negotiations between the Parties and their respective counsel. These negotiations produced numerous drafts which were prepared by one or more of the Parties. The Parties agree that these drafts, including omissions, do not provide or represent evidence of intent of any Party and may not be relied upon for purposes of construction and enforcement of this WGFP Agreement or for any other purpose.

VIII. No Waiver

A. The Parties do not agree:

1) Whether amendment of the Blue River Decree or Senate Document No. 80 is required to authorize the storage of C-BT Project water in Chimney Hollow Reservoir,

2) Whether a change of water right is required to allow the storage of Windy Gap Firming Project water in Chimney Hollow Reservoir, or

3) Whether the Section 390b(d) of the Water Supply Act of 1958 requires Congressional approval for the Windy Gap Firming Project.

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4) Notwithstanding these disagreements, the West Slope Parties will not object to, litigate or otherwise dispute in any forum the storage of C-BT Project water in Chimney Hollow Reservoir or the storage of Windy Gap Firming Project water in Chimney Hollow Reservoir in accordance with, and subject to the following provisions:

   (a) The total volume of C-BT Project water stored in the combination of Granby and Chimney Hollow Reservoirs will not exceed 465,568 acre-feet. For the purposes of this Paragraph of the WGFP Agreement, the amount of C-BT Project water in storage in Granby Reservoir shall be the amount of C-BT Project water stored above the invert of the Farr Pumping Plant Intake and below the normal high water line.

   (b) In any year in which the April 1st or subsequent projection by Northern Water anticipates a spill at Granby Reservoir, C-BT Project water then in storage in Chimney Hollow Reservoir shall not be released to satisfy delivery requirements to Colorado-Big Thompson Project Allottees if such release would allow the capture and storage of additional C-BT Project water in Granby Reservoir.

   (c) The implementation of this WGFP Agreement.

   (d) The Parties do not waive any rights regarding any other changes to the historical operations of the C-BT Project or Windy Gap Project.

B. No Waiver – C-BT. The Parties agree that the dispute concerning storage of C-BT Project water in Chimney Hollow Reservoir has not been litigated. The Parties agree that, except as provided for in this Agreement, in entering into the agreement and not litigating or otherwise objecting in any forum to the legal issues specified in Paragraph VII.A., above, that this Agreement shall never give rise to any claim, defense, or theory of acquiescence, bar, merger, issue or claim preclusion, promissory estoppel, equitable estoppel, waiver, laches, unclean hands or any other similar position or defense concerning any factual or legal position regarding the parties respective position regarding the storage of C-BT Project water and the Parties' respective interpretations of Senate Document No. 80, the 1961 Principles, the 1938 Repayment Contract, Reclamation Law, the Blue River Decrees, or Colorado law. The parties further agree that they do not intend this Agreement to have the effect of precedent or preclusion on any factual or legal issue in any other matter. The parties expressly reserve their rights to assert any legal or factual position or challenge the legal or factual position taken by any other party on any other matter.

C. No Waiver – WGFP. The Parties agree that the dispute concerning storage of Windy Gap Project Water in Chimney Hollow Reservoir has not been litigated. The parties agree that, except as provided for in this WGFP

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Agreement, in entering into this WGFP Agreement and not litigating or otherwise objecting in any forum to the legal issues specified in Paragraph VII.A, above, that this Agreement shall never give rise to any claim, defense, or theory of acquiescence, bar, merger, issue or claim preclusion, promissory estoppel, equitable estoppel, waiver, laches, unclean hands or any other similar position or defense concerning any factual or legal position regarding the parties respective position regarding the storage of Windy Gap Firming Project water in Chimney Hollow Reservoir and the Parties' respective interpretations of federal or Colorado law. The Parties further agree that they do not intend this Agreement to have the effect of precedent or preclusion on any factual or legal issue in any other matter. The parties expressly reserve their rights to assert any legal or factual position or challenge the legal or factual position taken by any other party on any other matter.

D. The Parties do not agree whether Grand County has the authority to regulate the WGFP pursuant to C.R.S. § 24-65.1-101, et seq.

1) Notwithstanding these disagreements, the Subdistrict will not object to, litigate, or otherwise dispute in any forum the authority of Grand County to require a permit for the WGFP issued by Grand County pursuant to C.R.S. § 24-65.1-101, et seq. (1041 Permit), including any terms and conditions thereof once said Permit has been accepted by the Subdistrict.

2) With the exception of a challenge to the County's authority to require a permit for the WGFP, the Subdistrict does not waive or relinquish its rights to raise any defense or assert in any forum that it has fully complied with and is not in violation of the WGFP 1041 Permit.

3) The Subdistrict does not waive or relinquish its rights to object to, litigate, or otherwise dispute in any forum the authority of Grand County to modify, amend or terminate the WGFP 1041 Permit or to require a 1041 Permit or other Grand County Permit or authorization for any other existing or future project, action, or other activity of the Subdistrict.

E. Preservation of Governmental Powers. Except as specifically provided herein, nothing in this Agreement shall be construed as a limitation on or waiver of any review, approval, or permit authority, or a predetermination of any action taken thereunder, by any governmental or quasi-municipal entity including, without limitation, the regulatory or quasi-judicial power or authority of Grand County.

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Windy Gap Firming Project

Fish and Wildlife Enhancement Plan

Prepared for:
The Colorado Wildlife Commission
In accordance with CRS 37-60-122.2

Prepared by:
Municipal Subdistrict,
Northern Colorado Water Conservancy District

In Partnership With:
Denver Water

June 9, 2011

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WINDY GAP FIRMING PROJECT
FISH AND WILDLIFE ENHANCEMENT PLAN

1.0 INTRODUCTION

1.1. Enhancement Project Overview

The Windy Gap Firming Project (WGFP) is a proposed water supply project that would provide more reliable water deliveries to Front Range and West Slope communities and industries. The Municipal Subdistrict, Northern Colorado Water Conservancy District, acting by and through the WGFP Water Activity Enterprise (Subdistrict) is seeking to construct the project on behalf of the 13 WGFP Participants. Project Participants include the City and County of Broomfield; the towns of Erie and Superior; the cities of Evans, Fort Lupton, Greeley, Lafayette, Longmont, Louisville, and Loveland; the Little Thompson Water District; the Central Weld County Water District; and the Platte River Power Authority. The proposed action is to add water storage and related facilities to the existing Windy Gap operations that would be capable of delivering a firm annual yield of about 30,000 AF to Project Participants.

Pursuant to CRS 37-60-122.2(1), Denver Water and the Municipal Subdistrict, Northern Colorado Water Conservancy District, acting by and through the Windy Gap Firming Project (WGFP) Water Activity Enterprise (Subdistrict) have agreed to participate with the Colorado Department of Natural Resources (DNR) and Colorado Division of Wildlife (CDOW) in concurrent development of the Fish and Wildlife Mitigation Plan (FWMP) for the Subdistrict's WGFP and Denver Water's Moffat Project. In addition to the concurrent FWMP's, Denver Water and the Subdistrict have elected to submit to the CDOW enhancement plans to improve existing fish and wildlife resources to the CDOW. These enhancement plans are submitted pursuant to regulations implementing CRS 37-60-122.2(2) and are intended to enhance fish and wildlife resources over and above the levels existing without the Moffat Project and WGFP. Denver Water and the Subdistrict are submitting their Enhancement Plans simultaneously with their FWMP's.

1.2. Fish and Wildlife Enhancement Plan Stakeholders

The Subdistrict has been consulting with a broad range of federal and state agencies, as well as local governments and environmental groups, to solicit input on desired enhancements to existing fish and wildlife resources. These entities include:

- Governmental organizations: CDOW, Denver Water, Grand County, and Town of Hot Sulphur Springs
- Non-governmental organizations: Trout Unlimited, and landowners along the upper Colorado River

Although the CRS 37-60-122.2 procedures do not specify public involvement requirements, Denver Water and the Subdistrict acknowledge the Colorado Wildlife Commission's desire to provide ample opportunity for public participation. To date, the Wildlife Commission has provided the following opportunities for the public to provide mitigation and enhancement suggestions:

- Stakeholder Workshops, January 24-25, 2011, Winter Park – CDOW solicited input on options for fixing the upper Colorado River between Windy Gap and the Kemp-Breeze State Wildlife Area to ensure a functioning river that supports fish and wildlife resources given anticipated future flows.
- Public Comment Period on Draft Enhancement and Mitigation Plans, Feb. 10-24, 2011 – CDOW invited public review and comment on the February 9th draft plans. The input was reviewed by CDOW, Denver Water and the Subdistrict while preparing the April 7th plans.
- Wildlife Commission Meeting, March 10, 2011 – Member of the public provided comments on the February 9th draft plans and review process.
- Wildlife Commission Meeting, May 6, 2011 – Members of the public provided comments on the April 7th plans submitted to the Wildlife Commission on April 7, 2011. Time was also allowed for presentations from several groups on issues regarding the plans.

1.3 Other Concurrent and Related Activities

Moffat Collection System Project

The Moffat Collection System Project is currently proposed by Denver Water (Denver) to develop 18,000 AF/year of new annual yield to the Moffat Treatment Plant to meet future raw water demands on the East Slope. This project is anticipated to result in additional diversions, primarily from the upper Fraser River and Williams Fork River basins. Denver's proposed additional Fraser River diversions would be located upstream of the Windy Gap Project diversion site on the Colorado River and would directly affect the availability of water for the WGFP. The Moffat Collection System Project Draft EIS prepared by the Corps was released for public review in 2009.

Diversions for the WGFP and Moffat Project would result in changes to flows in the Colorado River below the Windy Gap dam. Denver Water and the Subdistrict have agreed to cooperate with each other and with the DNR and CDOW in concurrent development of the mitigation plans required under CRS 37-60-122.2 for the two projects. They have jointly developed stream temperature monitoring stations as mitigation (refer to Section 5.3.3 of this FWMP). Additionally, Denver Water and the Subdistrict have proposed enhancement with significant resources and funding to improve current conditions in the river.

2.0 ENHANCEMENTS

2.1 Upper Colorado River Habitat Project

The Upper Colorado River Habitat Project (Habitat Project) was designed in coordination with the Subdistrict to address concerns raised by CDOW and other stakeholders regarding the current conditions of the aquatic ecosystem in the Colorado River downstream of Windy Gap. CDOW studies have identified a decline in populations of *Pteronarcys californica* (giant stonefly), which, historically, has been a major source of food for trout in the Colorado River as well as other species of stoneflies and mayflies. Populations of the mottled sculpin (*Cottus bairdi*), a native fish that is also an important food source for trout and shares habitat with the *Pteronarcys*, have also declined. CDOW believes that riffle areas below the Windy Gap Reservoir have been altered by changes in flow regime, water depletions, sedimentation, and armoring of the channel bed. Trout populations between Windy Gap and Kremmling have declined. CDOW has expressed a desire to return the river to a more functional system considering current and future hydrology.

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 to the lower terminus of the Kemp-Breeze State Wildlife Area (Segment). Refer to Figure 1. The intent is for Denver Water and the Subdistrict to join with the CDOW, along with other stakeholders, in a cooperative effort to identify and address desired improvements to the stream environment.

Resources for the Project

A. Funds Provided by Denver Water. To implement the Habitat Project, Denver Water will provide $1.5 million.

B. Funds Provided by Subdistrict. To implement the Habitat Project, the Subdistrict will provide $3.0 million.

C. Possible Funds from CDOW. In addition to designing the Habitat Project, CDOW may contribute $500,000 to implement the Habitat Project.

D. Possible Funds Provided by Learning by Doing. Denver Water and the Subdistrict will participate in the LBD Cooperative Effort, which is described in Section 2.2. In the LBD Cooperative Effort, Denver Water has committed money for habitat improvements, water for environmental flows, and considerable system flexibility to provide flushing flows, all directed towards enhancing the aquatic environment in Grand County (refer to Appendix A for details). Denver Water and the Subdistrict, as two members of the six-member Management Committee, will work with the other members of the committee to dedicate an additional $1 million (from the funds committed to LBD by Denver Water) to the Habitat

Project, in addition to the amounts committed by Denver Water and the Subdistrict in paragraphs A and B above.

E. Possible Matching Funds. Denver Water and Subdistrict have committed $4.5 million for the Habitat Project described in A and B above and, as described below (Use of Funds), preference will be given to land that has public access. However, $1.0 million of this amount is available as matching funds for private landowners to perform additional work in the Colorado River in areas of private land.

F. Other Funding and Resources. If the Habitat Project participants desire additional resources beyond the $6.0 million described above, the project participants will work with other stakeholders and granting agencies to seek other sources of funding (a possible source of funding is matching funds as described in C above). In addition, Denver Water and the Subdistrict will contribute in-kind resources such as labor, equipment, and materials if and when available as determined by Denver Water and the Subdistrict, to help maximize the value of funds described above. Both Denver Water and Northern Water maintain significant workforces and equipment in Grand County as well as a quarry owned by Northern Water. In addition, CDOW has indicated a willingness to provide in-house expertise and resources for stream restoration design.

G. Future Funding. The Subdistrict and Denver Water will contribute $1.0 million and $500,000, respectively, for a total of $1.5 million to a fund to be used for adaptive management and/or maintenance in the Habitat Project segment. Adaptive Management in this case means that the $1.5 million will be available to adjust elements of the stream restoration efforts that are not functioning as designed.

The funding for the Habitat Project is summarized in Table 1.

Table 1. Upper Colorado River Habitat Project Funding

Source of Funding (Habitat Project)	**Amount (millions of $)**	
Denver Water	$1.5	
Subdistrict	$3.0	
CDOW	$0.5	Contingent upon CDOW approval
LBD	$1.0	Contingent upon LBD approval
Subtotal	$6.0	

Source of Funding (Future Funding)		
Denver Water	$0.5	
Subdistrict	$1.0	
Subtotal	$1.5	
Total	$7.5	

Use of Funds. The public funds described above will be used for the Habitat Project to restore the Segment on public land. However, the public stream reaches are interrupted by reaches of private land. The effectiveness of habitat restoration work and overall stream health will be compromised if there is not some degree of stream enhancement continuity for the entire Segment. While, preference will be given to work on public lands, public funds may be used for stream restoration on private land to provide continuity and prevent harm to the Habitat Project as a whole if CDOW determines that such work on private lands will provide benefits to the entire Grand County stream reach, and/or through a program of matching private funds with public funds. Proposed work on private land within the Segment will be developed in cooperation with the project participants and the land owner to ensure maximum benefit to the health of the river.

Any funds remaining after implementation of the Habitat Project will be used for additional projects to improve the aquatic environment on the Colorado River. Additional projects could include maintenance activities, a bypass around Windy Gap Reservoir or continuing stream improvements downstream to the confluence with Troublesome Creek (the lower terminus of the Gold Medal fishery designation). Other projects would be identified and agreed upon by the project participants.

Effective Date. The Habitat Project will commence when the Subdistrict and Denver Water have received acceptable Records of Decision and permits for their respective projects and have begun final design and construction activities. If a permit is appealed, the Habitat Project will commence after final resolution of the appeal and acceptance of the resolution by the Subdistrict and Denver Water.

Project Implementation. The Habitat Project will be implemented in collaboration with the LBD Cooperative Effort to ensure consistency and coordination with the overall stream enhancement efforts in Grand County. Section 2.2 describes the implementation of the Habitat Project and the goals and management structure of LBD.

2.2 Implementing the Habitat Project with the Learning by Doing Cooperative Effort

The Habitat Project will be implemented through an IGA among Denver Water, the Subdistrict, and CDOW. Denver Water and the Subdistrict will convey the committed dollars to CDOW and CDOW will design and implement the project. CDOW will also enter into any agreements, as needed, with private land owners or other funding sources. Additionally, the Habitat Project will be managed by CDOW in collaboration with the Habitat Project Stream Team.

Stream Team: The contributing members of the Habitat Project Steam Team include:

- Denver Water
- Subdistrict
- CDOW
- Grand County
- Other Parties that contribute financial resources to the Habitat Project, including but not limited to landowners

Advisory Team: Interested parties not contributing resources, including Trout Unlimited and landowners.

Implementation of Habitat Project: The Habitat Project will be managed by the Habitat Project Stream Team with advice from the Advisory Team. The Stream Team will make good faith efforts to resolve any conflicts. If the good faith effort does not result in consensus, the Habitat Project Stream Team will refer the issue to the Director of the DNR for resolution. Prior to referral, the unresolved issue will be summarized in writing with an explanation of any "competing views" and efforts to date to resolve the matter.

The Habitat Project will likely consist of several phases:

- *Project Goals* – The Stream Team will begin by setting specific goals for the Habitat Project to promote functionality of the river system. Goals may include specific biological goals related to health of the aquatic ecosystem, including fish and macroinvertebrates (e.g. trout, *Pteronarcys* and sculpin). The Habitat Project goals will be consistent with the LBD Effort and the SMP.
- *Project Design* – The Team will evaluate the most effective and sustainable restoration opportunities for the Segment. Different designs or solutions may be appropriate and implemented for different parts of the Segment. The Team will evaluate restoration opportunities based on site-

specific field evaluations, data from the SMP, and the specific objectives for a given reach.

- *Implementation* – The Team will prioritize proposed habitat improvements, as well as allocation of funding for public and privately-owned stream segments. The Habitat Project will be implemented over time as stream reaches are prioritized and designs are completed. The CDOW will be responsible for the final design, permitting and implementation of the stream restoration activities.
- *Monitoring* – The Team will determine the appropriate monitoring activities to measure outcomes from implementing the Habitat Project taking into consideration monitoring already in place or proposed as part of the LBD Effort. The CDOW will be responsible for the long-term monitoring and maintenance of the stream restoration activities.

Learning by Doing Cooperative Effort

The Habitat Project will be coordinated with the Learning by Doing Cooperative Effort to ensure consistency and coordination with the overall stream enhancement efforts in Grand County.

Denver Water and Grand County have spent over three years working cooperatively to resolve issues related to Denver Water's existing operations in Grand County. Denver Water and Grand County reached a proposed agreement on September 24, 2010 regarding Denver Water's commitments to enhance existing conditions in Grand County. Denver Water and Grand County are currently working with the State to assure that the benefits of Denver Water's commitments can be delivered and protected under Colorado's water rights system. Grand County Commissioners will also conduct a public process to gather input from county residents and other interested parties on the proposed agreement prior to a formal vote by the Commissioners on the agreement. A major component of the proposed agreement is the LBD Cooperative Effort. This is a cooperative, iterative and ongoing process to maintain, and when reasonably possible, restore or enhance the stream environment in the Fraser and Williams Fork river basins, and in the mainstem of the Colorado River from the outflow of Granby Reservoir to its confluence with the Blue River.

The Subdistrict has also been working cooperatively with Grand County and other West Slope stakeholders to develop an IGA regarding additional enhancements to existing conditions in Grand County. The IGA has not been completed, but the Subdistrict has committed to participate in the proposed LBD Cooperative Effort.

The Grand County Stream Management Plan (SMP) is the framework for the overall LBD Cooperative Effort. The SMP will be used as a "living" document that will be revised as additional monitoring data are gathered and as management goals for

each stream reach are agreed upon. Types of restoration opportunities include channel bank revegetation, enhancing fish passage, applying enhancement flows to existing low and/or high flow conditions, and in-stream habitat restoration.

The LBD Effort will be implemented with the following management structure, as shown in Figure 2.

Management Committee – The LBD Cooperative Effort will be managed by representatives of the public entities contributing resources to the various activities and projects undertaken by the group. Resources are defined as funding, water, project design, and/or equipment and manpower to implement a project. The Management Committee will operate by consensus (unanimous vote) under the LBD Cooperative Effort IGA. A copy of the proposed IGA is included in Appendix A of this Enhancement Plan. The Management Committee will include one representative from:

- Denver Water
- Northern Colorado Water Conservancy District, Subdistrict
- Grand County
- Colorado River Water Conservation District
- Middle Park Water Conservancy District
- Trout Unlimited

The Management Committee may elect to invite others to participate as members of the Management Committee based on commitments to long-term contributions of funding or other tangible resources that will further the goals of the LBD Cooperative Effort. It is anticipated that CDOW will be invited to join the Management Committee if the LBD Cooperative Effort is signed by all the parties.

Advisory Committee – The Management Committee may request participation by other parties, such as representatives from environmental, recreational, governmental and agricultural interests, to provide expertise and technical advice. It is anticipated that the U.S. Forest Service and others, would be invited to be advisors.

Responsibilities – The responsibilities of the Management Committee, with input and assistance from the Advisory Committee, include:

- ***Monitoring Plan*** – A long-term monitoring plan will be developed and implemented to identify critical stream reaches and assign priorities for actions; identify changes in the aquatic environment; evaluate effectiveness of actions taken, and modify and refine strategies for achieving the goals of the LBD Cooperative Effort.
- ***Operations Plan*** – As stream reaches are prioritized and projects identified, the Management Committee will develop an annual Operations Plan to maximize the stream environmental benefits with the available resources

such as water commitments, system flexibility and funding. The Management Committee will meet as frequently as necessary to explore opportunities to coordinate operations of all diversion structures and reservoir releases among all water users in Grand County.

- ***Enhancements*** – Denver Water committed in the proposed mediation agreement to provide substantial resources of money, water and system flexibility for the purpose of maintaining, restoring or enhancing the Upper Colorado, Fraser and Upper Williams Fork watersheds. Additional resources can be contributed by other parties to implement the LBD Cooperative Effort.
- ***Annual Review*** – The entire LBD Cooperative Effort, inclusive of coordinated operations, stream reach prioritization, stream improvement projects and monitoring programs, will be reviewed annually by the Management Committee in refining and updating the plans and projects.

STREAM PROJECTS

The Management Committee, with input from the Advisory Committee, will prioritize stream reaches for implementing stream improvement projects.

Stream Team – A specific stream project, as prioritized by the Management Committee, will be managed by a "Stream Team" comprised of organizations or individuals that have committed resources to that specific project. Resources are defined as funding, water, project design, and/or equipment and manpower to implement a specific project. Each Stream Team will consist of representatives of the Management Committee, who will be contributing resources, to ensure consistency and continuity with the LBD Cooperative Effort, plus any other contributing members. Each Stream Team will only develop and implement enhancement projects that support the goals and priorities of the LBD Effort. Private landowners who contribute resources would be invited to participate on the Stream Team for their respective segment of the river. These landowners would approve any projects proposed by the Stream Team on property they own.

Advisory Team – The Stream Team will invite other interested parties such as representatives from environmental, recreational, governmental and agricultural interests, to serve as technical advisors on a particular project.

2.3 Funding and Support for Windy Gap Bypass Studies

This measure addresses concerns raised by CDOW and other stakeholders regarding the current condition of the aquatic ecosystem in the Colorado River downstream of Windy Gap Reservoir. West Slope stakeholders and CDOW have expressed concerns that the reservoir has caused changes in water quality and sediment transport below the dam, which may be related to changes in populations of macroinvertebrates (Pteronarcys and other species) and sculpin below the

reservoir. In addition, stakeholders have expressed a desire for structural modifications that would allow free migration of fish around the Windy Gap dam.

The Subdistrict will provide up to $250,000 to fund detailed studies of methods for bypass of flows, sediment, and/or fish around Windy Gap Reservoir. CDOW would direct these studies to identify potential modifications that would provide tangible benefits to aquatic resources below Windy Gap Reservoir. Issues to be studied include sediment transport, water quality (effects on temperature and/or nutrients) and fish passage. If studies identify significant, measurable benefits and there is stakeholder consensus to pursue the project, the Subdistrict will provide site access, in-kind service for design and construction of any facilities, and long-term operation and maintenance of the facility. All stakeholders will be responsible for investigation of potential sources of funding and procurement of funding for any identified improvements.

3.0 RELATIONSHIP TO PROJECT MITIGATION

Both Denver Water and the Subdistrict will comply with all mitigation measures required in the permits for their respective projects, Moffat Project and WGFP. Compliance with the mitigation measures in permits will be the sole responsibility of the permittee (i.e., Denver Water and the Subdistrict). However, Denver Water and the Subdistrict are members of the Management Committee, and will collaborate, to the extent practicable, to implement the mitigation measures in a manner consistent with the objectives of the Habitat Project, LBD Cooperative Effort and specific Stream Team efforts.

The stream enhancement cooperative efforts, such as the Upper Colorado River Habitat Project and the LBD, are efforts to enhance the existing environment and are not intended to substitute for any mitigation required by the federal agencies for the projects. The goal is to coordinate the application of any required mitigation efforts with the voluntary and collaborative efforts of the stream enhancement projects to assure the maximum benefit for the stream environment.

Denver Water and the Subdistrict will enter into a binding agreement with CDOW for the Habitat Project, as described above. If the Corps or tReclamation requires aquatic mitigation in the Segment, some or all of the committed resources listed above will be enforceable through conditions in the permits. In that case, an IGA would not be needed for those portions of the Habitat Project required by the Corps or Reclamation as aquatic mitigation and included in the permit conditions for the Moffat Project and the WGFP. The Habitat Project will be implemented in a manner that complements any mitigation measures required by the Corps for the Moffat Project or by Reclamation for the WGFP.

State Approved Fish and
Wildlife Mitigation Plan

Windy Gap Firming Project

Fish and Wildlife Mitigation Plan

Prepared for:
The Colorado Wildlife Commission
In accordance with CRS 37-60-122.2

Prepared by:
Municipal Subdistrict
Northern Colorado Water Conservancy District

June 9, 2011

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EXECUTIVE SUMMARY

The Municipal Subdistrict of the Northern Colorado Water Conservancy District (Subdistrict), on behalf of 13 East Slope Windy Gap Project participants, is pursuing a project that will improve the reliability of the water supplies and deliveries from the existing Windy Gap Project. The purpose of this Fish and Wildlife Mitigation Plan (FWMP) for the Windy Gap Firming Project (WGFP) is to comply with the requirements of Colorado State law (CRS 37.60.122.2), including the Procedural Rules for the Wildlife Commission (Chapter 16).

The WGFP is also required to comply with the National Environmental Policy Act (NEPA) by preparing a Final Environmental Impact Statement (FEIS) and with Section 404(b) (1) of the Clean Water Act by applying for a "404 Permit." As part of the 404 permit process, a 401 certification from the Colorado Department of Public Health and Environment is required.

The WGFP participants are committed to comply with all mitigation measures required by the FWMP, the FEIS (and associated Record of Decision), the 404 Permit, and the 401 Certification.

The Subdistrict is also submitting a separate Fish and Wildlife Enhancement Plan (Enhancement Plan) in cooperation with Denver Water to enhance fish and wildlife resources over and above the levels existing without the WGFP and Moffat Project.

In addition to the required mitigation measures in the FWMP and enhancements in the Enhancement Plan, the Subdistrict is participating with several East Slope and West Slope water users, numerous state and federal agencies, and West Slope private entities to enhance the flows in the Colorado River in Grand County by managing and coordinating the release of approximately 5,400 AF of water (1/2 of 10825 Water) that will benefit the Upper Colorado River Endangered Fish Recovery Program.

The goal of the Subdistrict and the WGFP participants is to mitigate for environmental impacts of the WGFP through the measures identified in this Fish and Wildlife Mitigation Plan and to improve the aquatic and riparian habitat of the Colorado River in Grand County with measures identified in the separate Enhancement Plan, while at the same time improving the reliability of the Windy Gap Project water supplies.

This FWMP for the WGFP addresses two main impact areas. On the East Slope the proposed action primarily consists of the construction and operation of a new 90,000 AF water storage facility, Chimney Hollow Reservoir. Although there will be no new construction on the West Slope and all future operations of the Windy Gap Project will be within historic water rights limitations, there will be increased diversions of Colorado River water over the actual amounts historically diverted.

The associated impacts to the Colorado River stream and aquatic resources are addressed in this plan.

With respect to the Colorado River below the Windy Gap diversion, both the WGFP and Denver Water's Moffat Collection Project (Moffat Project) diversions can sometimes have cumulative, or combined, impacts to the river. Since the Moffat Project is also seeking approval through the state and federal regulatory processes, both the Subdistrict and Denver Water have agreed to cooperate in a process of simultaneous development of the mitigation and enhancement plans pursuant to CRS 37-60-122.2. The WGFP Enhancement Plan is being provided to the Wildlife Commission concurrently with this FWMP in a separate document.

WINDY GAP FIRMING PROJECT
FISH AND WILDLIFE MITIGATION PLAN

1.0 INTRODUCTION

The Windy Gap Firming Project (WGFP) is a proposed water supply project that would provide more reliable water deliveries to Front Range and West Slope communities and industries. The Municipal Subdistrict, Northern Colorado Water Conservancy District, acting by and through the WGFP Water Activity Enterprise (Subdistrict) is seeking to construct the project on behalf of the 13 WGFP Participants. Project Participants include the City and County of Broomfield; the towns of Erie and Superior; the cities of Evans, Fort Lupton, Greeley, Lafayette, Longmont, Louisville, and Loveland; the Little Thompson Water District; the Central Weld County Water District; and the Platte River Power Authority.

This Fish and Wildlife Mitigation Plan (FWMP) was developed to satisfy the requirements of Colorado Revised Statute (CRS) 37-60-122.2 and outlines the actions that Project Participants will implement to mitigate the impacts that the WGFP may have on fish and wildlife. The FWMP also addresses concerns regarding WGFP impacts that were identified by CDOW staff in a detailed review of the DEIS impacts. The Subdistrict has also prepared a separate Fish and Wildlife Enhancement Plan (Enhancement Plan), pursuant to CRS 37-60-122.2 to address issues raised by Colorado Division of Wildlife and other stakeholders regarding the current condition of the aquatic environment on the Colorado River, which includes proposed enhancement measures to enhance fish and wildlife resources over and above levels existing without the WGFP.

2.0 PROJECT BACKGROUND

2.1 COLORADO-BIG THOMPSON PROJECT

The Colorado-Big Thompson Project was developed by the U.S. Bureau of Reclamation on behalf of the Northern Colorado Water Conservancy District between 1938 and 1957. The project was designed to provide water for agricultural, municipal, and industrial beneficial uses. The C-BT Project provides supplemental water to 33 cities and towns and is used to help irrigate more than 600,000 acres of northeastern Colorado farmland. On average, about 220,000 AF of water is delivered to northeast Colorado.

Twelve reservoirs, 35 miles of tunnels, 95 miles of canals, and 700 miles of power transmission lines comprise the complex C-BT collection, distribution, and power systems. Willow Creek Reservoir, Shadow Mountain Reservoir, Grand Lake, and

Lake Granby on the west of the Continental Divide collect and store C-BT water from the upper Colorado River basin. Water is pumped from Lake Granby into Shadow Mountain Reservoir where it flows by gravity into Grand Lake. From there, the 13.1-mile Adams Tunnel transports the water under the Continental Divide to the East Slope.

Once the water reaches the East Slope, it is used to generate electricity as it descends almost one-half mile through five power plants on its way to Colorado's Front Range. Carter Lake, Horsetooth Reservoir, and Boulder Reservoir store the water. C-BT water is delivered as needed via canals and pipelines to supplement native water supplies in the South Platte River Basin.

2.2 WINDY GAP PROJECT

During the 1960s, the cities of Boulder, Greeley, Longmont, Loveland, Fort Collins, and the Town of Estes Park determined that additional water supplies were needed to meet their projected municipal demands. The Municipal Subdistrict, Northern Colorado Water Conservancy District, consisting of the incorporated areas of the six entities, was formed in 1970 to develop the Windy Gap Project. Prior to project construction, the Platte River Power Authority acquired all of the City of Fort Collins' allotment contracts, as well as one-half of the City of Loveland's and one-half of the Town of Estes Park's contracts. Allotment contracts are used to allocate 480 units of Windy Gap Project water. Each Windy Gap unit represents a yield of up to 100 AF and, similar to C-BT units, can be bought and sold. The Windy Gap unit holders have changed since the original project was completed.

The Windy Gap Project consists of a diversion dam on the Colorado River, a 445-AF reservoir, a pumping plant, and a 6-mile pipeline to Lake Granby. Currently, Windy Gap Project water is stored and conveyed through C-BT Project facilities prior to delivery to Windy Gap Project allottees. Middle Park Water Conservancy District contractees on the West Slope use Windy Gap water to replace out-of-priority diversions by release of water directly from Lake Granby to the Colorado River.

2.2.1 Windy Gap Project Environmental Impact Statement

In April 1981, Reclamation completed the Final EIS on the effects of using C-BT Project facilities for the "storage, carriage and delivery" of Windy Gap Project water. The 1981 Record of Decision (ROD) for the original Windy Gap Project EIS allowed Reclamation to negotiate a contract with the Subdistrict and the NCWCD for the storage, conveyance, and delivery of Windy Gap Project water using facilities of the C-BT Project.

The original EIS determined that about 56,000 AF of water could be diverted annually from the Colorado River and that about 48,000 AF would be available for delivery to East Slope Windy Gap unit holders after subtracting 3,000 AF for MPWCD and allowances for various storage and conveyances losses. Windy Gap diversions are limited to a rate of 600 cfs and occur primarily during the months of

April to July. Total Windy Gap diversions are measured at the Adams Tunnel and are limited to a maximum of 90,000 AF in any one year and a maximum of 650,000 AF during any consecutive 10-year period pursuant to the *Agreement Concerning the Windy Gap Project and Azure Reservoir and Power Project*, dated April 30, 1980 and the Windy Gap water rights.

2.2.2 Mitigation Measures Included in the Original Windy Gap EIS

The 1981 Windy Gap Project EIS and ROD, as well as subsequent agreements, included a variety of mitigation measures to compensate and offset the effects associated with construction of the Windy Gap Project and its water diversions. Operational mitigation measures are still in place and funding and compensatory mitigation measures have been paid. Mitigation measures are summarized below.

Minimum Streamflow. A Memorandum of Understanding between the Municipal Subdistrict, Northern Colorado Water Conservancy District, NCWCD, and Colorado Division of Wildlife (June 23, 1980) established the following minimum streamflows on a 24-mile reach of the Colorado River downstream of the Windy Gap Project to the mouth of the Blue River that apply when the Windy Gap Project is pumping:

- From the Windy Gap Diversion Point to the mouth of the Williams Fork River: 90 cfs
- From the mouth of the Williams Fork River to the mouth of Troublesome Creek: 135 cfs
- From the mouth of Troublesome Creek to the mouth of the Blue River: 150 cfs

If flows are less than those specified above, Windy Gap must curtail diversions except that the project cannot be required to bypass more than the natural inflow. Additionally, bypass of at least 450 cfs for at least 50 hours during the period of April 1 through June 30 is required at least once every 3 years.

Endangered Species. Endangered Species Act Section 7 consultation with the U.S. Fish and Wildlife Service concluded with a Biological Opinion (March 13, 1981) determination that Windy Gap depletions, with the conservation measures listed below is not likely to jeopardize the existence of the endangered squawfish or humpback chub. The Subdistrict agreed to payment of $100,000 for a habitat project and $450,000 for biological investigations on the Colorado River as conservation measures to compensate for the adverse effects of the Windy Gap Project. Specific conservation and recovery measures included:

- The establishment of backwater habitat areas along the mainstem of the Colorado River
- Support of a field research team for 3 years to evaluate habitat improvement techniques for endangered fish
- Bypass flow agreements with CDOW for trout habitat to benefit Colorado River endangered fish downstream of the project area

Azure Agreement. Western Slope objections to the Windy Gap project were resolved in the *Agreement Concerning the Windy Gap Project and the Azure Reservoir and Power Project* dated April 30, 1980, entered into by the Subdistrict and several West Slope entities that had been opposed to the project because of anticipated West Slope impacts. Following negotiations between the Subdistrict and the Colorado River Water Conservation District (CRWCD), a settlement was reached and mitigation measures acceptable to the parties were identified. Other parties to this agreement included: the Northwest Colorado Council of Governments (NWCCOG), Grand County, MPWCD, Three Lakes Water and Sanitation District, the towns of Granby and Hot Sulphur Springs, Winter Park Water and Sanitation District, and 30 ranchers. The purpose of this agreement was to provide compensation to West Slope entities from the transbasin diversion of water and associated impacts. Principal agreements included:

- A commitment by the Subdistrict to fund the construction of the Azure Reservoir and Power Plant, or if infeasible, fund an alternative project or a cash payment to the CRWCD
- Payment of $25,000 to Grand County for salinity studies of the Colorado River
- Payment of $150,000 to the Town of Hot Sulphur Springs for assistance in improving its water treatment facility and $270,000 for improving its wastewater treatment facility
- Payment of $500,000 to plan, construct, and design facilities needed for ranchers to maintain their diversion structures on the Colorado River
- An agreement by the Subdistrict to subordinate its Windy Gap decrees to all present and future in-basin irrigation, domestic, and municipal uses, excluding industrial uses, on the Colorado and Fraser rivers and their tributaries above the Windy Gap Reservoir site
- An agreement by the Subdistrict to volumetric limits on diversions, which included a maximum single-year diversion of 90,000 AF/year and a maximum of 650,000 AF during any consecutive 10-year period. Per the 1985 *Supplement to the 1980 Azure Settlement Agreement*, these diversion limitations apply to deliveries through the Adams Tunnel, as opposed to diversions at Windy Gap Reservoir
- An agreement by the Subdistrict to bypass flows necessary to meet senior downstream water rights
- An agreement by the NCWCD to allow Grand County's use of a rock and gravel quarry on their property
- An agreement by the Subdistrict to cooperate with CDOW and others to allow public use for recreation at Windy Gap Reservoir

In return for these mitigation measures, West Slope interests agreed to drop objections to the Windy Gap conditional water right decrees and cooperate with all the necessary permitting requirements to allow construction of the project. The 1985 *Supplement to the 1980 Azure Settlement Agreement* was later signed on March 29, 1985 by the Subdistrict, CRWCD, NWCCOG, Grand County

commissioners, and the MPWCD. This agreement was implemented after the planned Azure Reservoir was determined infeasible. The 1985 agreement included the following compensation to West Slope entities:

- Payment of $10.2 million, which was used to fund construction of Wolford Mountain Reservoir on Muddy Creek north of Kremmling, and release of obligations for funding of the Azure Project
- The Subdistrict's agreement to set aside annually, but non-cumulatively, at no cost to the MPWCD, 3,000 AF of water in Lake Granby that is produced each year from Windy Gap supplies, for beneficial use without waste in the MPWCD for all beneficial uses, except instream uses and industrial uses
- Subordination of Windy Gap water rights to either Rock Creek or Wolford Mountain projects; Wolford Mountain Reservoir was completed in 1996

The 1980 and 1985 agreements were incorporated as integral parts of the Windy Gap water rights decrees.

2.3 WINDY GAP FIRMING PROJECT

The proposed WGFP would entail construction of a new water storage reservoir that would provide more reliable water deliveries to Front Range and West Slope communities and industry. Due to limitations and constraints with the existing system, the current Windy Gap facilities, which were completed in 1985, are unable to deliver the anticipated firm yield of water. Water deliveries from the West Slope are limited by storage capacity in Lake Granby and by the delivery capacity of the Adams Tunnel, which delivers water from Grand Lake to the East Slope. As a result, a group of the Windy Gap Project unit holders, working through the Subdistrict, have initiated the proposed WGFP which will firm all or a portion of their individual Windy Gap units to meet a portion of existing and future municipal and industrial water requirements. The proposed action is to add water storage and related facilities to the existing Windy Gap operations that would be capable of delivering a firm annual yield of about 30,000 AF to Project Participants.

The intent of the WGFP is to improve the reliability of the Windy Gap Project and the existing Windy Gap water rights by increasing the firm yield from the existing Windy Gap Project water supply. The Subdistrict's Proposed Action is the construction of Chimney Hollow Reservoir to store Windy Gap Project water. To improve yield, the Subdistrict also is requesting integration of the Colorado-Big Thompson Project (C-BT) and Windy Gap Project operations so that C-BT water can be stored in Chimney Hollow Reservoir. The Proposed Action would require new connections to C-BT East Slope facilities and continued use of C-BT storage and conveyance systems and other existing pipelines, canals, and diversions to deliver Windy Gap water to Project Participants.

The Preferred Alternative includes construction of the 90,000-AF Chimney Hollow Reservoir with a surface area of about 740 acres. This alternative includes

prepositioning, which is the storage of C-BT water, as well as Windy Gap water, in the new reservoir. Water would be conveyed to Chimney Hollow Reservoir via a new pipeline connection to existing East Slope C-BT facilities at the upper end of the existing Flatiron Penstocks, where a new buried pipeline would deliver water to Chimney Hollow Reservoir or Carter Lake. Connections between Chimney Hollow Reservoir and Carter Lake would allow delivery of water to Participants using existing infrastructure. Reservoir construction would require relocation of about 3.8 miles of an existing 115-kV transmission line.

The new Chimney Hollow Reservoir would be located on Subdistrict land, and these lands, along with adjacent Larimer County open space lands, would be managed by Larimer County for recreation. Combined Subdistrict and Larimer County lands would provide about 3,400 acres including the reservoir for recreation and fish and wildlife habitat. Anticipated recreation features include a parking area, trails, boat dock and ramps, picnic facilities, and vault toilets. No overnight camping would be allowed.

2.3.1 Relationship of the Original Windy Gap EIS to Current Firming Project EIS

The WGFP EIS evaluates the potential effects of alternatives associated with firming the yield of the water diverted under the terms of the original Windy Gap Project EIS. The proposed WGFP would not exceed the average annual diversion of 56,000 AF evaluated in the 1981 EIS and ROD or any other diversion-related limitations or water rights. Additional reservoir storage capacity is needed in the WGFP because of the limitations in the C-BT system to store Windy Gap water when it is available. The WGFP EIS evaluates the direct, indirect, and cumulative effects of any new physical disturbances or changes in operation needed by the WGFP. As described above, the original EIS included a number of mitigation measures to offset impacts, several of which are ongoing.

3.0 OTHER CONCURRENT OR RELATED ACTIVITIES

3.1 MOFFAT COLLECTION SYSTEM PROJECT

The Moffat Collection System Project is currently proposed by Denver Water (Denver) to develop 18,000 AF/year of new annual yield to the Moffat Treatment Plant to meet future raw water demands on the East Slope. This project is anticipated to result in additional diversions, primarily from the upper Fraser River and Williams Fork River basins. Denver's proposed additional Fraser River diversions would be located upstream of the Windy Gap Project diversion site on the Colorado River and would directly affect the availability of water for the WGFP. The Moffat Collection System Project Draft EIS prepared by the Corps was released for public review in 2009.

Diversions for the WGFP and Moffat Project would result in changes to flows in the Colorado River below the Windy Gap dam. Denver Water and the Subdistrict have

agreed to cooperate with each other and with the Colorado Department of Natural Resources (DNR) and CDOW in concurrent development of the mitigation plans required under CRS 37-60-122.2 for the two projects. They have jointly developed stream temperature monitoring stations as mitigation (refer to Section 5.3.3 of this FWMP). Additionally, Denver Water and the Subdistrict have proposed enhancement with significant resources and funding to improve current conditions in the river. The WGFP Enhancement Plan is being provided to the Wildlife Commission concurrently with this FWMP in a separate document.

3.2 UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Reclamation is preparing an Environmental Assessment (EA) to assess the effects of proposed contracts that would provide for permanent release of 10,825 AF/yr of water to the 15-Mile Reach of the upper Colorado River. As a condition of a 1999 Programmatic Biological Opinion (PBO) (U.S. Fish and Wildlife Service 1999), a group of East and West Slope water users is committed to make releases of "10825 water" in late summer and fall in support of the recovery of endangered fish species in the 15-Mile Reach near Grand Junction. The EA will document whether a Finding of No Significant Impact (FONSI) can be issued for the proposed contracts.

The Proposed Action Alternative would use releases from Ruedi Reservoir and Lake Granby, and to a limited extent, storage in and releases from Green Mountain Reservoir when excess capacity is available, to provide 10,825 AF/yr of water for the 15-Mile Reach.

The Proposed Action Alternative involves release of 5,412.5 AF/year from Lake Granby. Releases from Lake Granby would range from 20 to 50 cfs during the period from July 15 to September 30, depending upon the hydrologic year type. This alternative was not included in the hydrologic analyses for either the WGFP or Moffat Project. Accordingly, the flows in the Colorado River below Lake Granby would be increased over flows shown in the Draft EIS for each project.

3.2.1 Coordination of 10825 Project Releases from Lake Granby

Each year, a total of 5,412.5 AF of water is to be released from Lake Granby. The water will be released to benefit the 15-Mile Reach on a fixed delivery schedule to be agreed upon by the parties in the future, and pursuant to applicable federal and state laws. The parties anticipate that the release pattern will depend on the type of hydrologic year (dry, average, or wet) and will be based on the target stream flow in the Colorado River between Lake Granby and Kremmling during late summer and early fall. Releases from Lake Granby will be pursuant to a municipal-recreation contract with a Grand Valley municipal entity within or downstream of the 15-Mile Reach.

Under some hydrologic conditions, releases from Lake Granby made to meet targeted stream flow in the Colorado River downstream of Lake Granby may not coincide with the FWS requirements for the 10825 water at the 15-Mile Reach. In these instances, water released from Lake Granby will be stored in Green Mountain

Reservoir by exchange or substitution pursuant to a contract with Reclamation (subject to availability of storage capacity and exchange potential). This water will then be released at the request of the Service to benefit the 15-Mile Reach.

An Operations Group will be established, consisting of representatives from the water users, FWS, Reclamation, and the State of Colorado Division 5 Engineer. The Operations Group will meet each spring to develop a plan for releasing the 10,825 AF of water during the coming 12 months, and at other times as necessary to fulfill the purposes of this Project. The Subdistrict will propose that CDOW be added as a member of the Operations Group.

4.0 REGULATORY PROCESS

The WGFP is required to obtain numerous federal and state permits, licenses, and approvals. The primary regulatory processes related to the C.R.S. 37-60-122.2 requirement for fish and wildlife mitigation are described below.

4.1 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) REVIEW

The Subdistrict is seeking approval from Reclamation for approval of a physical connection to C-BT Project facilities and for operations of the Chimney Hollow Reservoir in order to implement the project. As the lead federal agency, Reclamation prepared a Draft Environmental Impact Statement (Reclamation 2008) for the proposed project. The U.S. Army Corps of Engineers (Corps), Western Area Power Administration (Western), and Grand County are cooperating agencies. A Final EIS is expected to be published in mid-2011. If impacts to fish and wildlife are identified in the FEIS that were not identified in the DEIS, Reclamation will coordinate with CDOW and other state agencies as required under the Fish and Wildlife Coordination Act and will make adjustments to project mitigation as appropriate.

4.2 SECTION 404 PERMIT

Because the proposed WGFP would involve the discharge of dredged and fill material into wetlands or other waters of the U.S., a permit is required from the Corps under Section 404 of the Clean Water Act. The Subdistrict, acting by and through the Windy Gap Firming Project Water Activity Enterprise, has notified the Corps that it will seek a Section 404 permit for the WGFP. Issuance of a permit would be a Corps federal action.

4.3 COLORADO FISH AND WILDLIFE MITIGATION PLAN

This FWMP is prepared to satisfy the requirements of C.R.S. 37-60-122.2. The first portion of this statute states:

> (1)(a) The general assembly hereby recognizes the responsibility of the state for fish and wildlife resources found in and around state waters which are affected by the construction, operation, or maintenance of water diversion, delivery, or storage facilities. The general assembly hereby declares that such

> fish and wildlife resources are a matter of state-wide concern and that impacts on such resources should be mitigated by the project applicants in a reasonable manner. It is the intent of the general assembly that fish and wildlife resources that are affected by the construction, operation, or maintenance of water diversion, delivery, or storage facilities should be mitigated to the extent, and in a manner, that is economically reasonable and maintains a balance between the development of the state's water resources and the protection of the state's fish and wildlife resources.

FWMPs for water projects considered under C.R.S. 37-60-122.2 are to be developed by the project applicant, working in cooperation with CDOW, and submitted to the Colorado Wildlife Commission (CWC). If the CWC and applicant agree on the mitigation plan, the CWC forwards the mitigation plan to the Colorado Water Conservation Board (CWCB) for adoption as the official state position on the mitigation actions required of the applicant.

4.3.1 Mitigation and Enhancement Plans

C.R.S. 37-60-122.2 makes a specific distinction between mitigation of impacts caused by the proposed project, and enhancing fish and wildlife resources over existing conditions. This distinction is further defined in the Procedural Rules for the Wildlife Commission (Chapter 16), and clarified in a memorandum dated December 9, 2010 to the Director of the Colorado Division of Wildlife and the Wildlife Commission from the First Assistant Attorney General, Natural Resources and Environment Section. Accordingly, this FWMP includes mitigation measures to address the direct impacts that have been identified for the proposed project. The Subdistrict has also prepared a separate Enhancement Plan, in accordance with CRS 37-60-122.2 to address issues raised by Colorado Division of Wildlife and other stakeholders regarding the current condition of the aquatic environment on the Colorado River, which includes proposed enhancement measures to enhance fish and wildlife resources over and above levels existing without the WGFP. The Subdistrict, as an applicant for one or more federal permits, or licenses, is required by C.R.S. 37-60-122.2 to submit a proposed mitigation plan, but submittal of an enhancement plan is voluntary.

4.3.2 Consultation, Coordination and Public Input

The Subdistrict consulted with Colorado Division of Wildlife (CDOW) U.S. Fish and Wildlife Service (FWS) representatives during preparation of this Plan. In addition, CDOW and FWS were provided an opportunity to review and comment on the Wildlife Resource Technical Report (ERO 2008) and Aquatic Resource Technical Report (Miller Ecological 2008) prepared as part of the EIS process. Both of these reports provide additional details on the impacts of the alternatives evaluated in the EIS. The CDOW and FWS also were given an opportunity to review and comment on the draft EIS.

CRS 37-60-122.2 requires CDOW and Colorado Water Conservation Board review and input on mitigation for fish and wildlife impacts resulting from a federally

approved water project. The review process is intended to provide a balanced review between fish and wildlife protection and water development.[1] Although the procedures for CRS 37-60-122.2 do not require public review and input, the Subdistrict and CDOW have been involved in extensive efforts to allow for public participation. To date, the Wildlife Commission has provided the following public meetings to solicit input on the potential impacts and mitigation for the Moffat Project:

- Wildlife Commission Workshop, October 7, 2010, Las Animas – CDOW presented the proposed fish and wildlife impacts of the WGFP
- Wildlife Commission Public Meetings ("1313" Meetings), October 13, 2010 in Loveland and October 21, 2010 in Granby – Wildlife Commissioners solicited public comment on the potential impacts of the WGFP
- Stakeholder Workshops, January 24-25, 2011, Winter Park – CDOW solicited input on enhancement options for fixing the upper Colorado River between Windy Gap and the Kemp-Breeze State Wildlife Area to ensure a functioning river that supports fish and wildlife resources given anticipated future flows. (Refer to the *WGFP Enhancement Plan* for details.)
- Public Comment Period on Draft Enhancement and Mitigation Plans, Feb. 10-24, 2011 – CDOW invited public review and comment on the February 9th draft plans. The input will be reviewed by CDOW, Denver Water and the Subdistrict while preparing the final plans.
- Wildlife Commission Meeting, March 10, 2011 – Member of the public provided comments on the February 9th draft plans and review process.
- Wildlife Commission Meeting, May 6, 2011 – Members of the public provided comments on the April 7th plans submitted to the Wildlife Commission.

Input from all of these processes has been used to help prepare this plan.

5.0 PROPOSED FISH AND WILDLIFE MITIGATION PLAN

This section constitutes the Mitigation Plan for fish and wildlife impacts that are expected to be caused by the proposed WGFP. Mitigation measures have been developed to address impacts identified in the Draft EIS. The mitigation measures are also intended to address concerns regarding WGFP impacts that were identified by CDOW staff in a detailed review of the DEIS impacts. The impacts are based on a comparison of the existing conditions scenario to the Preferred Alternative, which consists of a 90,000 AF reservoir at the Chimney Hollow site. A detailed description of existing conditions in the project area and the analysis and identification of project impacts are included in the Draft EIS. The Draft EIS and associated Technical Reports prepared in conjunction with the DEIS are the only studies that

[1] See Testimony of Clyde Martz, Direction of the Department of Natural Resources, Senate Testimony HB 87-1158, April 9, 1987

have been conducted that specifically analyze the incremental impacts of the WGFP.

5.1 WGFP PROJECT AREA

The WGFP would have effects on both the east and west sides of the Continental Divide. The West Slope project area shown on Figure 1 includes the Colorado River below Lake Granby, which is affected by changes in Lake Granby spills and increased Windy Gap diversions at the existing Windy Gap Reservoir. Willow Creek below Willow Creek Reservoir is also included in the project area because of small changes in Willow Creek Feeder Canal diversions. Lake Granby is included because water levels would decrease as a result of storage of a portion of Windy Gap water in Chimney Hollow Reservoir. Shadow Mountain Reservoir and Grand Lake are included in the project area because of potential water quality effects, but there would be no change in lake levels.

The East Slope project area shown in Figure 2 includes the Chimney Hollow Reservoir site located west of Carter Lake, which is also shown on Figure 3. Hydrologic changes would occur in the Big Thompson River below Lake Estes from the import of additional Windy Gap water and from slight increases in flow that would occur below Participant wastewater treatment plants (WWTPs) on the Big Thompson River, St. Vrain Creek, Big Dry Creek, and Coal Creek. Carter Lake and Horsetooth Reservoir would experience a change in reservoir levels with the WGFP.

Proposed mitigation measures for the West Slope (Colorado River) area and the East Slope (South Platte Tributaries and Chimney Hollow Reservoir) are described below in separate sections.

5.2 AVOIDANCE AND MINIMIZATION

The Preferred Alternative for the WGFP was selected to minimize environmental impacts as a result of a detailed alternatives analysis conducted by Reclamation and a Section 404(b)(1) alternatives analysis prepared in coordination with the Corps. The alternatives analysis evaluated over 170 project elements which included both structural and non-structural alternatives. The Preferred Alternative consists of a 90,000 AF reservoir at the Chimney Hollow site and has been designed to minimize direct effects to wetlands and other waters of the U.S.

As part of the federal and state permits and approvals, the Subdistrict will implement a variety of best management practices (BMPs) during design and construction to reduce impacts to the environment, including fish and wildlife. Some of the environmental permits and approvals with BMPs and environmental protection measures include:

- Migratory Bird Treaty Act Compliance
- CDPHE Fugitive Dust Control Plan

- CDPHE Stormwater Management Plan
- CDPHE Section 401 Water Quality Certification

The CDOW has developed BMPs and actions to minimize adverse impacts to wildlife resources. The BMPs were specifically developed for the oil and gas industry; however, they can also be applicable to other major construction projects. These BMPs will be considered by the Subdistrict when preparing final design and construction plans. The Subdistrict will consult with the CDOW to implement the appropriate BMPs to avoid or minimize impacts on fish and wildlife resources.

5.3 PROPOSED MITIGATION MEASURES FOR WEST SLOPE (COLORADO RIVER) IMPACTS

Table 1 summarizes West Slope impacts and the proposed mitigation measures for each identified impact. The table also includes a column that outlines issues and concerns regarding WGFP impacts that were identified by CDOW staff in a detailed review of the DEIS impacts. The mitigation measures identified in the table are described in more detail in this section.

5.3.1. Modified Prepositioning to Maintain Higher Water Levels in Lake Granby

This measure addresses Impact CR-3, as well as CR-16, CR-23, ES-1, ES-2, and ES-29.

In any year when Lake Granby is projected to fall below an elevation of 8,250 feet, modified prepositioning, which reduces the delivery of C-BT water from Lake Granby to Chimney Hollow Reservoir, will be implemented to maintain higher water levels in Lake Granby.

Details of this measure will be developed by the Subdistrict and incorporated into a proposed agreement between Reclamation and the Subdistrict with a concurrence by the Corps. The objective is to minimize the adverse effects of prepositioning on water levels in Lake Granby. This measure will minimize any potential negative effects on aquatic resources and recreation in Lake Granby that may be caused by reduced water levels from prepositioning.

5.3.2 Improvements to Flushing Flows in the Colorado River

This measure addresses Impact CR-6, as well as CR-2, CR-14, CR-15 and CR-17.

The Windy Gap Project is currently required to bypass 450 cfs for 50 hours once in every 3 years, if such flows are naturally available in accordance with the *Memorandum of Understanding Between Municipal Subdistrict, Northern Colorado Water Conservancy District and Division of Wildlife, Colorado Department of Natural Resources, Relating to Minimum Stream Flow in Association with the Windy Gap Diversion Project*, dated June 23, 1980. The Subdistrict will modify project operations as follows:

- The flushing flow provision of the 1980 MOU will be modified to increase the required flushing flow from 450 cfs to 600 cfs.
- In any year when flows below Windy Gap have not exceed 600 cfs for at least 50 consecutive hours in the previous two years, and total Subdistrict water supplies in Chimney Hollow and Granby Reservoirs exceed 60,000 AF on April 1, the Subdistrict will cease all Windy Gap pumping for at least 50 consecutive hours to enhance peak flows below Windy Gap.

The intent of this measure is to enhance peak flows below Windy Gap . The Subdistrict will coordinate with CDOW and other water suppliers, including Denver Water, to maximize benefits of the higher flows and minimize any potential negative impacts to aquatic resources.

5.3.3 Temperature Mitigation

This measure addresses Impact CR-9, as well as CR-11 and CR-24.

- Monitoring Stations. The Subdistrict will work with Denver Water to install, operate and maintain two continuous real-time temperature-monitoring stations on the Colorado River; one at the Windy Gap gage and one upstream of the confluence with the Williams Fork River.

- Temperature Thresholds. For the purposes of this mitigation plan, the threshold temperatures will be the following, as measured at the temperature monitoring stations identified above:

  1. MWAT Chronic Threshold: 18.2°C (64.8° F), based on current Maximum Weekly Average Temperature (MWAT) Chronic Standard
  2. DM Acute Threshold: 23.8°C (74.8° F), based on current Daily Maximum (DM) Acute Standard

- MWAT Chronic Threshold Exceedances - Reduction or Curtailment of WGFP Pumping . For the period after July 15th of each year:

  1. At such times as the Weekly Average Temperature (WAT) exceeds the MWAT Chronic Threshold,, the Subdistrict will reduce or curtail WGFP pumping at the Windy Gap diversion to the extent necessary to maintain temperatures within the MWAT Threshold. Reduced pumping may not be sufficient to maintain temperatures below the threshold.

2. Pumping for the original Windy Gap Project, now and after the WGFP is in operation, may occur at any time that the Windy Gap water rights are in priority and sufficient space is available in Lake Granby that such water pumped will not be reasonably expected to spill from the reservoir. Therefore, WGFP pumping will be defined as pumping that occurs at such times as the Northern Colorado Water Conservancy District determines, based on its most probable forecasts of inflows to Lake Granby, that a spill of water from Lake Granby is reasonably foreseeable. All other pumping will be considered to be for the original Windy Gap Project.

- DM Acute Threshold Exceedances - Reduction or Curtailment of Pumping for the WGFP and the original Windy Gap Project .

  1. At such times as the Daily Maximum temperature is within 1 °C of the DM Acute Threshold, the Subdistrict will reduce or curtail pumping for the original Windy Gap Project or the WGFP at the Windy Gap diversion to the extent necessary to maintain temperatures within the DM Threshold. Reduced pumping may not be sufficient to maintain temperatures below the threshold. In the future, the 1 degree buffer may be altered, based on experience, to maintain compliance with the DM Threshold.

- Limitations on Reduction or Curtailment of Windy Gap pumping. The temperature mitigation measures identified above will be suspended in the event that and at such times as there is no material causal relationship between Windy Gap Project or Windy Gap Firming Project operations and any exceedence of the MWAT Chronic threshold or DM Acute threshold at the monitoring stations identified above. For the purposes of this Paragraph a "material causal relationship" is defined as either an actual measureable impact on temperature using readily available monitoring technology or a modeled impact on temperature that is not *de minimus* and is based on a computer model or studies accepted by the Colorado Division of Wildlife. The Subdistrict will cooperate with future studies to determine what factors, other than flow changes, have effects on water temperatures in the Colorado River below Windy Gap.

- Use of the Windy Gap Bypass Valve and Auxiliary Outlet. The Subdistrict will use the Windy Gap Project Bypass Valve and Auxiliary Outlet to the maximum extent practicable, without causing adverse effects to the Windy Gap Project facilities or operations for the bypass of water that is otherwise bypassed from the Windy Gap Project. This measure is intended to make releases of water from these outlets deeper in the reservoir that may be colder than water bypassed over the spillway.

5.3.4 Nutrient Mitigation to Offset Impacts to Grand Lake Water Quality

This measure addresses Impact CR-10, as well as CR-12, CR-13, CR-26, and ES-8.

The Subdistrict will develop a proposed nutrient reduction mitigation plan for Reclamation and Corps approval. The plan includes point source nutrient reductions from WWTP discharges in the Fraser River and nonpoint source nutrient reductions from agricultural land in the Willow Creek watershed. Other nutrient reduction measures would be implemented as necessary to meet the requirement to provide a documented nutrient reduction credit factor of 1:1 to satisfy Reclamation and the Corps mitigation requirements.

5.3.5 Participation in Upper Colorado River Recovery Program

This measure addresses Impact CR-20.

The Subdistrict will complete Section 7 consultation and compliance consistent with the requirements of the Programmatic Biological Opinion (PBO). The Service issued a Biological Opinion on February 12, 2010 for the Preferred Alternative indicating WGFP coverage under the PBO with Participation in Upper Colorado River Recovery Program and payment of a depletion fee for additional depletions attributable to the WGFP.

Documentation of Section 7 consultation will be submitted to the Corps in order to meet requirements for the Fish and Wildlife Coordination Act.

5.3.6 Curtailment of Windy Gap Diversions during Gore Race

This measure addresses Impact CR-22 and CR-25.

WGFP diversions would be suspended during the Gore Race in August if flows drop below preferred range (1,250 cfs).

5.4 PROPOSED MITIGATION MEASURES FOR EAST SLOPE (SOUTH PLATTE TRIBUTARIES AND CHIMNEY HOLLOW RESERVOIR) IMPACTS

Table 2 summarizes East Slope impacts and the proposed mitigation measures for each identified impact. The table also includes a column that outlines issues and concerns regarding WGFP impacts that were identified by CDOW staff in a detailed review of the DEIS impacts. The mitigation measures identified in the table that are relevant to fish and wildlife resources are described in more detail in this section.

5.4.1 Revegatiation and Weed Control on Areas Impacted by Construction

This measure addresses Impact ES-11.

Revegetation and weed control on all disturbed areas in accordance with an erosion control plan to be developed by the Subdistrict and approved by Reclamation and the Corps. Plan will be developed in coordination with CDOW and incorporate CDOW Oil & Gas BMPs where appropriate.

5.4.2 Wetlands Mitigation

This measure addresses Impact ES-13, ES-14, and ES-15.

Avoid, minimize and mitigate wetland impacts as specified in the 33 CFR Part 332 (Mitigation Rule, 10-Apr-08) and as approved by the Corps. Wetlands would be mitigated by contribution to an approved wetland mitigation bank.

5.4.3 Wildlife Habitat Mitigation at Chimney Hollow Reservoir Site

This measure addresses Impact ES-16 and ES-17.

Subdistrict will develop a plan to replace the values provided by habitat lost or altered by construction of Chimney Hollow Reservoir. Mitigation of impacts to wildlife resources will involve a combination of mitigation strategies and tools, including:

- Restoring habitats temporarily disturbed during reservoir and facility construction
- Working with Larimer County to restore or enhance degraded habitat surrounding Chimney Hollow Reservoir
- Working with CDOW and Larimer County to establish hunting access on the Chimney Hollow property
- Conducting management and education activities to minimize human-wildlife conflicts
- Implementing a migratory bird management plan
- Implementing seasonal restrictions and buffer zones

Details of this plan will include:

Restoration of Temporary Disturbances. The temporary loss of 123 acres of wildlife habitat will be mitigated through reclamation and revegetation of all habitats disturbed during construction and relocation of the transmission line and towers. Temporary loss of vegetation communities due to construction of dams, pipelines, staging, and access roads will be restored with plantings and seed mixes that replicate the vegetation cover types. Vegetation restoration of the transmission line corridor will involve working closely with Western to incorporate strategies for maintenance of stable low-growing vegetative communities that include mechanical cutting, removal of timber, on-site treatment of slash, and planting sustainable, low-growing shrubs and grasses. Plantings and seed mixes will focus on restoring diverse vegetation communities that provide wildlife forage, particularly during fall and winter. A reclamation plan will be developed as part of the construction program and the Stormwater Management Plan.

Habitat Enhancement. Subdistrict will work with Larimer County to develop a land management plan that will include habitat enhancement of vegetation communities surrounding Chimney Hollow Reservoir, which involves planting native species beneficial to wildlife where appropriate. The Subdistrict will provide $50,000 to Larimer County to use in their ongoing habitat management plan. A weed control plan would be developed in cooperation with Larimer County prior to implementing habitat enhancement to improve the quality of lands not specifically within the areas of vegetation enhancement. Weed management will focus on monitoring restored habitats and implementing an integrated weed management approach of mechanical, chemical, and biological control strategies. Integrated weed management strategies also will be used to control existing areas of noxious and invasive species, particularly large patches of thistle and cheatgrass. The weed management plan will be developed prior to construction disturbances and updated periodically through implementation of wildlife enhancement.

Hunting Opportunities. Larimer County will develop a management plan for the Chimney Hollow area. As part of this process, the Subdistrict and Larimer County will work with CDOW and Larimer County to explore opportunities to provide seasonal hunting on portions of the Chimney Hollow Reservoir site and open space to assist with game management and provide additional recreation.

Minimization of Human-Wildlife Conflicts. The displacement of elk and bear into surrounding residential areas as they search for lost food resources will be offset by the habitat enhancement activities and hunting opportunities described above. Additionally, the Subdistrict will work with Larimer County and CDOW to reduce/eliminate wildlife attractants from recreation facilities and establish education/outreach programs and information kiosks/signs informing the public on the dangers of close interactions with wildlife, and methods to avoid and minimize potentially dangerous encounters.

Implementing Migratory Bird Avoidance Plan. The active nesting season for most migratory bird species in Colorado is between April 1 and August 15. Over the past few years, FWS and CDOW have suggested that the best way to avoid a violation of the Migratory Bird Treaty Act (MBTA) is to remove vegetation outside of the active breeding season. The Subdistrict will develop BMPs in accordance with CDOW guidance to avoid disturbing active bird nests at the Chimney Hollow Reservoir site. *Note: Implementing these BMPs demonstrates a good faith effort to avoid incidental violation of the MBTA, but does not guarantee that migratory birds will not still nest in some areas despite these efforts.*

Seasonal Restrictions and Buffer Zones for Raptors. Avoidance and mitigation options for nesting raptors at the Chimney Hollow Reservoir site consists of: 1) conducting nest surveys prior to construction, 2) establishing

reasonable site-specific buffers and seasonal restrictions, 3) implementing seasonal restrictions to avoid and minimize disturbance, and 4) removing inactive nests from the transmission line corridor, construction footprints, reservoir pool area, or other areas of permanent impacts. Currently, there are no expected permanent impacts to existing raptor nests; however, there is the possibility that a new active raptor nest could be established in areas slated for disturbance or inundation. The intent of any mitigation is to encourage individual raptor pairs to nest at selected and more secure locations. BMPs will be developed in accordance with CDOW guidance to avoid, minimize and mitigate potential impacts.

5.4.4 Air Quality Mitigation

This measure addresses Impact ES-23 and ES-24.

Subdistrict will develop a fugitive particulate emissions control plan and BMPs to minimize air quality and noise impacts to wildlife.

5.5 MITIGATION COSTS AND SCHEDULE

Estimated mitigation costs are shown in the following table. Total project costs are estimated to be $273,000,000, which includes construction costs of about $237,000,000. The mitigation schedule will be contingent on the issuance of permits and licenses, construction timetables, project completion, and the ability of the Subdistrict to fill the reservoir. The schedule provided in the following table provides a timetable based on these contingencies.

Mitigation Insurance Policy - The mitigation listed above is based on the Draft EIS for the WGFP that was released for public comment in August of 2008. Since that time and based on comments to the Draft EIS, Reclamation has conducted additional studies related to the preparation of the Final EIS, that in part are designed to further refine the analysis of environmental impacts of the proposed action. If new impacts to fish and wildlife resources are identified in the Final EIS that were not discussed in the Draft EIS and not addressed in this mitigation plan, the Subdistrict will propose mitigation for these new impacts. The additional mitigation will be developed in cooperation with the CDOW prior to submittal to Reclamation for its consideration as a permit condition. The Subdistrict will reserve $600,000 for any new impacts to fish and wildlife resources identified by the Final EIS and required by Reclamation. If Reclamation does not identify new impacts requiring mitigation, the Subdistrict will have no further obligation to reserve this money.

West Slope

Mitigation Measure	Scheduled Start	Scheduled End	Estimated Cost
Modified prepositioning to reduce Lake Granby fluctuations	Concurrent with project start up	Permanent change in WGFP operation	$0 May have minor effect project yield
Improvements to flushing flows in Colorado River	Concurrent with project start up	No end date	May have effects on project yield but cost cannot be estimated.
Temperature mitigation	Temperature monitoring would begin within one year after issuance of permits. Curtailed diversions occur when Chimney Hollow Reservoir is completed and diversions increase	Diversion curtailments per the established criteria would continue as long as the WGFP is in operation	$50,000 for monitoring stations May have effects on project yield but cost cannot be estimated.
Nutrient mitigation to offset impacts to Grand Lake water quality – will also improve water quality in Colorado River below Windy Gap	Monitoring of baseline conditions will begin in 2011 and nutrient removal will begin concurrent with project start up	Monitoring will continue until 1:1 nutrient offset has been verified. Operation of nutrient reduction projects will continue as long as the WGFP is in operation	$4.3 million (estimated)
Participation in Upper Colorado River Recovery Program	Payment upon issuance of permits; expected by 2011	One time upfront fee	$405,000 (estimated)
Curtailed diversions for annual Gore Race, if needed	Concurrent with project start up	Permanent change in WGFP operation	

East Slope

Mitigation Measure	Scheduled Start	Scheduled End	Estimated Cost
Revegetation and weed control on areas impacted by construction	Immediately upon completion of specific habitat-disturbing activity	Three years post-restoration or until success criteria are met	$25,000
Wetland mitigation	Within one year of issuance of permit	One time upfront fee	$115,000
Wildlife habitat mitigation at Chimney Hollow Reservoir site	Concurrent or following construction depending on location	Three years post-construction or until success criteria are met	$50,000 (estimated)
Air quality mitigation	Concurrent or following construction depending on location	Until completion of construction	$0

6.0 CONCLUSIONS

The FWMP presents a broad range of mitigation actions to address the potential fish and wildlife impacts of the WGFP. If accepted by the Colorado Wildlife Commission and CWCB, this mitigation plan will represent the official state position on mitigation for the WGFP. Since the state-adopted FWMP is not enforceable by itself, the Subdistrict anticipates that Reclamation and the Corps will determine these mitigation measures are adequate and will impose them within their regulatory requirements for Reclamation's approvals and the Section 404 Permit, respectively.

REFERENCES

AMEC (AMEC Earth & Environmental, formerly Hydrosphere Resource Consultants). 2008a. Windy Gap Firming Project Lake and Reservoir Water Quality Technical Report. Prepared for U.S. Bureau of Reclamation.

AMEC (AMEC Earth & Environmental, formerly Hydrosphere Resource Consultants). 2008b. Windy Gap Firming Project Three Lakes Water Quality Model Documentation. Prepared for U.S. Bureau of Reclamation.

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Proposed Memorandum of Understanding – Grand Lake Project Clarity

ATTACHED DOCUMENT IS CURRENT AS OF DATE OF APPLICATION – JUNE 11, 2012.

DOCUMENT IS CURRENTLY IN NEGOTIATIONS AND IS NOT A FINALIZED DOCUMENT

Clarity Agreement based on 4-26-12 discussions.
Prepared by BG 4-27-12, revised by NW 4-30-12

MEMORANDUM OF UNDERSTANDING
GRAND LAKE CLARITY PROJECT

This Memorandum of Understanding by and between Grand County Board of County Commissioners (County), Northern Colorado Water Conservancy District (Northern), and United States Department of the Interior, Bureau of Reclamation (Reclamation), is made to be effective on this ___ day of _____, 20__.

I. DEFINITIONS

A. "Appraisal Study" is part of Reclamation's formal planning process which has been initiated with MOU No. 10AG6C0004 among Reclamation, County and Northern dated October 19, 2010.

B. "C-BT" means the Colorado-Big Thompson Project.

C. "Clarity Project" means the process to attain the Colorado Water Quality Control Commission clarity standards for Grand Lake now in effect or as may subsequently be adopted, in a manner consistent with Senate Document No. 80.

D. "Clarity Workgroup" is one of the Grand Lake Water Clarity Project's technical workgroups. The Three Lakes Technical Committee has invited the Clarity Workgroup to participate as part of its efforts.

E. "Effective Date" shall be the date upon which this Memorandum of Understanding has been signed by all the Parties.

F. "County" shall mean the Grand County Board of County Commissioners.

G. "Grand Lake Stakeholders Group" is comprised of representatives from federal, state and local agencies, the public and special interest groups to address Grand Lake clarity.

H. "Reclamation" shall mean the United States Department of the Interior, Bureau of Reclamation.

I. "Northern" shall mean Northern Colorado Water Conservancy District.

J. "MOU" shall refer to this Memorandum of Understanding.

K. "Nutrient Project" is the Three Lakes Nutrient Project jointly funded and overseen by Northern Water and Reclamation, which is part of the larger C-BT Nutrient Study.

L. "Parties" includes Grand County, Northern Water, and Reclamation.

M. "Three Lakes System" includes Grand Lake, Granby Reservoir and Shadow Mountain Reservoir.

N. "Three Lakes Technical Committee" is the committee providing oversight and technical guidance on the Three Lakes Nutrient Project.

O. Senate Document No. 80, 75th Congress 1st Session is one of the authorizing documents for the C-BT Project, and the "Manner of Operation of Project Facilities and Auxiliary Features" is relevant to this MOU.

II. EXPLANATORY RECITALS

A. WHEREAS, Grand Lake is Colorado's largest natural lake and was reported to have registered a single 9.0 meter Secchi depth measurement on September 6, 1941 during a study entitled "Diurnal Movements of Zooplankton Organisms in Some Colorado Mountain Lakes" by Robert Pennak, Biology Department, University of Colorado (1944) and also referenced in a

report entitled "Comparative Limnology of Eight Colorado Mountain Lakes" (9.2 meter Secchi depth on September 6, 1941) by Robert Pennak, Professor of Biology, University of Colorado (July 1955);

B. WHEREAS, a portion of Senate Document No. 80, entitled "Manner of Operation of Project Facilities and Auxiliary Features" states that the C-BT Project "must be operated in such a manner as to most nearly affect" five primary purposes;

C. WHEREAS, Grand County and other interested parties believe that the scenic attraction of Grand Lake is diminished due to decreased clarity;

D. WHEREAS, in 2008 the Colorado Water Quality Control Commission adopted both a narrative water quality standard and a numeric standard for clarity in Grand Lake which are attached hereto;

E. WHEREAS, it is the goal of this MOU that the clarity in Grand Lake be improved to meet the applicable standard of the Water Quality Control Commission;

F. WHEREAS, the Parties intend to work together to evaluate options for improving clarity in Grand Lake while considering related issues;

G. WHEREAS, in order to begin this process, Reclamation, the County and Northern have entered into a separate MOU to finance and participate in the Appraisal Study Process, the first step in Reclamation determining its responsibility for clarity in Grand Lake associated with operation of the C-BT Project, if any;

H. WHEREAS, the Parties intend to continue moving ahead with Reclamation's planning process by initiating the development of a Statement of Work for a Feasibility Study Plan;

I. WHEREAS, a Grand Lake Stakeholders Group has been created.

NOW, THEREFORE, in consideration of the above and the mutual covenants and commitments made herein the Parties agree as follows:

III. OBJECTIVES:

A. The Parties agree to jointly conduct the Clarity Project, which will have the following objectives:

i. Identify and evaluate any and all concerns, issues, and factors that affect clarity in Grand Lake;

ii. Continue to develop and implement a coordinated water quality monitoring program that will support the Clarity Project.

iii. Explore options for identifying reasonable and effective measures that would attain the clarity standards.

iv. Identify and evaluate, with appropriate tools such as models, the feasibility of short, intermediate and long term operational, nonstructural and structural alternatives (as further described in the Appraisal Study) that can be implemented without adversely impacting the C-BT Project yield.

IV. PROJECT MANAGEMENT

A. The Parties or their designees shall meet as necessary and provide direction and make decisions concerning the Clarity Project. Whenever applicable, efforts associated with the Clarity Project should be coordinated with the Nutrient Study; however, the parties understand that the Clarity Project and Nutrient Study are separate projects with distinct management and goals. Reclamation shall act as the coordinator for the Clarity Project covered by this MOU.

B. The Parties will keep the Town of Grand Lake and the Grand Lake Stakeholders Group, as well as any other organizations or individuals expressing interest in participating at this level, notified of upcoming meetings and the progress of the Clarity Project. The Grand Lake Stakeholders Group, Town of Grand Lake, or interested parties will consult with and provide input to the Parties with respect to implementation of this MOU.

C. The Parties may form technical workgroups as needed. Any technical workgroups shall periodically report back to the Parties, Town of Grand Lake, and Grand Lake Stakeholders Group. The Clarity Workgroup is one such group that has already been created.

D. The Parties will use the information and recommendations of both the Nutrient Project and Clarity Project to determine what measures or changes that are necessary.

V. PROJECT PLANNING

A. In consultation with the Three Lakes Technical Committee, the Parties shall identify studies, develop scopes of work, delineate phases of the studies, and clearly articulate the objectives. The studies shall be completed according to sound scientific methods.

B. In consultation with the Three Lakes Technical Committee, the Parties shall coordinate monitoring efforts with the various studies.

C. The Three Lakes Technical Committee will complete an annual report summarizing activities and results of studies and monitoring efforts including both monitoring efforts for special studies and on-going baseline water quality and clarity monitoring.

D. In consultation with the Three Lakes Technical Committee, the Parties will develop an annual work plan for the upcoming year that will include schedules and deadlines for all Clarity Project activities.

VI. CONSULTANTS

A. The Parties may engage consultants to conduct studies or prepare reports as necessary.

B. The Parties will jointly select consultants and develop and approve consultants' scopes of work. The Parties will jointly review and approve invoices for work performed by the consultant(s). Any consultant(s) shall be hired as an independent contractor.

VII. FUNDING

A. The Parties initial contribution to the Clarity Project shall be the services of their staff members.

B. If the Clarity Project retains consultants, the Parties shall agree to a funding mechanism at the time that the consultant is retained.

C. The Parties agree to provide funding for the Feasibility Study Plan.

D. The funding obligation of all Parties shall be subject to and contingent upon the annual appropriation of funds therefore by their governing bodies in accordance with law.

i. Any agreement with consultants shall expressly recognize and implement such

limitation.

ii. The obligations of any governmental entity shall not constitute a general obligation, indebtedness, or multiple fiscal year direct or indirect debt or other financial obligation whatsoever, within the meaning of the Constitution or laws of the State of Colorado.

iii. If alternatives are identified for implementation, the Parties will work together to secure adequate sources of funding.

E. If Federal funds are available to support the goals of this MOU, they will be allocated to the Clarity Project covered by this MOU. Reclamation will annually propose budget funding for this MOU with all parties understanding that there is no guarantee of Federal funding.

F. Grand County does not accept responsibility for payment of any costs associated with measures implemented to achieve the goal of this MOU.

G. Northern Water has a contractual relationship with the United States as defined by its 1938 Repayment Contract and related documents, nothing herein changes Northern Water's obligations as defined by that contract and related documents, and Northern Water's commitments under this MOU are separate from Northern Water's obligations under that contract and related documents.

H. The Parties will use their best efforts to obtain an allocation of funds appropriated in the Arapaho National Recreation Legislation for water quality efforts. If successful, the Parties will work with the U. S. Forest Service to have those funds attributed to the long term effort to improve clarity in Grand Lake.

VIII. OTHER FACTORS.

A. All parties to this MOU will work with land use authorities in the watershed to address any land use or land management factors that could be or are affecting clarity in Grand Lake.

IX. MODIFICATION AND WAIVER

A. No modification or waiver of this MOU or any covenant condition or provision contained herein shall be valid unless in writing and duly executed by all Parties to this MOU.

X. BINDING AGREEMENT

A. This MOU shall be binding upon the Parties, and their respective successors or assigns. The Parties' rights and obligations under this MOU may not be assigned without the express written consent of all the Parties.

XI. ENTIRE UNDERSTANDING

A. This MOU is the complete integration of all understandings between the Parties regarding the Clarity Project. No prior or contemporaneous addition, deletion, or other amendment hereto shall have any force or affect whatsoever, unless embodied herein in writing.

XII. TERMINATION.

A. Termination requires unanimous consent of the parties.

XIII. THIRD PARTIES.

A. The Parties do not intend to create in any other individual or entity the status of third-party beneficiary, and this MOU shall not be construed so as to create such status. The rights,

duties and obligations documented in this MOU shall operate only between the Parties to this MOU, and shall inure solely to the benefit of the Parties to this MOU.

B. The provisions of this MOU are intended only to assist the Parties in determining or performing their obligations under this MOU.

C. The Parties to this MOU expressly agree that only Parties signatory to this MOU shall have any legal or equitable right to seek to enforce this MOU, to seek any remedy arising out of a Party's performance or failure to perform any term or condition of this MOU, or to bring an action for the breach of this MOU.

D. This MOU does not and shall not be deemed to confer upon or grant to any third-party any right enforceable at law or equity arising out of any term, covenant, or condition herein or the breach thereof.

XIV. SEVERABILITY

A. In case one or more of the provisions contained in this MOU, or any application hereof, shall be invalid, illegal, or unenforceable in any respect the validity, legality and enforceability of the remaining provisions contained in this MOU and the application thereof shall not be in any way affected or impaired thereby.

XV. COMPLIANCE WITH LAWS

A. At all times during the performance of this MOU, the Parties shall strictly adhere to all applicable federal, state and local laws, rules, and regulations that have been or may hereafter be established.

XVI. SOVEREIGN IMMUNITY

A. The Parties do not waive their sovereign immunity by entering into this MOU, and each fully retains all immunities and defenses provided by law with respect to any action based on or occurring as a result of this MOU.

XVII. EFFECTIVE DATE

A. This MOU shall become effective the date upon which it has been signed by all the Parties.

XVIII. POINTS OF CONTACT

A. Lurline Underbrink Curran, Senate Document 80 Representative and Grand County Manager, Grand County

B. Don Carlson, Assistant Manager, Northern Colorado Water Conservancy District.

C. Carlie Ronca, Natural Resource Specialist- Project Manager, Eastern Colorado Area Office, Bureau of Reclamation.

IN WITNESS WHEREOF, the Parties hereto have signed this MOU effective as of the day and year written above.

GRAND COUNTY BOARD OF COUNTY COMMISSIONERS

By: _____

Title: _____ Date: _____

NORTHERN COLORADO WATER CONSERVANCY DISTRICT

By: _____

Title: _____ Date: _____

BUREAU OF RECLAMATION

By: _____

Title: _____ Date: _____

ATTACHED DOCUMENT IS CURRENT AS OF DATE OF APPLICATION – JUNE 11, 2012.

DOCUMENT IS CURRENTLY IN NEGOTIATIONS AND IS NOT A FINALIZED DOCUMENT

INTERGOVERNMENTAL AGREEMENT FOR THE LEARNING BY DOING COOPERATIVE EFFORT

This Intergovernmental Agreement (Agreement) is entered into between the NORTHERN COLORADO WATER CONSERVANCY DISTRICT (Northern Water); The Municipal Subdistrict, Northern Colorado Water Conservancy District (Subdistrict), GRAND COUNTY BOARD OF COUNTY COMMISSIONERS (Grand County) MIDDLE PARK WATER CONSERVANCY DISTRICT (Middle Park) and COLORADO RIVER WATER CONSERVATION DISTRICT (River District), collectively, the "parties."

WHEREAS, Northern Water, Subdistrict, Grand County, Middle Park, and the River District desire to engage in a cooperative, iterative and on-going process (Cooperative Effort) to maintain, and when reasonably possible, restore or enhance the aquatic environment in the Fraser and Williams Fork River Basins and in the mainstem of the Colorado River from the outflow of Windy Gap Reservoir to its confluence with the Blue River (the Cooperative Effort Area); and

WHEREAS, in addition to other data and information, this Cooperative Effort will rely on the information contained in the draft Grand County Stream Management Plan (SMP). The current draft SMP is dated August 2010, but the parties anticipate that the SMP will evolve over time with the addition of real time information and data; and

WHEREAS, this Cooperative Effort is intended to address impacts that may be associated with existing operations by the Northern Water, Subdistrict, Denver Water, Grand County and other water users in the Cooperative Effort Area. Any new impacts to the aquatic environment projected to be caused by the Subdistrict's proposed Windy Gap Firming Project will be addressed by mitigation plans to be developed by regulatory agencies as part of the permitting process for the Windy Gap Firming Project; and

WHEREAS, the parties to this Cooperative Effort will develop a process to monitor the stream conditions to identify and respond to potential changes in or desired improvements to the aquatic environment, based upon the concepts embodied in this Agreement; and

WHEREAS, the Cooperative Effort will allow the participants to identify and react to changes in the aquatic environment in a manner that maximizes the benefits to be realized from the defined resources available to the entities, and that minimizes adverse changes to the aquatic environment whenever possible; and

WHEREAS, the parties are authorized to enter into this Agreement by, *inter alia,* Section 29-1-201, *et seq.*, C.R.S.; Section 29-10-101, *et seq.*, C.R.S.; and Article XIV, Section 18(2) of the Colorado Constitution.

NOW THEREFORE, the parties agree to implement this Cooperative Effort in accordance with the following provisions:

I. Guiding Principles

The overarching goal for the Cooperative Effort is to maintain and, where reasonably possible, restore or enhance the condition of the aquatic environment in Grand County. The Upper Colorado River system and the Fraser and Williams Fork rivers serve as a critical municipal, agricultural, recreational and industrial water supply source for the state as a whole and provide important aquatic habitat. The participants in the Cooperative Effort have a mutual interest in protecting the aquatic environment and commit to work together in a cooperative and comprehensive manner to address issues related to maintaining and, when reasonably possible, enhancing the condition of the aquatic environment in Grand County. To that end, the parties agree to the following principles to build and promote a stable, permanent, relationship that respects the interests and legal responsibilities of the parties, while achieving the goals of the Cooperative Effort.

A. The Cooperative Effort will not seek a culprit for changes in the condition of the stream, but will provide a mechanism to identify issues of concern and focus available resources to address those issues.

B. The parties to this Agreement have been involved since 2009, along with numerous other West Slope entities, in negotiating the Windy Gap Firming Project Intergovernmental Agreement (WGFP IGA) to resolve longstanding issues. Northern Water has committed to Grand County a substantial, but defined amount of resources described in the WGFP IGA Windy Gap Firming Project Fish and Wildlife Enhancement Plan authorized by the Colorado Wildlife Commission for the purpose of maintaining, restoring or enhancing the Upper Colorado, Fraser and Williams Fork watersheds. Grand County commits to using the resources provided for the sole purpose of implementing the Cooperative Effort. In addition, Grand County, Middle Park and the River District agree to contribute resources to the Cooperative Effort on an ongoing basis, as available and appropriate. Because resources available to the Parties are limited, the use of those resources will be prioritized as part of the Cooperative Effort.

C. The Cooperative Effort does not constitute mitigation for the Windy Gap Firming Project. The Subdistrict agrees to undertake all Mitigation Measures related to Windy Gap Firming Project required in the Record of Decision (ROD) for the Windy Gap Firming Project to be issued by the Bureau of Reclamation (Reclamation) and the 404 Permit to be issued by the Corps of Engineers (COE). The parties to the Cooperative Effort agree not to pursue a challenge to the Mitigation Measures described in the ROD for Windy Gap Firming Project. All the parties to the Cooperative Effort will work in good faith to implement the Cooperative Effort in a way that complements the Mitigation Measures.

D. If the Management Committee desires additional resources beyond the resources provided by the Subdistrict, and resources contributed by Denver Water, Middle Park, Grand County and the River District, to implement the Cooperative Effort, the parties will work with other stakeholders, granting agencies, and identify other sources of funding to provide additional resources. If mutually defined additional resources are still

desired, the parties may agree to consider contributing more of their own resources on a case-by-case basis and within the context of the other principles listed herein. Each party retains its sole discretion whether to provide any additional resources without future judgment or prejudice by the other parties.

E. The parties to this Agreement agree that active participation in the Cooperative Effort by Northern Water and the Subdistrict will commence after Issuance and Acceptance by the Subdistrict of the ROD and all permits necessary for the Windy Gap Firming Project. Prior to the issuance and acceptance of the ROD and the permits, the parties agree that they will continue to work together on completing and improving the draft SMP.

F. The parties acknowledge that actions not the subject of other contractual obligations that would impair a party's ability to meet its water supply commitments will not be undertaken as part of the Cooperative Effort, unless agreed to voluntarily by the owner of the water supply.

G. For a period of five years from the date of the first diversions into the constructed WGFP, no party will unilaterally request, or cause others to request, that the Reclamation or other applicable regulatory agencies reopen a permit or license for the Windy Gap Firming Project for any reason. Each party reserves the right to oppose any such efforts to reopen the permits or licenses for the Windy Gap Firming Project.

II. The Cooperative Effort

A. **Organization.**

1. **Management Committee.** The parties will form a Management Committee within six months after this Agreement becomes effective.

2. **Representation.** The initial Management Committee will comprise six members, one representative each from Grand County; the City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water); the River District; Middle Park; Northern Water and the Subdistrict (one member to represent both); and Trout Unlimited. The Management Committee may decide to invite others to be members, such as representatives from agricultural, environmental, recreational, industrial, and governmental interests. It is anticipated that the Colorado Division of Parks and Wildlife will be invited to be a member of the Management Committee and the United States Forest Service will be invited to play an advisory role in the Management Committee. Any decision to add other members to the Management Committee will be by consensus, with consideration being given to the resources and contributions other potential members may provide to the Cooperative Effort.

3. **Decision-making.** The Management Committee will operate by consensus. The Management Committee will make a good faith effort to resolve any issues. If the good faith effort does not result in consensus, the Management Committee will implement the Conflict Resolution process.

4. **Organizational Structure**. The Management Committee may establish a not-for-profit organization to implement the Cooperative Effort if it determines that such a vehicle is the most effective means for accomplishing its objectives.

B. **Tasks and Responsibilities**. The following are expected under the Cooperative Effort:

1. **Continue to Improve the Grand County Stream Management Plan.** Phase 1, 2, and 3 of the draft SMP have been completed. The parties will continue to adapt and improve the draft SMP cooperatively as additional information is developed, the understanding of desired stream conditions is better defined, and the management goals for each stream reach are agreed upon.

2. **Management Goals and Priorities.** The Management Committee will define the management goals for each stream reach of interest. By way of example, one reach may be managed to increase the fishing experience for rainbow trout, while another reach may be managed for a specific stream characteristic such as macro-invertebrate diversity. Which management goals are practicable for a specific reach could be influenced by the resources available for use in that reach. It is expected that the Management Committee might also define secondary management goals for specific reaches. Once the management goals for the stream reaches are agreed upon, the Management Committee will prioritize the reaches based upon the agreed upon management goals, the desired stream conditions for each reach, and the available resources.

3. **Coordinate with the Reclamation and COE.** If applicable, the Management Committee may work with Reclamation and the COE to coordinate, to the extent practicable, Mitigation Measures for WGFP with the management goals, priorities and projects undertaken as part of the Cooperative Effort. The Management Committee will work to ensure that the Subdistrict is not required to engage in duplicative or conflicting actions, nor implement measures that do not accomplish their stated benefits.

4. **Water Quality Standards.** CDPHE has listed several stream reaches in the Cooperative Effort Area on the 2010 303d list of impaired waters. The Cooperative Effort will participate in developing the appropriate management actions for these segments.

5. **Monitoring Plan.** The ability to fully identify cause and effect relationships in a complex aquatic environment is difficult. Therefore, the parties agree to implement a monitoring plan to identify undesirable changes in, and agree upon desired modifications to, the aquatic environment, and to measure the effectiveness of actions taken to protect or improve the aquatic environment. This approach will allow the available resources to be focused on avoiding problems, responding to changing conditions, and achieving agreed-upon goals. The Cooperative Effort will rely on existing data and new data gathering under existing programs to provide the primary source of information for designing the management goals and for prioritizing those goals and reaches where the goals will be applied. The Management Committee can initiate additional monitoring, data gathering and analysis, and may choose to focus on specific measurable indicators, as circumstances warrant, to guide in applying the resources and to monitor the effectiveness of the resources in meeting a management goal. The principles of the potential monitoring plan are described in Attachment A.

6. **Implementation.** The Management Committee will review the results of monitoring to evaluate the effectiveness of the Cooperative Effort and of the allocation of available resources in meeting the management goals and priorities. The results of the monitoring program also may be used to identify measures that might be desirable to maintain or improve the stream environment.

7. **Independent Experts.** The Management Committee may retain independent experts and consultants if deemed necessary to perform the Committee's work. The cost of such independent experts and consultants shall be allocated among the parties as agreed to by the Management Committee.

8. **Operations Plan**. The Management Committee will develop an annual operations plan to maximize the stream environmental benefits of the available resources (including water commitments, system flexibility and funding). The plan will explore opportunities for coordinated operations of diversion structures and reservoir releases among all water users in Grand County, including Northern Water; the Subdistrict; the Bureau of Reclamation, Denver Water; Middle Park; River District; and in-county diversions for agricultural, municipal, industrial, and others uses. The purpose of coordinated operations is to allow the water users to meet the supply requirements of their systems, while maximizing the effectiveness of the Cooperative Effort. Subject to any contractual commitments regarding system operations, all water users retain sole discretion over their water supply system demands and opportunities and available system flexibility. The decisions and actions by the Management Committee in developing and implementing the operations plan shall take into account water rights priorities, draft SMP flow ranges as they change over time, naturally

occurring hydrologic conditions, recreational flow needs, CWCB instream flows, and the results of monitoring.

9. **Incorporate New Knowledge into Management Actions.** As the results of testing various operational changes, monitoring the effectiveness of measures, and collecting and analyzing additional data, the Management Committee will have new information to inform its decision-making. The Management Committee will address data management and access issues in a timely fashion.

10. **Obtain and Manage Funding.** The Management Committee will explore whether the most effective use of funds made available for the benefit of the stream environment is to set up an endowment fund dedicated to the goals of the Cooperative Effort. For example, the interest from such a fund could be used as matching funds for grants. The Management Committee also will research available sources of funding for planning, monitoring and implementing measures identified during the Cooperative Effort, including, but not limited to grants, contributions, assessments, or fees on water or sewer services.

11. **Weekly Coordination.** The Management Committee will conduct weekly coordination meetings or calls from May through September or at such other times as mutually agreed by the Management Committee. The purpose of these meetings/calls is to highlight upcoming operational issues, discuss potential options to reduce possible negative impacts to the aquatic environment, and to coordinate implementation of actions under the Cooperative Effort. The Management Committee can agree to include other entities in the meetings or calls, as a general practice or as warranted. However, the other entities participating in these calls would act as advisors only unless they were providing water, usable resources, or system flexibility to a particular solution or action of the Management Committee.

12. **Annual Review and Stream Management Plan Adaptations.** The Management Committee will conduct an annual review in January or February before the next spring and summer field season to assess whether management goals are being met, evaluate the monitoring data gathered, assess the use of available resources, identify additional data and analysis needs, determine if refinements are needed to the Grand County draft SMP or the operations plan, and provide an annual summary to each of the parties.

III. Conflict Resolution

The parties agree that, if the Management Committee cannot adequately address an issue to the satisfaction of one of the parties, the parties will confer in good faith and endeavor to resolve the concern.

Where the Management Committee cannot make a decision by consensus, and any single entity believes that issue warrants mediation, the Management Committee will select a neutral third party mediator who would seek an acceptable voluntary solution to the conflict.

For conflicts that involve a technical or scientific matter, the neutral third party mediator may select an independent technical or scientific expert, acceptable to all parties, to review and make a recommendation on the matter. If the conflict cannot be resolved through the efforts of the mediator, then the Management Committee would agree to disagree, and move forward with the other elements of the Cooperative Effort where they had reached agreement.

If the conflict cannot be resolved by the efforts of the mediator and the Management Committee is prevented from moving forward with the other aspects of the Cooperative Effort, then the parties can pursue any available legal or administrative recourse.

IV. Effective Date

This Agreement shall become effective upon the Issuance and Acceptance by the Subdistrict of the ROD and permits necessary for the Windy Gap Firming Project.

V. Miscellaneous Provisions

A. Regulatory Action or Litigation

In the event any person or entity files a petition to Reclamation, Corps of Engineers or other regulatory agency for regulatory action, or commences litigation, which would materially adversely affect the Windy Gap Firming Project (Adverse Action), the parties to the Cooperative Effort agree to meet and discuss in good faith the potential detrimental effect of such Adverse Action, with the goal of determining whether any action by one or more parties could avoid the Adverse Action or mitigate its impact on the affected party. Each party agrees to evaluate in good faith whether it can implement changes in its operations or undertake other efforts that would achieve this goal, and to implement any such efforts as may be agreed to by the parties. If the Windy Gap Firming Project is denied an acceptable ROD or permit, or if the Subdistrict decides not to proceed with its project, then the Subdistrict shall provide notice to the parties to this Agreement within ten days of the decision and shall be released from its obligation to participate in the Cooperative Effort No Property Rights or Servitude

Nothing in this Agreement shall be deemed or construed as granting or creating any property right or servitude whatsoever on any party's water rights or facilities. The foregoing sentence shall not impair the rights of any party to specific performance of this Agreement.

B. No Operating Obligation

Nothing in this Agreement shall be deemed or construed as creating any obligation on any party to operate its raw or treated waterworks system in any particular manner, so long as the party complies with the terms of this Agreement. Each party retains sole and exclusive discretion concerning the operation of its system.

C. **Right of Specific Performance**

If any party shall fail to cure any default or breach of this Agreement within 120 days after receipt of notice from the non-defaulting or non-breaching party, then the non-defaulting or non-breaching party may elect to file suit, without further notice, for specific performance of this Agreement. The parties agree that the terms and conditions of this Agreement are enforceable by specific performance, and the parties hereby waive any defenses to specific performance based on the doctrine of sovereign immunity

D. **Force Majeure**

A party shall be excused from performing its obligations under this Agreement during the time and to the extent that it is prevented from performing by a cause beyond its control, provided that such nonperformance is beyond the reasonable control of, and is not due to the fault or negligence of the party not performing.

E. **Severability**

If any provision of this Agreement shall prove to be illegal, invalid, unenforceable or impossible of performance, the remainder of this Agreement shall remain in full force and effect.

F. **Assignment**

Neither this Agreement nor any of a party's rights, obligations, duties or authority hereunder may be assigned in whole or in part without the prior written consent of the other parties.

G. **Colorado Law**

This Agreement shall be construed in accordance with the laws of the state of Colorado.

H. **Termination**

This Agreement will remain in effect unless terminated in writing by all the parties.

J. **Admission of New Parties**

The original parties to this Agreement may, upon unanimous consent, admit new parties upon such terms and conditions as they determine appropriate.

SIGNATURES ON FOLLOWING PAGE

NORTHERN COLORADO WATER CONSERVANCY DISTRICT

By: _____
Michael Applegate, President

Date: _____

MUNICIPAL SUBDISTRICT, NORTHERN COLORADO WATER CONSERVANCY DISTRICT

By: _____
Les Williams, President

Date: _____

APPROVED AS TO FORM:

By: _____
Bennett W. Raley,
Trout, Raley, Montaño, Witwer & Freeman, PC

COLORADO RIVER WATER CONSERVATION DISTRICT

By: _____

Date: _____

MIDDLE PARK WATER CONSERVANCY DISTRICT

By: _____

Date: _____

GRAND COUNTY BOARD OF COUNTY COMMISSIONERS

By: _____

Date: _____

ATTEST: _____

ATTACHMENT A
Monitoring Plan

Some level of effective monitoring of the stream environment is essential to understanding and measuring success of applied prescriptions. The Management Committee will design an Aquatic Resource Monitoring Plan, which will cover the Cooperative Effort Area. The Monitoring Plan will focus on understanding the resource and preparing to measure the success of the applied prescriptions.

The Monitoring Plan will be developed and implemented as part of the Cooperative Effort, and will incorporate the elements of the monitoring plan prepared during Phase 3B of the draft SMP that the Management Committee determines are appropriate. The monitoring data will be used by the Management Committee for its decision-making. For example, monitoring will be used to identify changes in the aquatic environment, identify critical stream reaches, assign priorities for action steps, evaluate the effectiveness of actions taken, and to modify and refine strategies for achieving goals of the Cooperative Effort.

The elements of the plan will be determined as part of the Cooperative Effort. The Plan could include some or all of the following elements:

- Identification of key stream segments and groundwater to monitor.
- Existing hydrologic conditions.
- Specific existing ecological conditions at key locations.
- Permanent stream transects to monitor and evaluate any future changes in ecological conditions (e.g., shifts in riffle/pool ratios, increases in sedimentation, reduction in stream habitat diversity) associated with changes in channel maintenance and applied flushing flows proscribed in the Cooperative Effort.
- Establish key indicators of aquatic life and stream health (e.g., fish biomass) and threshold levels at specific locations that reflect increases or declines in aquatic life and stream health from application of measures defined in the Cooperative Effort.

RECLAMATION

Managing Water in the West

Windy Gap Firming Project

Final Environmental Impact Statement

Executive Summary

FES 11-29



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

Cooperating Agencies:

- U.S. Army Corps of Engineers
- U.S. Department of Energy, Western Area Power Administration DOE/EIS-0370
- Grand County

November 2011

EXECUTIVE SUMMARY

FINAL ENVIRONMENTAL IMPACT STATEMENT

WINDY GAP FIRMING PROJECT

INTRODUCTION

The Windy Gap Firming Project (WGFP) is a proposed water supply project that would provide more reliable water deliveries to Colorado's Front Range and West Slope communities and industries. The Municipal Subdistrict, Northern Colorado Water Conservancy District (Northern Water) acting by and through the Windy Gap Firming Project Water Activity Enterprise (Subdistrict), on behalf of WGFP Participants, is seeking approval from the U.S. Bureau of Reclamation (Reclamation) for additional physical connections to Colorado-Big Thompson (C-BT) Project facilities in order to implement the proposed project. Reclamation's decision on the WGFP is a major federal action requiring preparation of an Environmental Impact Statement (EIS). This Executive Summary summarizes the alternatives analyzed in detail and their anticipated environmental effects. The reader is referred to the entire Final EIS for a more complete description and analysis.



Existing Windy Gap Reservoir, Grand County, Colorado

Due to limitations and constraints with the existing system, the current Windy Gap Project facilities, which were completed in 1985, are unable to deliver the anticipated firm yield of water. Water deliveries from the West Slope currently are limited by storage capacity in Granby Reservoir and by the delivery capacity of the Adams Tunnel, which delivers water from Grand Lake to the East Slope. The WGFP would add water storage and related facilities to the existing Windy Gap operations capable of delivering a firm annual yield of about 30,000 acre-feet (AF) to Project Participants. The intent of the WGFP is to improve the yield from an existing project and existing Windy Gap water rights.

Project Participants in the WGFP include municipalities, rural domestic water districts, and an industrial water user. Project Participants on the East Slope are the City and County of Broomfield, Central Weld County Water District, Town of Erie, City of Evans, City of Fort Lupton, City of Greeley, City of Lafayette, Little Thompson Water District, City of Longmont, City of Louisville, City of Loveland, Platte River Power Authority, and the Town of Superior. In addition, the project seeks to firm the water supply for the Middle Park Water Conservancy District (MPWCD), which is a wholesale water supplier that allocates Windy Gap water to about 67 water providers, including towns, water districts, agricultural water suppliers, consumers,

and ski areas in Grand and Summit counties on the West Slope. WGFP Participants determined that a cooperative project was the most efficient means to firm Windy Gap water deliveries rather than each entity developing storage for its own share of Windy Gap water.

COOPERATING AGENCIES

In addition to Reclamation (the lead agency), the U.S. Army Corps of Engineers (Corps), Western Area Power Administration (Western), and Grand County are cooperating agencies. The Corps has regulatory authority under the Clean Water Act for actions that require the placement of dredge or fill material in a water of the United States. Western is participating as a cooperating agency because it has jurisdiction over the transmission line that would be relocated if Chimney Hollow Reservoir is constructed. Western would need to acquire a new easement for the relocated line as well as construct, operate, and maintain the line. Western also has responsibilities for marketing additional power that may be generated as a result of the WGFP. Grand County has an interest in the project because Colorado River diversions and several alternative reservoir sites are located in the county.

REVISIONS SINCE THE DRAFT EIS

The Draft EIS was released for public review in August 2008. Reclamation held two open house/public hearings during the comment period to give the public an opportunity to learn more about the alternatives and impacts, and to formally comment on the Draft EIS. Notice of the public hearings was included with the Federal Register notification; distribution of the Draft EIS; and publication in newspapers, Internet message boards and blogs, and by e-mail. The public hearings were held at the McKee Conference Center in Loveland, Colorado on October 7, 2008 and at the Inn at Silver Creek in the Town of Granby, Colorado on October 9, 2008.

The comment period on the Draft EIS ended on December 29, 2008. Reclamation received approximately 1,150 letters, comment forms, and recorded written and oral comments (including 714 form letters) on the proposed project from the public, businesses, environmental groups, and federal, state, and local agencies. In response to these comments and additional information available since completion of the Draft EIS, Reclamation has revised portions of the Final EIS. This includes additional analyses, incorporation of new information, and revision of the discussion for some resources to better define and explain potential impacts. Significant changes included in the Final EIS are summarized below with locations where more detailed information is available. In addition, Volume 2 of the Final EIS includes a response to the substantive comments received on the Draft EIS.

Change in Firming Storage Request

The amount of firming storage requested by Platte River Power Authority (Platte River) and the City of Loveland (Loveland) changed after the modeling was completed for the Draft EIS. Platte River decreased their firming storage request by 1,000 AF from 13,000 AF to 12,000 AF and Loveland increased their firming storage request by 1,000 AF from 6,000 AF to 7,000 AF. The total firming storage requested by all

Participants (not including MPWCD) remains at 87,180 AF; however, 1,000 AF of storage has been shifted from Platte River to Loveland. Because there is no change in the total storage requested by the Participants, the effects of this change on model results including Windy Gap diversions and streamflow on the East and West slopes was negligible.

Mitigation

Substantial effort has gone into developing mitigation measures to offset or reduce identified impacts from implementation of the WGFP. A major component of the new mitigation is contained in the *Fish and Wildlife Mitigation Plan* (FWMP) that was developed by the Subdistrict in cooperation with the Colorado Division of Parks and Wildlife (CDPW). The FWMP was adopted by the Colorado Wildlife Commission on June 9, 2011 and by the Colorado Water Conservation Board on July 13, 2011 (Appendix E). On October 6, 2011, Reclamation was notified by the State of Colorado that the FWMP incorporated into and made a part of this Final EIS, comprehensively addresses impacts to Colorado's fish and wildlife resource and is the official position of the State with regard to mitigation of impacts from this project. Key components of the FWMP and other mitigation measures are listed in the *Mitigation* section on page ES-24 and in Section 3.25 of the FEIS.

Colorado River Temperature Modeling

Since completion of the Draft EIS, additional stream temperature data for the Colorado River became available, which allowed the development of a dynamic temperature model to better predict the effects of alternative actions on river temperature. Thus, the previous analysis using the QUAL2K model for temperature analysis was replaced by the results from the dynamic temperature model as discussed in *Surface Water Quality* (Section 3.8 of the Final EIS).

Granby Reservoir, Shadow Mountain Reservoir, and Grand Lake Nutrient Loading

Nutrient loadings to Granby Reservoir, Shadow Mountain Reservoir, and Grand Lake (Three Lakes) were recalculated for the Final EIS after it was discovered that historic water quality data from an incorrect location on Willow Creek were used for the analysis upstream of Windy Gap Reservoir in the Draft EIS. Revised total nitrogen and phosphorus loadings to the Three Lakes are found in Tables 3-68, 3-69, and 3-70 of the Final EIS.

Recreation

To clarify potential impacts to recreational rafting and kayaking on the Colorado River, the preferred flow ranges were simplified to indicate that the preferred flow range for boating in Big Gore Canyon is 850 to 1,250 cfs and that flows of 1,100 to 2,200 cfs are preferred for the Pumphouse Reach. An analysis of a change in frequency of flows in these ranges is found in *Recreation* (Section 3.19.2 of the Final EIS). The socioeconomic effect of the revised impact analysis for recreational boating is found in *Socioeconomics* (Section 3.22.2.4 of the Final EIS).

Aquatic Resources

The discussion of aquatic resources was revised with new tables and graphics to better illustrate modeled changes in rainbow trout and brown trout habitat associated with projected changes in streamflow. New tables and figures are in *Aquatic Resources* (Section 3.9.2 of the Final EIS).

Reasonably Foreseeable Future Actions

Since completion of the Draft EIS, additional information or new actions were identified that are likely to occur in the future and would contribute to cumulative effects as described below:

Climate Change. Climate change is an evolving science and while it is still difficult to predict the specific impacts of climate change on the Proposed Action, new information on the latest potential changes in temperature, precipitation, and runoff for the upper Colorado River basin was added to the Final EIS as described in Section 2.8.2 of the Final EIS. The effects associated with climate change are discussed in the cumulative effects section for relevant resources including *Surface Water Hydrology*, *Stream Morphology*, *Surface Water Quality*, and *Aquatic Resources*.

10825 Project. This project would permanently supply 10,825 AF of water per year during the late summer months to assist with the recovery of endangered fish in the "15-Mile Reach" of the Colorado River near Grand Junction per the Upper Colorado River Endangered Fish Recovery Program. The proposed project includes release of 5,412.5 AF of water from Granby Reservoir to the Colorado River each year during the late summer and fall. This action was considered in the evaluation of impacts to stream temperature in the cumulative effects section of *Surface Water Quality* (Section 3.8.3.1 of the Final EIS).

Windy Gap Firming Project and Moffat Collection System Project Fish and Wildlife Enhancement Plans. In addition to the Fish and Wildlife Mitigation Plans developed by the Subdistrict as a component of mitigation for the WGFP and by Denver Water for the proposed Moffat Collection System Project (Moffat Project) pursuant to regulations implementing CRS 37-60-122.2(2), both the Subdistrict and Denver Water cooperatively developed separate enhancement plans to further improve existing fish and wildlife resources. These enhancement plans are intended to enhance fish and wildlife resources over and above the levels existing without the WGFP and Moffat Project and were endorsed by the Colorado Wildlife Commission on June 9, 2011 and by the Colorado Water Conservation Board on July 13, 2011. The cumulative effects of the enhancements are discussed in *Surface Water Quality* (Section 3.8.3.1) and *Aquatic Resources* (Section 3.9.3.1) in the Final EIS.

Colorado River Cooperative Agreement. As part of negotiations between West Slope parties and Denver Water, Grand County and Denver Water have reached a proposed agreement that addresses some of the issues related to Denver Water's existing operations in Grand County. In the Proposed Colorado River Cooperative Agreement, Denver Water has committed to the Learning By Doing Cooperative Effort and additional resource commitments to provide environmental enhancements to benefit the aquatic environment in the Fraser, Williams Fork, and upper Colorado rivers. These commitments are contingent upon the issuance and acceptance by Denver Water of the permits necessary for construction of the Moffat Project.

PROJECT NEED

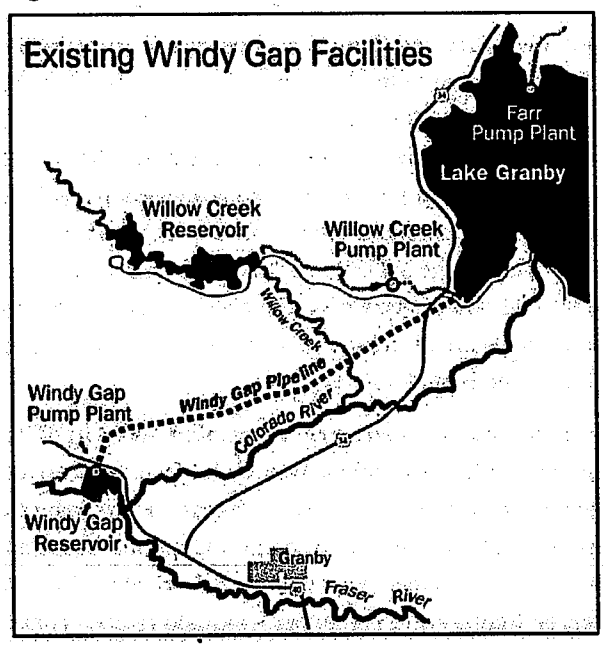
Windy Gap Project water is currently diverted from the Colorado River just downstream of the confluence of the Colorado and Fraser rivers into the Windy Gap Reservoir (Figure ES-1). From the reservoir the water is pumped to Granby Reservoir for storage and conveyance through C-BT Project facilities and ultimate delivery to Windy Gap Project allottees on the East Slope. MPWCD's Windy Gap water is stored in Granby Reservoir and released to replace stream diversions or ground water use by contract holders at various locations in Grand and Summit counties.

Purpose and Need
The purpose of the Windy Gap Firming Project is to deliver a firm annual yield of about 30,000 AF of water from the existing Windy Gap Project to meet a portion of the water deliveries anticipated from the original Windy Gap Project and to provide up to 3,000 AF of storage to firm water deliveries for the Middle Park Water Conservancy District. Firm water deliveries from the Windy Gap Project are needed to meet a portion of the existing and future demands of the Project Participants.

The original Windy Gap Project was estimated to deliver about 48,000 acre-feet (AF) of firm annual deliveries to Windy Gap allottees and the MPWCD; however, Project Participants have not been able to rely on Windy Gap water for water deliveries for two primary reasons:

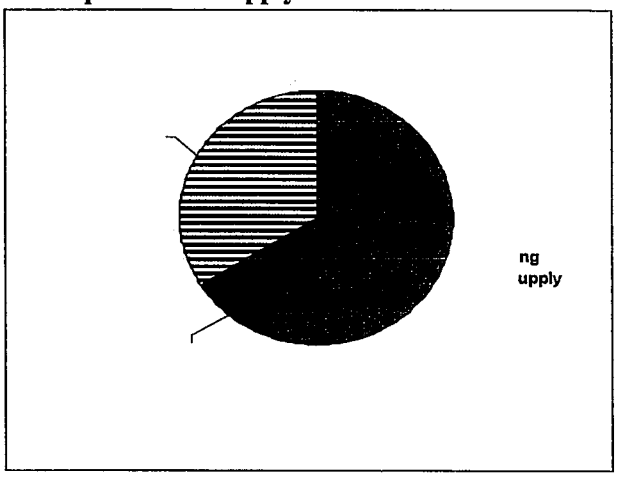
- In dry years, the Windy Gap Project has not been able to divert water because more senior water rights upstream and downstream have a higher priority to divert water and "call out" the more junior Windy Gap Project water right. In addition, the Windy Gap Project is required to bypass water to maintain certain minimum streamflows downstream of the Windy Gap diversion dam.
- Granby Reservoir, a component of the C-BT Project, is currently the only storage available for Windy Gap water prior to delivery to Participants. Water conveyed and stored for the C-BT Project has priority over water conveyed and stored for the Windy Gap Project. Thus in wet years, when the C-BT system is full, there is no conveyance or storage capacity for Windy Gap Project water. This prevents the Windy Gap Project from storing water in some wet years for use in subsequent dry years.

Figure ES-1. Windy Gap Reservoir facilities.



Because the Windy Gap Project is unable to provide reliable yields in both wet and dry years, the current firm yield is zero. Firm yield is typically defined as the amount of water that can be delivered on a reliable basis in all years and is typically determined by yield in dry years. For the Windy Gap Project, lack of available storage space in wet years also affects yield.

Figure ES-2. Summary of projected 2050 Participant water supply sources.



Participants in the proposed project have a need to firm Windy Gap water deliveries to meet existing and future water demands. In 2005, WGFP Participants had a firm water supply of about 141,000 AF and a demand of about 120,000 AF. Water demand for East Slope Participants is projected to increase to about 251,000 AF by 2050 and shortages in firm yield at that time would increase to more than 110,000 AF (Table ES-1). Water demand is projected to increase 17,000 AF by 2030 for Grand and Summit county water users partially served by the MPWCD. While water conservation is an important strategy used by all the Participants to improve the efficiency of water use, extend supplies, and reduce overall demand, conservation measures alone will not be sufficient to meet projected water demands. The WGFP would collectively supply about 10 percent of the projected 2050 East Slope Participant water supply needs (Figure ES-2) and would contribute to meeting the future demands of Grand and Summit counties. The source for about 34 percent of future water supplies is still unknown. It is anticipated that some portion of this future supply will be realized by increased water conservation, but additional water supplies will still be needed.

Table ES-1. WGFP Participant water supply, demand, and estimated shortage.

Participant	Firm Supply from All Sources (2005)	Projected 2050 Water Demand	Estimated 2050 Water Shortage	Estimated Firm Yield under the Proposed Action**
Broomfield	13,739	24,400	10,661	5,600
Central Weld County Water District	2,786	5,900	3,114	93
Erie	2,145	8,900	6,755	1,840
Evans	9,298	13,300	4,002	455
Fort Lupton	3,538	6,800	3,262	265
Greeley	43,850	78,500	34,650	2,230
Lafayette	4,534	8,600	4,066	610
Longmont	30,963	42,300	11,337	4,515
Louisville	5,063	6,900	1,837	825
Loveland	17,792	28,300	10,508	2,075
Little Thompson Water District	5,510	19,100	13,590	1,200
MPWCD	NA	*	NA	429
Platte River Power Authority	0	5,150	5,150	5,050
Superior	1,544	3,300	1,756	1,380
TOTAL	140,762	251,450	110,688	26,567

*Grand and Summit counties project an increase in water demand of 17,000 AF by 2030, with a total build-out demand of about 32,000 AF.

**Values rounded.

ALTERNATIVES

Following extensive screening of more than 170 different alternatives using National Environmental Policy Act (NEPA) criteria and Clean Water Act Section 404(b)(1) guidelines, in cooperation with the Corps, five alternatives were included for evaluation in the EIS. The No Action Alternative and four action alternatives are described below.

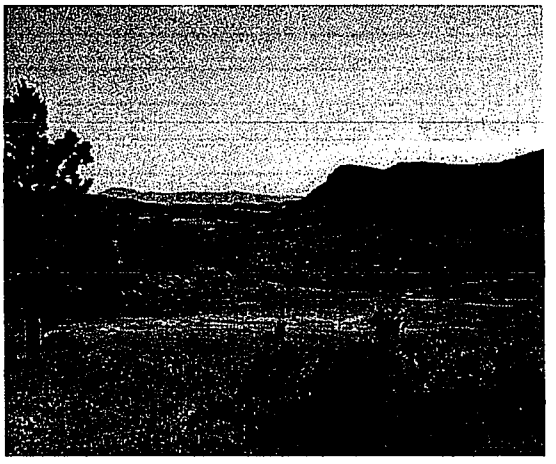
- **Alternative 1 (No Action):** Continuation of operations under existing agreements between Reclamation and the Subdistrict for conveyance of Windy Gap water through C-BT facilities and the enlargement of Ralph Price Reservoir by the City of Longmont.
- **Alternative 2 (Proposed Action):** Chimney Hollow Reservoir (90,000 AF) with prepositioning.
- **Alternative 3:** Chimney Hollow Reservoir (70,000 AF) and Jasper East Reservoir (20,000 AF).
- **Alternative 4:** Chimney Hollow Reservoir (70,000 AF) and Rockwell/Mueller Creek Reservoir (20,000 AF).
- **Alternative 5:** Dry Creek Reservoir (60,000 AF) and Rockwell/Mueller Creek Reservoir (30,000 AF).

The Municipal Subdistrict's Proposed Action is to construct a new 90,000 AF Chimney Hollow Reservoir on the East Slope near Carter Lake and to allow the storage of C-BT Project water in the new reservoir to improve Windy Gap yield.

Alternative 2, construction of Chimney Hollow Reservoir with prepositioning, along with associated operational changes developed as part of mitigation, is the Bureau of Reclamation's preferred alternative.

Alternative 1 (No Action)

The No Action Alternative defines what Participants would do if Reclamation does not approve a new connection of WGFP facilities to C-BT facilities as required for the action alternatives. Under this alternative, Participants would maximize delivery of Windy Gap water according to their demand, water rights, availability of storage in Granby Reservoir, and existing Adams Tunnel conveyance constraints. The City of Longmont would evaluate the enlargement of Ralph Price Reservoir by raising the dam and increasing storage capacity by 13,000 AF (Figure ES-3). Participants that do not have a currently defined storage option would take delivery of Windy Gap water whenever it is available within the capacity of their existing water systems and delivery points under the terms of the existing contract between Reclamation and the Subdistrict. Windy Gap diversions will increase in the future regardless of whether one of the action alternatives is implemented because of increased demand.

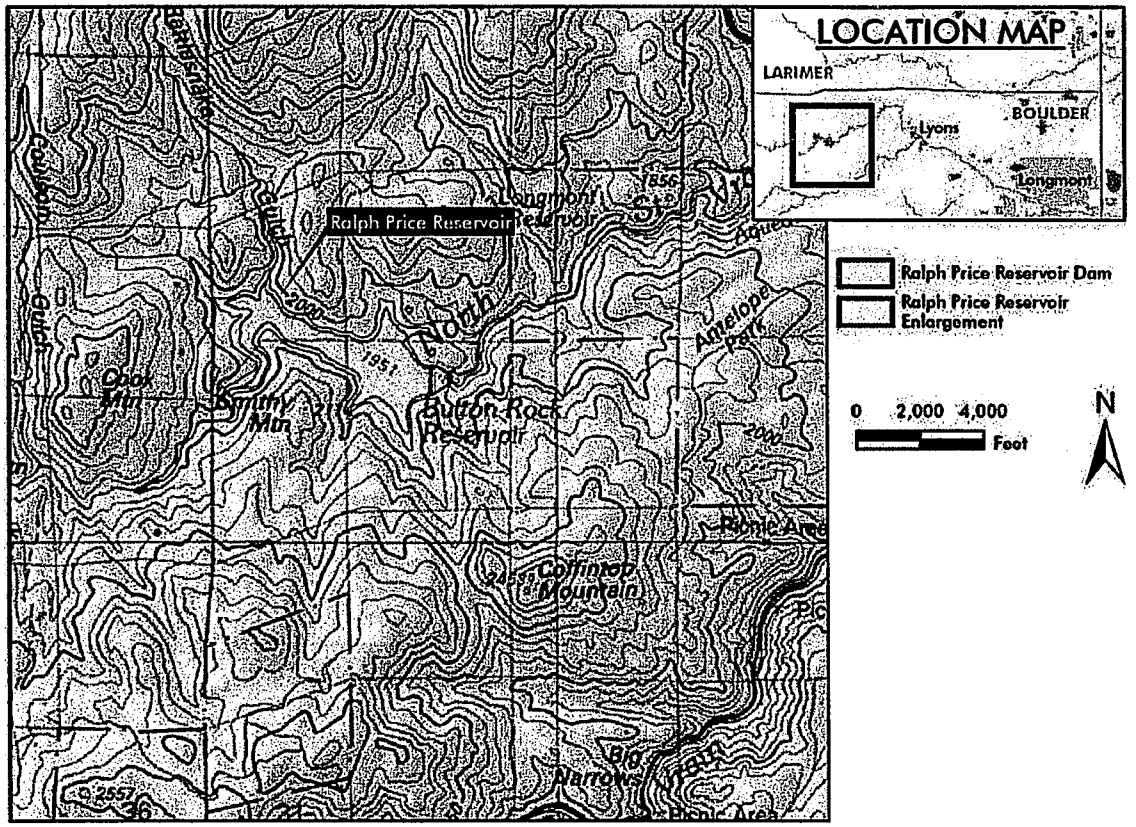


Chimney Hollow Reservoir Site

Alternative 2 (Proposed Action)

The Proposed Action includes construction of a 90,000 AF Chimney Hollow Reservoir, along with the ability to store, or preposition, C-BT water in the new reservoir (Figure ES-4). Water would be conveyed to Chimney Hollow Reservoir via a new pipeline connection to existing East Slope C-BT facilities.

Figure ES-3. Ralph Price Reservoir enlargement under the No Action Alternative.



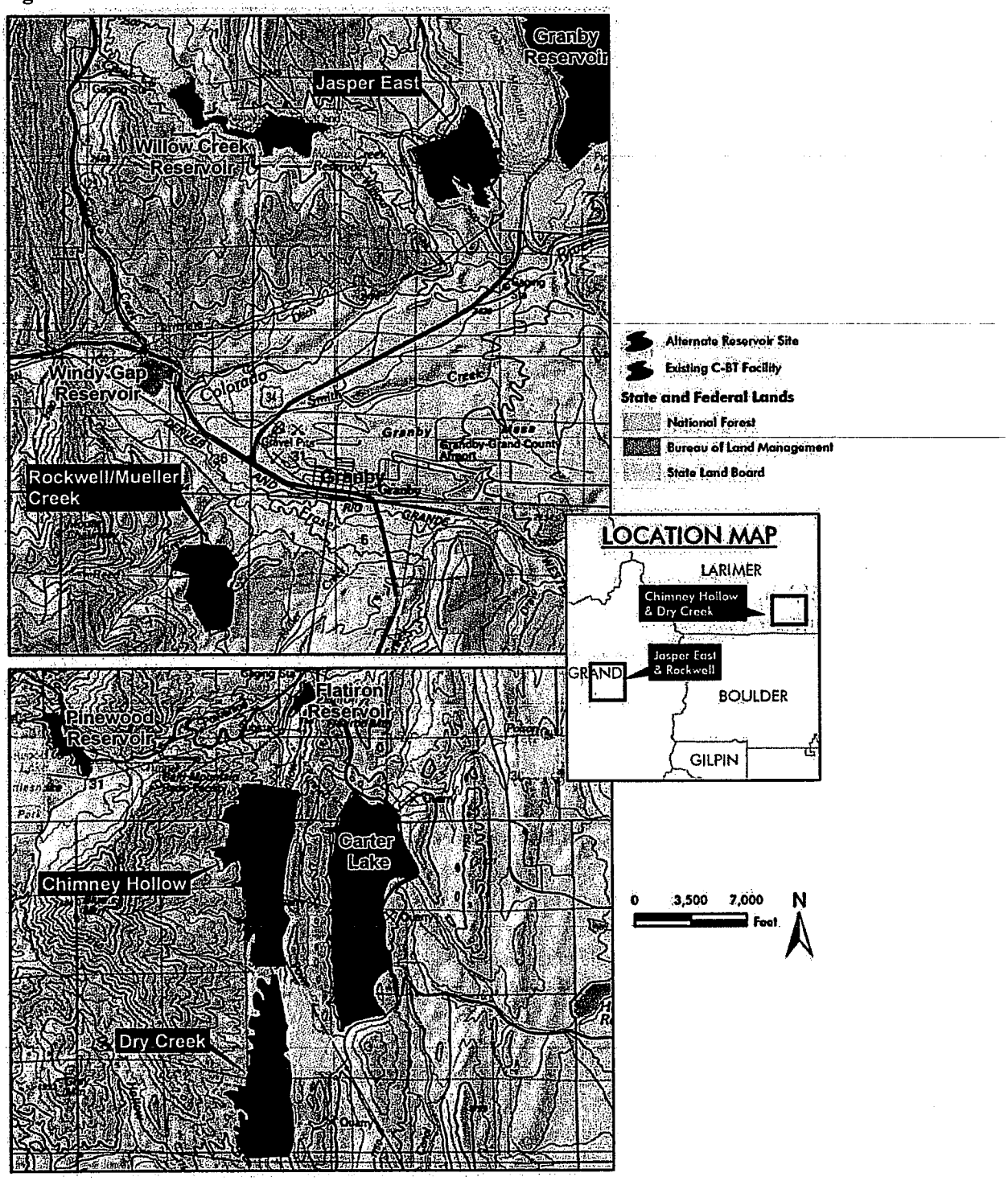
New connections between Chimney Hollow Reservoir and Carter Lake would allow delivery of water to Participants using existing infrastructure. No new West Slope infrastructure would be needed to divert or convey water to the East Slope.

Prepositioning would involve the use of available Adams Tunnel capacity to deliver C-BT water into Chimney Hollow Reservoir to occupy storage space that is not occupied by Windy Gap water. The delivery of C-BT water from Granby Reservoir into Chimney Hollow Reservoir would create space for Windy Gap water in Granby Reservoir. When Windy Gap water is diverted into Granby Reservoir, the C-BT water in Chimney Hollow Reservoir would be exchanged for a like amount of Windy Gap water in Granby Reservoir. Total allowable C-BT storage would not change and the existing C-BT diversions would not be expanded. If operated in this manner, Chimney Hollow Reservoir would be nearly full most of the time.

Alternative 3

Alternative 3 is a combination of a 70,000 AF Chimney Hollow Reservoir on the East Slope and a 20,000 AF Jasper East Reservoir on the West Slope (Figure ES-4). A new 1-mile-long pipeline would connect Jasper East Reservoir to the existing Windy Gap pipeline that delivers water to Granby Reservoir. The Willow Creek Pump Station, forebay, and portions of the canal and pipeline would be relocated. The availability of a

Figure ES-4. Alternative new reservoir sites.



new West Slope reservoir would allow water diversions from the existing Windy Gap Reservoir to be delivered to either Jasper East Reservoir or Granby Reservoir. Thus, when Granby Reservoir is full or the Adams Tunnel is at capacity, Windy Gap water would be diverted and stored in Jasper East Reservoir until there is sufficient capacity to transfer water to Chimney Hollow Reservoir.

Alternative 4

Alternative 4 is a combination of a 70,000 AF Chimney Hollow Reservoir on the East Slope and a 20,000 AF Rockwell/Mueller Creek Reservoir (Rockwell Reservoir) on the West Slope (Figure ES-4). Deliveries to and from Rockwell Reservoir would require a new connection to the existing Windy Gap pump station and a new 3.3-mile-long pipeline to Rockwell Reservoir. As with the Jasper East Reservoir site, the availability of a new West Slope reservoir would allow water diversions from the existing Windy Gap Reservoir to be delivered to either Rockwell Reservoir or Granby Reservoir. When Granby Reservoir is full or the Adams Tunnel is at capacity, Windy Gap water would be diverted and stored in Rockwell Reservoir until there is sufficient capacity to transfer water to Chimney Hollow Reservoir.

Alternative 5

Alternative 5 is a combination of a 60,000 AF Dry Creek Reservoir on the East Slope and a 30,000 AF Rockwell Reservoir on the West Slope (Figure ES-4). Water deliveries to and from Rockwell Reservoir would require a new pipeline and connection to the existing Windy Gap pump station. A new 3.4-mile-long pipeline connection to C-BT facilities would convey Windy Gap water to Dry Creek Reservoir. A new 2.1-mile-long pipeline also would be needed to deliver water from Dry Creek Reservoir to Carter Lake. As with Alternatives 3 and 4, the availability of a new West Slope reservoir would allow water diversions from the existing Windy Gap Reservoir to be delivered to either Rockwell Reservoir or Granby Reservoir. When Granby Reservoir is full or the Adams Tunnel is at capacity, Windy Gap water would be diverted and stored in Rockwell Reservoir until there is sufficient capacity to transfer water to Dry Creek Reservoir.

ENVIRONMENTAL EFFECTS

The WGFP would result in environmental effects to a number of resources. The effects of all of the action alternatives related to increased water diversions would be similar because similar amounts of water would be diverted from the Colorado River. The No Action Alternative would result in similar, but smaller, effects because Windy Gap diversions would increase in the future with a higher water demand even though the enlargement of Ralph Price Reservoir would only increase storage for Windy Gap water by 13,000 AF. This summary focuses on those resources with the greatest potential impacts. Effects on ground water, geology, soils, air quality, noise, cultural resources, and visual quality are expected to be minimal and are not discussed in this summary. However, impacts to these resources are discussed in detail in the Final EIS. The following sections summarize the effects to key resources of concern. It should be noted that the effects presented in the following sections are based on an analysis of the alternatives without any mitigation. Proposed mitigation, which is discussed at the end of this summary, would reduce the effects in many cases.

Surface Water Hydrology

The WGFP would result in increased diversions and reduced flows in the Colorado River below Windy Gap Reservoir. In many years, the flows would be unchanged, but in wetter years, diversions would increase, with a corresponding decrease in Colorado River flows. Estimated average annual flow changes based on hydrologic modeling are described below.

- Windy Gap diversions would increase about 7,000 AF per year on average from existing conditions under the No Action Alternative compared to an increase of about 9,500 AF for the Proposed Action, and an increase of 12,000 AF for the other alternatives (Table ES-2).

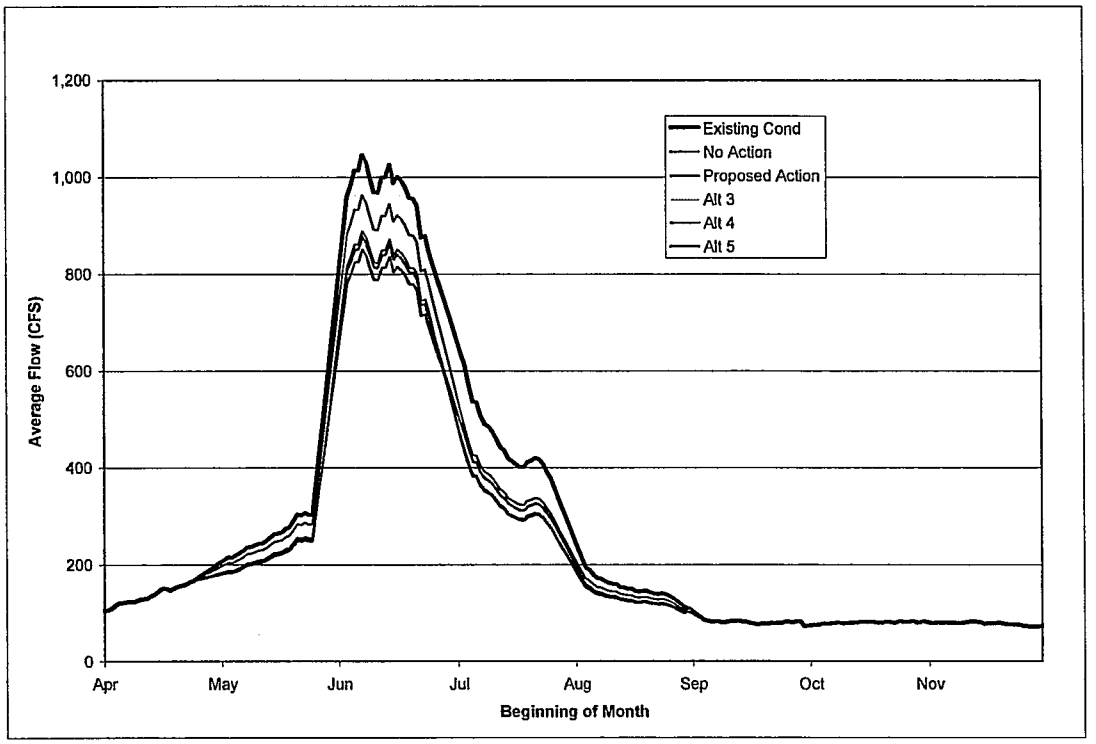
Table ES-2. Average annual changes in Colorado River flow and diversions by alternative.

Alternative	Colorado River below Granby Reservoir		Windy Gap Diversions		Colorado River below Windy Gap		Colorado River below Kremmling	
	AF	%	AF	%	AF	%	AF	%
Existing Conditions	59,385	—	36,532	—	151,358	—	701,801	—
Alt 1 – No Action	55,345	-7	43,573	+19	138,914	-8	689,357	-2
Alt 2 – Proposed Action	50,220	-15	46,084	+26	130,075	-14	680,512	-3
Alt 3	52,071	-12	48,052	+32	130,370	-14	680,807	-3
Alt 4	52,091	-12	47,997	+31	130,453	-14	680,890	-3
Alt 5	51,903	-13	48,483	+33	129,681	-14	680,118	-3

- Colorado River average annual flow below Granby Reservoir would decrease about 7 percent (4,000 AF) under the No Action Alternative, 15 percent (9,000 AF) under the Proposed Action, and 12 to 13 percent for the other alternatives as a result of the availability of additional Windy Gap storage and fewer reservoir spills (Table ES-2). This effect would occur primarily during spill years, when flows are higher than normal.
- Colorado River average annual flow below the Windy Gap Reservoir would decrease by 8 percent (12,000 AF) under the No Action Alternative compared to a 14 percent (21,000 AF) decrease for the action alternatives (Table ES-2). The majority of WGFP diversions would occur in May and June, but in some years, diversion would occur between April and August (Figure ES-5). Although WGFP diversions in July are generally lower than May and June, the greatest percentage reduction in Colorado River flows would occur in July. Average monthly flow reductions up to 20 percent for the No Action Alternative, 23 percent for the Proposed Action, and 28 percent for Alternatives 3 to 5 are predicted for July. In wet years, WGFP diversions as a percent of existing flow would be greater. In dry years, there would be no change in flow from existing conditions.
- Colorado River average annual streamflow reductions below the confluence with the Blue River would be about 2 percent (12,000 AF) under the No Action Alternative and 3 percent (21,000 AF) for the action alternatives (Table ES-2).
- Average annual Willow Creek streamflow below Willow Creek Reservoir would decrease by 7 percent (1,400 AF) under the No Action Alternative, 14 percent (2,600 AF) for the Proposed Action, and 12 percent (2,200 AF) for the other alternatives due to changes in Willow Creek Feeder Canal

deliveries to Granby Reservoir. This effect would occur primarily during spill years, when flows are higher than normal.

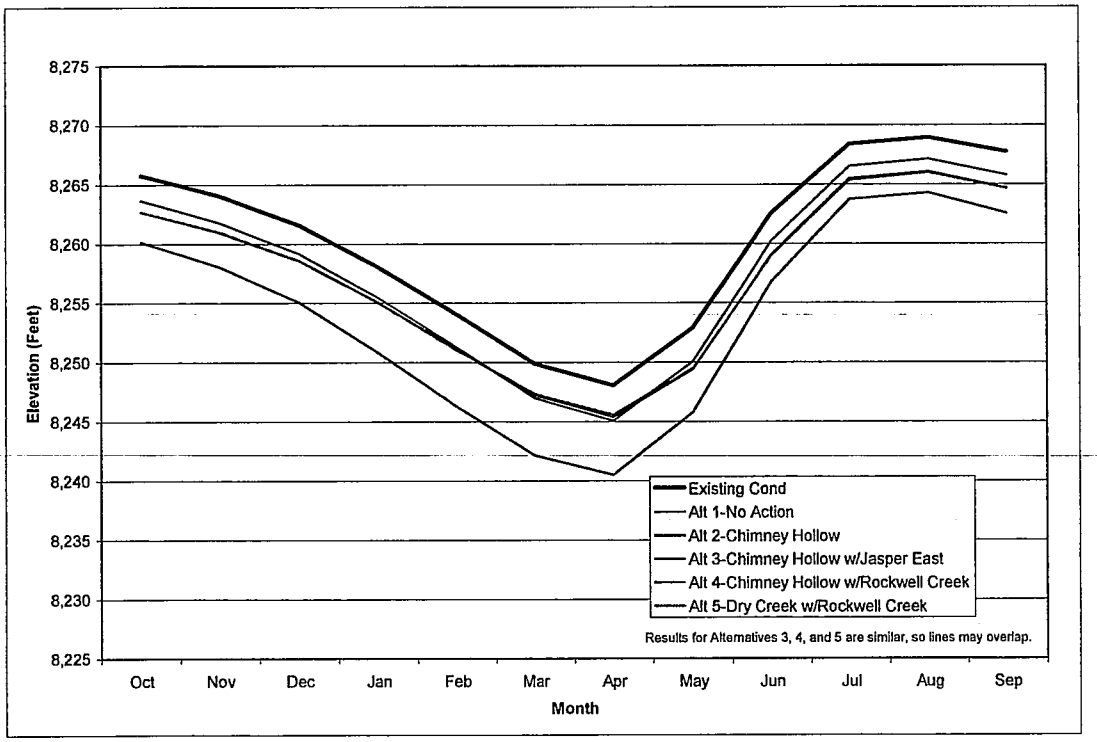
Figure ES-5. Average daily flow in the Colorado River below Windy Gap Reservoir by alternative.



- Big Thompson River flows below Lake Estes would increase about 1 percent (450 AF) on average under the No Action Alternative compared to a 5 percent increase (3,200 AF) for the Proposed Action, and less than a 2 percent increase (1,000 AF) for the other alternatives as a result of the additional Windy Gap water imports and lower diversions for power generation in the C-BT system.
- Streamflow below Participant wastewater treatment plants (WWTPs) would increase from the discharge of Windy Gap return flows to the Big Thompson River, St. Vrain Creek, Big Dry Creek, and Coal Creek.
- Water levels in Grand Lake or Shadow Mountain Reservoir would not change under any of the alternatives.
- Granby Reservoir average monthly water levels would decrease from 2 to 3 feet under the No Action Alternative, 5 to 8 feet under the Proposed Action, and 3 to 4 feet under the other alternatives (Figure ES-6). A series of dry years could lower water levels up to 23 feet under the Proposed Action. Mitigation Measure #3 at the end of this section would address this impact.
- Water levels in Carter Lake would decrease less than 1 foot under all of the alternatives.
- Average monthly water levels in Horsetooth Reservoir would not change under the No Action Alternative, but would decrease 2 to 6 feet under the Proposed Action and would decrease 0 to 2 feet

under the other action alternatives. Mitigation Measure #3 at the end of this section would address this impact.

Figure ES-6. Granby Reservoir estimated average monthly surface elevation by alternative.



- Windy Gap firm yield would increase from zero under existing conditions to about 26,000 AF under the Proposed Action and other action alternatives (Table ES-3). Firm yield under the No Action Alternative would be about 1,200 AF, which does not meet the applicant's purpose and need.

Table ES-3. Windy Gap Firming Project firm yield.

Condition/Alternative	Firm Yield (AF)
Existing Conditions	0
Alt. 1 – No Action	1,229
Alt. 2 – Proposed Action	26,559
Alt. 3	25,849
Alt. 4	25,849
Alt. 5	26,629

Stream Morphology and Floodplains

Stream morphology refers to the form and structure of a stream, including its channel, banks, floodplain and drainage area, which could be altered as a result of changes in flow. The upper Colorado River is a morphologically stable stream and the changes in flow predicted from the WGFP are not expected to substantially affect stream morphology or sediment transport and deposition in the Colorado River below Windy Gap Reservoir.

Channel maintenance flows are considered necessary to maintain the physical characteristics of a stream channel and are critical to ensuring unimpaired flow and sediment conveyance. A range of channel maintenance flows provide the benefits of conveying water and eroded materials from tributaries without aggradation or degradation, preventing vegetation encroachment and narrowing of the channel, sustaining aquatic ecosystems, temporarily storing flood flows on the floodplain, and maintaining healthy streambank and floodplain vegetation. The range of channel maintenance flows is generally defined as bankfull discharge, which is the peak flow that occurs every 1.5 to 2 years, to higher flows that occur about every 25 years. The lower limit is the flow rate at which coarse sediment transport begins and the upper limit is the flow above which valley rather than channel maintenance occurs and when property damage may occur.

- Under all alternatives, the percentage of years that channel maintenance flows occur on the Colorado River at the Hot Sulphur Springs gage below the Windy Gap diversion would be less than under existing conditions. The decrease in channel maintenance flows is predicted to range from 4 percent less years for 2- to 5-year flows up to a 13 percent decrease for 5- to 10-year flows. The duration of channel maintenance flows would decrease by 2 to 4 days for the lower range of such flows (510 to 1,240 cfs) and increase by 1 to 3 days for greater flows. The projected reduction in the frequency of peak discharges and channel maintenance flows is unlikely to substantially affect stream morphology or change sediment transport or deposition.
- Flushing flows in the Colorado River equal to or greater than 450 cfs, which occur about 28 days per year on average under existing conditions, would decrease to 23 days per year under the No Action Alternative, and 20 to 21 days under the Proposed Action and the other alternatives. The reduction in the frequency of flushing flows would remain adequate to transport sediment and prevent deposition. Mitigation Measure #2 at the end of this section would address this impact.
- Increased flows in East Slope streams below the Participants WWTPs would have minimal effect on stream morphology.
- The potential for flooding along the Colorado River and Willow Creek would decrease and the potential for flooding along East Slope streams below the Participants WWTPs would increase slightly.

Surface Water Quality

Water quality impacts from the WGFP would occur as a result of changes in Colorado River flow below Granby Reservoir; in Willow Creek below Willow Creek Reservoir; and in several East Slope streams, including the Big Thompson River, St. Vrain Creek, North St. Vrain Creek, Coal Creek, Big Dry Creek, and the Cache la Poudre River. Potential effects to water quality also were evaluated for the Three Lakes system (Granby Reservoir, Shadow Mountain Reservoir, and Grand Lake), Carter Lake, and Horsetooth Reservoir, as well as the predicted water quality for new reservoirs. Stream and reservoir water quality models were used to estimate the following water quality effects.

- Dynamic temperature modeling indicates that the chronic maximum weekly average temperature (MWAT) standard, and occasionally the acute daily maximum (DM) temperature standard, would be exceeded more frequently than existing conditions under all of the alternatives in the 24-mile reach of the Colorado River below Windy Gap Reservoir to the confluence with the Williams Fork. Mitigation Measure #1 at the end of this section would address these impacts.

- Ammonia and inorganic phosphorus concentrations in the Colorado River are predicted to increase and dissolved oxygen (DO) concentrations decrease under all alternatives. Water quality standards would not be exceeded under average flow conditions, but when Windy Gap diversions reduce flow to the 90 cfs minimum flow, the DO concentration is predicted to be less than the spawning standard for a few miles upstream of the Williams Fork, although this would occur outside of the spawning season. Mitigation Measure #4 at the end of this section would address this impact.
- Ammonia and some metal concentrations in Willow Creek would increase slightly for all alternatives, but water quality standards are not expected to be exceeded. Mitigation Measure #4 at the end of this section would address this impact.
- **Granby Reservoir:** Total phosphorus concentrations are predicted to increase under all alternatives and total nitrogen concentrations would increase under the No Action Alternative and Proposed Action (Table ES-4). Alternatives 3 to 5 would have lower nitrogen levels due to the effects of storage in a West Slope Reservoir prior to delivery to Granby Reservoir. Chlorophyll *a* concentrations (algae) are predicted to increase under the Proposed Action, but there would be no change in water clarity as measured by the Secchi-disk depth for any of the alternatives. Mitigation Measures #4 and #7 at the end of this section would address these impacts.

Table ES-4. Granby Reservoir predicted water quality changes (on an average annual basis) by alternative compared to existing conditions.

Parameter	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Total phosphorus (µg/L)	+6.3%	+12.7%	+4.0%	+3.2%	+1.6%
Total nitrogen (µg/L)	+0.3%	+0.7%	-2.1%	-2.8%	-3.5%
Chlorophyll *a* (µg/L)	No Change	+2.4%	No Change	No Change	No Change
Peak chlorophyll *a* (µg/L)	No Change	-1.5%	No Change	No Change	No Change
Secchi-disk depth (m)	No Change	No Change	No Change	No Change	No Change
Trophic state	No Change	No Change	No Change	No Change	No Change
Minimum DO (mg/L)	-2.2%	-4.4%	No Change	No Change	No Change
TSS (mg/L)	No Change	+4.3%	+4.3%	+4.3%	+4.3%

- **Shadow Mountain Reservoir:** All alternatives would increase phosphorus concentrations and total nitrogen would increase in Alternatives 1 to 3 and decrease in Alternatives 4 and 5 (Table ES-5). Chlorophyll *a* concentrations would increase in Alternatives 1 to 3. Water clarity would not change in any alternative. Dissolved oxygen would decrease under the Proposed Action and would not change in other alternatives. Mitigation Measures #4 and #7 at the end of this section would address these impacts.

Table ES-5. Shadow Mountain Reservoir predicted water quality changes (on an average annual basis) by alternative compared to existing conditions.

Parameter	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Total phosphorus (µg/L)	+5.6%	+11.3%	+8.1%	+4.8%	+3.2%
Total nitrogen (µg/L)	+1.1%	+1.8%	+0.4%	-0.7%	-1.1%
Chlorophyll *a* (µg/L)	+1.8%	+1.8%	+1.8%	No Change	No Change
Peak chlorophyll *a* (µg/L)	+3.4%	+6.8%	+1.1%	No Change	-1.1%
Secchi-disk depth (m)	No Change	No Change	No Change	No Change	No Change
Trophic state	No Change	No Change	No Change	No Change	No Change
Minimum DO (mg/L)	No Change	-1.4%	No Change	No Change	No Change
TSS (mg/L)	+5.0%	+5.0%	+5.0%	+5.0%	+5.0%

- **Grand Lake:** Total phosphorus concentrations are predicted to increase under all alternatives (Table ES-6) and total nitrogen is predicted to increase under the No Action Alternative and Proposed Action. Chlorophyll *a* concentrations would increase under all alternatives and Secchi-disk depth would decrease under all alternatives except Alternative 5. Dissolved oxygen concentrations would decrease under all alternatives. Mitigation Measures #4 and #7 at the end of this section would address these impacts.

Table ES-6. Grand Lake predicted water quality changes (on an average annual basis) by alternative compared to existing conditions.

Parameter	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4	Alternative 5
Total phosphorus (µg/L)	+6.0%	+12.0%	+6.0%	+6.0%	+4.8%
Total nitrogen (µg/L)	+0.4%	+1.6%	-0.4%	-0.4%	-0.8%
Chlorophyll *a* (µg/L)	+4.2%	+6.1%	+4.2%	+2.0%	+2.0%
Peak chlorophyll *a* (µg/L)	+4.1%	+5.4%	+1.4%	+1.4%	No Change
Secchi-disk depth (m)	-3.8%	-3.8%	-3.8%	-3.8%	No Change
Trophic state	No Change	No Change	No Change	No Change	No Change
Minimum DO (mg/L)	-11.1%	-7.4%	-5.6%	-5.6%	-5.6%
TSS (mg/L)	No Change	+5.6%	+5.6%	+5.6%	No Change

- No additional water quality standards would be exceeded at the Three Lakes. Lower DO levels would contribute to continued exceedance of the manganese standard in the Three Lakes.
- Ammonia concentrations in St. Vrain Creek, Big Dry Creek, and Coal Creek would increase under all of the alternatives. The potential for exceedance of the water quality standard is possible for some locations.
- In Carter Lake and Horsetooth Reservoir, total phosphorus, total nitrogen, and chlorophyll *a* concentrations would increase, and DO concentrations would decrease. Lower DO concentrations in Horsetooth Reservoir would contribute to continued exceedance of the manganese standard. Mitigation Measure #4 at the end of this section would address these impacts.

Aquatic Resources

The assessment of effects to fish habitat along the Colorado River was modeled following the concepts of the Instream Flow Incremental Methodology (IFIM). This approach combines stream hydraulics, habitat use criteria, and hydrology to predict fish habitat as a function of streamflow. Fish community and fish populations were assessed based on changes in physical habitat, as well as projected water quality changes within those systems in rivers and reservoirs. The changes were compared to the existing conditions to determine if there would be factors that affect fish populations at the acute or chronic level. Major effects are summarized below:

- Aquatic habitat modeling of the Colorado River for the alternatives indicate the greatest decrease in fish habitat would occur from Windy Gap Reservoir downstream to the Williams Fork. Reductions in fish habitat are generally greatest in July and August. Adult rainbow trout habitat would decrease up to 34 percent in August, while adult brown trout habitat would decrease less than 8 percent. The hydrologic model indicates WGFP diversions of more than 100 AF in August would increase from 6 times in the 47-year hydrologic modeling period to 15 times. Actual WGFP pumping in August is likely to be less because a new reservoir(s) would typically be close to full in years when the WGFP diversions are in priority in August and the cost of pumping is high for the limited available water. WGFP diversions in June often results in an increase in fish habitat by lowering high flows. Adult rainbow trout habitat increases by approximately 20 percent in average years downstream of Windy Gap Reservoir.
- In the Colorado River below the Williams Fork, decrease in rainbow or brown trout habitat for juveniles or adults would be less than 15 percent.
- No adverse impacts to spring spawning rainbow trout or fall spawning brown trout are predicted for any of the alternatives.
- The predicted flow regime in the Colorado River as a result of the No Action Alternative and action alternatives would still include the components for stream health, but at lower levels than existing conditions.
- Projected increases in the exceedance of the aquatic life chronic and acute stream temperature standards for the Colorado River under all alternatives would increase the stress on fish populations, although predicted exceedances as a result of the WGFP would occur only in about 4 out of 15 years, assuming very warm July and August air temperatures. Increased stream temperature, particularly the acute daily maximum temperatures, has the greatest potential for affecting trout species in the Colorado River between Windy Gap Reservoir and the Williams Fork. Mitigation Measure #1 at the end of this section would address this impact.
- The amount and frequency of available habitat for adult brown trout in Willow Creek would decrease up to 25 percent under the action alternatives.
- Lower water levels and predicted changes in water quality in Granby Reservoir, Carter Lake, and Horsetooth Reservoir are unlikely to impact fish because lake productivity is expected to remain within the range observed under existing conditions. No change in fish population dynamics are expected from changes in the physical environment at Grand Lake, Shadow Mountain Reservoir, Granby Reservoir, Carter Lake, or Horsetooth Reservoir.
- Increased East Slope streamflows would slightly enhance fish habitat in the Big Thompson River, St. Vrain Creek, Big Dry Creek, and Coal Creek.

- Flow changes in North St. Vrain Creek under the No Action Alternative would affect fish habitat both positively and negatively depending on storage and release from Ralph Price Reservoir.

Vegetation and Wetlands

Permanent effects to vegetation and wetland resources would occur in areas that would be inundated by a reservoir or located within the footprint of dams, roads, relocated transmission line, or other facilities. Temporary effects to vegetation and wetlands from construction of pipelines, staging areas, and other short-term disturbances would be revegetated following construction.

- The enlargement of Ralph Price Reservoir under the No Action Alternative would result in a loss of about 77 acres of forest vegetation. Construction of Chimney Hollow Reservoir would permanently impact about 790 acres of shrublands, grasslands, and forest vegetation. The other alternatives would impact about 1,000 to 1,100 acres of mixed vegetation types.
- All of the alternatives would result in permanent and temporary impacts to wetlands and other waters (Table ES-7). Of the action alternatives, the Proposed Action would have the least impact to wetlands and waters. Mitigation Measure #8 at the end of this section would address this impact.

Table ES-7. Summary of effects to wetlands and other waters by alternative.

Wetlands and Other Waters	Alternative 1 No Action	Alternative 2 Proposed Action	Alternative 3	Alternative 4*	Alternative 5*
	Acres				
Permanent	0.4	2.9	30.3	9.4 – 20.0	15.7 – 28.3
Temporary	—	0.2	5.2	3.9 – 6.9	4.3 – 7.3
TOTAL	0.4	3.1	35.5	13.3 – 26.9	20.0 – 35.6

*The range in wetland impacts is due to uncertainty about the wetlands present at the Rockwell/Mueller Creek Reservoir site. Access to this site for field survey was denied by the landowners.

Wildlife

The potential effects on wildlife resources were assessed using information on known populations or suitable habitat. Permanent impacts to wildlife habitat could occur in areas that would be inundated or permanently disturbed by project features such as the dam, access roads, and pump stations. Temporary impacts to habitat from pipelines and staging areas would be reclaimed following construction. Effects to waterbirds and aquatic and riverine mammals from changes in hydrology were based on potential effects to riparian vegetation.

- Enlargement of Ralph Price Reservoir would result in the loss of 77 acres of elk and mule deer winter range and habitat for other terrestrial wildlife species.
- Construction of Chimney Hollow Reservoir under the Proposed Action would result in the loss of 810 acres of elk winter range, mule deer winter range and concentration area, and black bear foraging area. A slightly smaller Chimney Hollow Reservoir under Alternatives 3 and 4 would impact similar habitats on about 675 acres. Habitat for migratory birds, northern leopard frog, common garter snake, and other species would be impacted at Chimney Hollow Reservoir. This impact is addressed in the FWMP, Appendix E.

- Construction of Jasper East Reservoir would impact about 480 acres of moose and mule deer summer range and 24 acres of elk winter range. Elk movement in the area could shift as a result of the new reservoir.
- Construction of Rockwell Reservoir would affect about 312 acres of summer range for moose and mule deer and 73 acres of elk winter range. About 300 acres of greater sage grouse habitat would be lost.
- Construction of Dry Creek Reservoir would result in the loss of about 650 acres of elk and mule deer winter range.

Threatened and Endangered Species

Federally threatened and endangered species are protected under the Endangered Species Act. Potential direct and indirect effects to threatened or endangered species were evaluated for each alternative.

- All of the alternatives would result in depletions that affect Colorado River endangered fish downstream of the Windy Gap diversion. Reclamation reinitiated consultation with the U.S. Fish and Wildlife Service (Service) because the stream depletions associated with the Proposed Action would adversely impact bonytail chub, Colorado pikeminnow humpback chub, and razorback sucker. The Service issued a biological opinion on February 12, 2010 for the Preferred Alternative (Appendix D of the Final EIS). The biological opinion determined that the Windy Gap Project meets the criteria for coverage under the existing "Programmatic Biological Opinion" because a Recovery Agreement was previously signed by the Subdistrict in 2000. The Subdistrict would need to make a monetary contribution for water depletions to help fund their share of the costs of recovery actions as part of Mitigation Measure #5.
- Construction of Rockwell Reservoir would result in the loss of less than 10 acres of potential lynx habitat.

Land Use and Ownership

Potential effects to existing land ownership were evaluated by overlaying proposed project facilities for each alternative on land ownership maps. Potential conflicts with local land use regulations were also evaluated for each of the alternative reservoir sites. Predicted construction traffic volumes and visitor estimates were used to evaluate short and long-term effects to local traffic.

- Enlargement of Ralph Price Reservoir would occur entirely on City of Longmont property. Traffic would increase on U.S. 36 and County Road 80 during construction.
- Construction of Chimney Hollow Reservoir would require acquisition or easements on private and Reclamation land, and relocation of 3.8 miles of Western's transmission line. Traffic would increase on County Road 18E and County Road 31 during construction. Recreation traffic on County Road 18E would increase when the reservoir is complete to access Chimney Hollow open space, which would be managed by Larimer County.
- Construction of Jasper East Reservoir would require acquisition of Reclamation managed land and relocation of the Willow Creek Pump station and a portion of the canal (facilities that are part of the C-BT Project). County Road 40 to Willow Creek would need to be relocated and a right-of-way through private land would have to be obtained.

- Construction of Rockwell Reservoir would require acquisition of private land, including four residences. Bureau of Land Management property would also be affected and realignment of County Road 57 would be required. Traffic would increase on these county roads and U.S. 40 during construction.
- Private, state, and Reclamation-managed property would be affected by construction of Dry Creek Reservoir. Three private residences and a llama operation would be impacted. Traffic on County Road 31 would increase during construction.
- No elements associated with the construction of alternative reservoirs and facilities were identified that would directly conflict with local land use plans or other regulations. The review process in Larimer, Grand, and Boulder counties, to the extent applicable, would further evaluate the effects of the actions and any conditions for approval.

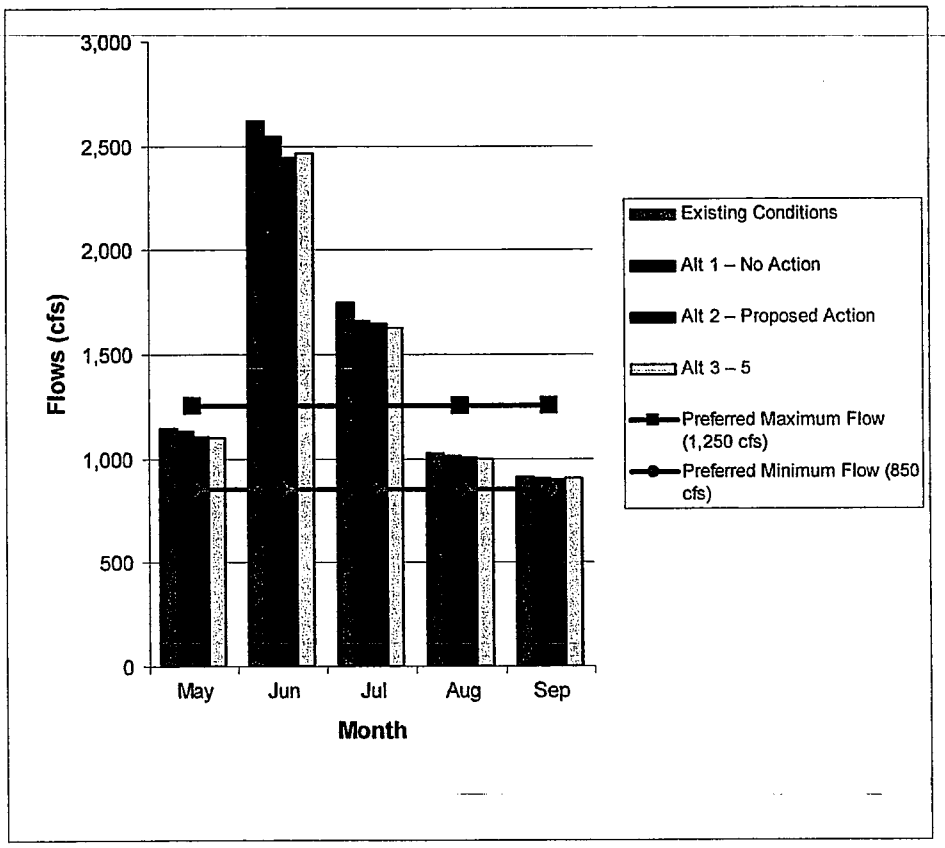
Recreation

Potential recreation effects were based primarily on changes in hydrologic conditions at reservoirs and streams in the study area. Changes in preferred flows for rafting and kayaking in the Colorado River were used to evaluate the effect on river recreation. Potential effects to rafting and kayaking on the Colorado River were evaluated for Byers Canyon below Hot Sulphur Springs, and in the Big Gore Canyon and Pumphouse reaches of the Colorado River below Kremmling. Daily hydrologic data from 1950 to 1996 were used to estimate the change in the number of days when preferred rafting and kayaking flows would occur in those reaches of the river.

- There would be no change in the number of days that flows are above the preferred minimum kayaking flows in Byers Canyon (400 cfs) in 29 years of the 47-year study period. In the remaining 18 years, the No Action Alternative would result in 8 fewer days per year where flows were less than preferred, while the action alternatives would result in 12 fewer days.
- For Big Gore Canyon, there would be no change from existing conditions in the number of days that preferred rafting flows of 850 to 1,250 cfs occur for any of the alternatives in 37 years of the 47-year study period. Under the No Action Alternative and Proposed Action, there would be about 2.3 days per year, on average, with fewer preferred rafting flows during the 10 years when flows fall outside of the preferred range. The greatest decrease in the number of days with preferred flows for rafting in the driest year would be 11 days under all of the alternatives. Average monthly flows and preferred flows for rafting are shown in Figure ES-7. Mitigation Measure #6 at the end of this section would address this impact.
- The number of days preferred kayaking flows between 1,100 and 2,200 cfs occur in Big Gore Canyon and the Pumphouse reach would not change in 32 years of the 47-year study period for any of the alternatives. Over the 47-year study period, there would be about 1 more day of preferred kayaking flows under the No Action Alternative and Alternative 4 compared to existing conditions. The greatest change in the number of days with preferred kayaking flows in the driest year would be 15 days fewer under all of the alternatives, with an increase of up to 7 days with preferred kayaking flows under the No Action Alternative and 6 more days under the Proposed Action.
- No measurable effect to angler user days on the Colorado River or associated economic effects were identified for any of the alternatives.

- Granby Reservoir boat ramps would remain accessible in the summer under all alternatives, except in dry years when access to the Arapaho Bay boat ramp would be diminished due to lower water levels. Mitigation Measure #3 at the end of this section would address this impact.
- Kayaking opportunities in North St. Vrain Creek would be reduced in July under the No Action Alternative.
- Access to the South Bay-South boat ramp in Horsetooth Reservoir could be impacted under the Proposed Action in September and by all alternatives in dry years. Mitigation Measure #3 at the end of this section would help address this impact.
- The new Chimney Hollow Reservoir would provide nonmotorized boating, fishing, and hiking opportunities under Larimer County management, with 50,000 visitors estimated annually.
- No managing agency has been identified for other potential new reservoirs, but recreation development is possible if a managing entity is found.

Figure ES-7. Average monthly streamflows on the Colorado River through Big Gore Canyon for rafting.



Socioeconomics

Socioeconomic effects evaluated include the cost of alternatives, impact of construction and operation on employment and spending, and the effects of hydrologic changes to recreation resources, such as boating and fishing.

- Enlargement of Ralph Price Reservoir under the No Action Alternative would cost about $31 million (Table ES-8). The cost of the action alternatives in 2005 dollars, ranges from $223 million for the Proposed Action to $288 million for Alternative 5.

Table ES-8. Project, direct labor, and operation and maintenance costs by alternative.

Alternative	Total Project Costs	Direct Labor	Annual O&M Costs
	Millions of 2005 dollars		
Alternative 1 – No Action	$31	$8	No change
Alternative 2 – Proposed Action	$223*	$47	$0.79
Alternative 3	$240	$49	$1.37
Alternative 4	$252	$52	$1.73
Alternative 5	$288	$60	$2.24

*Cost for Chimney Hollow Reservoir in 2007 dollars increased 17 percent to $261 million.

- All of the alternatives would increase local and regional employment and construction-related spending.
- The alternatives would generate additional hydropower revenues ranging from $850,000 for the No Action Alternative to $1.4 million for Alternative 5. Western would use this energy to fill existing contracts entered into following original construction of the Windy Gap Project.
- Hydrologic changes that reduce or increase the number of days that preferred flows for boating in the Colorado River occur, could impact recreation-associated spending. Assuming a decrease in the number of days of preferred flows results in a total loss in recreation user days, the annualized cost or benefit to recreational boating based on changes in flow preferences over the 47-year study period is shown in Table ES-9.
- The economic effect for the worst-case individual year (based on the 47-year study period) when preferred flows would not be available, could result in a loss of about 429 visitor days for commercial rafting in Big Gore Canyon with a value of about $31,000. In the Pumphouse reach, a maximum loss of 15 boating days in a single year under all of the alternatives would result in a loss of 6,705 visitor days with a value of $492,750. This analysis makes the conservative assumption that no boating occurs when flows are outside of the preferred flow range.
- Some years would have an increase in boating days within the preferred ranges from WGFP diversions. This would result in 2,700 to 4,500 additional visitor days with a value of $197,000 to $329,000.

Table ES-9. Annualized cost (-) or benefit (+) from recreational boating on the Colorado River by alternative.

Alternative	Byers Canyon (Kayaking)	Big Gore Canyon (Rafting and Kayaking)	Pumphouse (Rafting and Kayaking)
Alt 1 – No Action	Minor	-$2,423	-$132,798
Alt 2 – Proposed Action	Minor	-$3,392	-$144,680
Alt 3 – 5	Minor	-$3,756	-$139,787

CUMULATIVE EFFECTS

Several reasonably foreseeable actions are anticipated to occur regardless of the implementation of any of the action alternatives or the No Action Alternative. Reasonably foreseeable future actions, when combined with past and present actions and the alternatives evaluated in this Final EIS, may result in cumulative effects. Reasonably foreseeable effects were classified as either water-based or land-based actions that might have effects overlapping those of the WGFP.

Water-based Reasonably Foreseeable Actions

- Denver Water Moffat Collection System Project
- Increased water use from population growth in Grand and Summit counties
- Reduction of Xcel Energy's Shoshone Power Plant call
- Elimination of releases from Williams Fork and Wolford Mountain reservoirs to meet flow recommendations (10,825 AF of water) for endangered fish
- Increase in Wolford Mountain Reservoir contract demand
- Expiration of Denver Water's contract with Big Lake Ditch in 2013
- Climatic change (not quantitatively assessed)
- Mountain pine beetle killed trees (not quantitatively assessed)
- 10825 Project with 5,412.5 AF releases from Granby Reservoir
- Subdistrict and Denver Water Fish and Wildlife Enhancement Plans
- Denver Water Colorado River Cooperative Agreement

Land-based Reasonably Foreseeable Actions

- Various residential developments near new reservoir sites
- Western's replacement of the transmission line from the Granby Pumping Plant to the Windy Gap substation
- Larimer County open space development near Chimney Hollow Reservoir

Cumulative Resource Effects

Future implementation of water-based reasonably foreseeable actions would result in changes in the amount and timing of Colorado River streamflows. In general, less water would be available for diversion by the WGFP. Firm yield for the Proposed Action (24,000 AF) would be about 2,500 AF less than under the direct effect model run. The hydrologic changes associated with the WGFP would be slightly less than those described for direct effects because of the lower water diversions, although cumulative water diversions would be greater. Water quality in the Colorado River from lower overall flows and increased wastewater

discharges upstream of Windy Gap Reservoir would result in higher ammonia concentrations and possibly lower inorganic phosphorus levels with assumed improvements in wastewater treatment. The potential for exceedance of the temperature standards in the Colorado River would increase with cumulative water diversions, but the releases from Granby Reservoir in the late summer from the 10825 Project would reduce temperature increases. Water quality in the Three Lakes, Carter Lake, and Horsetooth Reservoir would be similar to that under direct effects. Less fish habitat would be available in the Colorado River from the cumulative decrease in streamflows. Preferred recreational boating flows in the Big Gore Canyon and Pumphouse reaches of the Colorado River would occur less frequently, primarily because of lower Blue River flows from increased Denver Water demands. However, the assumption used in hydrologic modeling for Denver Water's future diversions in the Blue River basin are overstated by about 30,000 AF; therefore, reductions in Colorado River streamflow below the confluence with the Blue River are overstated in the Final EIS. The economic effects of reduced preferred flows for boating also would be greater than under direct effects. Other resource effects would be similar to those described for direct effects.

MITIGATION

Avoidance and minimization of environmental impacts began with the screening of potential alternatives as described in Chapter 2 of the Final EIS. Comments received on the Draft EIS from the public; federal, state, and local agencies; and cooperating agencies provided valuable feedback in identifying additional mitigation measures that would reduce impacts associated with implementation of the WGFP. Mitigation and environmental commitments for the Proposed Action are discussed in detail in the mitigation sections for each resource and are summarized in Section 3.25 of the Final EIS. Following is a brief summary of the principal mitigation measures that would be implemented for the Proposed Action.

1. Curtailment of WGFP diversions after July 15 when temperature in the Colorado River below Windy Gap Reservoir and above the Williams Fork exceeds the chronic or acute temperature standard.
2. Flushing flows from the original Windy Gap Project (1980 MOU) would be modified to increase from 450 to 600 cfs. In any year when flows below Windy Gap have not exceeded 600 cfs for at least 50 consecutive hours in the previous two years, and total Subdistrict water supplies in Chimney Hollow and Granby Reservoirs exceed 60,000 AF on April 1, the Subdistrict would cease all Windy Gap pumping for at least 50 consecutive hours to enhance peak flows below Windy Gap.
3. The originally proposed prepositioning of C-BT water to Chimney Hollow Reservoir was modified to maintain higher water levels (>8,250 feet in elevation) in Granby Reservoir.
4. To offset nutrient loading to Granby Reservoir, Shadow Mountain Reservoir, and Grand Lake, the Subdistrict would implement point and nonpoint source nutrient mitigation measures upstream of Windy Gap Reservoir. This would serve to improve water quality in portions of Willow Creek, the Fraser River, and Colorado River year-round and offset nutrient loading to the Three Lakes from WGFP pumping.

5. The Subdistrict would participate in the Upper Colorado River Recovery Program and pay a fee to address depletions that would impact Colorado River endangered fish species.
6. Curtailment of WGFP diversions during the annual Gore Race in August would occur if flows in Gore Canyon drop below 1,250 cfs.
7. The Subdistrict would commit to continued participation and funding of the ongoing Nutrient Studies, with participation and collaboration by Reclamation, Northern Water, and Grand County, to better understand water quality issues in the Three Lakes system and provide guidance for future management decisions.
8. All permanent wetland impacts would be replaced by purchasing wetland bank credits.
9. Per an agreement with Larimer County Parks and Open Lands, Chimney Hollow Reservoir would be managed as open space. A plan for habitat restoration, enhancement, and wildlife management would be developed with Larimer County and CDPW.
10. A variety of best management practices would be implemented during and following construction to reduce erosion, protect water quality, suppress dust and noise, revegetate disturbed areas, and protect or avoid important wildlife habitat.

WHAT'S NEXT?

A number of decisions, permits, and approvals are needed from federal, state, and local agencies to implement the WGFP. Reclamation is responsible for NEPA compliance and other decisions associated with use and connection to C-BT facilities, any changes in C-BT operations, and use of Reclamation land. The Corps, as a cooperating agency, has regulatory authority for Section 404 dredge and fill permitting requirements under the Clean Water Act. Western, a federal power marketing agency in the U.S. Department of Energy, will make a decision on the relocation of a transmission line for the Chimney Hollow Reservoir alternative. Both the Corps and Western are using this Final EIS to meet NEPA compliance requirements for their federal actions associated with the WGFP.

As the lead agency, Reclamation is responsible for preparation of the Final EIS and Record of Decision (ROD). In addition, Reclamation must make several decisions regarding potential actions associated with implementation of the Proposed Action or other alternatives. All of the action alternatives would involve a physical connection of WGFP conveyance facilities on the East Slope to C-BT facilities. Reclamation will need to decide whether to allow this connection. The No Action Alternative does not require any authorization by Reclamation.

Because the Proposed Action includes the storage of C-BT water in a new WGFP facility (a concept referred to as prepositioning), Reclamation also will need to make a decision regarding accounting for changes in the C-BT system to allow water storage and exchange between the two projects to occur. Implementation of prepositioning may require modification or replacement of the existing conveyance and storage contract between Reclamation, the Subdistrict, and Northern Water.

Reclamation expects to complete the NEPA process with a Record of Decision (ROD) no sooner than 30 days after the Final EIS is made available to the public. The ROD will document Reclamation's selection of an alternative for the WGFP and discuss the factors, including C-BT Project water rights that were considered in making that decision. If the selected alternative includes issuing a water contract, Reclamation intends to determine whether the proposed contract complies with Senate Document 80, and other applicable authorities, prior to execution of the proposed contract.

Copies of the Final EIS and related documents are available online from Reclamation's website at: www.usbr.gov/gp/ecao

To receive a copy of the Final EIS on compact disk, please submit a written request to the attention of Lucy Maldonado through regular mail or e-mail:

Mail: Lucy Maldonado, Bureau of Reclamation
11056 West County Rd. 18E
Loveland, CO 80537

Fax: Lucy Maldonado, 970-663-3212

E-mail: lmaldonado@usbr.gov

For more information please contact Kara Lamb at (970) 962-4326 or klamb@usbr.gov.

Fish and Wildlife Service,
Fish and Wildlife
Coordination Act Report

Windy Gap Firming Project

Fish and Wildlife Coordination Act Report

U.S. Fish and Wildlife Service
Denver, Colorado

March, 2012

The U.S. Fish and Wildlife Service approves of the findings in the Fish and Wildlife Coordination Act Report and agrees that the measures to avoid, minimize, and mitigate impacts to fish and wildlife resources from implementation of the Preferred Alternative to construct Chimney Hollow Reservoir, with prepositioning, adequately addresses identified effects.

Approved: Susan Linner Date: March 9, 2012

Susan Linner, Field Supervisor, Colorado Field Office, U.S. Fish and Wildlife Service, Intermountain Region

Fish and Wildlife Coordination Act Report

Windy Gap Firming Project

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WINDY GAP FIRMING PROJECT

FISH AND WILDLIFE COORDINATION ACT REPORT

1.0 EXECUTIVE SUMMARY

This Fish and Wildlife Coordination Act (FWCA) report was prepared for, and accepted by, the U.S. Fish and Wildlife Service (Service) to document an analysis of the potential consequences to fish and wildlife resources of actions by the U.S. Department of the Interior, Bureau of Reclamation (Reclamation) associated with the Windy Gap Firming Project (WGFP). The WGFP is a proposed water supply project that would provide more reliable water deliveries to Front Range and West Slope communities and industries. The Municipal Subdistrict, Northern Colorado Water Conservancy District acting by and through the Windy Gap Firming Project Water Activity Enterprise (Subdistrict), on behalf of WGFP Participants, is seeking approval from the U.S. Bureau of Reclamation (Reclamation) for additional physical connections to Colorado-Big Thompson (C-BT) Project facilities in order to implement the proposed project. Reclamation's decision on the WGFP is a major federal action requiring preparation of an Environmental Impact Statement (EIS). A Final EIS was released to the public in November 2011.

The FWCA Report was prepared in accordance with the FWCA (16 USC 661-666c), which recognizes the need to minimize the loss or damage to wildlife resources associated with the impoundment, diversion, or control of waters, as well as providing for the development and improvement of fish and wildlife resources in connection with water development. The scope of this report is to discuss the potential effects to aquatic and wildlife resources and associated habitat from implementation of the WGFP along with measures to avoid, minimize, or mitigate those impacts.

The purpose and need statement for the WGFP as described in Chapter 1 of the Final EIS (Reclamation 2011a) is to "deliver a firm annual yield of about 30,000 acre-feet of water from the existing Windy Gap Project to meet a portion of the water deliveries anticipated from the original Windy Gap Project and to provide up to 3,000 acre-feet of storage to firm water deliveries for the Middle Park Water Conservancy District. Firm water deliveries from the Windy Gap Project are needed to meet a portion of the existing and future demands of the Project Participants."

Following extensive screening of more than 170 different alternatives using National Environmental Policy Act (NEPA) criteria and Clean Water Act Section 404(b)(1) guidelines, in cooperation with the Corps, five alternatives were included for evaluation in the EIS. The No Action Alternative and four action alternatives are described below.

- **Alternative 1 (No Action):** Project Participants would maximize delivery of Windy Gap water within the capacity of existing facilities under the existing contractual arrangement between Reclamation and the Subdistrict without any new Reclamation action or new C-BT connections. In addition, the City of Longmont would evaluate the enlargement of Ralph Price Reservoir for storage of its Windy Gap water.

- **Alternative 2 (Proposed Action):** Chimney Hollow Reservoir (90,000 acre-feet (AF)) with prepositioning (allowing storage of C-BT water in Chimney Hollow Reservoir). Alternative 2 was selected by Reclamation as the Preferred Alternative in the Final EIS.
- **Alternative 3:** Chimney Hollow Reservoir (70,000 AF) and Jasper East Reservoir (20,000 AF).
- **Alternative 4:** Chimney Hollow Reservoir (70,000 AF) and Rockwell/Mueller Creek Reservoir (20,000 AF).
- **Alternative 5:** Dry Creek Reservoir (60,000 AF) and Rockwell/Mueller Creek Reservoir (30,000 AF).

Using information prepared as part of the Final EIS, this report describes the effects of these alternatives on aquatic and wildlife resources. Aquatic resources would be affected by changes in streamflow, channel morphology, storage patterns in reservoirs, water quality, water temperature, and riparian vegetation. Wildlife habitat and wildlife species would incur temporary or permanent effects due to construction activities, permanent structures, reservoir inundation, storage patterns in reservoirs, or alteration of wildlife habitat along streams potentially affected by altered flow regimes. Effects were evaluated compared to a Future Without Project scenario, in which the No Action Alternative (Alternative 1) would be implemented in place of the action alternatives (Alternatives 2 through 5). The direct, indirect, and cumulative effects evaluations in the Final EIS were used as the basis for evaluation in the FWCA report.

Reclamation and the Subdistrict developed a variety of mitigation measures to address the identified impacts associated with implementation of the Preferred Alternative, which are described in the Final EIS. A component of the mitigation and environmental commitments described in the Final EIS is the Fish and Wildlife Mitigation Plan (FWMP) that was developed by the Subdistrict in close collaboration with the Colorado Division of Parks and Wildlife (CPW; formerly Colorado Division of Wildlife-CDOW) in accordance with the requirements of Colorado Revised Statutes (CRS) 37-60-122.2. The Colorado Wildlife Commission adopted the FWMP on June 9, 2011 and the Colorado Water Conservation Board (CWCB) adopted it on July 13, 2011 (CPW 2011). On October 6, 2011, Reclamation was notified by the Governor of the State of Colorado that the FWMP comprehensively addresses impacts to Colorado's fish and wildlife resource and is the official position of the State with regard to mitigation of impacts from the WGFP. Key provisions of fish and wildlife mitigation include:

- Curtailment of WGFP diversions after July 15 when temperature in the Colorado River below Windy Gap Reservoir and above the Williams Fork exceeds the chronic or acute temperature standard.
- Flushing flows from the original Windy Gap Project (1980 Memorandum of Understanding (MOU)) would be modified to increase from 450 to 600 cubic feet per second (cfs). In any year when flows below Windy Gap have not exceeded 600 cfs for at least 50 consecutive hours in the previous two years, and total Subdistrict water supplies in Chimney Hollow and Granby reservoirs exceed

60,000 AF on April 1, the Subdistrict would cease all Windy Gap pumping for at least 50 consecutive hours to enhance peak flows below Windy Gap.

- The originally proposed prepositioning of C-BT water to Chimney Hollow Reservoir was modified to maintain higher water levels (>8,250 feet in elevation) in Granby Reservoir.
- To offset nutrient loading to Granby Reservoir, Shadow Mountain Reservoir, and Grand Lake (Three Lakes), the Subdistrict would implement point and nonpoint source nutrient mitigation measures upstream of Windy Gap Reservoir. This would serve to improve water quality in portions of Willow Creek, the Fraser River, and Colorado River year-round and offset nutrient loading to the Three Lakes from WGFP pumping.
- The Subdistrict would participate in the Upper Colorado River Recovery Program and pay a fee to address depletions that would impact Colorado River endangered fish species.
- The Subdistrict would commit to continued participation and funding of the ongoing Nutrient Studies, with participation and collaboration by Reclamation, Northern Water, and Grand County, to better understand water quality issues in the Three Lakes system and provide guidance for future management decisions.
- All permanent wetland impacts would be replaced by purchasing wetland bank credits.
- Per an agreement with Larimer County Parks and Open Lands, Chimney Hollow Reservoir would be managed as open space. A plan for habitat restoration, enhancement, and wildlife management would be developed with Larimer County and CPW.
- A variety of best management practices would be implemented during and following construction to reduce erosion, protect water quality, suppress dust and noise, revegetate disturbed areas, and protect or avoid important wildlife habitat.

The Subdistrict has and will continue to work in collaboration with federal, state, and local agencies, as well as stakeholders (including the Service) in the implementation of mitigation measures. The Service concurs with the mitigation measures and environmental commitments included in the Final EIS and the FWMP, and as described in Section 11 of this FWCA Report.

2.0 INTRODUCTION

The Bureau of Reclamation (Reclamation) received a proposal from the Municipal Subdistrict, Northern Colorado Water Conservancy District, acting by and through the Windy Gap Firming Project Water Activity Enterprise (Subdistrict) on behalf of 13 East Slope Windy Gap Project Participants to improve the reliability of the water supplies and deliveries (firm yield) from the existing Windy Gap Project. The Subdistrict proposes to improve the firm yield water supply by constructing the Windy Gap Firming Project (WGFP). The proposal includes a connection of WGFP facilities to the Colorado-Big Thompson Project. Reclamation's decision on the WGFP is a major federal action that requires preparation of an

Environmental Impact Statement. The Draft EIS was released for public review and comment in August 2008 (Reclamation 2008) and the Final EIS was released in November 2011. This report was prepared to address the potential environmental effects on fish and wildlife resources in compliance with the FWCA.

2.1. Purpose, Scope, and Authority

The purpose and need statement for the WGFP as described in Chapter 1 of the Final EIS (Reclamation 2011a) is to "deliver a firm annual yield of about 30,000 acre-feet of water from the existing Windy Gap Project to meet a portion of the water deliveries anticipated from the original Windy Gap Project and to provide up to 3,000 acre-feet of storage to firm water deliveries for the Middle Park Water Conservancy District. Firm water deliveries from the Windy Gap Project are needed to meet a portion of the existing and future demands of the Project Participants."

Reclamation and the Service determined the need for preparation of a FWCA report. The scope of this report is to discuss the potential effects to aquatic and wildlife resources and associated habitat from implementation of the WGFP along with measures to minimize or mitigate those impacts. This report was prepared under the authority of and in accordance with the FWCA (48 Stat. 401, as amended; 16 USC 661-667e), the Endangered Species Act of 1973 as amended (16 USC 1531 et seq.), National Environmental Policy Act of 1969 (NEPA), as amended (42 USC 4321 et seq.), Federal Water Pollution Control Act ("Clean Water Act") (CWA), as amended, (33 USC 1251 et seq.), and the Migratory Bird Treaty Act of 1918 (MBTA), as amended, (16 USC 703 et seq.). This report constitutes the report of the Secretary of the Interior as required by Section 2(b) of the FWCA.

2.2. Acknowledgement of Input, Coordination, and Concurrence with the Colorado Division of Parks and Wildlife

Reclamation consulted with the CPW over the course of NEPA compliance for the WGFP. CPW was given an opportunity to review and comment on wildlife and aquatic resource technical reports and the Draft EIS. CPW comments were used in preparation of the Final EIS and were incorporated into this FWCA Report. In addition, on June 9, 2011, the Colorado Wildlife Commission approved the FWMP prepared by the Municipal Subdistrict: Northern Water Conservancy District (Municipal Subdistrict 2011a). The Colorado Water Conservation Board (CWCB) adopted it on July 13, 2011 (CPW 2011). On October 6, 2011, Reclamation was notified by the Governor of the State of Colorado that the FWMP comprehensively addresses impacts to Colorado's fish and wildlife resource and is the official position of the State with regard to mitigation of impacts from the WGFP. The FWMP was developed to satisfy the requirements of CRS 37-60-122.2 and the mitigation commitments in the FWMP are incorporated into this report. The FWMP is included as Appendix A.

2.3. Relevant Prior Studies and Reports

Reclamation released several technical reports prepared as supporting documentation for the Draft EIS. The Windy Gap Firming Project: Purpose and Need Report (ERO Resources Corporation (ERO) and Harvey Economics 2005) described the purpose of the proposed WGFP and the anticipated water demands for Project Participants. A projected water supply shortage of about 110,000 AF was estimated by 2050 for the 13 WGFP Participants. As discussed further in Section 7.0, Reclamation prepared a Windy Gap Firming Project:

Alternatives Report (ERO 2005) to identify a reasonable range of alternatives to meet the project purpose and need.

Several resource technical reports were prepared relevant to identifying potential impacts to fish and wildlife species. These reports include:

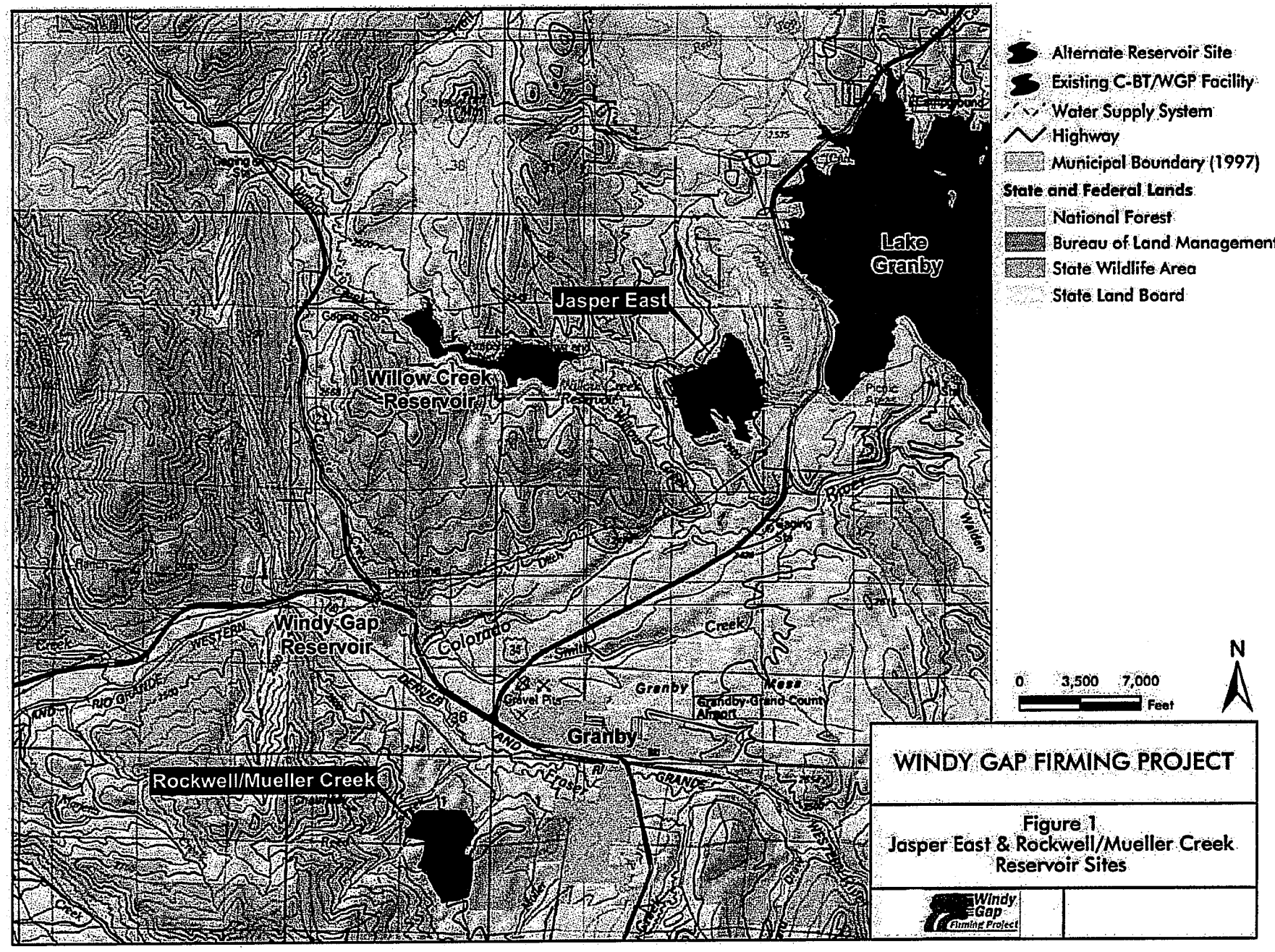
- Windy Gap Firming Project Water Resources Technical Report. 2007. Prepared by ERO and Boyle Engineering.
- Windy Gap Firming Project Stream Water Quality Technical Report. 2008. Prepared by ERO and AMEC Earth and Environmental.
- Windy Gap Firming Project Stream Water Quality Modeling Report. 2008. Prepared by ERO and AMEC Earth and Environmental.
- Windy Gap Firming Project Lake and Reservoir Water Quality Model Report. 2008. Prepared by AMEC Earth and Environmental.
- Windy Gap Firming Project Three Lakes Water Quality Model Documentation. 2008. Prepared by AMEC Earth and Environmental.
- Windy Gap Firming Project Wildlife Resources Technical Report. 2007. Prepared by ERO.
- Windy Gap Firming Project Aquatic Resource Technical Report. 2010. Prepared by Miller Ecological Consultants.
- Windy Gap Firming Project Aquatic Resource Memo. 2011. Prepared by Miller Ecological Consultants.
- Windy Gap Firming Project Vegetation Resources Technical Report. 2007. Prepared by ERO.
- Upper Colorado Dynamic Temperature Modeling Report. 2011. Prepared by Hydros Consulting.

3.0 DESCRIPTION OF THE STUDY AREA

The WGFP includes alternatives with potential effects on both the east and west sides of the Continental Divide. The West Slope study area includes areas where changes in streamflow, lake level, or water quality may occur, including Granby Reservoir and the Colorado River below Granby Reservoir. Shadow Mountain Reservoir and Grand Lake are included in the study area because of water quality effects, but there would be no change in lake levels. Willow Creek below Willow Creek Reservoir is also included in the study area because of changes in Willow Creek Feeder Canal diversions. Potential new reservoir sites at Jasper East and Rockwell/Mueller Creek are located in the West Slope study area (Figure 1).

The East Slope study area includes areas with projected hydrologic changes, including the Big Thompson River below Lake Estes, North St. Vrain Creek, St. Vrain Creek, Big Dry Creek, and Coal Creek. Carter Lake and Horsetooth Reservoir are included in the study area because there would be a change in reservoir levels. Chimney Hollow and Dry Creek Reservoirs would be located in the East Slope study area (Figure 2) along with the existing Ralph Price Reservoir, a component of the No Action Alternative (Figure 3).

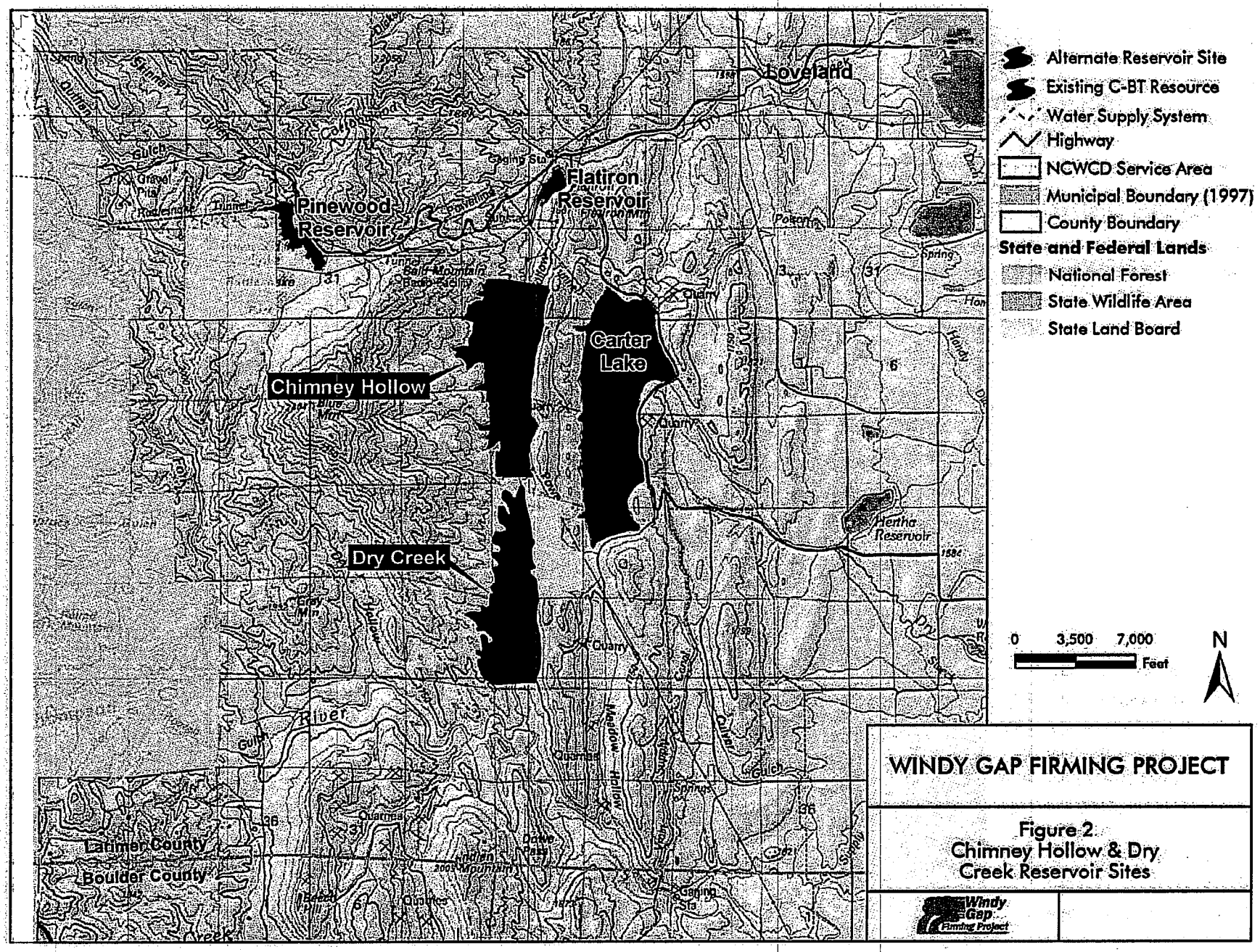
The following provides a description of the various study area locations.



WINDY GAP FIRMING PROJECT

Figure 1
Jasper East & Rockwell/Mueller Creek Reservoir Sites

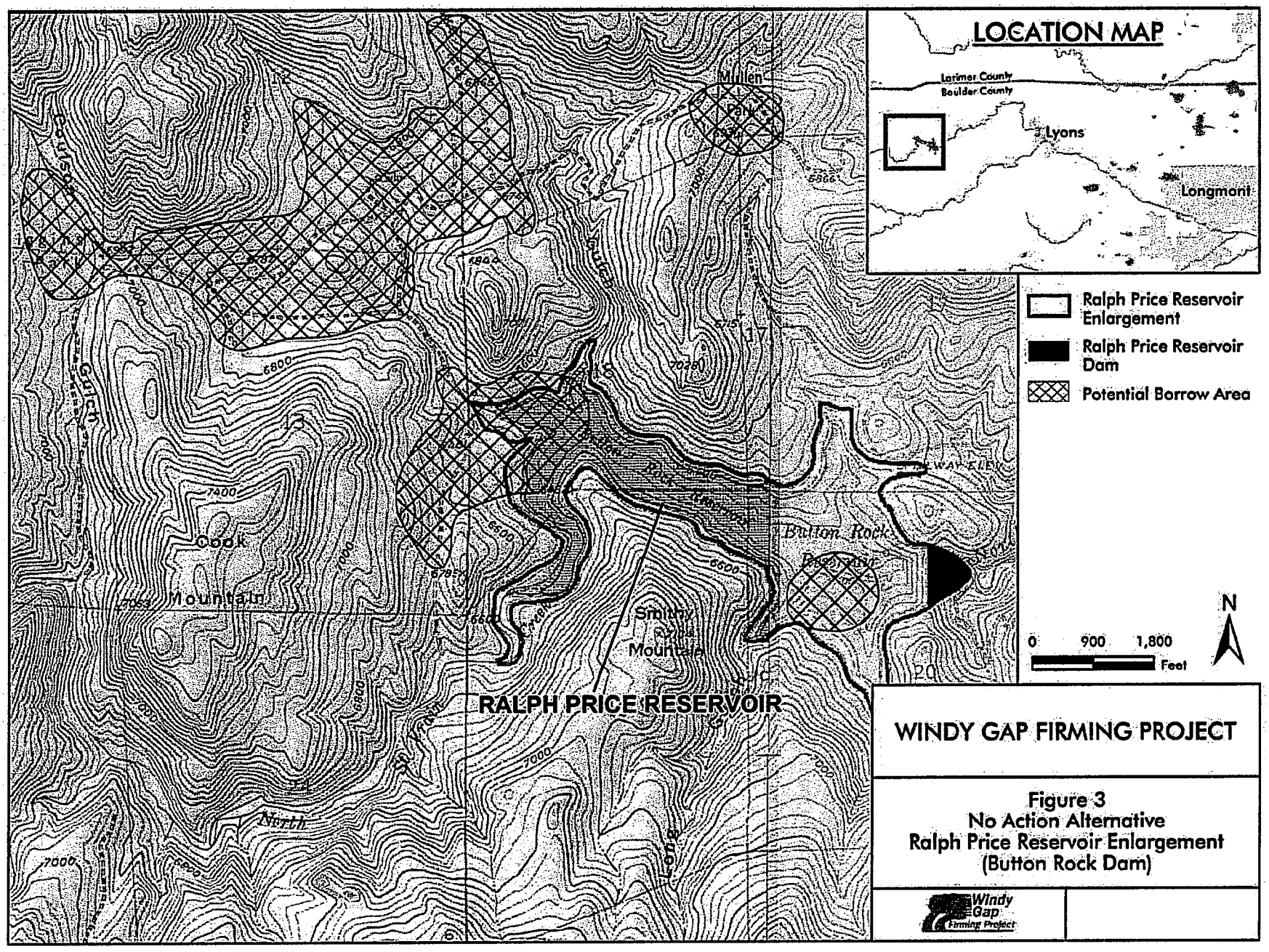
Windy Gap Firming Project



WINDY GAP FIRMING PROJECT

Figure 2
Chimney Hollow & Dry Creek Reservoir Sites

Windy Gap Firming Project


LOCATION MAP
Larimer County
Boulder County
Lyons
Longmont
Ralph Price Reservoir Enlargement
Ralph Price Reservoir Dam
Potential Borrow Area
RALPH PRICE RESERVOIR
Button Rock Reservoir
Cook Mountain
Smiley Mountain
North
Mullen Park
Coulson Gulch
0 900 1,800
Feet
N
WINDY GAP FIRMING PROJECT
Figure 3
No Action Alternative
Ralph Price Reservoir Enlargement
(Button Rock Dam)
Windy Gap Firming Project

3.1. West Slope Study Area

3.1.1. Colorado River

The Colorado River study area begins below Granby Reservoir through the Gore Canyon below the confluence with the Blue River. Flow in the Colorado River experience wide seasonal fluctuations with the largest flows resulting from snowmelt in the spring in early summer. Streamflow in the Colorado River within the study area is influenced by operation of Granby Reservoir completed in 1951 and the Colorado-Big Thompson Project. Other operations that affect Colorado River streamflow include the Denver Moffat Collection System Project on the Fraser River, the Grand Ditch Diversion, irrigation and municipal stream diversion, and other water rights in the basin. The existing Windy Gap Reservoir, diversions, and bypass flow requirements also influence Colorado River flows.

3.1.2. Willow Creek

Willow Creek is a tributary to the Colorado River regulated by releases from Willow Creek Reservoir, a component of the C-BT Project and irrigation diversions. The NCWCD currently maintains bypass flows of 7 cfs below the reservoir throughout the year.

3.1.3. Granby Reservoir

Granby Reservoir is a 7,300-acre reservoir constructed as a feature of the C-BT Project. It is the second largest reservoir in Colorado. Granby Reservoir stores C-BT and Windy Gap water prior to pumping and delivery through Shadow Mountain Reservoir to Grand Lake and the Adams Tunnel to the East Slope.

3.1.4. Shadow Mountain Reservoir

Shadow Mountain Reservoir serves to maintain a constant water surface elevation in Grand Lake and is a conduit for flow between Granby Reservoir and Grand Lake. The North Fork of the Colorado River is the major tributary flowing into the reservoir. Water levels fluctuate less 1 foot.

3.1.5. Grand Lake

Grand Lake is the largest natural lake in Colorado with several tributaries from Rocky Mountain National Park. Grand Lake also receives water from Shadow Mountain Reservoir. The majority of the lake's outflow is via the Adams Tunnel. The water surface elevation fluctuates less than 1 foot as part of C-BT operations.

3.1.6. Jasper East Reservoir Study Area

The Jasper East Reservoir site is located in Grand County at elevations ranging from about 8,100 to 8,200 feet (Figure 1). The Jasper East study area consists mainly of flood-irrigated meadows bordered by areas of sagebrush shrublands and stands of lodgepole pine at higher elevations. An intermittent unnamed tributary to Church Creek flows from east to west through the Jasper East study area. Natural flows in the tributary are supplemented by irrigation return flow and seepage from the Willow Creek Pump Canal and forebay. The property is currently used for livestock grazing and hay production.

3.1.7. Rockwell/Mueller Creek Reservoir Study Area

The Rockwell/Mueller Creek study area encompasses two ephemeral drainages Rockwell Creek and Mueller Creek, which are tributary to the Fraser River (Figure 1). Elevations in the study area range from about 8,000 to 8,200 feet. The Rockwell/Mueller Creek study area consists mainly of big sagebrush shrublands, with areas of lodgepole pine forest, meadow, and wetland and riparian areas.

3.2. East Slope Study Area

3.2.1. Big Thompson River

Windy Gap deliveries through the CB-T system are delivered to Lake Estes, so the project area includes the Big Thompson River below Lake Estes to the confluence with the South Platte River. Big Thompson River flows are influenced by CB-T diversion via the Olympus Tunnel and Dille Tunnel for power generation and deliveries to Carter Lake and Horsetooth Reservoir. WWTP discharges from some of the WGFP Participants also affect BTR flows and water quality.

3.2.2. North St. Vrain Creek

North St. Vrain Creek is a perennial stream with headwaters along the Continental Divide. North St. Vrain Creek below Ralph Price Reservoir is included in the study area because of potential changes in flow under the No Action Alternative. Streamflow typically peaks in June from snowmelt runoff. Releases from Ralph Price Reservoir and diversions by the City of Longmont affect flows.

3.2.3. St. Vrain Creek

St. Vrain Creek below the confluence with North St. Vrain Creek to Lyons is included in the study area because of potential changes in flow in the No Action Alternative. St. Vrain Creek downstream from the St. Vrain Feeder Canal in Lyons to the South Platte River is included in the study area for all alternatives because of the additional discharges from Participant WWTP with the WGFP.

3.2.4. Big Dry Creek

Big Dry Creek is a small perennial stream beginning in the foothills west of Rocky Flats to its confluence with the South Platte River. Big Dry below the Broomfield WWTP is included in the study area.

3.2.5. Coal Creek

Coal Creek is a small perennial stream tributary to Boulder Creek. It is included in the study area because of WWTP discharges from WGFP Participants in Superior, Louisville, Lafayette, and Louisville.

3.2.6. Cache la Poudre River

The Cache la Poudre River is included in the study area below the City of Greeley's WWTP to the confluence with the South Platte River. Streamflow in the Cache la Poudre is influenced by reservoir storage, municipal, industrial, and irrigation diversions and return flows.

3.2.7. Carter Lake

Carter Lake is a 1,100-acre existing reservoir constructed by Reclamation as a component of the C-BT Project. West Slope water deliveries to Carter Lake are distributed for use to various Front Range cities, water districts, and agricultural water users. Larimer County leases the Carter Lake from Reclamation for recreation activities.

3.2.8. Horsetooth Reservoir

Horsetooth Reservoir is a component of the C-BT Project and used to deliver water to northern Colorado water users. The 2,100-acre reservoir supports a variety of recreation uses managed by Larimer County.

3.2.9. Ralph Price Reservoir Study Area

Ralph Price Reservoir (Button Rock Dam) is located on North St. Vrain Creek, west of the town of Lyons in Boulder County (Figure 3) at an elevation of about 6,500 feet. Currently, the 227-acre reservoir has a storage capacity of about 16,000 AF. The study area consists mostly of a mixture of ponderosa pine and Douglas fir forest. North St. Vrain Creek, which flows into the reservoir from the west, is the primary source of water to the reservoir. Other small drainages, including Rattlesnake Gulch from the north and Long Gulch from the south, flow into the reservoir.

3.2.10. Chimney Hollow Reservoir Study Area

The Chimney Hollow study area occurs in a long north-south trending valley between a hogback ridge to the east and foothills to the west (Figure 2). Average elevation at the Chimney Hollow study area is about 5,700 feet. Chimney Hollow is a small intermittent creek that flows through the center of the valley. Several ephemeral to intermittent tributaries drain from the west into the Chimney Hollow Creek. Chimney Hollow flows into Flatiron Reservoir, a component of the C-BT Project. Ponderosa pine forests cover the foothills to the west with mostly native grasslands occurring in openings within the forest. Native and nonnative grasslands cover the valley floor with riparian woodlands and shrublands occurring along the drainages. Native shrublands cover the slopes on the rocky hogback to the east.

3.2.11. Dry Creek Reservoir Study Area

The Dry Creek study area is located in the valley south of the Chimney Hollow Reservoir site separated by a gentle saddle (Figure 2). Dry Creek, a tributary to the Little Thompson River, flows south through the center of the valley. Several small, intermittent or ephemeral tributaries from the foothills to the west and the hogback to the east flow into Dry Creek. The forests, shrublands, and grassland vegetation in the Dry Creek study area are similar to the Chimney Hollow study area.

4.0 FISH AND WILDLIFE CONCERNS AND PLANNING OBJECTIVES

4.1. Aquatic Resource Concerns

The Service is concerned about changes in streamflow, stream channel morphology, and chemical and physical water quality parameters that affect habitat supporting fish, invertebrates, and aquatic life in impacted streams and reservoirs. New reservoirs that provide an opportunity for creating habitat for aquatic life are also of interest to the Service.

4.2. Wildlife Resource Concerns

Project actions that result in a direct or indirect impact to terrestrial wildlife populations or habitat are of concern to the Service. The loss of wetlands, fens, riparian vegetation, and native vegetation communities that support wildlife are a concern. The Service is concerned about actions that fragment wildlife habitat or impact wildlife movement.

4.3. Threatened and Endangered Species Concerns

Project actions, such as diversion of additional water from the Colorado River are of concern to the Service because of the adverse impact to Colorado River endangered fish. The Service is also concerned with any actions that would decrease streamflow in the South Platte River and potentially impact threatened and endangered species downstream in the Platte River. The Service is also concerned with actions that might affect habitat for terrestrial threatened or endangered species.

4.4. Planning Objectives

The Service's planning objectives for the proposed project include working with Reclamation:

- To operate within state water quality standards for the Colorado River, Willow Creek River, Granby Reservoir, Shadow Mountain Reservoir, and Grand Lake Reservoir on the West Slope.
- To operate within state water quality standards for the Big Thompson River, St. Vrain Creek, Cache la Poudre River, Coal Creek, Big Dry Creek, Carter Lake, and Horsetooth Reservoir on the East Slope.
- To operate Chimney Hollow within state water quality standards and conditions favorable for potentially establishing a fishery and habitat for other aquatic life.
- To develop environmental commitments and an operational plan for the Preferred Alternative that minimizes impacts, compensates for unavoidable impacts, and, where possible, enhances fish and wildlife resources.
- To implement mitigation measures using adaptive management and effectiveness monitoring to ensure that ineffective strategies are changed as climatic, or other, parameters change.

5.0 EVALUATION METHODS

5.1. Hydrologic Modeling

A water allocation computer model was used to analyze the WGFP alternatives and to estimate the amount of water that could reliably be delivered to Project Participants. Two models were used: the Boyle Engineering Stream Simulations Model (BESTSM) and the Upper Colorado Water Resources Planning Model from the Colorado Decision Support System (CDSS Model). These models were used to estimate streamflow in the Colorado River, Willow Creek and Big Thompson River below Lake Estes. In addition, the models were used to estimate reservoir volumes in Granby Reservoir, Carter Lake and Horsetooth Reservoir. The model study period was the 47-year period from 1950 through 1996.

Hydrologic model output was generated for existing conditions and with the WGFP alternatives superimposed on both existing conditions and future conditions with reasonably foreseeable actions in place.

A separate analysis was used to estimate changes in streamflow for East Slope streams expected to experience a change in flow or water quality. Projected flow changes were calculated based on estimated changes in WWTP discharges and return flows below WGFP Participant discharge points.

5.2. Water Quality Modeling

The simulation of water quality effects in the Colorado River was conducted using the QUAL2K numerical model (Chapra et al. 2006). The model was used to predict conductivity, and concentrations of dissolved oxygen (DO), nutrients, pH, and selenium. A dynamic temperature model was developed subsequent to release of the Draft EIS to provide better estimates on changes in Colorado River stream temperature below Windy Gap Reservoir as a result of alternative actions (Hydros 2011). Effects to water quality in Willow Creek were estimated using a USGS temperature model (SSTEMP) and a mass balance analysis of ammonia, copper, and iron (parameters of concern). A mass balance calculation also was conducted for East Slope streams expected to experience a change in flow and/or water quality.

The method used for the prediction of water quality for Grand Lake, Shadow Mountain reservoir, and Granby Reservoir was based on the Three Lakes Water Quality Model (Hydrosphere 2003). This dynamic process-based model was used to predict water quality based on changes in hydrologic conditions and water quality input variables. Three Lakes Model output predicted total phosphorus, total nitrogen, chlorophyll a, Secchi-disk depth, trophic state, and total suspended solids. The LAKE2K Model (Chapra and Marin 2004) was used to simulate lake temperature in Granby Reservoir.

Carter Lake, Horsetooth Reservoir, Ralph Price reservoir and the potential four new reservoirs were evaluated using a Corps of Engineers BATHTUB Water Quality Model (Corps 2008). Model output included nutrients, chlorophyll a, Secchi-disk depth, hypolimnetic oxygen demand, metalimnetic oxygen demand, and trophic status.

5.3. Aquatic Resources

The assessment of effects to fish habitat along the Colorado River and Willow Creek was conducting using the River2D Model. Fish habitat was assessed using Physical Habitat Simulation (PHABSIM). This approach follows the concepts of the Instream Flow Incremental Methodology (IFIM) (Bovee 1982; Bovee et al. 1998). Two study areas were selected on the Colorado River below Windy Gap Reservoir and above and below the confluence with Williams Fork in consultation with the CPW. The analysis focused on juvenile and adult life stages of rainbow trout and brown trout. Hydrologic conditions at seven locations from Windy Gap downstream to the Kremmling Gage below the Blue River confluence were combined with the habitat data to determine changes in fish habitat for the alternative actions. Daily flows for average, dry, and wet year flow conditions were modeled under each of the alternatives. Potential effects to fish habitat in East Slope streams and reservoirs were qualitatively assessed based on hydrologic changes. Information from water quality modeling also was used to evaluate potential effects to aquatic life on both the East and West Slopes.

5.4. Wildlife Resources

Potential effects on wildlife resources were assessed for each of the alternatives using information on known populations or suitable habitat for migratory birds and raptors, state threatened, endangered, or species of concern, Colorado Natural Heritage Program species of concern, and large game and other wildlife. The acres of lost habitat from construction of dams, roads and other facilities, along with the area inundated by a new reservoir were quantified. The potential for habitat fragmentation or disruption in movement patterns also was assessed with input from the CPW.

6.0 FISH AND WILDLIFE RESOURCES EXISTING CONDITIONS

6.1. Vegetation Resources

6.1.1. Ralph Price Reservoir

Lands bordering the existing Ralph Price Reservoir support upland native forest dominated by ponderosa pine with Douglas fir most common on north-facing slopes. Small areas of upland native grasslands and upland shrubland are interspersed around the reservoir shoreline. Suitable habitats for several imperiled or vulnerable CNHP plant species is present, but no known populations have been located. Small areas of wetlands are present adjacent to the reservoir shore in a few scattered locations and along the North St. Vrain Creek at the reservoir inlet.

6.1.2. Chimney Hollow and Dry Creek Reservoirs

The Chimney Hollow and Dry Creek Reservoir sites are located in adjacent small watersheds between a hogback ridge and the foothills. At an elevation of about 5,500 feet, both reservoir sites support similar vegetation cover types. Upland native forests of ponderosa pine are found on the west side of the reservoir sites. Mesic native woodlands of plains cottonwood, peachleaf willow are common along the two drainages. Native shrublands support mountain mahogany, skunkbush, chokecherry, and wild plum. Native grasslands on valley side slopes are composed of blue grama, sideoats grama, needleandthread grass, western wheatgrass, and big bluestem. Mixed grasslands with native and nonnative species are found in valley bottoms. Common weeds include cheatgrass, musk thistle, and kochia.

Both reservoir sites contain scattered pockets of vegetation communities classified as vulnerable or imperiled by the CNHP. Ponderosa pine/mountain mahogany/big bluestem and skunkbush riparian communities are present at both reservoir sites. Mountain mahogany/New Mexico needlegrass and narrowleaf cottonwood/chokecherry riparian communities are found at Chimney Hollow. Suitable habitat for 12 CNHP tracked plant species is present at both reservoir sites, but none were discovered during field surveys.

Wetlands at Chimney Hollow are present in narrow bands along the Chimney Hollow drainage as well as several small tributaries. These wetlands support sandbar willow, redtop, Nebraska sedge, and cattails. Wetlands in Dry Creek are primarily found along the principal drainage with a few on ephemeral tributary drainages and seeps. Species composition is similar to the wetlands at Chimney Hollow.

6.1.3. Jasper East and Rockwell/Mueller Creek Reservoirs

Lodgepole pine forests are found in scattered locations at Jasper East and on the west side of the Rockwell Reservoir site. Native shrublands at both sites are primarily composed of sagebrush with snakeweed, bitterbrush, snowberry, and shrubby cinquefoil. Grasslands support mountain brome, smooth brome, and slender wheat grass. The Jasper Reservoir site contains irrigated hay meadows with mesic mixed grasses such as timothy, smooth brome, Kentucky blue grass, and clover.

Suitable habitat for nine CNHP plant species is present at the two reservoir sites. Middle Park penstemon was the only CNHP species found during field surveys at Jasper East. Access for field surveys at Rockwell was denied by landowners.

Wetlands at Jasper East occur along several ephemeral drainages and within irrigated meadows. Wetlands support planeleaf willow, beaked sedge, small-winged sedge, water sedge, and tufted hairgrass. Wetlands in irrigated meadows appear to be supported primarily by irrigation and leaking ditches. Wetlands at Rockwell based on aerial photography and National Wetland Inventory mapping occur primarily along the two principal drainages and are likely to have a composition similar to Jasper East.

6.1.4. Colorado River and Willow Creek

Riparian vegetation along the Colorado River and Willow Creek in the project area is influenced by stream channel morphology, topography, ground water, streamflow and irrigation of agricultural lands. Riparian vegetation along the Colorado River includes stands of narrow-leaf cottonwoods, willows, sedges, and grasses. Riparian habitat along Willow Creek supports similar species along with irrigated wet meadows dominated by meadow foxtail, timothy, and redtop.

6.1.5. East Slope Streams

Riparian habitat is present along most of the streams on the East Slope within the project area. North St. Vrain Creek is primarily bordered by upland forestland with scattered banks of willow, alder, cottonwood, and chokecherry. Cottonwoods are the dominant overstory species along St. Vrain Creek from Lyons downstream. The Big Thompson River below Lake Estes supports bands of blue spruce, cottonwood, willows, alder, hawthorn, with cottonwood more dominant at lower elevations. Coal Creek and Big Dry Creek support willows, cottonwoods, and mixed shrubs.

6.2. Aquatic Resources

6.2.1. Colorado River

The Colorado River between Windy Gap Reservoir and Kremmling, Colorado is managed by CPW as a sport fishery for brown trout and rainbow trout. Special regulations include a two-fish bag and possession limit from Granby Dam downstream to the lower boundary of Byers Canyon, and from the Troublesome Creek confluence downstream to Rifle, Colorado. The section between the lower boundary of Byers Canyon and the Troublesome Creek confluence is a catch and release Gold Medal designated fishing with artificial flies and lures only. This designation is limited to "waters of the State accessible for fishing to the general angling public." Only public waters are designated as Gold Medal; private waters are excluded by the above requirement.

A 2002 CPW fish survey in the Colorado River from Windy Gap Reservoir downstream to Kremmling indicated that brown trout and rainbow trout, both introduced species, were two of the dominant fish species at each sampling location (Ewert 2011). Recent surveys of fish populations in the Colorado River downstream of Windy Gap show that abundance of fish greater than 6 inches long has ranged from a high of 11,255 fish/mile in 2003 to a low of 3,441 fish/mile in 2010, with an average of 7,740 fish/mile over the 8-year period (Ewert 2011). Rainbow trout comprised approximately 2 percent of the total population in 2010. It is undetermined why the highest numbers were collected after one of the driest hydrologic years on record and the lower numbers were collected recently. The conditions for survival may have been better in 2001 and 2002 with lower peak flows. Nehring and Anderson (1993) found a strong correlation between year class strength and peak flows. While species composition and streamflow has changed substantially from presettlement conditions, the trout populations in the Colorado River are very high and comparable to the best fisheries in the state (Brauch 2011; Bakich 2011).

In the Colorado River between Parshall and Sunset from 2001 to 2007, two nonnative sucker species, the white sucker and longnose sucker, also were consistently reported throughout this reach. One nonnative minnow, the longnose dace, was found throughout the reach, while other small fish occasionally collected included the nonnative Johnny darter, nonnative creek chub, and native mottled sculpin. Prior to European settlement, Colorado River cutthroat trout was the only native trout species in the Colorado River. The existing habitat conditions are generally favorable for all fish species collected.

Quantitative macroinvertebrate (aquatic insects) sampling was conducted at two sites (Lone Buck and Breeze) on the Colorado River to characterize the composition and health of the benthic community. Ecological parameters such as diversity, evenness, biotic indices, taxa richness, biomass, and functional feeding groups were used to evaluate the existing condition of macroinvertebrate populations. The results of these evaluations indicated that aquatic conditions were excellent at both study areas, with the best metric values occurring at the Breeze site. More than 40 identifiable taxa were collected at each site with more than half of the taxa represented by species that are sensitive to disturbance (Plafkin et al. 1989). Sampling data indicated high biomass values at both sites, with the highest at the Lone Buck site. The Breeze site had the highest density values. Collector-gatherer functional feeding groups were most common at both sites, as is typical of most western streams; however, other groups also were well represented at each location.

Aquatic invertebrates in the Colorado River near Windy Gap have a high diversity with numerous species present (Miller Ecological Consultants 2010; Rees 2009). The Colorado Department of Public Health and Environment (CDPHE) evaluates macroinvertebrate communities for impairment based on the Multi Metric Index (MMI). This index assesses biological condition on a scale of 0 to 100. For high-elevation coldwater streams, a MMI value of 50 or less indicates impairment (CDPHE 2010). Rees (2009) calculated MMI values of 92 and 89 for the macroinvertebrates upstream and downstream of Windy Gap Reservoir, respectively. Miller Ecological Consultants data (2010) for the Lone Buck and Breeze sites had MMI values of 100. Both of these samples indicate a healthy macroinvertebrate community. Although studies in 2004 (Miller Ecological Consultants 2010) found the *Pteronarcys* stonefly downstream of Windy Gap, surveys in 2009 (Rees) did not find *Pteronarcys* stoneflies upstream or downstream of Windy Gap. CPW also reported a

decrease in the abundance and distribution of both the stonefly *Pteronarcys* and mottled sculpin since Windy Gap Reservoir was constructed (Nehring et al. 2010).

6.2.2. Willow Creek

Fish population data were available for three locations on Willow Creek between Willow Creek Reservoir and the Colorado River (Miller 1997). Fish abundance was typical of small streams. Brown trout was the dominant species at all three locations with a relative abundance ranging from 63 to 97 percent. All life stages of brown trout were present and population estimates ranged from about 1,650 fish per acre to 2,670 fish per acre. The habitat conditions in Willow Creek support a reproducing brown trout population. Also present were longnose sucker, white sucker, Piute sculpin, and very few rainbow trout.

Macroinvertebrate sampling on Willow Creek was conducted at the same sites and time as fish collection (Miller 1997). Index values used to assess aquatic health indicated some stress to the macroinvertebrate communities; however, the high number of individuals and taxa collected, and the presence of several pollution intolerant species suggests that pollution was not the cause of stress. It is likely that the effects of the Willow Creek Reservoir dam (i.e., less temperature fluctuation and rapid changes in discharge), or local land use created the disturbance necessary to have a slight negative effect on the index values. Typically, streams below dams support larger, but less diverse, macroinvertebrate communities.

6.2.3. Rockwell/Muller Creeks and Unnamed Drainage at Jasper East Reservoir Site

CPW does not have fish data for Rockwell and Mueller creeks or the unnamed drainage at the Jasper East Reservoir site. No fish were observed in the unnamed Jasper East drainage during a site visit. Short-lived invertebrates, typical of intermittent streams were observed, but intermittent flows are unlikely to support a fishery. Access to Rockwell and Mueller Creeks was not available to assess fish presence, but conditions are likely similar to the drainage at Jasper East.

6.2.4. Grand Lake

Grand Lake provides recreational fishing for rainbow trout, brown trout, kokanee, and lake trout. Natural reproduction of lake trout is self-sustaining at a level to support a reasonable fishery. Lake trout were stocked on two occasions in the 1990s and additionally in 2004 and 2007 to investigate growth rates. No extensive stocking of lake trout is anticipated in the foreseeable future (Velarde, pers. comm. 2008). Populations of brown trout are at least partially maintained by natural reproduction in streams feeding into the lake. Other game fish populations are augmented through a stocking program conducted by CPW. Rainbow trout and kokanee are stocked annually, while lake trout are stocked semiannually. In a July 2001 survey, rainbow trout and kokanee were not collected, but brown trout and lake trout were well represented (CDOW 2001a unpublished). The only other species present in collections was the longnose sucker.

6.2.5. Shadow Mountain Reservoir

Shadow Mountain Reservoir is managed by the CPW as a recreational fishery that provides angling opportunities for rainbow trout, brown trout, cutthroat trout, kokanee, and lake trout. Natural reproduction for game fish is inadequate to support the existing level of

angling recreation; therefore, populations are augmented through a stocking program. Rainbow trout, brown trout, and kokanee are stocked annually, and cutthroat trout are stocked occasionally. Nonnative sucker species present are the longnose sucker and white sucker (CDOW 2001a unpublished). The white sucker was the dominant fish species collected in July 2001 (CDOW 2001a unpublished data).

6.2.6. Granby Reservoir

Granby Reservoir is a recreational fishery that provides angling opportunities for lake trout, kokanee, rainbow trout, and brown trout. Fish populations are maintained through natural reproduction and a strategic stocking program that provides angling opportunities while supporting a balanced fish community. Lake trout and brown trout are maintained through natural reproduction. Rainbow trout are capable of limited natural reproduction, but populations are augmented through frequent stocking. Kokanee exhibit little or no natural reproduction; therefore, populations are dependent on stocking. However, Granby Reservoir is a critical source for kokanee eggs used in the hatchery program for kokanee stocking. An unpublished CDOW fish survey (2004) indicated that nonnative, nongame fish (longnose sucker and white sucker) were the most abundant, representing more than 85 percent of the total (CDOW 2004 unpublished data).

Balance between lake trout populations and kokanee is dependent on the water surface elevation of Granby Reservoir. During periods of low reservoir levels, the two species are thermally separated because the kokanee are more tolerant of warmer surface water than lake trout. Young lake trout survival is lower at low reservoir levels, which ultimately results in fewer lake trout, but a better balance between fish populations. During periods of high reservoir elevations, survival of young lake trout is greater than survival at low reservoir levels and less thermal separation occurs between lake trout and kokanee. The conditions that exist during high water elevations result in an overabundance of lake trout, with greater accessibility to and predation on kokanee. This, in turn, results in fewer kokanee, which eventually has negative effects on lake trout numbers because there is not a sufficient prey base to support the lake trout. Through stocking management, and specific angling regulations, CPW strives to keep an appropriate balance between the predatory lake trout and the kokanee upon which lake trout prey.

6.2.7. Windy Gap Reservoir

Windy Gap Reservoir is a private reservoir that is not stocked or managed by CPW; however, fish stocked in the Fraser or Colorado rivers upstream of Windy Gap are expected to be found in the reservoir. A 2004 CPW fish survey at Windy Gap Reservoir indicated the presence of rainbow trout, brown trout, kokanee, longnose sucker, and white sucker. The white sucker was the dominant species comprising more than 85 percent of the captured fish (CDOW 2004 unpublished).

Whirling disease (WD), which has been shown to decrease the survival of juvenile trout, is found in most West and East Slope streams, including Windy Gap Reservoir. WD is caused by a parasite (*Myxobolus cerebralis*) with a complex life cycle that requires two aquatic host organisms (Nehring 2004). The earliest detection of *M. cerebralis* in the upper Colorado River basin occurred in 1988. Since that time, recruitment of wild rainbow trout has severely declined (Nehring et al. 2000). The two host organisms required for completion of

the *M. cerebralis* life cycle are aquatic tubificid worm (*Tubifex tubifex*) and a salmonid fish (trout). Spores released by one species of host organism infect the other host organism. The spore of *M. cerebralis* that is produced and released from *T. tubifex* worms is referred to as a triactinomyxon or TAM.

CPW identified Windy Gap Reservoir as some of the most suitable habitat (low-velocity water and silt or mud substrate) for *T. tubifex*, especially those lineages that are most susceptible to infection by *M. cerebralis* (Beauchamp et al. 2002). Therefore, Windy Gap Reservoir has historically been considered a major source for TAM production in this drainage (Nehring and Thompson 2003). However, CPW sampling in Windy Gap Reservoir in 2004 and 2005 indicated a dramatic decrease in the worm population structure in the lake in the last 5 to 6 years (Nehring, pers. comm. 2006). TAM production in Windy Gap Reservoir is now similar to that produced in the Fraser and Colorado rivers above the lake. Windy Gap is no longer considered a major source of TAM in the upper Colorado River.

6.2.8. Big Thompson River, North St. Vrain Creek, St. Vrain Creek, Big Dry Creek, and Coal Creek

East Slope streams in the study area contain both game and nongame species. Fish abundance varies by location, with cool water game species such as brown trout and rainbow trout found closer to the foothills. Warm water game and nongame species found farther east include smallmouth bass, walleye, black crappie, common carp, and a variety of minnow-type species.

Several of the warm water nongame species are state species of concern. These species are Iowa darter, plains topminnow, common shiner, brassy minnow, northern red-belly dace, stonecat, and Johnny darter. Although their presence varies by location, all of these species are present in the Big Thompson and St. Vrain drainages, Big Dry Creek, and Coal Creek.

6.2.9. Carter Lake and Horsetooth Reservoir

Carter Lake and Horsetooth Reservoir are managed by CPW for recreational fishing. Fish species present include walleye, smallmouth bass, wiper, and trout species. Salmonid populations within both lakes are managed by stocking. Warm water species, such as smallmouth bass populations are maintained by natural reproduction.

6.2.10. Ralph Price Reservoir

Ralph Price Reservoir is managed for fishing by CPW and is stocked with trout. Access is limited to walk-in recreation use with no fishing from a boat allowed.

6.2.11. Chimney Hollow and Dry Creek

Chimney Hollow is an intermittent stream that is often dry and does not support a fishery. Dry Creek is an intermittent drainage that is dry in the upper reaches, but the lower reach supports fathead minnows and invertebrates common to intermittent streams.

6.3. Wildlife Resources

6.3.1. State Endangered, Threatened, and Species of Concern

Several state listed endangered, threatened, and species of concern with potentially suitable habitat in the study area are listed in Table 1 and described below.

Table 1. State endangered, threatened, and species of concern potentially occurring in the study areas.

Common Name	State Status	Ralph Price	Chimney Hollow	Dry Creek	Jasper East	Rockwell/ Mueller
AMPHIBIANS						
Boreal toad	SE	0	0	0	1	1
Northern leopard frog	SOC	1	3	3	1	1
Wood frog	SOC	0	0	0	1	1
REPTILES						
Common gartersnake	SOC	0	3	3	0	0
BIRDS						
Ferruginous hawk	SOC	0	1	1	1	1
Greater sandhill crane	SOC	0	0	0	1	0
Peregrine falcon	SOC	1	3	3	1	0
Greater sage grouse	SOC	0	0	0	1	3
MAMMALS						
Townsend's big-eared bat	SOC	1	1	1	0	0
River otter	ST	1	0	0	0	0

0– No habitat
1 – Limited habitat present, species unlikely to occur
2 – Potential foraging habitat
3 – Potential breeding and foraging habitat
SE = State Endangered ST = State Threatened SOC = State Species of Concern
Source: CDOW 2006.

Boreal Toad

The boreal toad inhabits wetland areas such as beaver ponds, wet meadows, and slow moving streams at elevations above 7,800 feet (Hammerson 1999). The species was removed as a candidate for federal listing (Service 2005).

West Slope Study Area. The boreal toad is known to occur along Willow Creek in Grand County (USFS 2005). Wetland and aquatic habitat at the Jasper East Reservoir site does not contain preferred foraging and breeding habitat suitable for the boreal toad and none were discovered during field surveys. No records of boreal toad near Rockwell Reservoir are known. The small pond and two drainages provide limited suitable habitat for boreal toad.

East Slope Study Areas. The Chimney Hollow, Dry Creek, and Ralph Price Reservoir study areas are below the boreal toad's known elevation range and therefore do not contain any habitat for this species.

Northern Leopard Frog

The northern leopard frog occupies much of Colorado with the exception of the southeastern part of the state. Typical habitat includes irrigation ditches, streams, wet meadows, marshes, ponds, and lakes (Hammerson 1999). The CPW lists the northern leopard frog as uncommon in Boulder and Larimer counties and rare in Grand County (CNDIS 2006).

West Slope Study Areas. Historically the northern leopard frog was recorded along all of the major drainages in Grand County. Potentially suitable habitat exists within wetland areas in the Jasper East study area; however, none were discovered during field surveys. Potentially suitable habitat exists in and near wetland areas associated with the pond and tributary on the Rockwell Reservoir site. The nearest capture site is along the Colorado River approximately 3 miles northwest of the Rockwell Reservoir site (CDOW 2005b).

East Slope Study Areas. Suitable habitat for northern leopard frog exists in wetland areas within the Chimney Hollow and Dry Creek drainages. One adult leopard frog was observed in July 2005 along Dry Creek. It is likely that small breeding populations exist along wetter areas of Dry Creek. No leopard frogs were observed during field surveys at Chimney Hollow, but they could be present. Dry Creek contains more riparian wetlands and several small ponds that provide more suitable leopard frog habitat than Chimney Hollow. The steep rocky areas along the Ralph Price Reservoir shoreline do not provide quality habitat for northern leopard frog; however, this species may be present upstream and downstream of the reservoir along shallow areas of North St. Vrain Creek.

Wood Frog

This species typically inhabits high mountain marshes, bogs, beaver ponds, willow thickets and stream borders (Hammerson 1999). In Colorado, this species is only known in Larimer, Jackson, and Grand counties. The CPW lists the wood frog as common in Grand County (CNDIS 2006).

West Slope Study Areas. The nearest known population of the wood frog occurs along the Colorado River near Grand Lake (CDOW 2005b). Potentially suitable habitat for the wood frog exists within wetland areas of the Jasper East study area; however, none were found during field surveys. The pond and wetlands present at Rockwell Reservoir do not provide the type of habitat favored by the wood frog.

East Slope Study Areas. No potential habitat exists for the wood frog in the Chimney Hollow, Dry Creek, or Ralph Price study areas. All three sites are located below the elevation range for this species in Colorado.

Common Gartersnake

The common gartersnake is distributed in northeastern Colorado and is associated with the South Platte River and its tributaries at elevations below 6,000 feet (Hammerson 1999). It is found in aquatic and riparian habitats within floodplains and inhabits marshes, ponds, and stream edges. The CPW lists the common gartersnake as sparsely common in Boulder County and uncommon in Larimer County (CNDIS 2006).

West Slope Study Areas. Both the Jasper East and Rockwell study areas are located outside the known range of the common gartersnake in Colorado.

East Slope Study Areas. The Chimney Hollow and Dry Creek study areas contain suitable habitat for the common gartersnake and it was observed at Chimney Hollow during field studies. It is likely that this species inhabits the wetland and riparian areas at both East Slope reservoir sites.

Ralph Price Reservoir is above the upper elevation limit for this species and, therefore, the common gartersnake is unlikely to be present. It may occur downstream of the reservoir along North St. Vrain Creek.

Ferruginous Hawk

The ferruginous hawk inhabits open prairie and desert habitats and is strongly associated with primary prey species such as ground squirrels and jackrabbits. Ferruginous hawks are relatively common winter residents in eastern Colorado, particularly in association with the black-tailed prairie dog (Kingery 1998). The CPW lists the ferruginous hawk as an uncommon to rare breeder in Boulder, Larimer, and Grand counties (CNDIS 2006).

West Slope Study Areas. Breeding bird surveys did not document any nesting of this species in the county (Kingery 1998); however, the Colorado River basin within Grand County is considered winter and migration habitat (Andrews and Righter 1992). Ferruginous hawks were observed in low numbers near Jasper East and Rockwell during field studies. Wintering ferruginous hawks could possibly roost within or near West Slope study areas.

East Slope Study Areas. No records of ferruginous hawks nesting in central or western Larimer or Boulder counties are known (Kingery 1998). This species is a common migrant along the Front Range. Although it may occasionally occur at the Chimney Hollow, Dry Creek, and Ralph Price study areas, it is unlikely to nest at any of these study areas because more suitable habitat is available to the east.

Greater Sandhill Crane

In Colorado, the greater sandhill crane nests west of the Continental Divide, typically near flooded wetlands, beaver ponds, and wet meadows. The CPW lists the northern sandhill crane as an unknown breeder in Boulder and Larimer counties and uncommon in Grand County (CNDIS 2006).

West Slope Study Areas. The greater sandhill crane has been recorded nesting in the northwestern portion of Grand County, but no breeding populations have been noted within or near the Jasper East or Rockwell (Kingery 1998; Sumerlin, pers. comm. 2005). The Jasper East study area contains irrigated wet meadows that could be used for foraging, but is unlikely to provide nesting habitat because the area is mowed regularly. The Rockwell Reservoir site contains narrow riparian wetlands and a small pond that does not provide suitable for foraging or nesting habitat.

East Slope Study Areas. No suitable nesting or foraging habitat for this species exists within the Chimney Hollow, Dry Creek, or Ralph Price study areas.

Peregrine Falcon

The peregrine falcon has been removed from both the CPW and federal endangered species lists, but it remains a state species of concern. Peregrines nest on high steep cliffs generally along stream courses. The peregrine falcon migrates through eastern Colorado and nests in canyons and cliffs along the Front Range (Craig and Enderson 2004).

West Slope Study Areas. Peregrine nesting has never been documented in Grand County, but breeding populations have been noted in nearby Jackson County (Kingery 1998). The Jasper East study area does not contain suitable nesting habitat for the peregrine falcon. Rocky outcrops to the northeast provide potential habitat for the peregrine, but the U.S. Forest

Service has no records of occurrence in the area (Sumerlin, pers. comm. 2005). No rocky cliffs or canyon habitat that peregrines typically favor occur at or near the Rockwell Reservoir study area.

East Slope Study Areas. Although no nests or individuals have been recorded in the East Slope study areas, rocky outcrops and cliffs on the hogback east of Chimney Hollow and Dry Creek and rocky outcrops near Ralph Price have potentially suitable habitat. The hogbacks near Chimney Hollow and Dry Creek are relatively small and provide habitat more suitable for prairie falcons. No peregrine falcon was observed at Chimney Hollow or Dry Creek during field surveys and there are no records of occurrence at Ralph Price (CNHP 2006).

Greater Sage Grouse

Greater sage grouse populations in North and Middle Parks typically occur in sagebrush habitat between 7,000 and 9,500 feet (Kingery 1998). Habitat requirements shift from sage-dominated habitat in winter to more variable mountain-shrub habitat in summer (GSGCP 2001). In the spring, male grouse congregate in courtship displays in flat open areas dominated by sagebrush. Nesting usually occurs near production areas (leks) and 80 percent of sage grouse forage within 4 miles of a lek. Sage grouse does not occur in Boulder or Larimer counties and is uncommon in Grand County (CNDIS 2006). Greater sage grouse is listed as a candidate species.

West Slope Study Areas. Vegetation mapping and site reconnaissance indicate that habitat preferred by sage grouse is present in the Jasper East study area. Sage grouse are common in west Grand County and uncommon in east Grand County, with only two leks remaining (CNDIS 2006). CPW recorded breeding activity in drier habitat west of the Jasper East site in 2004 (CDOW 2005a). The Horn lek, above the intersection of Highways 34 and 40 and south of Jasper East, was active with five males on the lek in 2005 and 2006, and only one male in 2007 (Cowardin, pers. comm. 2006, 2007).

The eastern side of the Rockwell study area includes a designated sage grouse lek (CDOW 2001b; CNDIS 2006). A sage grouse brooding area also has been identified north and east of Rockwell. Sagebrush at Rockwell provides nesting and year-round grouse habitat. Sage grouse have experienced population declines in eastern Grand County and recent residential development in the Granby area has reduced available habitat. The highest number of males counted on the Linke lek, east of Rockwell, was 26 in 1990. The decline has been significant over the last few years from 20 males in 2004 to 5 in 2005, 3 in 2006, 1 in 2007, and then 9 in 2008 (Cowardin, pers. comm. 2006, 2008).

East Slope Study Areas. The Chimney Hollow, Dry Creek, and Ralph Price study areas do not contain suitable sage-dominated habitat for sage grouse.

Townsend's Big-eared Bat

The Townsend's big-eared bat is a year-round resident in the western ⅔ of Colorado (Fitzgerald et al. 1994). This species inhabits woodland areas with rocky outcrops, vacant buildings, caves and old mine shafts (Fitzgerald et al. 1994). The CPW lists the Townsend's big-eared bat as uncommon in Boulder and Larimer counties and has no records of occurrence for Grand County (CNDIS 2006).

West Slope Study Areas. Due to the lack of large rocky outcrops and vacant mines or buildings on both West Slope study areas, it is unlikely that the species occurs at Jasper East or Rockwell. However, it may intermittently forage in these study areas.

East Slope Study Areas. The Chimney Hollow, Dry Creek, and Ralph Price study areas contain potentially suitable habitat for the Townsend's big-eared bat. The species could potentially roost or hibernate in rocky areas along the hogbacks and foothill areas, as well as in old buildings or small caves.

River Otter

The river otter inhabits riparian habitats across a variety of ecosystems ranging from semi-desert shrublands to montane and subalpine forests. River otter requires clear, permanent water with an abundant food base of fish and crustaceans. Other habitat requirements include ice-free water in winter, water depth, stream width, and suitable access to shoreline (Fitzgerald et al. 1994).

West Slope Study Area. River otter occur in all the larger streams of eastern Grand County, including the Colorado and Fraser rivers and Willow Creek, both above and below Willow Creek Reservoir. Otter may occasionally visit the Jasper East or Rockwell area, but the sites lack suitable habitat, including permanent water of relatively high quality and an abundant food base.

East Slope Study Area. No known populations of otter occur near any of the three East Slope study areas. Although tracks and other sign of otter have been found in the Poudre and Laramie drainages in Larimer County the nearest location to Chimney Hollow and Dry Creek is more than 15 miles east, near Windsor (CNDIS 2007). The Chimney Hollow and Dry Creek study areas also lack suitable habitat for river otter including permanent water of relatively high quality and an abundant food base.

6.3.2. Colorado Natural Heritage Program Species

Colorado Natural Heritage Program species considered imperiled, rare, or vulnerable in the state with potentially suitable habitat in the study area are described below.

Sage Sparrow

The sage sparrow is a local and irregular summer resident in western Colorado (CNDIS 2006). This sparrow has a narrow habitat requirement for nesting, but tends to be associated with sagebrush. Most of the confirmed nests for sage sparrow in Colorado are in Moffat County (Kingery 1998). The CPW lists the sage sparrow as unknown in Boulder, Larimer, and Grand counties (CNDIS 2006).

West Slope Study Areas. Jasper East and Rockwell study areas contain potentially suitable nesting habitat for the sage sparrow. However, based on museum records and statewide breeding bird surveys, no documented nesting has been recorded in Grand County (Andrews and Righter 1992; Kingery 1998). This species may occasionally visit these sites during migration.

East Slope Study Areas. The Chimney Hollow and Dry Creek study areas do not contain sage habitat that this species typically favors. Sage sparrow has not been documented nesting in Boulder or Larimer counties (Kingery 1998).

Butterflies—Argos Skipper, Ottoe Skipper, Dusted Skipper, Cross-line Skipper, Mottled Duskywing, Moss' Elfin, Rhesus Skipper, and Simius Roadside Skipper

Habitat for several species of butterfly is present along the East Slope of the Front Range within the study areas primarily for Chimney Hollow and Dry Creek. There is no suitable habitat for these butterfly species in the West Slope study areas.

Argos skipper and ottoe skipper prefer habitat dominated by big bluestem grasslands. Big bluestem is not abundant at Chimney Hollow or Dry Creek, but Argos skipper has been found in the grasslands and foothills near the reservoir sites (CNHP 2005).

Dusted skipper occurs in abandoned agricultural fields, open woodlands, and mid- to tallgrass prairies; cross-line skipper favors prairie grasslands. Both skippers inhabit areas with little bluestem and dusted skipper also prefers big bluestem. Chimney Hollow and Dry Creek provide patches of potential habitat for these species.

Mottled duskywing occurs in hilly open woodlands preferring buckbrush shrubs. It has been found in central Larimer County (CNHP 2005). Mountain mahogany shrublands with scattered buckbrush at Chimney Hollow and Dry Creek provide potential habitat.

Moss' elfin is found in moist north-facing slopes and steep canyons. The caterpillar stage of this species feeds on yellow stonecrop. Areas of potential habitat could be present at Chimney Hollow, Dry Creek, and Ralph Price if stonecrop is present.

Rhesus skipper and simius roadside skipper prefer shortgrass prairie habitat dominated by blue grama grass. A population of simius roadside skipper was recorded in the foothills near Chimney Hollow and Dry Creek (CNHP 2005). Potential habitat for both species is present at Chimney Hollow and Dry Creek.

6.3.3. Migratory Birds

Nearly all bird species potentially present in the East and West Slope study areas are protected under the Migratory Bird Treaty Act. Bald eagles, which were downlisted from a federally threatened species in August 2007, are still protected under the MBTA and Bald Eagle Protection Act. Known and potential species for each reservoir site are discussed below.

Ralph Price Study Area

The mixed ponderosa pine and Douglas fir forest and open water at Ralph Price Reservoir provides habitat for migratory upland birds and waterfowl. Species observed by reservoir management staff and during an August 2005 site visit included osprey, great blue heron, cormorant, and gadwall. Northern goshawks also have been observed in the area (Jones 2006). No bald eagle active nest sites, winter range, winter roost site, or winter concentration area or associated buffers are known at Ralph Price Reservoir (CNDIS 2006), although bald eagle have been observed (Jones 2006). The St. Vrain River east of Lyons about 6 miles from Ralph Price Reservoir supports known bald eagle nesting, winter roosting, and summer foraging areas. Habitat for waterfowl, including various ducks, and white pelican is available at Ralph Price Reservoir. Forests bordering the reservoir likely support pygmy nuthatch, Steller's jay, mountain bluebird, hairy woodpecker, dark-eyed junco, and other woodland species.

Chimney Hollow and Dry Creek Study Areas

Several migratory bird species were observed foraging within the Chimney Hollow and Dry Creek study area during field surveys. Ground-nesting species observed within the study areas included spotted towhee, savannah sparrow, western meadowlark, and mourning dove. Species observed in riparian and wetland habitat included Bullock's oriole, American goldfinch, and yellow warbler. Additional species observed were barn swallow, eastern kingbird, American robin, American kestrel, and chipping sparrow. Riparian and ridge areas, combined with ponderosa pine forests in the higher elevations of the site, contained potentially suitable nesting habitat for several bird species such as dark-eyed junco, pygmy nuthatch, western tanager, American crow, and red-tailed hawk.

Bald eagle winter range is present east of the Chimney Hollow Reservoir site, which incorporates Carter Lake and the east side of the Dry Creek Reservoir site (CNDIS 2006). Bald eagle winter concentration areas are present along the Little Thompson River south of the Dry Creek Reservoir dam site. Bald eagle use of the Chimney Hollow or Dry Creek Reservoir sites for winter roosting or nesting is unlikely because no perennial streams or large bodies of water are present; however, they may occasionally forage in the area.

Several small nests were observed in riparian areas along Chimney Hollow, Dry Creek, and adjacent tributaries. Many of the nests were identified as oriole and magpie nests. Three large nests were present on rocky outcrops and cliffs on the ridgeline east of Chimney Hollow. Two of these large nests appeared to be inactive during the July 2003 site visit. Adult and fledgling golden eagles were observed in a third nest. All large nests on the ridgeline are likely used as alternative nests for golden eagles in the area.

A red-tailed hawk nest was observed in a stand of cottonwood trees in the southern portion of Dry Creek. A large golden eagle nest also was seen along the eastern ridgeline on the northern end of the Dry Creek study area. Both nests showed evidence of activity in 2005.

Jasper East Study Area

Raptors and migratory birds likely forage throughout the Jasper East study area. Ground-nesting birds observed, such as green-tailed towhee, savannah sparrow, and killdeer, are likely to inhabit pasture or meadow habitat. Species such as golden eagle and cliff swallow, common raven, American kestrel, and red-tailed hawk are likely to nest along the rocky ridges of the hogbacks northeast of the reservoir site. Wetland and riparian species such as red-winged blackbird, yellow-headed blackbird, and song sparrow are likely to nest in cattail stands or along the edge of wet areas. Several generalist species such as American robin, violet-green swallow, and American crow may nest in forested or wetland areas. Waterfowl, herons, and an occasional migrant sandhill crane have been observed in wetlands and open water habitats in the Jasper East study area (Sumerlin, pers. comm. 2005). Nearby Willow Creek Reservoir and Granby Reservoir, support breeding Canada geese, mallards, and common mergansers (Kingery 1998).

Bald eagle winter concentration and winter foraging areas are present along the Colorado River and Willow Creek west and south of the Jasper East Reservoir study area and north of the Rockwell Reservoir site (CNDIS 2006). Two active nests are near Granby Reservoir. There is no habitat suitable for winter roosting, nesting, important foraging areas, or essential eagle habitat at the Jasper East or Rockwell Reservoir sites, but bald eagles could occasionally forage in the area.

No potentially suitable raptor nests were identified directly within the Jasper East study area during the 2004 and 2005 site visits. A series of three alternate golden eagle nests are located on Table Mountain, northeast of the reservoir site. One of these nests was active in 2007 (Sumerlin, pers. comm. 2007). An osprey nest is located on a platform approximately 1,000 feet east of the potential reservoir. Foraging osprey were observed during the 2004 site visit along the Willow Creek Pump Canal within the potential reservoir footprint.

Rockwell Study Area

The Rockwell study area contains habitat similar to Jasper East, although somewhat drier without irrigated meadows. Bald eagle habitat in the region is described previously under Jasper East Reservoir. The pipeline connection to Windy Gap Reservoir for Rockwell Reservoir would cross bald eagle winter range along the Colorado River. The stock pond and drainages provide habitat for wetland bird species. Various waterfowl such as gadwall, American wigeon, and mallard may use the stock pond during different times of the year. Dry meadow and sagebrush habitat may support shrubland and ground-nesting species such as killdeer, Brewer's sparrow, and vesper sparrow.

6.3.4. Large Game and Other Wildlife

Large game wildlife such as deer, elk, pronghorn, bighorn sheep, mountain lion, and black bear are economically important species in Colorado. The Colorado Wildlife Commission through the CPW is responsible for regulations and policies regarding game management and hunting.

No major large game migration routes exist within the East and West Slope study areas (CNDIS 2006; SREP 2005), although ridgelines and drainages often serve as smaller movement corridors for game species as well as other wildlife species. The CPW has identified and mapped the overall range of large game throughout Colorado. The CPW has further identified seasonally important areas, including winter range, winter concentration areas, and severe winter range for several large game species within the study areas (CNDIS 2006). Winter range is defined as an area of land necessary for winter survival of large game species. Severe winter range is defined as, "winter range where 90 percent of the individuals are located when the annual snow pack is at its maximum and/or temperatures are at a minimum in the two worst winters out of ten." Winter concentration area is defined as "that part of the winter range where densities are at least 200 percent greater than the surrounding winter range density" (CNDIS 2006). Big game and other wildlife habitat in the study areas are described below.

Elk

Elk are an important big game species in Colorado. This species primarily inhabits the western two-thirds of the state, but is occasionally found east of the Front Range foothills (Fitzgerald et al. 1994). Elk are generally associated with forested areas adjacent to meadows, open parks, and tundra in the warmer months.

West Slope Study Areas. The Jasper East and Rockwell study areas contain the scattered meadow/forest habitat that provides elk overall range. Elk winter range and concentration areas occur on the south side of Jasper East. Nearby lands bordering the reservoir site also, provide winter range and winter concentration areas for elk. No elk migration routes are present at the Jasper East site, but elk move across a broad area in the Willow Creek drainage,

with seasonal movement and numerous road kills along U.S. Highway 34 to the east (Oldham, pers. comm. 2007). The Rockwell study area provides summer elk range and winter range on the west and northwest side of the reservoir site.

East Slope Study Areas. The Chimney Hollow and Dry Creek study areas contain overall range and winter range for elk. Elk winter concentration areas are located northeast of the Chimney Hollow Reservoir site. Elk in this region use a variety of habitat in the foothills, plains, and agricultural and residential areas. No summer concentration ranges occur near either study area.

The Ralph Price study area is located within elk overall winter and severe winter range. The north side of the reservoir provides winter concentration area. No important summer concentration or summer range is present.

Mule Deer

Mule deer is an important big game species in Colorado that occupies all ecosystems in Colorado from grasslands to alpine tundra (Fitzgerald et al. 1994). This species reaches it greatest densities in shrublands that provide abundant forage and cover.

West Slope Study Areas. The Jasper East and Rockwell study areas are located in mule deer summer range, although, mule deer likely visit these areas during all seasons. Mule deer winter range occurs southeast of the Jasper East Reservoir site and a small area of severe winter range overlaps the southern portion of the reservoir. Winter mule deer range is located east and west of the Rockwell study area.

East Slope Study Area. The Chimney Hollow and Dry Creek study areas are located in mule deer overall and summer range. Additionally, both study areas are located within winter concentration areas and overall winter range for mule deer. The Ralph Rice study area provides overall summer and winter range for mule deer.

White-tailed Deer

White-tailed deer are less widespread and more secretive than mule deer. The white-tailed deer occupies shrublands that provide plentiful forage and cover. White-tailed deer are often seen in riparian areas bordering larger streams and rivers. This species does not migrate in large numbers, but does move seasonally up and down river corridors in small numbers.

West Slope Study Areas. No white-tailed deer concentration areas occur within the Jasper East or Rockwell study areas. White-tailed deer are found along the Colorado River approximately 1 mile south of the Jasper East and along the Fraser River approximately ½ mile north of Rockwell. White-tailed deer occasionally may forage on both sites.

East Slope Study Area. The Chimney Hollow and Dry Creek study areas fall within the overall range for the white-tailed deer. No white-tailed deer concentration areas, winter, or summer ranges occur at either site. The Ralph Price Reservoir study area does not fall within the overall range for white-tailed deer.

Pronghorn

The pronghorn is a big game species in Colorado that inhabits grasslands and semi-desert shrublands on rolling topography that provides good visibility (Fitzgerald et al. 1994).

Pronghorn tend to favor vast expanses of open areas and are typically sensitive to human presence.

West Slope Study Areas. The Jasper East and Rockwell study areas fall within the overall range for pronghorn. However, no identified seasonal ranges, migration corridors or seasonal concentration areas occur in either study area.

East Slope Study Areas. Both the Chimney Hollow and Dry Creek study areas fall within the overall range for pronghorn. No seasonal ranges, migration corridors or seasonal concentration areas have been identified in either study area. No large open meadow areas or seasonal ranges for pronghorn occur at Ralph Price Reservoir.

Bighorn Sheep

Bighorn sheep inhabit steep, rocky areas in the mountains of Colorado (Fitzgerald et al. 1994). Once thought to have ranged throughout the Colorado foothills and mountains, the sheep currently have sporadic distribution in locations throughout the higher mountains.

West Slope Study Areas. The nearest sheep population is north of the proposed Jasper East and Rockwell Reservoir sites near the Grand County boundary with Jackson and Larimer counties. It is unlikely that bighorn sheep migrate onto either study area because of a lack of suitable habitat.

East Slope Study Area. The nearest sheep population is located south and west of the Chimney Hollow and Dry Creek within Big Thompson Canyon and the western Larimer County boundary with Jackson County. It is unlikely that bighorn sheep migrate onto either study area because of the distance to the nearest population and a lack of suitable habitat.

Bighorn sheep have been observed approximately 5 miles west of the Ralph Price Reservoir (CNDIS 2006). Winter range is located on the west and southeast of the reservoir.

Black Bear

The black bear is Colorado's largest carnivore and inhabits montane shrublands and forests. It also is found in subalpine forests at moderate elevations, and even ranges from the edge of the alpine tundra to canyon country and lower foothills (Fitzgerald et al. 1994).

West Slope Study Areas. The Jasper East and Rockwell study areas are located within the overall range for black bear. A portion of the Jasper East reservoir footprint overlaps a black bear summer concentration area.

East Slope Study Area. The Chimney Hollow and Dry Creek study areas are located within the overall range for black bear. Both study areas also are located within a black bear fall concentration area. Black bear may occasionally forage on both of the sites at all times of the year. Because of the number of human residences and recreation areas, the CPW has identified Carter Lake, located to the east and northeast of both study areas, as a black bear/human conflict area.

The Ralph Price Reservoir study area provides overall range for black bear. No human conflict areas or seasonal concentration areas occur immediately adjacent to the reservoir.

Mountain Lion

This species 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).

West Slope Study Areas. The Jasper East and Rockwell study areas occur within the overall range for mountain lion; however, this species typically favors rocky outcroppings, not the open meadow and sage habitat located in the study areas.

East Slope Study Area. The Chimney Hollow and Dry Creek study areas occur within the overall range for the mountain lion and tracks of a female lion with two cubs were observed during field studies at Chimney Hollow. Mountain lion typically favor rocky outcroppings, such as the hogbacks west and east of the reservoir sites. It is likely that lions prey on mule deer and other animals near and in the Chimney Hollow and Dry Creek study area. Because of the density of human residences and recreation areas, human conflict areas occur around Carter Lake and Flatiron Reservoir north and east of the Chimney Hollow study area. Human conflict areas also occur south of the Dry Creek study area.

Ralph Price Reservoir is located within the mountain lion overall range. No concentration areas or human conflict areas are located nearby.

Moose

Moose were introduced to the state in 1978. This species inhabits high elevation meadows and boreal forest edges in northern and central Colorado (Fitzgerald et al. 1994).

West Slope Study Areas. Moose overall range includes the Jasper East and Rockwell study areas. Moose winter range and winter concentration areas occur north of the Jasper East Reservoir site.

No seasonal ranges or concentration areas within 5 miles of Rockwell are present. Winter range and winter concentration areas are located about 8 miles southwest of the Rockwell site.

East Slope Study Areas. The Chimney Hollow, Dry Creek, and Ralph Price study areas are located outside of the overall range for moose in Colorado.

Other Wildlife

West Slope Study Areas. Both the Jasper East and Rockwell study areas provide habitat for a variety of other mammals. Larger mammals likely to use habitat in either study area include coyote, red fox, badger, raccoon, porcupine, and bobcat. Smaller mammals such as deer mouse, mountain cottontail, montane vole, and northern pocket gopher are likely to be present in the study areas.

East Slope Study Area. The Chimney Hollow Dry Creek, and Ralph Price study areas provide habitat for species similar to those mentioned for the West Slope study area. Coyote, red fox, raccoon, bobcat and porcupine all likely occur on these sites. Smaller mammals, such as cottontail rabbit, deer mouse, northern pocket gopher and amphibians and reptiles, including Woodhouse toad, and bullsnake potentially use habitat within these study areas. Wildlife endemic to ponderosa pine or Front Range canyon habitats include long-eared myotis, rock squirrel, northern rock mouse, and Mexican woodrat.

6.4. Threatened and Endangered Species

Federally listed threatened and endangered fish and wildlife species identified by the Service as potentially occurring in Boulder, Larimer, and Grand counties and downstream are

shown in Table 2. Habitat suitability, survey, and other sources of data were used to determine whether any of these species are located within the area of potential effect for each alternative. Potential Canada lynx habitat is found near the Rockwell Reservoir site Threatened and endangered fish species in the Colorado River are located downstream near Rifle. The following sections provide a brief description for each of the species and potential presence in the study areas.

Table 2. Federally listed threatened and endangered fish and wildlife species in Boulder, Larimer, and Grand counties potentially occurring in the study areas or downstream.

Common Name	Federal Status	Suitable Habitat in the Area of Potential Effect				
		Ralph Price	Chimney Hollow	Dry Creek	Jasper East	Rockwell
BIRDS						
Interior least tern[1]	Endangered	N	N	N	N	N
Piping plover[1]	Threatened	N	N	N	N	N
Whooping crane[1]	Endangered	N	N	N	N	N
Mexican spotted owl	Threatened	N	N	N	N	N
Greater sage grouse	Candidate	N	N	N	Y	N
MAMMALS						
Black-footed ferret	Endangered	N	N	N	N	N
Canada lynx	Threatened	N	N	N	N	Y
Preble's meadow jumping mouse	Threatened	N	N	N	N	N
FISH						
Bonytail chub[2]	Endangered	N	N	N	N	N
Colorado pikeminnow[2]	Endangered	N	N	N	N	N
Humpback chub[2]	Endangered	N	N	N	N	N
Razorback sucker[2]	Endangered	N	N	N	N	N
Greenback cutthroat	Threatened	N	N	N	N	N
Pallid sturgeon[1]	Endangered	N	N	N	N	N

[1] Water depletions in the South Platte River may affect the species and/or critical habitat in downstream reaches in other states.
[2] Water depletions in the Upper Colorado River may affect the species and/or critical habitat in downstream reaches.

6.4.1. Interior Least Tern, Piping Plover, and Whooping Crane

The interior least tern, piping plover, and whooping crane seasonally use habitat along the Platte River in Nebraska. The western prairie fringed orchid is found in wet meadow habitat including the Platte River floodplain in Nebraska. The pallid sturgeon is found in the Missouri River downstream from the East Slope study area. These species are potentially affected by water depletions in the South Platte River basin. All of the WGFP alternatives import water from the West Slope to the East Slope; therefore, there would be no depletions to streamflows in the Platte River that would affect piping plover, least tern, whooping crane,

western prairie fringed orchid, or pallid sturgeon. A negligible increase in flows in the Platte River are possible from return flows after WGFP water is used; however, Windy Gap water is reusable to extinction and most WGFP Participants have plans to reuse the water in some capacity. Therefore, any appreciable increase in Platte River flows is unlikely.

6.4.2. Mexican Spotted Owl

Mexican spotted owl typically inhabits areas with steep, exposed cliffs and canyons that are characterized by piñon-juniper and old growth forests interspersed with Douglas fir, ponderosa pine, and white fir (Andrews and Righter 1992). No critical habitat has been designated in Boulder, Larimer, or Grand County (66 FR 8530).

No suitable habitat or documented observations of Mexican spotted owl are reported for Ralph Price, Chimney Hollow, or Dry Creek Reservoir study area. Chimney Hollow and Dry Creek reservoir sites do not contain old growth coniferous forests typically favored by this species. Although mixed Douglas fir and ponderosa pine forests surround Ralph Price Reservoir, the only recorded occurrence of a Mexican spotted owl was 8 miles south of Ralph Price Reservoir (BCAS 2005).

The Jasper East and Rockwell Reservoir study areas do not contain suitable old growth Douglas fir and ponderosa pine forests or rocky cliffs that this species typically inhabits. Mexican spotted owl has never been recorded in this portion of the state (Andrews and Righter 1992).

6.4.3. Black-footed Ferret

The black-footed ferret is associated with prairie dog colonies because it depends on prairie dogs for food and shelter. No prairie dog colonies are present within the study areas for any alternative.

6.4.4. Canada Lynx

Canada lynx (lynx) in Colorado typically forage in spruce/fir forests surrounded by lodgepole pine, with uneven-aged stands, open canopies, and mature understories at higher elevations. The lynx's foraging and denning habitat closely follows that of the snowshoe hare—the primary food source in Colorado, although alternative prey including grouse, voles, and squirrels will be taken (Fitzgerald et al. 1994; Ruggiero et al. 2000; NatureServe 2006). Lynx rarely venture into open nonforested areas wider than 300 feet (Ruggiero et al. 2000).

The Chimney Hollow, Dry Creek, and Ralph Price Reservoir study areas are located below the known lower elevation limits for lynx.

The western side of the Rockwell Reservoir study area and adjacent lands to the west have been identified by the CNDIS (2006) as potential lynx habitat. Lynx could occasionally visit the site, but the area contains limited coniferous forest habitat that lynx typically favors. The study area does not contain habitat for the snowshoe hare, the lynx's primary prey. No designated lynx habitat is present at Jasper East Reservoir, but nearby lands to the north and west provide potential habitat. Lynx could occasionally travel through the Jasper East Reservoir study area; however, suitable foraging and denning habitat is not present, the area lacks suitable habitat for snowshoe hare, and contains large open meadows that lynx typically avoid.

6.4.5. Preble's Meadow Jumping Mouse

Preble's meadow jumping mouse (Preble's) is typically found in riparian corridors with trees or tall shrubs and low undergrowth, or in wet meadows. Along Colorado's Front Range, Preble's is generally found between 5,000 and 7,600 feet in elevation, generally in lowlands with medium to high moisture along permanent or intermittent streams and irrigation canals (Service 1999; Meaney et al. 1997). There is no designated critical habitat within or downstream of any of the study areas (68 FR 37276).

Ralph Price Reservoir does not contain the shrub and riparian habitat that Preble typically inhabits and, therefore, is not likely to occur in the area. Preble's have been captured approximately 5 miles downstream of the reservoir near Lyons (Service 1999).

Field trapping surveys for Preble is conducted in) at the Chimney Hollow Reservoir study area did not locate Preble's. Following the 2000 survey, the Service concluded that a population of Preble's was not likely to be present within the Chimney Hollow Reservoir study area and that development or other actions on the site would not directly affect Preble's. A subsequent habitat evaluation on an additional portion of the Chimney Hollow site determined that no suitable habitat was present in previously surveyed areas or the expanded area (ERO 2003). The Service (2003) concurred with the habitat assessment, but requested an additional habitat assessment prior to construction. Reclamation discovered Preble's on Dry Creek (a different Dry Creek than the one in Alternative 5) downstream of Flatiron Reservoir, as part of consultation on C-BT Project facilities (see Sections 6.5.4 and 9.4.1).

Trapping surveys at Dry Creek Reservoir did not locate Preble's (ERO 2004). The Service (2004) concurred with the negative findings, but requested that the area be surveyed again prior to construction of the reservoir.

The Jasper East Reservoir and Rockwell Reservoir study areas are located out of the known geographic range for Preble's.

6.4.6. Fish

No threatened or endangered fish species are present within the West Slope study areas. In the downstream reaches of the Colorado below Rifle there is critical habitat and presence of four endangered fish species—bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker.

On the East Slope, one threatened species is present in Larimer County and Boulder County, the greenback cutthroat trout. Greenbacks do not occur within the study area, but are generally present in small headwater areas with isolation from other cutthroat species.

6.5. Future Without the Project

The No Action Alternative assumes that the existing Windy Gap Project will continue to operate and that Windy Gap unit holders will increase their delivery of Windy Gap water to meet their needs within the limits of the existing infrastructure and contract with Reclamation. In addition, the City of Longmont will enlarge Ralph Price Reservoir to provide 13,000 AF of storage capacity for Windy Gap water. Effects to fish and wildlife resources under the No Action Alternative are discussed below and in Section 8.1.

6.5.1. Vegetation Resources

Enlargement of Ralph Price Reservoir would result in a long-term loss of about 77 acres of vegetation from additional reservoir inundation and dam construction. The majority of the effect would occur to upland native forests bordering the existing reservoir. The enlarged reservoir would inundate about 0.3 acre of wetlands around the existing shoreline and at stream inlets. New shoreline wetlands would likely develop along stream inlets and shoreline areas of the expanded reservoir, similar to those currently present. Reservoir enlargement would inundate about 500 feet of the North St. Vrain Creek at the upstream end of the reservoir. It is uncertain if raising the existing dam by 50 feet would require additional fill in North St. Vrain below the dam. Small tributaries to Ralph Price Reservoir, such as Rattlesnake Gulch, Long Gulch, and other unnamed drainages, also may have waters that would be inundated. The enlarged reservoir would create about 77 acres of additional open water.

The projected changes in channel maintenance flows and the slight reduction in the percentage of time that flows exceed bankfull discharge in the Colorado River compared to existing conditions is not expected to alter channel morphology or sediment movement. As a result, the conditions for growth, establishment, maintenance, and periodic scouring of riparian vegetation below Granby Reservoir or the Windy Gap diversion are not expected to change substantially under the No Action Alternative. It is unlikely that riparian vegetation along Willow Creek would be adversely affected by the projected changes in streamflow given the natural contribution from ground water discharge, irrigation return flows, and continued Willow Creek Reservoir minimum flow releases. Projected changes in streamflow in the Colorado River and Willow Creek are unlikely to affect terrestrial wildlife resources because of the negligible adverse effect to riparian habitat.

The projected 1 percent increase in spring and summer flows in the Big Thompson River is unlikely to adversely affect channel morphology or hydrologic conditions supporting riparian vegetation. Projected increases and decreases in flow on North St. Vrain Creek and St. Vrain Creek below Ralph Price Reservoir are unlikely to adversely affect the shrub and tree riparian vegetation along these creeks, which would continue to be supported by ground water discharge and streamflow, including existing bypass flows on North St. Vrain Creek below Ralph Price Reservoir. Projected small increases in streamflow on Big Dry Creek, Coal Creek, St. Vrain Creek, and the Big Thompson River from additional Windy Gap return flows under all alternatives are unlikely to substantially alter channel morphology or hydrologic conditions for riparian vegetation and impact wildlife habitat.

6.5.2. Aquatic Resources

The No Action Alternative would result in both increases and decreases in flows in North St. Vrain Creek below Ralph Price Reservoir and St. Vrain Creek to Lyons. A slight reduction in fish habitat would occur with lower May and July flows; however, increased flows in the fall and winter when flows are typically lowest would benefit fish habitat. Overall, the small changes in streamflow and water quality parameters are not expected to affect the current fish or macroinvertebrate populations in East Slope streams.

A substantial drawdown of Ralph Price Reservoir during enlargement of the dam could adversely impact existing fish populations. Following construction, the fishery would be restored and maintained with conditions similar to the current reservoir. Water quality is

predicted to be oligotrophic, which means productivity would be relatively low and growth for fish stocked in the lake may be slow, as is currently the case.

Potential effects to aquatic resources in the Colorado River, Willow Creek, Three Lakes, Carter Lake, Horsetooth Reservoir, and East Slope streams under the No Action Alternative would be similar in nature as those from the action alternatives because all of the alternatives would result in changes in hydrologic conditions from additional Colorado River water diversions, deliveries, return flows, and changes in reservoir operation. A consolidated discussion of aquatic resource impacts for streams and reservoirs under the No Action and action alternatives are included in Section 9.2.

6.5.3. Wildlife Resources

State Threatened, Endangered and Species of Concern

Enlargement of Ralph Price Reservoir would inundate about 0.1 acre of riparian vegetation on North St. Vrain Creek that could provide habitat for northern-leopard frog and common gartersnake. Projected minor changes in streamflow below the reservoir would not measurably affect riparian vegetation or habitat for leopard frog or gartersnake. No peregrine falcon habitat would be affected. Potential Townsend's big-eared bat habitat could be impacted if rocky areas bordering the reservoir are inundated.

CNHP Species

Yellow stonecrop, the host plant for the butterfly Moss' elfin, could potentially occur within the area of inundation, although habitat for the stonecrop is marginal.

Migratory Birds and Raptors

Enlargement of Ralph Price Reservoir would inundate potential foraging and nesting habitat for some migratory birds, primarily tree-nesting birds. No known raptor nests would be affected, but suitable habitat is present for northern goshawk, Cooper's hawk, flammulated owl, and red-tailed hawk. There would be no impact to any existing bald eagle nesting or roosting sites. Reservoir drawdown during construction would temporarily reduce bald eagle foraging opportunities. Bald eagle, osprey and waterfowl would benefit slightly from a larger reservoir.

Large Game and Other Wildlife

Ralph Price Reservoir expansion would result in a permanent loss of about 77 acres of elk winter range, including 4 acres of elk winter concentration area. The same amount of mule deer summer and winter range and overall range for white-tailed deer, black bear, and mountain lion also would be lost. No areas of severe winter range, which is the most critical to large game, would be affected. Winter range for elk and mule deer is widespread throughout Boulder County; thus, populations of these big game species are unlikely to be adversely affected by the habitat loss. No seasonal ranges for black bear or mountain lion would be affected. Additional temporary effects to big game habitat are possible if borrow areas outside the reservoir footprint are needed. The expansion of the existing reservoir would not substantially affect wildlife movement or fragment habitat.

Other wildlife species potentially displaced with reservoir expansion include coyote, red fox, cottontail rabbit, and species common in ponderosa pine and Douglas fir habitat such as

long-eared myotis, porcupine, rock squirrel, northern rock mouse, southern red-backed vole, and Mexican woodrat.

6.5.4. Threatened and Endangered Species

Enlargement of Ralph Price Reservoir would have no impact to lynx, Preble's, or other terrestrial species because no suitable habitat is present at the reservoir site. Proposed water diversions from the Colorado River would likely adversely impact endangered Colorado River fish species—bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker. The Subdistrict has signed a recovery agreement and would be responsible for paying a depletion fee for additional diversions. As noted in Section 9.4.2, the Service issued a biological opinion on February 12, 2010 for the Preferred Alternative. The No Action Alternative would result in additional diversions to the East slope, but negligible changes in flow in the South Platte River at the Kersey gage are anticipated because Windy Gap water is reusable to extinction and any return flows that accrue to the South Platte River are expected to be diverted by other water rights. As a result, there would be no adverse effect to least tern, piping plover, whooping crane or pallid sturgeon on the Platte River in Nebraska.

As noted in Section 9.4.1, the Eastern Colorado Area Office (ECAO) of Reclamation is currently undergoing separate consultation with the Service on the potential impacts of Reclamation's C-BT Project, which includes the continued operation of the East Slope features of the C-BT Project, on the listed species and habitats not addressed in the Platte River Recovery Program. ECAO is in the process of preparing a biological assessment addressing the effects of C-BT Project East Slope facilities on listed species not covered by the Platte River Recovery Program. When completed, the biological assessment will be submitted to the Service with appropriate recommendations.

7.0 ALTERNATIVE SELECTION PROCESS

A number of alternatives were considered to meet the purpose and need of the proposed WGFP to firm the yield of the existing Windy Gap Project. The initial range of alternatives included 171 different project elements that individually or in combination might meet the project need (ERO 2005). A series of alternative screening criteria were developed based on 404(b)(1) guidelines as well as NEPA guidelines (CEQ 1986) to evaluate alternatives and narrow the selection of alternatives for inclusion in the EIS. Screening criteria were the project purpose and need, logistical and technological considerations, and environmental consequences. Cost was not used as a screening criterion. Environmental screening criteria included a preference for alternatives with the least impact to wetlands and those that avoided fens and reservoir construction on perennial streams. The alternative screening process resulted in the selection of the following alternatives for evaluation in the EIS:

1. No Action— Project Participants would maximize delivery of Windy Gap water within the capacity of existing facilities under the existing contractual arrangement between Reclamation and the Subdistrict without any new Reclamation action or new C-BT connections. In addition, the City of Longmont would evaluate the enlargement of Ralph Price Reservoir for storage of its Windy Gap water.
2. Proposed Action by the Subdistrict— Chimney Hollow Reservoir (90,000 AF) with prepositioning (allowing storage of C-BT water in Chimney Hollow Reservoir). Alternative 2 was selected by Reclamation as the Preferred Alternative in the Final EIS.

3. Chimney Hollow Reservoir (70,000 AF) and Jasper East Reservoir (20,000 AF).
4. Chimney Hollow Reservoir (70,000 AF) and Rockwell/Mueller Creek Reservoir (20,000 AF).
5. Dry Creek Reservoir (60,000 AF) and Rockwell/Mueller Creek Reservoir (30,000 AF).

8.0 DESCRIPTION OF ALTERNATIVES

8.1. Alternative 1—No Action Alternative (future without Reclamation approval of new WGFP connections to the C-BT facilities)

The No Action Alternative indicates what WGFP Participants would do if Reclamation does not approve a contract to connect new WGFP facilities to C-BT facilities as required by the action alternatives. Thus, No Action indicates what is reasonably likely to occur with continuation of the existing contractual arrangement between Reclamation and the Subdistrict for the delivery of Windy Gap water. Under these conditions, WGFP Participants would maximize delivery of Windy Gap water according to water demand, water rights, availability of storage in Granby Reservoir, and existing Adams Tunnel conveyance constraints. The City of Longmont is the only Participant with an option to develop additional storage, hence they would consider enlargement of Ralph Price Reservoir by raising the dam 50 feet and increasing storage by 13,000 AF for its Windy Gap water. Storage of Windy Gap water in Ralph Price Reservoir, which is located on North St. Vrain Creek, would require delivery of Windy Gap water to St. Vrain Creek via the St. Vrain Supply Canal and exchanging the water up to the enlarged Ralph Price Reservoir by capturing an equivalent amount of water from North St. Vrain Creek in the reservoir. Water released from Ralph Price Reservoir would flow about 2 miles in North St. Vrain Creek prior to diversion at the existing Longmont Dam diversion for delivery to the city. The City of Lafayette anticipates that it would sell its Windy Gap units and not seek storage or delivery of Windy Gap water if the WGFP is not implemented. The MPWCD would continue to use Windy Gap water when available to provide augmentation flows for other water diversions in a manner similar to current operations.

8.2. Alternative 2—Chimney Hollow Reservoir (Proposed Action)

Alternative 2 includes construction of a 90,000 AF Chimney Hollow Reservoir with a surface area of about 740 acres. This alternative includes prepositioning or storage of C-BT water in the new reservoir. Water would be conveyed to Chimney Hollow Reservoir via a new pipeline connection to existing East Slope C-BT facilities to the upper end of the existing Flatiron Penstock, where a new buried penstock would deliver water to Chimney Hollow or Carter Lake. Connections between Chimney Hollow Reservoir and Carter Lake would allow delivery of water to Participants using existing infrastructure. Reservoir construction would require relocation of about 3.8 miles of an existing 115-kV transmission line. The new reservoir and adjacent Subdistrict and Larimer County lands would be managed by Larimer County for recreation. Anticipated recreation features include a parking area, trails, boat dock

and ramps, picnic facilities, and vault toilets. No overnight camping would be allowed. Development of recreational fishery managed by CPW is proposed.

Water delivery and operations for Alternative 2 include continued diversions from Windy Gap Reservoir with the water pumped to Granby Reservoir. Water would then either be delivered to Chimney Hollow Reservoir using C-BT facilities or stored in Granby Reservoir as currently occurs. Instantaneous delivery of Windy Gap water as allowed by the existing Carriage Contract between Reclamation, the NCWCD, and Municipal Subdistrict, Northern Colorado Water Conservancy District allows Windy Gap water in Granby Reservoir to be immediately delivered out of Carter Lake or Horsetooth Reservoir on the East Slope, with the same amount of water being exchanged with C-BT. MPCWD's 3,000 AF of water would be stored in Chimney Hollow Reservoir then exchanged back to Granby Reservoir where releases to the Colorado River would be made to offset depletions.

Prepositioning would be used to facilitate delivery of Windy Gap water and increase yield. Prepositioning would involve the use of available Adams Tunnel capacity to deliver C-BT water into Chimney Hollow to occupy storage space that is not occupied by Windy Gap water. Delivery of C-BT water to Chimney Hollow in this manner would maintain Chimney Hollow full most of the time. The delivery of C-BT water from Granby Reservoir into Chimney Hollow would create space for Windy Gap water in Granby Reservoir. When Windy Gap water is diverted into Granby Reservoir, the C-BT water in Chimney Hollow would be exchanged for a like amount of Windy Gap water in Granby Reservoir. The amount of C-BT water delivered to Chimney Hollow in any month generally would coincide with the amount of Windy Gap water released to meet Participant demands, which range from about 1,000 AF to 3,000 AF per month throughout the year. Prepositioning would not require any additional structural facilities to operate and would not change the storage or yield of C-BT Project water.

8.3. Alternative 3—Chimney Hollow Reservoir and Jasper East Reservoir

Alternative 3 is a combination of a 70,000 AF Chimney Hollow Reservoir on the East Slope and a 20,000 AF Jasper East Reservoir on the West Slope. Chimney Hollow Reservoir would have a surface area of about 630 acres and Jasper East Reservoir would have a surface area of about 430 acres. The availability of a new West Slope reservoir would allow water diversions from the existing Windy Gap Reservoir to be routed to either Jasper East or Granby Reservoir. Thus, when Granby Reservoir is full or the Adams Tunnel is at capacity, Windy Gap water could be diverted and stored in Jasper East Reservoir until there is sufficient capacity to transfer water to Chimney Hollow Reservoir.

Deliveries to and from Jasper East would require a new connection to the existing Windy Gap Pipeline. Diversions at the existing Windy Gap Reservoir would be pumped to Jasper East via a new pipeline off the existing pipeline at a connection less than 1 mile south of the reservoir. Water from Jasper East would be delivered to Granby Reservoir using the new pipeline back down to the existing Windy Gap pipeline. Water would be conveyed from the West Slope to Chimney Hollow Reservoir via existing C-BT facilities to the upper end of the existing Flatiron Penstock, where a new buried penstock would deliver water to Chimney Hollow or Carter Lake as described for Alternative 2. Construction of Jasper East Reservoir would require relocation of the Willow Creek Pump Station, forebay, and portions of the

canal and pipeline that would be inundated by the new reservoir. Recreation facilities at Chimney Hollow Reservoir would be similar to those described for Alternative 2. Recreation uses at Jasper East are possible, but no managing entity has been identified.

Windy Gap diversions would first be delivered to Chimney Hollow Reservoir, depending on the availability of space in the Adams Tunnel for conveyance to the East Slope. If the Adams Tunnel is full, then diversions would be delivered to Jasper East for storage. Releases to Participants would first be made from Jasper East and then out of Chimney Hollow when necessary. The general goal for filling and emptying the reservoirs is to move Windy Gap water to the East Slope as soon as possible. This can be done physically when space in the Adams Tunnel is available by delivering to Chimney Hollow first and then by releasing from Jasper East. Once Windy Gap water enters Granby Reservoir, it is available for delivery to meet Windy Gap demand out of East Slope C-BT storage in Carter Lake or Horsetooth Reservoir via instantaneous delivery. In addition to storage in Chimney Hollow and Jasper East, Windy Gap water may also be stored in Granby Reservoir when unused capacity is available.

8.4. Alternative 4—Chimney Hollow Reservoir and Rockwell/Mueller Creek Reservoir

Alternative 4 is a combination of a 70,000 AF Chimney Hollow Reservoir on the East Slope and a 20,000 AF Rockwell/Mueller Creek Reservoir (Rockwell) on the West Slope. As with the Jasper East Reservoir site, the availability of a new West Slope reservoir would allow water diversions from the existing Windy Gap Reservoir to be routed to either Rockwell or Granby Reservoir. Thus, when Granby Reservoir is full or the Adams Tunnel is at capacity, Windy Gap water would be diverted and stored in Rockwell Reservoir until there is sufficient capacity to transfer water to Chimney Hollow Reservoir.

Deliveries to and from Rockwell Reservoir would require a new connection to the existing Windy Gap Pump Station and Pipeline. Diversions at the existing Windy Gap Reservoir would be pumped using the existing Windy Gap Pump Station to Rockwell Reservoir. Water from Rockwell Reservoir would be delivered to Granby Reservoir using the same pipeline. Water would be conveyed from the West Slope to Chimney Hollow Reservoir via existing C-BT facilities with other connections the same as described for Alternative 2. Rockwell and Chimney Hollow reservoirs would be operated the same as described for Jasper East Reservoir in Alternative 3. Recreation facilities at Chimney Hollow Reservoir would be similar to those described for Alternative 2. Recreation uses at Rockwell are possible, but no managing entity has been identified.

8.5. Alternative 5—Dry Creek Reservoir and Rockwell/Mueller Creek Reservoir

Alternative 5 is a combination of a 60,000 AF Dry Creek Reservoir on the East Slope and a 30,000 AF Rockwell/Mueller Creek Reservoir on the West Slope. As with the Alternatives 3 and 4, the availability of a new West Slope reservoir would allow water diversions from the existing Windy Gap Reservoir to be routed to either Rockwell Reservoir or Granby Reservoir. Thus, when Granby Reservoir is full or the Adams Tunnel is at capacity, Windy Gap water could be diverted and stored in Rockwell Reservoir until there is sufficient capacity to transfer water to Chimney Hollow Reservoir. Recreation uses at Dry Creek or Rockwell reservoirs is possible if a managing entity is identified.

Water deliveries to and from Rockwell Reservoir would require a new pipeline and connection to the existing Windy Gap Pump Station and Pipeline as described in Alternative 4. Delivery of Windy Gap water to Dry Creek Reservoir would require a new pipeline originating above the existing penstock valve house and traversing down the ridge to the south of the existing Flatiron Penstocks (as described for Alternative 2), then turning south through Chimney Hollow to the upper end of Dry Creek Reservoir. Releases from Dry Creek Reservoir would be made from the dam outlet and pumped via a new tunnel conduit through the ridge to the east, then flow by a gravity pipeline into the southern end of Carter Lake. Once in Carter Lake, deliveries could be made using existing conveyance canals and pipelines.

The operation of Dry Creek and Rockwell reservoirs would be similar to the Chimney Hollow and Rockwell Reservoir combination described in Alternative 4. Windy Gap diversions would first be delivered to Dry Creek Reservoir as limited by available capacity in the Adams Tunnel. If the Adams Tunnel is full, then diversions would be delivered to Rockwell Reservoir for storage.

9.0 DESCRIPTION OF IMPACTS

The description of impacts includes the potential effect from each of the action alternatives to vegetation, aquatic life, wildlife, and threatened and endangered species.

9.1. Vegetation Resources

9.1.1. Alternative 2—Chimney Hollow Reservoir (Proposed Action)

Construction of Chimney Hollow Reservoir and related facilities would permanently affect about 788 acres of vegetation and temporarily disturb about 123 acres of vegetation (Table 3). The largest permanent effect would occur to upland native shrubs, mixed grasslands, and upland native forests.

Table 3. Alternative 2—Direct effects to vegetation cover types at Chimney Hollow Reservoir.

Vegetation Cover Type	Perm. Effects	Temp. Effects
	acres	
Upland native shrublands	261	21
Upland native grasslands	119	39
Upland native forest	135	4
Upland introduced grasslands	32	10
Mesic mixed grasslands	193	24
Mesic native woodlands	40	6
Mesic native shrublands	8	19
TOTAL	788	123

Relocation of the existing Western transmission line would result in small additional areas of vegetation loss associated with placement of the tower foundations as well as removal of the existing line. Removal of the existing poles and line would result in temporary vegetation

disturbances, many of which would be located within the footprint of the reservoir that would be impacted by material excavation and eventually inundation in the new reservoir. Western would remove trees that could negatively impact the reliable operation of the relocated transmission line (e.g., trees that could grow tall enough to cause arcing between the tree and the conductors or could fall into the conductors or structures). Western would promote the growth of low-growing native plants on the ROW. There would be a long-term change in vegetation cover under the transmission line. Relocation of the transmission line also would result in vegetation disturbance during installation and from access and maintenance roads. The extent of these effects depends on the final transmission line alignment. Additional unquantified effects to vegetation would occur from construction of a parking area, picnic area, marina, and other recreation facilities on the west side of the reservoir near the dam. Upland native grasslands and native shrublands would be the primary vegetation types affected by these facilities. Trail construction for linkage with Larimer County Open Space on the west side of the reservoir also would result in a loss of vegetation. The specific placement of recreation facilities would not be determined until final design.

About 1.6 acres of wetlands would be permanently impacted and about 0.1 acre of wetlands would be temporarily disturbed from construction of a 90,000 AF Chimney Hollow Reservoir and facilities (Table 4). Impacted wetlands are rated with a high function for rare or imperiled CNHP-tracked wildlife species habitat and ground water discharge. Wetland and riparian vegetation communities could develop around portions of the lake margin because the reservoir would remain near capacity throughout the growing season and the rest of year. Stable water levels would help support shoreline wetlands and riparian species, although steep banks would prevent substantial riparian development around much of the reservoir. Seepage below the dam also could increase the potential for wetland or riparian vegetation establishment.

Table 4. Summary of wetland effects by alternative.

Alternative	Perm. Effects	Temp. Effects	Total
	acres		
Alternative 2			
Proposed Action	1.6	0.1	1.7
Alternative 3			
Chimney Hollow	1.5	0.1	1.6
Jasper East	21.2	4.8	26.0
TOTAL	**22.7**	**4.9**	**27.6**
Alternative 4			
Chimney Hollow	1.5	0.1	1.6
Rockwell	3.0-13.6	2.0-5.0	5.0-18.6
TOTAL	**4.5- 15.1**	**2.1-5.1**	**6.6-20.2**
Alternative 5			
Dry Creek	6.2	0.3	6.5
Rockwell	3.0-15.6	2.0-5.0	5.0-20.6
TOTAL	**9.2-21.8**	**2.3-5.3**	**11.5-27.1**

Construction of Chimney Hollow Reservoir would permanently affect 1.3 acre of waters along Chimney Hollow and several small ephemeral drainages (Table 5). Temporary effects

to waters would be about 0.1 acre. The new reservoir would create about 742 acres of open water when full.

Table 5. Summary of effects to other waters.

Alternative	Perm. Effects	Temp. Effects	Total
	acres		
Alternative 2			
Proposed Action	1.3	0.1	1.4
Alternative 3			
Chimney Hollow	1.3	0.1	1.4
Jasper East[1]	6.3	0.2	6.5
TOTAL	**7.6**	**0.3**	**7.9**
Alternative 4			
Chimney Hollow	1.3	0.1	1.4
Rockwell	3.6	1.7	5.3
TOTAL	**4.9**	**1.8**	**6.7**
Alternative 5			
Dry Creek	2.8	0.3	3.1
Rockwell	3.7	1.7	5.4
TOTAL	**6.5**	**2.0**	**8.5**

[1]In addition, the existing 6-acre Willow Creek Pump Canal forebay would be relocated.

9.1.2. Alternative 3—Chimney Hollow Reservoir and Jasper East Reservoir

Construction of a 70,000 AF Chimney Hollow Reservoir would result in the permanent loss of about 669 acres of vegetation and a temporary disturbance to about 131 acres of vegetation (Table 6). The largest effect would occur to upland native shrubland and mesic mixed grasslands. Permanent impacts to vegetation at the Jasper East Reservoir site would be about 436 acres and temporary effects would be about 114 acres. The mesic mixed grasslands (irrigated meadows) would have the largest area of impact followed upland native shrubland. The combined total permanent effect to vegetation from construction of both reservoirs would be 1,104 acres. About 245 acres of temporarily disturbed lands would need to be reclaimed following construction of both reservoirs.

Table 6. Alternative 3—Direct effects to vegetation cover types at Chimney Hollow Reservoir (70,000) and Jasper East Reservoir.

Vegetation Cover Type	Chimney Hollow		Jasper East		Total	
	Perm. Effects	Temp. Effects	Perm. Effects	Temp. Effects	Perm. Effects	Temp. Effects
	acres					
Upland native shrublands	204	30	107	58	311	88
Upland native grasslands	100	52	0	0	100	52
Upland native forest	117	12	13	1	130	13
Upland introduced/ mixed grasslands	31	11	23	0	54	11
Mesic mixed grasslands	169	20	290	47	458	67
Mesic native shrublands	8	<1	3	8	11	8
Mesic native forest	40	6	0	0	40	6
TOTAL	669	131	436	114	1104	245

Permanent effects to wetlands from construction of a 70,000 AF Chimney Hollow Reservoir would be slightly less than the 90,000 AF Chimney Hollow Reservoir in the Proposed Action. About 1.5 acres of wetlands would be permanently affected and about 0.1 acre of wetlands would be temporarily affected (Table 4). The effect to waters would be the same as the Proposed Action (Table 5). A 70,000 AF Chimney Hollow Reservoir would create about 674 acres of open water.

About 21.2 acres of wetlands would be permanently impacted in the footprint of the Jasper East Reservoir dam, pump station, access road, and reservoir (Table 4). About 4.8 acres of wetlands would be temporarily disturbed during construction of pipelines and other facilities. Some of the wetlands (an estimated 8 acres, or 38 percent of the permanently impacted wetlands) are likely created as a result of flood irrigation and have been affected by grazing and hay harvesting. The development of shoreline wetlands and riparian vegetation communities around the reservoir margin is unlikely because of projected large annual fluctuations in reservoir elevations. Seepage below the dam also could increase the potential for wetland or riparian vegetation establishment.

About 0.3 acre of waters in the unnamed ephemeral drainage located within the reservoir and dam footprint would be permanently impacted (Table 5). Temporary effects to waters in the same drainage would affect about 0.2 acre. The existing, approximate 6-acre forebay and the Willow Creek Pump Canal would be relocated to the north. The new reservoir would create about 434 acres of open water.

9.1.3. Alternative 4—Chimney Hollow Reservoir and Rockwell/Mueller Creek Reservoir

The effect to vegetation and CNHP plant communities and species at Chimney Hollow Reservoir under Alterative 4 would be the same as described for Alterative 3.

Construction of a 20,000 AF Rockwell Reservoir would permanently affect about 304 acres of vegetation and temporarily disturb about 151 acres of vegetation (Table 7). The

majority of the impact would occur to upland native shrub habitat. The combined permanent effect to vegetation for Chimney Hollow and Rockwell reservoirs would be about 973 acres. Temporary disturbances that require revegetation would total 281 acres.

Table 7. Alternative 4—Direct effects to vegetation cover types at Chimney Hollow Reservoir (70,000) and Rockwell/Mueller Creek Reservoir.

Vegetation Cover Type	Rockwell/Mueller Creek		Total (Including Chimney Hollow)	
	Perm. Effects	Temp. Effects	Perm. Effects	Temp. Effects
	acres			
Upland native shrublands	261	103	466	132
Upland native grassland	0	0	100	52
Upland native forest	5	14	122	26
Upland introduced/mixed grasslands	24	14	55	25
Mesic mixed grasslands	<1	15	169	35
Mesic native shrubland	14	5	21	5
Mesic native forest	0	0	40	6
TOTAL	304	151	973	281

Effects to Chimney Hollow wetlands and waters would be the same as described for Alternative 3. The permanent effect to wetlands from construction of Rockwell Reservoir is estimated to range from 3.0 acres to 13.6 acres (Table 4). The 3.0-acre value is based on NWI mapping and the 13.6-acre value is based on the assumption that wetlands are located with the mesic native shrubland community mapped from aerial photography. Using the same data sources, temporary wetland effects are estimated to range from 2 to 5 acres.

Permanent wetland effects would occur primarily from dam construction and inundation from the reservoir. Temporary wetland effects would result from installation of the pipeline connection to Windy Gap Reservoir, which would involve crossing the Colorado River floodplain. Wetland functions and values were not investigated in the Rockwell Reservoir study area, but are likely similar to those in the Jasper East study area.

The development of shoreline wetlands and riparian vegetation communities around the Rockwell Reservoir margin is unlikely because of projected large annual fluctuations in reservoir elevations that would limit wetland development. Seepage below the dam could increase the potential for wetland or riparian vegetation establishment.

Although not field verified because access to private land was denied, it is assumed that Rockwell and Mueller creeks possess the characteristics of a water of the U.S. Construction of the 30,000 AF Rockwell Reservoir dam is estimated to inundate or permanently fill about 0.6 acre of stream channel (Table 5) in addition to an approximate 3-acre stock pond that would be inundated. About 1.7 acres of waters would be temporarily impacted during placement of the raw water pipeline across the Colorado River. A 20,000 AF Rockwell Reservoir would create about 294 acres of open water.

9.1.4. Alternative 5—Dry Creek Reservoir and Rockwell/Mueller Creek Reservoir

Construction of Dry Creek Reservoir would permanently disturb about 647 acres of vegetation and temporarily disturb about 149 acres of vegetation (Table 8). The largest effect would occur to upland native forest, mesic mixed grassland, and upland native shrubland. The construction of a 30,000 AF Rockwell Reservoir would permanently disturb about 378 acres of vegetation and temporarily disturb 156 acres of vegetation (Table 8). Most of the impact would occur to upland native shrubland vegetation. The combined effect to vegetation under Alternative 5 would be a permanently loss of about 1,025 acres and temporary disturbance to 305 acres.

Table 8. Alternative 5–Direct effects to vegetation cover types at Dry Creek Reservoir and Rockwell/Mueller Creek Reservoir (30,000 AF).

Vegetation Cover Type	Dry Creek Reservoir		Rockwell/Mueller Creek Reservoir (30,000 AF)		Total	
	Perm. Effects	Temp. Effects	Perm. Effects	Temp. Effects	Perm. Effects	Temp. Effects
	acres					
Upland native shrublands	149	31	323	108	475	139
Upland native grasslands	90	25	0	0	90	25
Upland native forest	201	36	9	14	209	50
Upland introduced/mixed grasslands	11	5	30	14	40	19
Mesic mixed grasslands	160	42	<1	15	160	57
Mesic native shrublands	12	2	16	5	27	7
Mesic native woodlands	24	8	0	0	24	8
TOTAL	647	149	378	156	1025	305

About 6.2 acres of wetlands would be permanently impacted and about 0.3 acre of wetlands would be temporarily impacted from construction of Dry Creek Reservoir and facilities (Table 4). Along Dry Creek, wetlands that would be permanently impacted have been somewhat disturbed by grazing; however, wetlands in the tributaries are relatively undisturbed. This alternative would affect wetlands rated with a high function for rare or imperiled CNHP-listed wildlife species habitat, general wildlife habitat, ground water discharge/recharge, sediment/shoreline stabilization, and production export/food chain support.

Construction of the reservoir may result in the development of new vegetation communities around the lake margin because the reservoir would remain near capacity throughout the growing season and the rest of year. Relatively stable water levels would help support shoreline wetlands and riparian species, although steep banks would prevent substantial riparian development. Seepage below the dam also could increase the potential for wetland or riparian vegetation establishment along Dry Creek.

Construction of Dry Creek Reservoir would permanently affect about 2.8 acres of waters (Table 5) including Dry Creek and several tributaries, either from inundation, fill from dam construction, or spillway. Temporary effects to waters would be about 0.3 acre. The new reservoir would create about 589 acres of open water.

Construction of a 30,000 AF Rockwell Reservoir would permanently affect about 3 to 15.6 acres of wetlands based on NWI mapping and aerial photography (Table 4). Temporary wetland effects would range from about 2 to 5 acres. The development of shoreline wetlands and riparian vegetation communities around the Rockwell Reservoir margin is unlikely because of projected large annual fluctuations in reservoir elevations, but seepage below the dam could support downstream wetlands.

Rockwell Reservoir is estimated to inundate or permanently fill from dam construction about 0.7 acre of stream channel and a 3-acre stock pond (Table 5). In addition, about 1.7 acres of waters would be temporarily impacted during placement of the raw water pipeline across the Colorado River. A 30,000 AF Rockwell Reservoir would create about 348 acres of open water.

9.1.5. Riparian Vegetation

The projected changes in Colorado River and Willow Creek channel maintenance flows, stream stage, and the slight reduction in the percentage of time that flows exceed bankfull discharge for all alternatives compared to existing conditions are not expected to substantially alter channel morphology or sediment movement. As a result, the conditions for growth, establishment, maintenance, and periodic scouring of riparian vegetation is unlikely to adversely affect riparian and wetland vegetation for any alternative. In the study area, most of the Colorado River is a gaining stream; thus, contributions from adjacent lands likely play an important role in supporting riparian vegetation. Riparian vegetation adjacent to the river would continue to be supported by streamflow, ground water discharge, and irrigation return flows under each alternative. Existing minimum instream flow and bypass requirements below Granby Reservoir and the Windy Gap diversion that contribute to supporting riparian vegetation would not change under any alternative.

The projected minor increases in flow in the Big Thompson River are unlikely to adversely affect channel morphology or hydrologic conditions supporting riparian vegetation under any of the action alternatives. Projected increases in St. Vrain Creek flow below Participant WWTPs are unlikely to adversely affect the shrub and tree riparian vegetation, which would continue to be supported by ground water discharge and streamflow. Projected increases in streamflow in Big Dry Creek and Coal Creek from additional Windy Gap return flows under all action alternatives are unlikely to substantially alter channel morphology or hydrologic conditions for riparian vegetation and impact wildlife habitat.

9.2. Aquatic Resources

9.2.1. West Slope

Colorado River

The results of fish habitat modeling for the Colorado River provided information on the changes in fish habitat and the season when those changes would occur. The habitat versus discharge curves for the Lone Buck site show similar shape for juvenile rainbow and adult

brown trout (Figure 4 and Figure 5). There is a much different response to flow between adult rainbow and brown trout. Habitat availability for adult rainbow trout is highest at flows between 250 and 400 cfs at Lone Buck. Brown trout adult habitat is highest at streamflows of about 500 cfs. Habitat for juvenile rainbow and brown trout is highest at flows from 400 to 500 cfs at both the Lone Buck and Breeze study sites (Miller Ecological Consultants 2010). Typically, a reduction in streamflow reduces available fish habitat; however, when flows exceed the flow at which the highest habitat occurs, as during periods of high runoff, a reduction in flow can increase available fish habitat. This occurs occasionally under all alternatives as a result of Windy Gap diversions during peak flows.

Figure 4. Rainbow trout habitat area versus discharge – Lone Buck site, Colorado River.

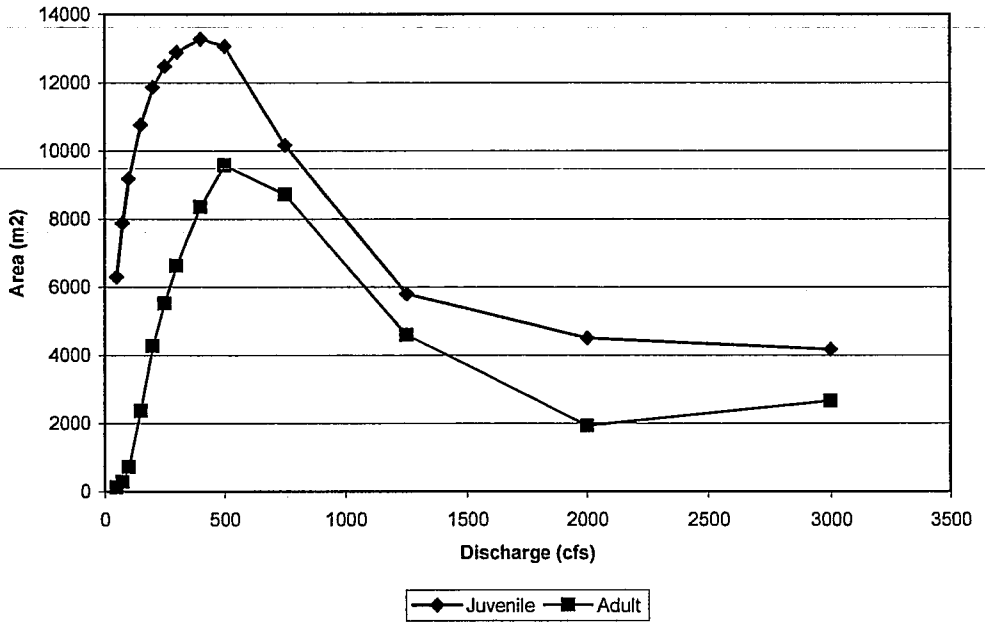
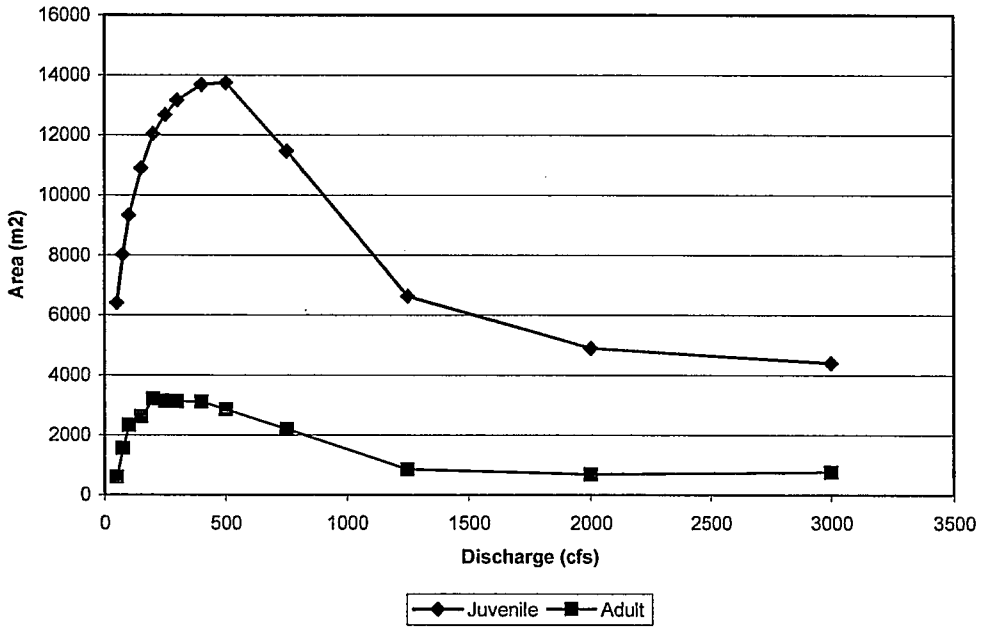


Figure 5. Brown trout habitat area versus discharge – Lone Buck site, Colorado River.



Habitat time series model output generates information on the amount of habitat available over time. The largest decrease in adult rainbow trout habitat during average flow conditions on the Colorado River occurs in the reach immediately downstream from Windy Gap Reservoir (Figure 6). On this graph, the left axis indicates the percent change in habitat from existing conditions, where the 0 line is existing conditions. Values above the 0 line indicate an increase in habitat and values below the 0 line indicate a decrease in habitat. The bottom axis indicates the time during the year when habitat changes. Figure 7 illustrates the effect to adult brown trout habitat at the same location below Windy Gap Reservoir during average years. WGFP diversions during high runoff increase brown trout habitat. A similar example farther downstream for rainbow and brown trout on the Colorado River above the confluence with the Blue River is shown in Figure 8 and Figure 9. At this location, adult rainbow and brown trout habitat increases and decreases by less than 10 percent during the year, with small differences between the alternatives. Under the No Action Alternative for average conditions, adult rainbow trout habitat would decrease up to 21 percent in August of average years below Windy Gap (Figure 9). Both increases and decreases in adult brown trout habitat of about 10 percent occur under the No Action Alternative below Windy Gap (Figure 7), with small changes in rainbow or brown trout habitat above the Blue River (Figure 8 and Figure 9).

Figure 6. Percent change in adult rainbow trout habitat from existing conditions on the Colorado River below Windy Gap for an average water year.

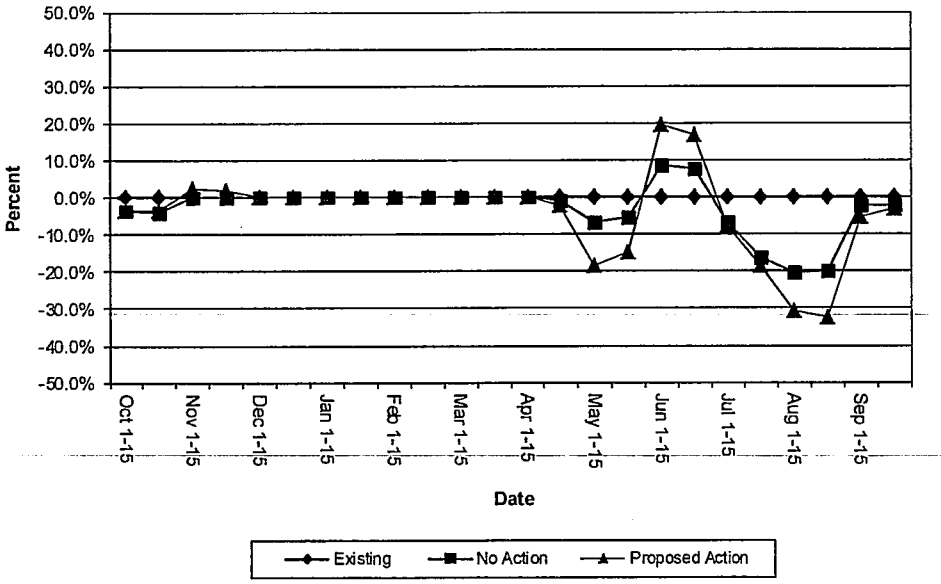


Figure 7. Percent change in adult brown trout habitat from existing conditions on the Colorado River below Windy Gap for an average water year.

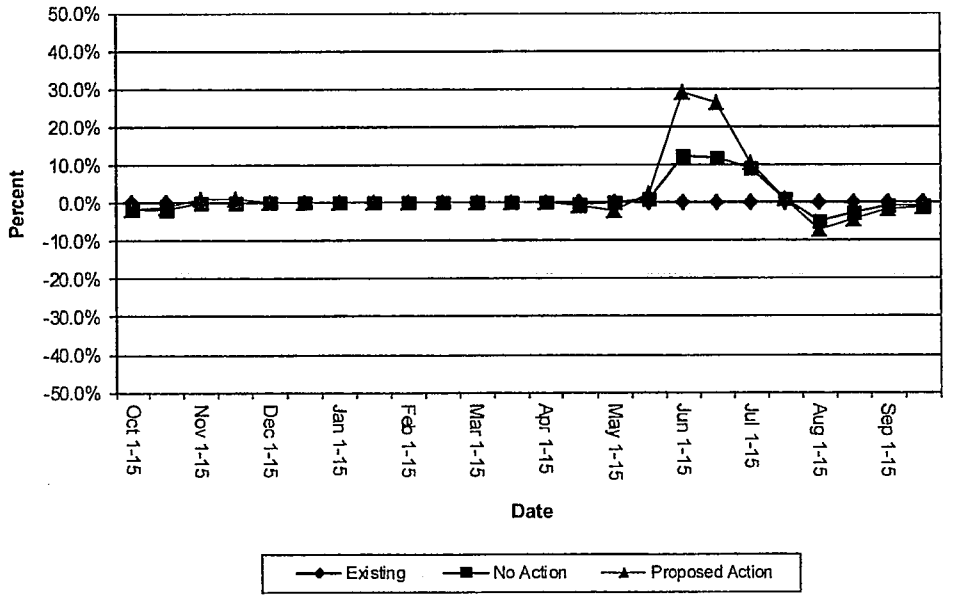


Figure 8. Percent change in adult rainbow trout habitat from existing conditions on the Colorado River above the Blue River for an average water year.

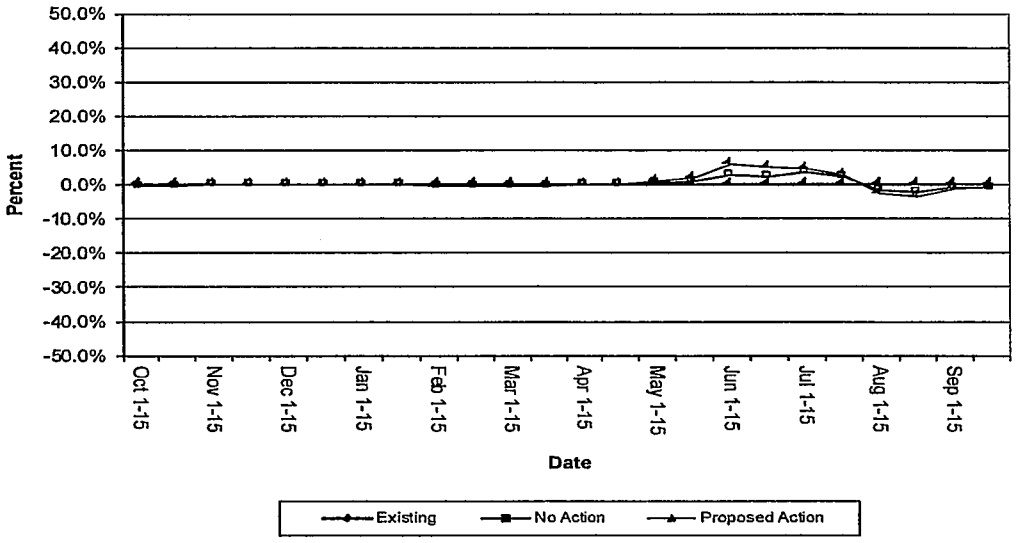
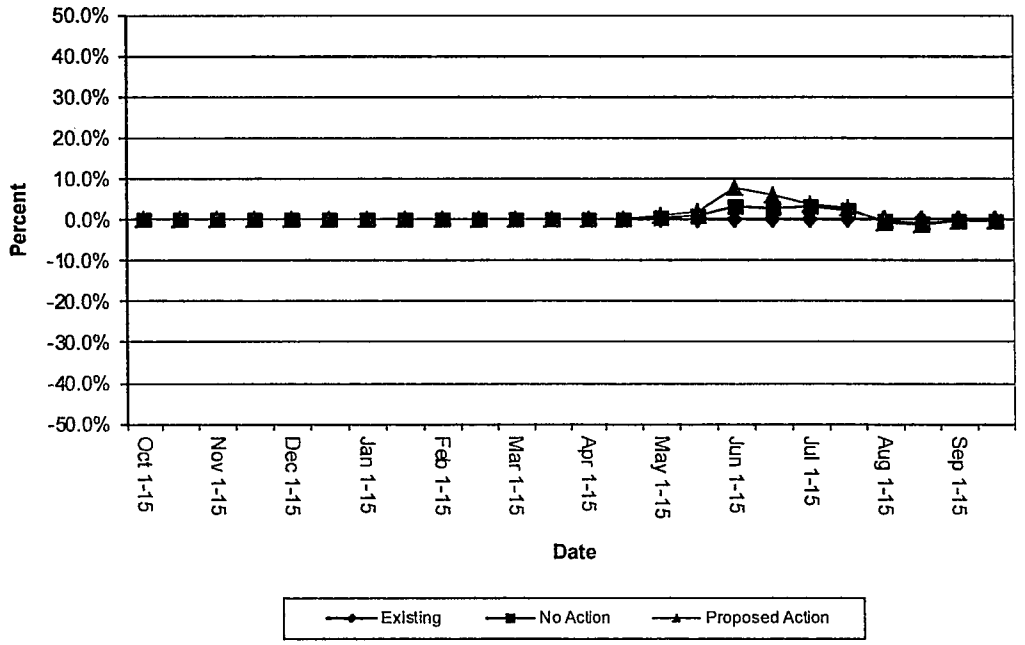


Figure 9. Percent change in adult brown trout habitat from existing conditions for the Colorado River above the Blue River for an average water year.



The results of the habitat modeling for rainbow and brown trout at locations on the Colorado River and Willow Creek for average years are summarized in Table 9 and Table 10. These data indicate the maximum change in habitat from WGFP diversions and the season when those changes would occur. The results are representative of all action alternatives because diversion volumes are similar and indicate the maximum change from existing conditions. The greatest decrease in habitat would occur from Windy Gap Reservoir downstream to the Williams Forks, where adult rainbow trout habitat would decrease up to 34 percent in August of average water years, while adult brown trout habitat would decrease less than 8 percent. Below the Williams Fork, maximum decreases in habitat would be less and would occur less frequently. The maximum decrease in rainbow or brown trout habitat for juveniles or adults would be less than 10 percent at all locations below the Williams Fork. WGFP diversions in June of average years would increase rainbow and brown trout habitat for juveniles and adults as much as 29 percent. Juvenile rainbow trout habitat would decrease up to about 6 percent below Windy Gap in average years (Table 9). Juvenile brown trout habitat would decrease about 6 percent in August and increase up to about 18 percent in June of average years below Windy Gap (Table 10). Adult brown trout habitat in Willow Creek would decrease up to 25 percent in July of average years and increase about 4 percent in June. Juvenile brown trout habitat in Willow Creek would decrease about 17 percent in July.

Table 9. Percent change in rainbow trout habitat from existing conditions under the Proposed Action for locations on the Colorado River and Willow Creek for average water years.

Location	Juvenile Rainbow Trout				Adult Rainbow Trout			
	Range of change from existing conditions				Range of change from existing conditions			
	↓ (%)	Date	↑ (%)	Date	↓ (%)	Date	↑ (%)	Date
Below Windy Gap	-6.1	Aug 1-15	+19.0	Jun 1-15	-32.5	Aug 16-30	+19.3	Jun 1-15
Hot Sulphur Springs	-5.5	Aug 16-31	+19.0	Jun 1-15	-28.7	Aug 16-31	+19.5	Jun 1-15
Above Williams Fork	-6.3	Aug 1-15	+18.8	Jun 1-15	-33.5	Aug 16-31	+19.1	Jun 1-15
Below Williams Fork	-3.1	May 1-15	+7.1	Jun 1-15	-9.1	May 1-15	+6.7	Jun 16-30
Above Troublesome Creek	-2.8	May 1-15	+7.1	Jun 1-15	-8.1	May 1-15	+6.6	Multiple
Above Blue River	-1.1	Aug 16-31	+4.7	Jul 1-15	-3.4	Aug 16-31	+6.1	Jun 1-15
Below Blue River	0.0	Multiple	+3.1	Jun 1-15	-0.1	Jan 16-31	+6.0	Jun 1-15
Willow Creek	-12.6	Jul 16-31	+1.1	Jun 1-15	-23.2	Jul 1-15	+1.3	Sep 16-30

Note: Percent change in habitat for Alternatives 3 to 5 are generally within 5% of the change shown for the Proposed Action.

Table 10. Percent change in brown trout habitat from existing conditions under the Proposed Action for locations on the Colorado River and Willow Creek for average water years.

Location	Juvenile Brown Trout				Adult Brown Trout			
	Range of change from existing conditions				Range of change from existing conditions			
	↓ (%)	Date	↑ (%)	Date	↓ (%)	Date	↑ (%)	Date
Below Windy Gap	-6.2	Aug 1-15	+17.8	Jun 1-15	-7.4	Aug 1-15	+29.0	Jun 1-15
Hot Sulphur Springs	-5.6	Aug 1-15	+17.9	Jun 1-15	-7.4	Aug 1-15	+29.1	Jun 1-15
Above Williams Fork	-6.3	Aug 1-15	+17.7	Jun 1-15	-7.3	Aug 1-15	+28.5	Jun 1-15
Below Williams Fork	-3.0	May 1-15	+9.2	Jun 1-15	-2.4	May 16-31	+5.7	Multiple
Above Troublesome Creek	-2.7	May 1-15	+9.2	Jun 1-15	-2.4	May 1-15	+5.7	Multiple
Above Blue River	-0.9	Aug 16-31	+ 6.1	Jul 1-15	-1.4	Aug 16-31	+7.7	Jun 1-15
Below Blue River	0.0	Multiple	+3.0	Jun 1-15	0.0	Multiple	+8.3	Jun 1-15
Willow Creek	-16.5	Jul 16-31	+0.8	Sep 1-15	-24.8	Jul 1-15	+3.5	Jun 1-15

Note: Percent change in habitat for Alternatives 3 to 5 are generally within 5% of the change shown for the Proposed Action.

Overall, the modeled changes in fish habitat in the Colorado River for all alternatives indicate the most substantial changes in habitat would occur between Windy Gap Reservoir and the confluence with the Williams Fork River in both average and wet years. For the remainder of the Colorado River downstream of the Williams Fork, a reduction in habitat also would occur in average or wet years, but would not result in a substantial change (<15 percent) from existing conditions.

The largest reductions in fish habitat would occur during August of average and wet years when Windy Gap diversions occur. The hydrologic model indicates that WGFP diversions of more than 100 AF in August would increase from 6 times in the 47-year hydrologic modeling period to 15 times. Actual WGFP pumping in August is likely to be less because new reservoirs would typically be close to full in years when the WGFP diversions are in priority in August and the cost of pumping is high for the limited available water. Adult rainbow trout would have the largest reduction of all species and life stages. During the remainder of the year (September through April of average years), flow and available habitat are lower than during the time Windy Gap diversions occur. Habitat area available during the low-flow periods from fall to early spring is likely a more controlling factor that influences the size of the fish population than diversions that occur when more abundant habitat is present in late spring and summer. Therefore, even though the maximum percent reduction in habitat is large from Windy Gap diversions in the spring, diversions occur when habitat is greater than during the majority of the year. Because fish habitat can be less available at high flows, diversions that reduce high flows can result in increased available habitat during runoff. Habitat time series output indicates Windy Gap diversions from the Colorado River, in average and wet years, would result in increases in habitat in June and July. The more important factor during peak runoff is the flows that create and maintain the aquatic habitat as discussed below in the *Channel Morphology* section.

In general, CPW research on Colorado rivers (Nehring and Anderson 1993) has demonstrated the greatest impact to trout populations occurs during high flows when small

juvenile fish are present (especially during wet hydrologic years). This research demonstrated that the strongest year classes for juvenile fish were present when peak flows were lower than normal. This response to lower peak flows had a positive influence on the year classes in subsequent years. The WGFP would reduce Colorado River peak flows, which may be beneficial to fish, particularly in wet years, but is dependent on the time when the flows occur in relation to the presence of young trout.

Fall spawning brown trout would not be affected by Windy Gap diversions. Rainbow trout spawning occurs from mid-April through May, with hatching in June and July. Rainbow fry emerge from the gravel in July into the first part of August (Nehring and Anderson 1993). With rainbow trout spawning occurring on the lower portion of the ascending limb of the hydrograph and an increase in flow after spawning, the redds would be covered by water through egg hatch and emergence. Since the eggs and fry would not be dewatered, an impact to these life stages is not likely for any of the alternatives.

Channel Morphology. In addition to hydrology and water quality, channel morphology is an important physical component of the riverine systems that affect the aquatic environment. The channel geometry and plan form of the channel and the biota within the channel are all affected by the volume and timing of annual discharges. Physical features of the stream channel change as a result of peak flows and the biota respond to those physical changes.

The No Action and action alternatives would result in a reduced frequency and duration of channel maintenance flows on the Colorado River below Windy Gap. However, hydrology data for the alternatives indicate the magnitude and recurrence intervals for bankfull flows and other channel maintenance flows would continue to occur regularly. The frequency and duration of large peak flow events would not change substantially (e.g., flows of 2,000 cfs or greater would occur 1.6 percent of the time under the Proposed Action compared to 2 percent of the time under existing conditions). The maximum Windy Gap diversion of 600 cfs would reduce flows available for channel maintenance, but large flows would still occur. The predicted changes in channel maintenance and peak flow characteristics are not expected to result in substantial changes to the existing habitats that are created and maintained by the existing flow regime. The range in channel maintenance flows under all alternatives would continue to provide sufficient flows to maintain channel capacity, provide periodic scouring, maintain riparian habitat, and create habitat suitable for fish and macroinvertebrates. In addition, no substantial change in stream productivity is anticipated from flow changes. Therefore, the current channel type and habitat characteristics are expected to be maintained with all alternatives.

Sediment transport is another important component of channel maintenance flows that is necessary to maintain the conditions needed to create fish spawning habitat and macroinvertebrate habitat. Channel maintenance flows are critical to ensuring unimpaired flow and sediment conveyance. A range of channel maintenance flows provide the benefits of conveying water and eroded materials from tributaries without aggradation (raising of the streambed by deposition of sediment) or degradation (lowering of the streambed), preventing vegetation encroachment and narrowing of the channel, sustaining aquatic ecosystems, temporarily storing flood flows on the floodplain, and maintaining healthy streambank and floodplain vegetation (Schmidt and Potyondy 2004). Colorado River flows under all of the alternatives would continue to have more than adequate capacity to transport the sediment

supply without aggradation or degradation. Sediment transport calculations for the Colorado River show that fine sediments (sand and silt, 2 mm, or finer) would be mobilized at flows of less than 50 cfs; fine gravel (8 mm) would require a flow of 200 cfs; medium gravel (16 mm) would require a flow of about 400 cfs; and coarse gravel (32 mm) would require a flow of about 850 cfs to be mobilized (ERC 2009). Channel maintenance flows under all alternatives would continue to provide flow sufficient to move medium to coarse gravel that is used as substrate by spawning trout. Flow magnitude and duration to flush fine material from spawning substrate would continue to occur under the Proposed Action and other alternatives. No impact to spawning habitat is expected due to changes in channel maintenance flows and peak flows.

Stream Temperature and Water Quality. Results of water quality modeling also were used to evaluate potential effects to aquatic life (Table 11). The current water temperature standards include both a numeric and narrative standard. The Colorado River near Windy Gap is classified as Cold Water Tier II. The water temperature standards are set to protect cold-water species in the river from both sublethal and lethal effects of temperature changes. The maximum weekly average temperature (MWAT) is set as a chronic threshold. Water temperatures lower than the MWAT would not adversely impact the species. The daily maximum (DM) is set to be protective against lethal conditions. The numeric standard (April through October) is a MWAT of 18.2°C and a DM of 23.8°C. The narrative standard is: "Temperature shall maintain a normal pattern of diel and seasonal fluctuations and spatial diversity with no abrupt changes and shall have no increase in temperature of a magnitude, rate, and duration deleterious to the resident aquatic life" (CDPHE Regulation 33, 33.5 (1)).

Table 11. Summary of stream water quality changes relevant to potential fish impacts.

Location	Greatest Change in Dissolved Oxygen (mg/L) from Existing Conditions for All Alternatives	Greatest Change in Water Temperature (°C) from Existing Conditions for All Alternatives
Colorado River in the study reach	-0.1 to -0.6	+2.7 MWAT, +6.0 DM
Willow Creek	No change	-0.2
St. Vrain Creek	No change	No change
North St. Vrain Creek	Decrease less than 0.5	No change
Big Thompson	No change	No change

Source: ERO and AMEC 2008a.

A dynamic temperature model was used in the Final EIS to better evaluate potential daily changes in stream temperature in the Colorado River (Hydros 2011). The analysis of potential changes in temperature was conducted for a range of water years. Water temperature simulations show that diurnal and seasonal water temperature patterns are similar to existing conditions. Modeled water temperatures with the WGFP show a diurnal fluctuation change with warming during the day and cooling at night, which is similar to the pattern found under existing conditions. Currently, the highest observed seasonal temperatures in the Colorado River occur in July and August. The water temperature simulations show this same seasonal pattern. Thus, the narrative water quality standard for stream temperature would be met under all alternatives.

Dynamic temperature modeling of the Colorado River using 2007 meteorological data, which included the hottest August on record and the sixth hottest July on record, predict that

primary increases in stream temperature would occur in the reach between Windy Gap Reservoir and the Williams Fork. In the 15 years of hydrology modeled, 4 years showed simulated temperature impacts under the Proposed Action that resulted in increased exceedence of WATs and/or DMs. Although exceedence of the MWAT and DM standard were predicted for several years under existing conditions, the No Action and action alternatives would increase the number of exceedence.

Temperature modeling results for the Colorado River showed a maximum 1-day increase in water temperature up to 6°C. This results in an estimated water temperature of about 24.8°C near Hot Sulphur Springs. The additional number of exceedence of the MWAT would likely increase the stress on the aquatic community. The additional exceedence of the DM would add stress above the level of the MWAT. The impacts from the exceedence would be greater if the exceedence were sequential rather than sporadic. Sequential exceedence would extend the time period when the fish are stressed and, therefore, have a higher probability of impact to the species, while sporadic exceedence may allow for recovery from the stressed condition. Higher stream temperatures over a long period of time may result in less fit individuals, and potential mortality. While both MWAT and DM are a concern, the increased number of DM exceedence may have the greatest impact. Downstream of the Williams Fork, no exceedence of temperature standards is expected as a result of the WGFP.

Modeling of water quality parameters for the Colorado River predicted a slight decrease of 0.1 to 0.6 mg/L in DO. Average DO concentrations for existing conditions are 8.3 mg/L or higher concentrations for all alternatives are within the range required by trout and other cold water species and does not drop below the nonspawning aquatic life water quality standard. However, the DO concentration may be slightly lower (6.9 mg/L predicted) than the spawning standard (7.0 mg/L) in late summer if flows drop to 90 cfs downstream of Windy Gap Reservoir, although this is not in the normal spawning period for trout and only occurs in a short reach of the river. DO levels in the Colorado River under all modeled conditions would be above the 5.0 mg/L required for lethal effects to trout and would not impact trout in this section of the river. DO levels would not violate the state standard, which is designed to protect all aquatic life, including nontrout species.

Modeling of other water quality parameters indicates a slight increase in ammonia and inorganic phosphorus concentrations in the Colorado River below Windy Gap. The total ammonia concentrations would be lower than the acute and chronic standards and no impacts are expected from the increased concentrations. The increase in phosphorus is also lower than the EPA-recommended value and no impact is expected from the increased phosphorus concentration.

Summary. The predicted flow regime in the Colorado River as a result of the No Action Alternative and action alternatives would still include the components for stream health, but at lower levels than existing conditions. Peak flows that exceed bankfull volumes on a regular basis and predicted future flow regimes would continue to provide the necessary conditions to create and maintain channel morphology and aquatic habitat. In addition, a range of channel maintenance flows would provide the conditions to maintain riparian habitat. Modeled baseflows under all alternatives would maintain benthic invertebrate populations. Sediment transport capacity of the Colorado River would still exceed the available sediment supply. Colorado River flows would continue to regularly move medium-sized gravels for trout spawning habitat. Winter flows, combined with the habitat created by periodic high flow

events, would continue to provide refuge habitat during winter conditions. Projected increases in the exceedence of chronic and acute stream temperature standards under all alternatives would increase the stress on fish populations, although predicted exceedence as a result of the WGFP would occur only in about 4 out of 15 years, assuming very warm July and August air temperatures.

Recently, research has focused on comprehensive ecologically based management of riverine systems to provide function for instream aquatic biota as well as near-stream riparian areas (Bunn and Arthington 2002; Chapin et al. 2002; Lytle and Merritt 2004; Lytle and Poff 2004; Poff and Zimmerman 2010; Richter et al. 2003). Natural flow regimes, with both floods and droughts, have occurred for many years prior to any river regulation and the biota in these ecosystems have adapted to that flow regime. That adaptation is the response to changes in the physical environment and the biological adaptation to withstand floods or prolonged droughts in those systems (Lytle and Poff 2004). The dynamic character of river systems has been stated as one of the important features in maintaining ecological integrity (Poff et al. 1997; Richter et al. 1997). Clipperton et al. (2003) incorporated four ecosystem components into an Instream Flow Needs Determination for the South Saskatchewan River basin. The four components were: 1) fish habitat, 2) water quality, 3) riparian vegetation, and 4) channel maintenance. The objective of their determination was to provide a high level of protection for the riverine ecosystem that could be achieved by instream flows alone. Further, Clipperton et al. (2003) wanted to provide for protection of aquatic habitats in the short term while protecting processes that maintained aquatic habitat in the long term.

All four of these ecosystem components were evaluated as part of the analysis of the impacts to the aquatic environment for the WGFP. A reduction in Colorado River flows would reduce fishery habitat primarily for rainbow trout, but many of the impacts occur in the spring when flows are high or in August when WGFP diversions are infrequent. Minimal impacts to stream morphology, water quality (except water temperature), and riparian vegetation are predicted for all alternatives. Increased stream temperature, particularly the acute DM temperatures, has the greatest potential for affecting trout species in the Colorado River between Windy Gap Reservoir and the Williams Fork.

Willow Creek

The changes to Willow Creek habitat would be similar to those modeled for the Colorado River, with most decreases in habitat expected to be less than 15 percent (Table 9 and Table 10). The greatest change in habitat for adult brown trout during an average water year would be a 21 percent reduction in habitat 2 out of 10 years. The frequency of maximum habitat changes would be 3 out of 10 years or less and the majority would occur 2 out of 10 years. Changes of this magnitude are unlikely to be measurable at the population level for fish in Willow Creek. In addition to physical habitat, the estimated change in water quality shows that there would be a slight decrease in water temperature, which may benefit the fishery, although this water temperature would not be measurable at the population level. Overall, the fish community in Willow Creek is not expected to change with any alternative.

Macroinvertebrates

Habitat needs of the macroinvertebrates present in the Colorado River and Willow Creek are similar to those of the trout species. The species, abundance, and distribution of macroinvertebrates should remain similar to existing conditions under all alternatives based

on the anticipated changes in flow and changes in water quality. Based on the field data, the wetted channel width reaches the banks at approximately 90 to 100 cfs, which provides the maximum wetted area for macroinvertebrates. The existing Multi Metric Index (MMI) for the Colorado River downstream of Windy Gap ranges from 92 (Rees 2009) to 100 (Miller Ecological Consultants 2011). These MMI values indicate the existing macroinvertebrate community is unimpaired. The DO and temperature conditions are not expected to change to a point that would substantially impact macroinvertebrates. The sediment transport analysis shows the flow regime for the Proposed Action would provide the flows needed to flush fine sediments from the streambed and maintain macroinvertebrate habitat. Because none of the projected changes in wetted channel, channel morphology, and water quality under the alternatives are predicted to substantially impact aquatic habitat, no significant change to macroinvertebrate communities are expected.

Grand Lake, Shadow Mountain Reservoir, Granby Reservoir, and Willow Creek Reservoir

There would be no change in reservoir elevation in Grand Lake, Shadow Mountain Reservoir, or Willow Creek Reservoir under any alternative; thus there would be no effect to available fish habitat. Predicted decreases in Granby Reservoir water levels of up to 10 feet in wet years are not expected to change the dynamics of the fish population. Sequential dry years that result in substantially lower reservoir elevations would reduce available fish habitat and could affect the dynamic balance between lake trout and kokanee. The Proposed Action has the greatest potential for drawdown in consecutive dry years at Granby Reservoir.

The Three Lakes would remain mesotrophic under all alternatives; thus, lake productivity would not change. The minimum DO concentrations in the hypolimnion for Grand Lake would decrease up to 0.6 mg/L for the No Action Alternative and less under the action alternatives. Granby Reservoir and Shadow Mountain minimum DO levels would decrease less than 0.2 mg/L for all alternatives. None of the alternatives would affect Three Lakes' surface temperature. Because the trophic state is expected to remain the same, the DO levels would remain within the range observed under existing conditions, and temperature changes would be minor, no change in fish population dynamics are expected from changes in the physical environment at the Three Lakes for any alternative.

Windy Gap Reservoir

Minimal or no changes are expected to the trophic state, reservoir sediment conditions, or water temperature regimes in Windy Gap Reservoir and C-BT system reservoirs; therefore, none of the alternatives are expected to enhance the conditions for the development and spread of whirling disease in Windy Gap Reservoir or elsewhere in the Colorado River, Three Lakes, or East Slope streams and reservoirs.

Jasper East Reservoir and Rockwell Reservoir

Jasper East and Rockwell reservoirs are predicted to be oligotrophic-mesotrophic (low to medium productivity). These reservoirs are likely to support a fishery with appropriate management, although the large fluctuations in reservoir storage may reduce productivity.

9.2.2. East Slope Effects

Big Thompson River, St. Vrain Creek, Big Dry Creek, and Coal Creek

All alternatives would result in an increase (1 to 9 percent) in Big Thompson River flows below Lake Estes from April to October from additional Windy Gap deliveries. These slight flow changes could increase fish habitat, but are unlikely to measurably affect fish populations. Increased return flow below the Participant's WWTPs on the Big Thompson River, St. Vrain Creek, Big Dry Creek, and Coal Creek, which occurs year-round, could slightly enhance fish habitat in these streams under all alternatives.

Carter Lake and Horsetooth Reservoir

Estimated lower average water levels in Carter Lake and Horsetooth Reservoir, under the action alternatives, would slightly reduce available fish habitat; however, these changes would not measurably impact fish survival, reproduction, or fishing success. Under all alternatives, there would be no change in the trophic state or other water quality parameters that would adversely impact fish of Carter Lake or Horsetooth Reservoir. Therefore, the habitat in these reservoirs would continue to support fish under current management by CPW.

Chimney Hollow and Dry Creek Reservoirs

There would be no adverse impact to aquatic habitat in Chimney Hollow because this intermittent stream is often dry and does not support a fishery. Dam construction and inundation of Dry Creek at Dry Creek Reservoir under Alternative 5 would impact intermittent aquatic habitat that supports minnows and aquatic invertebrates.

Chimney Hollow and Dry Creek reservoirs could support a fishery similar to other Front Range reservoirs, with a combination of cool water and cold-water species. Both reservoirs likely would be similar in species composition to Carter Lake or Horsetooth Reservoir; however, Chimney Hollow and Dry Creek reservoirs may be less productive because they are predicted to be oligotrophic, which is less productive than the trophic state of Carter Lake and Horsetooth Reservoir. A fishery could be established based on reservoir characteristics and expected outcomes for anglers.

9.3. Wildlife Resources

All action alternatives involve earthmoving, heavy equipment, noise, and other disturbances during construction of dams and other facilities, which would displace wildlife. These disturbances would have a direct impact to burrows, dens, and possible mortality of small less mobile mammals, reptiles, and amphibians. More mobile mammals and birds would be displaced from disturbed habitat. Construction activity would indirectly affect wildlife behavior in the vicinity. Tolerance to disturbance varies by species and individuals, but behavioral responses range from habituation to activity, to complete avoidance of undisturbed habitat near the construction site, or increased movement and expenditure of energy reserves. The indirect displacement of wildlife during construction would be a temporary effect, but would last about 3 years depending on the alternative.

The following describes anticipated impacts to state threatened, endangered, and species of concern; CNHP species; migratory birds and raptors; and big game and other wildlife for each of the action alternatives.

9.3.1. Alternative 2—Chimney Hollow Reservoir (Proposed Action)

State Threatened, Endangered and Species of Concern

The loss of about 2.9 acres of wetland and creek habitat from reservoir construction would affect potential northern leopard frog habitat. A leopard frog was observed along Dry Creek and similar, but lower quality habitat is present at Chimney Hollow. Common gartersnake, which also uses wetland habitat as well as mesic woodlands and shrublands, also could be affected by the loss of about 50 acres of suitable habitat. Replacement of lost wetland habitat and natural riparian development around the new reservoir could potentially offset some of the lost habitat for leopard frog and gartersnake.

The loss of grassland and shrubland habitat would reduce habitat for potential prey species of ferruginous hawk and peregrine falcon that may occasionally forage or migrate over this area. This alternative is unlikely to adversely affect these species because of the lack of documented breeding activity in the area and the availability of alternative prey nearby. Potential nest habitat for peregrines on the hogback east of Chimney Hollow would not be affected. The Chimney Hollow site contains limited potential habitat at the periphery of the Townsend's big-eared bat's range and there are no records of occurrence.

CNHP Species

Suitable habitat for several butterfly species would be affected by construction of Chimney Hollow Reservoir and facilities. There would be a loss of about 390 acres of native grassland and shrubland habitat that contains areas of blue grama grass suitable for simius road skipper and rhesus skipper. Argos skipper, dusted skipper, ottoe skipper, and cross-line skipper suitable habitat would be affected by the loss of big bluestem and little bluestem grassland habitat. There would be a loss of ponderosa pine and native grassland habitat where scattered patches of these grasses are present. The loss of about 270 acres of shrublands would affect habitat potentially used by mottled duskywing.

Migratory Birds and Raptors

Construction of Chimney Hollow Reservoir would affect nesting and foraging habitat for several migratory birds and raptors. There would be a permanent loss of about 400 acres of upland forest and shrub habitat, in which raptors such as Swainson's hawk and red-tailed hawk and other species such as black-billed magpie and American crow could nest. The loss of 40 acres of mesic native woodland habitat and riparian areas along Chimney Hollow would reduce potential foraging and breeding habitat for migratory bird species such as American robin, red-winged and yellow-headed blackbirds, and Bullock's oriole. Inundation or disturbance of about 340 acres of upland and mesic grassland habitat would reduce habitat for ground-nesting species such as killdeer, mourning dove, and western meadowlark. The loss of habitat would displace species that have historically nested in these habitats.

The disturbance of about 150 acres of various habitats from pipeline construction, staging areas, and other temporary activities would have a short-term effect on potential bird habitat until sites are revegetated. Clearing of about 43 acres of forest under the transmission line would reduce available habitat for tree- and cavity-nesting birds. Western would design the transmission line in conformance with Suggested Practices for Protection of Raptors on Power lines (APLIC 1994) and Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006 (APLIC 2006).

Approximately 7 acres of bald eagle winter range would be disturbed from construction of a southern access road. This road would be located within an existing transmission line maintenance road and may be partially reclaimed following construction. The new reservoir would result in a beneficial long-term effect to bald eagles by creating open water foraging habitat once a fish population is established. The loss of winter range would have a minor effect on bald eagles, while the construction of new open water habitat would have a long-term beneficial effect.

There would be no direct effect on golden eagle nest sites located on the hogback ridge to the east, although foraging habitat would be reduced with the loss of terrestrial habitat that supports small mammal prey species. Noise and visual disturbance during construction could affect normal behavior of golden eagles during the breeding season; however, all construction would be outside CPW's recommended ¼-mile buffer. No known raptor nests would be affected, but the loss of riparian woodlands along the Chimney Hollow drainage would eliminate potential nest and roost sites for raptors and other birds.

Osprey, and waterfowl, such as mallard, double-crested cormorant, and gadwall, would benefit from additional open water habitat.

Large Game and Other Wildlife

There would be a permanent loss of about 810 acres of elk winter range, mule deer winter range and concentration areas and mule deer summer range from reservoir construction. Loss of winter range would reduce the availability of forage and increase competition for limited forage resources during winter. The loss of elk and mule deer winter range represents about a 0.2 percent loss of available winter range within CPW Game Management Unit 20, which encompasses Larimer County and northern Boulder County. The Chimney Hollow study area occurs within the overall range of white-tailed deer, but there would be no effect to winter or summer ranges.

There would be a loss of about 810 acres of black bear fall concentration area, which would reduce foraging opportunities. The loss of foraging would be offset partially by increased opportunities to forage on fish and waterfowl attracted to reservoirs. There would be no effect to mountain lion seasonal ranges. Expansion of existing mountain lion/human conflict areas north of the reservoir site and black bear/human conflict areas near Carter Lake is possible with planned recreation activity in the area.

A new reservoir in the Chimney Hollow valley would fragment existing habitat for some mammals. Elk winter range and black bear fall concentration areas on the east side of Chimney Hollow may be more difficult to access due to the new reservoir and topographic constraints. Although no designated migration corridors for big game would be disrupted, Chimney Hollow Reservoir would alter local movement patterns by deer, elk, and other wildlife.

Other common mammals that would be displaced include coyote, red fox, cottontail rabbit, long-eared myotis, rock squirrel, northern rock mouse, Mexican woodrat, and other small mammals.

9.3.2. Alternative 3—Chimney Hollow Reservoir and Jasper East Reservoir

Construction of a 70,000 AF Chimney Hollow Reservoir would have effects to wildlife similar to those described for Alternative 2; however, the permanent loss of terrestrial habitat would decrease to about 675 acres and the temporary effect would be about 145 acres. Specific differences include a slight reduction in the loss of wetland and water habitat potentially used by northern leopard frog and common gartersnake. There would be a loss of about 675 acres of elk winter range, mule deer summer, winter, winter concentration areas, and black bear fall concentration areas. Impacts to bald eagles and golden eagles during construction would be the same as Alternative 2.

The following discussion pertains to the effect from construction of Jasper East Reservoir.

State Threatened, Endangered and Species of Concern

The Jasper East Reservoir site does not contain quality habitat for boreal toad, wood frog, and northern leopard frog and none were found in field surveys, but there would be a loss of about 22 acres of potential habitat in wetlands and waters. There would be no effect to potential breeding habitat for ferruginous hawks, which may migrate through the area in the winter, or to peregrine falcons that are not known to nest in Grand County. The loss of hayfields and wetlands is unlikely to adversely affect sandhill crane, which prefers grain fields with better forage and nesting habitat that is not mowed. There would be a loss of about 125 acres of native sagebrush shrublands and a temporary impact on 35 acres that could provide habitat for greater sage grouse. There would be no effect to any known sage grouse populations, but the loss of potentially suitable habitat could affect eastward expansion of a sage grouse population located west of Jasper East.

CNHP Species

The loss of sagebrush habitat would reduce suitable foraging habitat for the sage sparrow, which may migrate through the area.

Migratory Birds and Raptors

The loss of about 190 acres of grasslands and 129 acres of shrublands would reduce available foraging and nesting habitat for birds such as spotted towhee, savannah sparrow, and other ground-nesting birds. The loss of about 14 acres of upland forest would reduce habitat for tree- and cavity-nesting species. The disturbance to about 128 acres from pipelines and construction staging would temporarily displace birds from potential foraging and nesting sites.

Road construction would affect about 3 acres of bald eagle winter range, and pipeline construction would temporarily affect about 5 acres of bald eagle winter range. The temporary disturbance of winter range would have a short-term minor effect on bald eagles. Construction of new open water habitat would have a long-term beneficial effect by increasing bald eagle foraging habitat.

There would be no effect to the golden eagle nest site located on a bluff to the east of the Jasper East reservoir site. This alternate nest site was active in 2007, but is more than 1 mile from the reservoir site. No other known raptor nest would be affected. Jasper East Reservoir would provide additional foraging habitat for osprey and waterfowl.

Large Game and Other Wildlife

There would be a loss of about 480 acres of moose and mule deer summer range from construction of Jasper Reservoir. Summer range is not a limiting factor for either of these species, and the loss of a very small portion of summer range would not have any measurable effect on mule deer or moose populations. Relocation of the Willow Creek pump station and canal would affect about 16 acres of moose winter range and winter concentration area. The reservoir would impact about 24 acres of elk winter range. The very small loss of these winter ranges would not have any measurable effect on populations. Additional temporary impacts include disturbance of 85 acres of moose and mule deer summer range and 17 acres of elk winter range and concentration area. Overall range for white-tailed deer would be lost.

There would be a loss of about 93 acres and a temporary impact to 19 acres of black bear summer concentration area. No mountain lion seasonal range or concentration areas would be affected. Construction of Jasper East Reservoir would displace some widely dispersed and common wildlife species.

9.3.3. Alternative 4—Chimney Hollow Reservoir and Rockwell/Mueller Creek Reservoir

Effects to wildlife for Chimney Hollow Reservoir under Alternative 4 would be the same as Alternative 3. The effects below pertain to Rockwell Reservoir.

State Threatened, Endangered and Species of Concern

Construction of Rockwell Reservoir would result in the loss of about 17 acres of wetland and riparian habitat that potentially could provide habitat for boreal toad, wood frog, and northern leopard frog. The site is geographically separated from other boreal toad populations; therefore, effects are unlikely. Wood frogs are unlikely to be affected because they typically prefer higher elevation marshes that provide better quality habitat than at Rockwell. There would be no effect to potential breeding habitat for ferruginous hawk, which may migrate through the area in the winter, or peregrine falcon, which is not known to nest in Grand County. Sandhill cranes are unlikely to be affected because of a lack of suitable habitat. The loss of about 290 acres of sagebrush habitat within a sage grouse production and brood rearing area would adversely affect a declining sage grouse population.

CNHP Species

The loss of sagebrush habitat would reduce suitable foraging habitat for sage sparrow that may migrate through the area.

Migratory Birds and Raptors

The loss of about 297 acres of shrubland habitat would reduce foraging and nesting habitat for species such as Brewer's sparrow and vesper sparrow. Removal of about 14 acres of lodgepole pine forest would reduce habitat for cavity-nesting species. The loss of about 17 acres of riparian habitat along Rockwell and Mueller Creek would reduce habitat for species such as, pine siskin, white-crowned sparrow, and western wood pewee. Pipeline construction and staging areas would temporarily disturb about 105 acres of potential habitat used by various bird species.

The Rockwell Reservoir pipeline connection to Windy Gap Reservoir in Alternatives 4 and 5 would cross bald eagle winter range and winter concentration areas along the Colorado

River. Construction of new open water habitat at Rockwell Reservoir would have a long-term beneficial effect by increasing bald eagle foraging habitat.

No known raptor nests would be affected, but suitable foraging habitat is present and forested areas provide roost and perch sites. A new reservoir would provide breeding foraging habitat for waterfowl and other waterbirds.

Large Game and Other Wildlife

There would be a permanent loss of about 312 acres of summer range for moose and mule deer. Summer range is not a limiting factor for either of these species, and the loss of a very small portion of summer range would not have any measurable effect on mule deer or moose populations. The reservoir would permanently impact about 73 acres of elk winter range and 82 acres of summer range. The loss of elk winter range represents a loss of less than 0.1 percent of available winter range within CPW Game management Unit 18 in Grand County. Temporary disturbance to 56 acres of elk summer range and 9 acres of elk winter range would occur at borrow areas and along the pipeline route. Overall range for white-tailed deer would be lost. There would be no impact to black bear or mountain lion seasonal ranges, although these species may use habitat in the area.

Reservoir construction would displace widely dispersed wildlife species such as coyote, gray fox, and black-tailed jackrabbit, and striped skunk.

9.3.4. Alternative 5—Dry Creek Reservoir and Rockwell/Mueller Creek Reservoir

The effect to wildlife resources from construction of a 30,000 AF Rockwell Reservoir would be similar, but slightly greater than those described for the smaller reservoir in Alternative 4. There would be a permanent loss of wildlife habitat of about 390 acres and a temporary loss of about 69 acres of wildlife habitat. Key differences include a permanent impact to 334 acres of sage grouse breeding and brood rearing habitat, which would affect the existing population. The loss of moose and mule deer summer range would increase to about 393 acres and about 97 acres of elk winter range would be lost. The loss of elk winter range represents about 0.15 percent of the available winter range in CPW Game Management Unit 18 in Grand County.

The remainder of this section discusses effects to wildlife from construction of Dry Creek Reservoir.

State Threatened, Endangered and Species of Concern

The loss of about 8.5 acres of wetland and water habitat from Dry Creek Reservoir construction would affect known northern leopard frog habitat. Common gartersnake, which also uses wetland habitat as well as mesic woodlands and shrublands, also could be affected by the loss of about 30 acres of suitable habitat. Replacement of lost wetland habitat and riparian development around the new reservoir could potentially offset some of the lost habitat for leopard frog and gartersnake.

The loss of grassland and shrubland habitat would reduce potential foraging habitat for ferruginous hawk and peregrine falcon. Potential nesting, migration, and roosting habitat for peregrines on the hogback east of Dry Creek would not be affected. The loss of potential foraging habitat is unlikely to adversely affect these species because of the lack of

documented activity in the area. The Dry Creek site contains limited potential habitat at the periphery of the Townsend's big-eared bat's range, but there are no records of this species' occurrence in the study area.

CNHP Species

Suitable habitat for several butterfly species would be affected by construction of Dry Creek Reservoir and facilities. There would be loss of about 239 acres of native grassland and shrubland habitat that contains areas of blue grama grass potentially used by simius road skipper and rhesus skipper. Suitable habitat for Argos skipper, dusted skipper, ottoe skipper, and cross-line skipper would be affected by the loss of ponderosa pine and native grasslands that contain areas of big bluestem and little bluestem grasses. The loss of about 162 acres of shrublands would affect habitat potentially used by mottled duskywing.

Migratory Birds and Raptors

Construction of Dry Creek Reservoir would affect nesting and foraging habitat for several migratory birds and raptors. A permanent loss of about 200 acres of ponderosa pine forest would reduce available habitat for American crow, pygmy nuthatch, Steller's jay, and other forest-nesting species. The loss of about 400 acres of shrubland and grassland would affect habitat used by western meadowlark, mourning dove, savannah sparrow, and other ground-nesting birds. The loss of about 30 acres of woodlands and wetlands along Dry Creek would affect potential habitat for raptors, magpies, robins, goldfinch, and a variety of small birds. A red-tailed hawk nest located along Dry Creek would be lost. There would be no affect to a golden eagle nest located more than 3 miles away on the hogback to the east, although there would be loss of foraging habitat.

There would be a permanent impact to about 165 acres of bald eagle winter range and temporary disturbance of 40 acres of winter range. Construction of the spillway would affect less than 1 acre of bald eagle winter concentration area. The loss of winter range would reduce terrestrial habitat for bald eagle foraging while the construction of a new reservoir would have a long-term beneficial effect by creating open water foraging habitat.

The disturbance of about 158 acres of various habitats from pipeline construction, staging areas, and other temporary activities would have a short-term effect on potential bird habitat until sites are revegetated.

Osprey, and waterfowl, such as mallard, double-crested cormorant, and gadwall, would benefit from additional open water habitat.

Large Game and Other Wildlife

About 650 acres of elk winter range, mule deer summer range, and mule deer winter range and winter concentration areas would be lost permanently. The loss of elk and mule deer winter range represents a loss of less than 0.2 percent of available winter range within CPW Game Management Unit 20, which encompasses southern Larimer County and portions of northern Boulder County. The loss of this small portion of the overall available winter range would not have any measurable effect on elk or mule deer populations. Pipeline construction and construction staging would temporarily impact approximately 158 acres of elk winter range, mule deer summer range, and mule deer winter range and winter concentration areas. White-tailed deer overall range would be impacted, but no seasonal ranges would be affected.

There would be a permanent impact to 619 acres of black bear fall concentration area and overall mountain lion range. The loss of this small portion of the overall available range would not have a measurable effect on bear populations. Temporary impacts would occur to about 69 acres of black bear fall concentration area. Human conflict areas for black bear and mountain lions are possible if recreation use is developed at Dry Creek Reservoir.

Other common mammals that would be displaced include coyote, red fox and cottontail rabbit, as well as species endemic to ponderosa pine habitats, such as long-eared myotis, rock squirrel, northern rock mouse, Mexican woodrat, and other small mammals.

9.4. Threatened and Endangered Species

All of the alternatives would result in additional diversions from the Colorado River that would adversely impact endangered Colorado River fish species— bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker. The Subdistrict has signed a recovery agreement and will be responsible for paying a depletion fee for additional diversions. The alternatives would result in additional diversions to the East slope, but negligible changes in flow in the South Platte River at the Kersey gage are anticipated because Windy Gap water is reusable to extinction and any return flows that accrue to the South Platte River are expected to be diverted by other water rights. As a result there would be no adverse effect to least tern, piping plover, whooping crane or pallid sturgeon on the Platte River in Nebraska.

9.4.1. Colorado-Big Thompson Project Consultation

ECAO is currently undergoing separate consultation with the Service on the potential impacts of Reclamation's C-BT Project, which includes the continued operation of the East Slope features of the C-BT Project, on the listed species and habitats not addressed in the Platte River Recovery Program. In 2006, the ECAO contracted to survey all C-BT Project lands below elevations of 7,000 feet; this was approximately the elevation of the Pole Hill Power Plant west of Loveland. All fee-owned lands were evaluated for whether they provided potential habitat for Preble's, Colorado butterfly plant (CBP), and Ute ladies'-tresses orchid (orchid).

All lands associated with the following C-BT features were evaluated: Pole Hill Reservoir and adjacent lands; Pinewood Reservoir and adjacent fee-owned lands; Flatiron Reservoir and adjacent fee-owned lands; Carter Lake and adjacent fee-owned lands; Horsetooth Reservoir and adjacent fee-owned lands; Charles Hansen Feeder Canal – all fee-owned lands adjacent to the canal between Flatiron Reservoir and Horsetooth Reservoir; and St. Vrain and Boulder Creek Supply Canals – all fee-owned lands adjacent to the canals from Carter Lake to Boulder Reservoir.

The survey identified nine areas with potential habitat for one or more of the above-listed species. Seven areas were identified as potential habitat for Preble's, two areas for the orchid, and one site for CBP. Subsequent discussions with the Service eliminated several of these parcels as potential habitat because of their size and adjacent disturbances. In 2007 and 2008, two parcels at Pinewood Reservoir and one parcel along the Boulder Feeder Canal were surveyed for the orchid and CBP, with negative results. In 2008, one parcel of land near Flatiron Reservoir was surveyed for Preble's with positive results. To verify the results, additional sampling was conducted in 2009 and a population of Preble's was confirmed. ECAO is in the process of preparing a biological assessment addressing the effects of C-BT

Project East Slope facilities on listed species not covered by the Platte River Recovery Program. When completed, the biological assessment will be submitted to the Service with appropriate recommendations.

9.4.2. Alternative 2—Chimney Hollow Reservoir (Proposed Action)

There would be no adverse effect to threatened or endangered species at the Chimney Hollow Reservoir site. Construction of Chimney Hollow Reservoir would have no effect on Preble's populations based on trapping surveys. The Service concurred that a population of Preble's does not likely occur within the Chimney Hollow study area. There would be no changes in streamflow below Chimney Hollow Reservoir that would affect potential downstream Preble's habitat. Based on negative survey findings, lack of potentially suitable habitat, and past Service concurrence, construction of Chimney Hollow Reservoir would have no effect on Preble's. A habitat evaluation prior to construction in case conditions change (Service 2003). No other threatened or endangered species would be impacted because of a lack of suitable habitat at the reservoir site.

Impacts to the endangered species in the Colorado River were addressed in the 1981 Service Biological Opinion for the original Windy Gap Reservoir based on an estimated average annual diversion of 57,300 AF. A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River basin was initiated on January 22, 1988. The Recovery Program was intended to be the reasonable and prudent alternative for individual projects to avoid the likelihood of jeopardy to the endangered fishes from depletions from the Upper Colorado River basin. A Section 7 agreement was implemented on October 15, 1993 by Recovery Program participants. Incorporated in this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP) that identifies actions currently believed to be required to recover the endangered fish. On December 20, 1999, the Service issued a final programmatic biological opinion (PBO) for Reclamation's Operation and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions in the Upper Colorado River above the Confluence with the Gunnison River. The Service determined projects that fit under the umbrella of the Colorado River PBO would avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts. The Colorado River PBO states that in order for actions to fall within the umbrella of the PBO and rely on the RIPRAP to offset its depletions, the following criteria must be met:

- A Recovery Agreement must be offered and signed prior to conclusion of Section 7.
- A fee to fund recovery actions will be submitted as described in the Proposed Action for new depletion projects greater than 100 AF/year. The 2012 fee is $19.21 per AF and is adjusted each year for inflation.
- Reinitiation stipulations will be included in all individual consultations under the umbrella of this PBO.
- The Service and project proponents will request that discretionary federal control be retained for all consultations under this PBO.

Reclamation reinitiated consultation with the Service because the water depletions associated with the WGFP Preferred Alternative would adversely affect bonytail chub,

Colorado pikeminnow, humpback chub, and razorback sucker. The Service issued a biological opinion on February 12, 2010 for the Preferred Alternative (Appendix B). The biological opinion determined that the original Windy Gap Project meets the criteria for coverage under the PBO because a Recovery Agreement was signed by the Subdistrict in March 2000 and the depletions existed when the Recovery Program was initiated. Because it was not a new depletion, no additional fees were submitted for compliance with the PBO. Hydrologic modeling for the PBO determined that the existing average annual depletions caused by the Windy Gap Project between 1981 and 1999 was 18,779 AF. The proposed WGFP would cause an additional average annual depletion of 21,317 AF/year. The average annual water depletion from the Colorado River as a result of the Windy Gap Project, including the additional depletions of the proposed WGFP, would be 40,096 AF/year.

In order for the WGFP to rely on the Recovery Program to offset the new average annual depletions of 21,317 AF, the Subdistrict will make a monetary contribution for new water depletions to help fund their share of the costs of recovery actions. The Subdistrict will pay a one-time depletion fee, 10% is due at the time of project approval and the balance is due prior to construction of the project at the appropriate rate per AF in the year of payment. At 2012 rates of $19.21/AF, the cost for increased depletion of 21,317 AF for the Proposed Action would be $409,499.57.

9.4.3. Alternative 3—Chimney Hollow Reservoir and Jasper Reservoir

There would be no impacts to threatened or endangered species at the Chimney Hollow Reservoir site as described for Alternative 2. Construction of Jasper East Reservoir would not affect potentially suitable lynx habitat. There would be a loss of about 13 acres of native coniferous forest. The areas of impacted forest consist of small, isolated stands that do not provide foraging or denning habitat for lynx; therefore, Jasper East Reservoir would have no effect on the Canada lynx. No other threatened or endangered species would be impacted because of a lack of suitable habitat at the reservoir site.

Impacts to Colorado River endangered fish would be similar to Alternative 2 because Colorado River diversions would be similar.

9.4.4. Alternative 4—Chimney Hollow Reservoir and Rockwell/Mueller Creek Reservoir

There would be no impacts to threatened or endangered species at the Chimney Hollow Reservoir site as described for Alternative 2. Construction of the 20,000 AF Rockwell Reservoir and associated facilities would permanently impact about 5 acres of native forest and temporarily disturb about 14 acres of native forest within potential lynx habitat. Much of the forested area adjacent to the Rockwell Reservoir study area has been previously fragmented by road construction and residential development. The loss of forest may affect, but is not likely to adversely affect lynx because this forest habitat is on the edge of potential lynx habitat, is discontinuous and fragmented, and most of the reservoir site is nonforested.

Impacts to Colorado River endangered fish would be similar to Alternative 2 because Colorado River diversions would be similar.

9.4.5. Alternative 5—Dry Creek Reservoir and Rockwell/Mueller Creek Reservoir

There would be no adverse effect to threatened or endangered species at the Dry Creek or Rockwell Reservoir sites. Based on the negative trapping results at Dry Creek Reservoir, there would be no direct impact to Preble's populations from construction of the reservoir and facilities. There would be no change in streamflow below the reservoir site that would affect potential Preble's habitat downstream. The Service (2004) has requested an additional survey prior to construction to confirm the absence of Preble's. Thus, the interim determination of effects for the Preble's is no effect unless additional surveys locate Preble's.

Construction of the 30,000 AF Rockwell Reservoir and associated facilities would permanently impact about 9 acres of native forest and temporarily disturb about 14 acres of native forest within potential lynx habitat. Much of the forested area adjacent to the Rockwell Reservoir study area has been previously fragmented by road construction and residential development. The loss of forest may affect, but is not likely to adversely affect lynx because this forest habitat is on the edge of potential lynx habitat, is discontinuous and fragmented, and most of the reservoir site is nonforested. No other threatened or endangered species would be impacted because of a lack of suitable habitat at the reservoir site.

Impacts to Colorado River endangered fish would be similar to Alternative 2 because Colorado River diversions would be similar.

9.5. Cumulative Effects

9.5.1. Vegetation Resources

Land-based reasonably foreseeable actions potentially occurring in the basins where alternative reservoir facilities would be located were used to estimate cumulative direct effects to vegetation. The development of Larimer County Open Space adjacent to the Chimney Hollow Reservoir site and a residential development near Jasper East were the only reasonably foreseeable land-based actions identified with potential cumulative effects.

No Action Alternative

No reasonably foreseeable actions were identified in the vicinity or Ralph Price Reservoir were identified that would result in cumulative effects to vegetation or wetlands.

Alternative 2—Chimney Hollow Reservoir (Proposed Action)

The future planned management of the Chimney Hollow Reservoir site as part of Larimer County's adjacent Chimney Hollow Open Space includes trail development and public access. There would be a cumulative loss of vegetation from construction of about 10 miles of trail in addition to the vegetation disturbance and loss from construction of Chimney Hollow Reservoir and related facilities. No reasonably foreseeable actions were identified that would lead to a cumulative impact to wetlands.

Alternative 3—Chimney Hollow Reservoir and Jasper East Reservoir

Cumulative effects to vegetation at Chimney Hollow would be the same as Alternative 2. Reasonably foreseeable future development in the Jasper East basin includes about 980 acres of planned residential development at the C-Lazy-U Preserve located north of the reservoir site. A total cumulative effect to vegetation of up to 1,465 acres from the 485-acre Jasper

East Reservoir and the C-Lazy-U development is possible. However, future land developments at C-Lazy-U would impact a relatively small portion of the site based on planned low-density housing and designation of common open space. Much of C-Lazy-U land is currently used for hay production and pasture. No reasonably foreseeable actions were identified that would lead to a cumulative impact to wetlands.

Alternative 4—Chimney Hollow Reservoir and Rockwell/Mueller Creek Reservoir

Cumulative effects to vegetation at Chimney Hollow would be the same as Alternative 2. No reasonably foreseeable land development activities in the Rockwell Reservoir basin have been identified; thus, there would be no incremental cumulative effects to vegetation. No reasonably foreseeable actions were identified that would lead to a cumulative impact to wetlands.

Alternative 5—Dry Creek Reservoir and Rockwell/Mueller Creek Reservoir

Planned trail construction on adjacent Larimer County Open Space could result in a minor incremental cumulative effect to vegetation resources. No reasonably foreseeable land development activities in the Rockwell Reservoir basin have been identified; thus, there would be no incremental cumulative effects to vegetation. No reasonably foreseeable actions were identified that would lead to a cumulative impact to wetlands.

9.5.2. Aquatic Resources

West Slope

The evaluation of aquatic resource cumulative effects was based on fish habitat model runs using the hydrologic conditions with reasonably foreseeable water-based projects in place, including the Moffat Collection System Project, West Slope population growth, changes in Williams Fork and Wolford Mountain Reservoir releases, future Wolford Mountain Reservoir contract demand, and expiration of Denver Water's contract with Big Lake Ditch. Hydrologic modeling did not include the future July/August to September releases from Granby Reservoir as part of the proposed 10825 Project. Thus, the analysis of fish habitat changes does not include the release of 5,412.5 AF from Granby Reservoir at rates ranging from 21 to 70 cfs depending on whether it is a dry or wet year. Most of these releases would come from as early as mid-July through September. As noted in the following discussion, these releases would increase available fish habitat and reduce stream temperatures during periods of low flow. Because some of the largest decreases in adult rainbow trout habitat occur in August, the 10825 Project releases would reduce habitat loss during these low periods regardless of Windy Gap pumping, which occurs infrequently in August.

Cumulative impacts to fish habitat on the West Slope, in particular to the Colorado River and Willow Creek, show a decrease in habitat for juvenile and adult rainbow and brown trout from Windy Gap Reservoir downstream to Troublesome Creek. This contrasts with the direct effects that only show a decrease for adult rainbow trout habitat in the reach between Windy Gap Reservoir and the Williams Fork Reservoir. The additional decrease in habitat is the result of future foreseeable changes to flow attributable to projects other than Windy Gap. The WGFP contribution to cumulative effects decreases slightly because less water would be available for diversion in the future with reasonably foreseeable actions in place.

Average year impacts for the Proposed Action would be similar to the direct effects described in Section 9.2.1). The greatest decrease in adult rainbow trout habitat occurs in late August above the Williams Fork, with increases in habitat in June of average years. Habitat changes for brown trout show a similar pattern, but reasonably foreseeable actions other than the WGFP result in maximum habitat decreases in September. Figure 10 and Figure 11 illustrate the seasonal increases and decreases in adult rainbow trout and brown trout habitat during average flow years below Windy Gap Reservoir compared to existing conditions. Changes in fish habitat diminish downstream as shown in Figure 12 and Figure 13 for adult rainbow and brown trout habitat above the confluence with the Blue River.

Both increases and decreases in brown trout habitat occur in dry years as a result of reasonably foreseeable actions. WGFP diversions in dry years would not change from existing conditions. There is a substantial increase in habitat for brown trout in wet years in July except for a decrease in habitat downstream of the Blue River. Rainbow trout habitat changes show a similar pattern in dry and wet years (Miller Ecological Consultants 2010).

As noted in Figure 10 to Figure 13, cumulative impacts to rainbow and brown trout habitat with the No Action Alternative would parallel the impacts under the Proposed Action, but would not change as much, because Windy Gap diversions would be lower.

Figure 10. Percent change in rainbow trout (adult) habitat from existing conditions on the Colorado River below Windy Gap for average water year, cumulative effects.

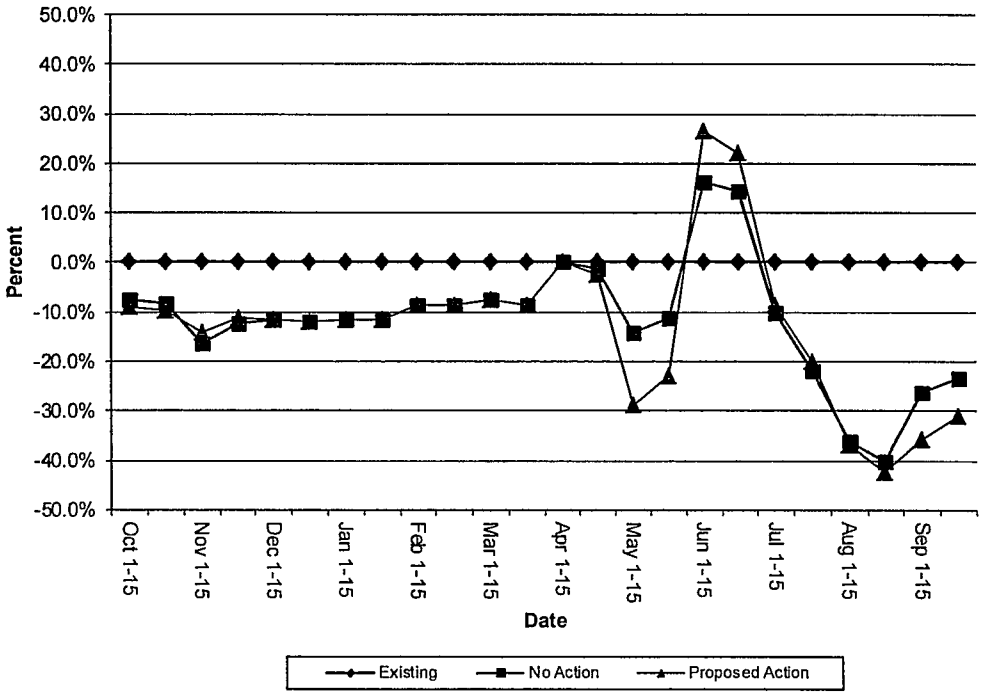


Figure 11. Percent change in brown trout (adult) habitat from existing conditions on the Colorado River below Windy Gap for average water year, cumulative effects.

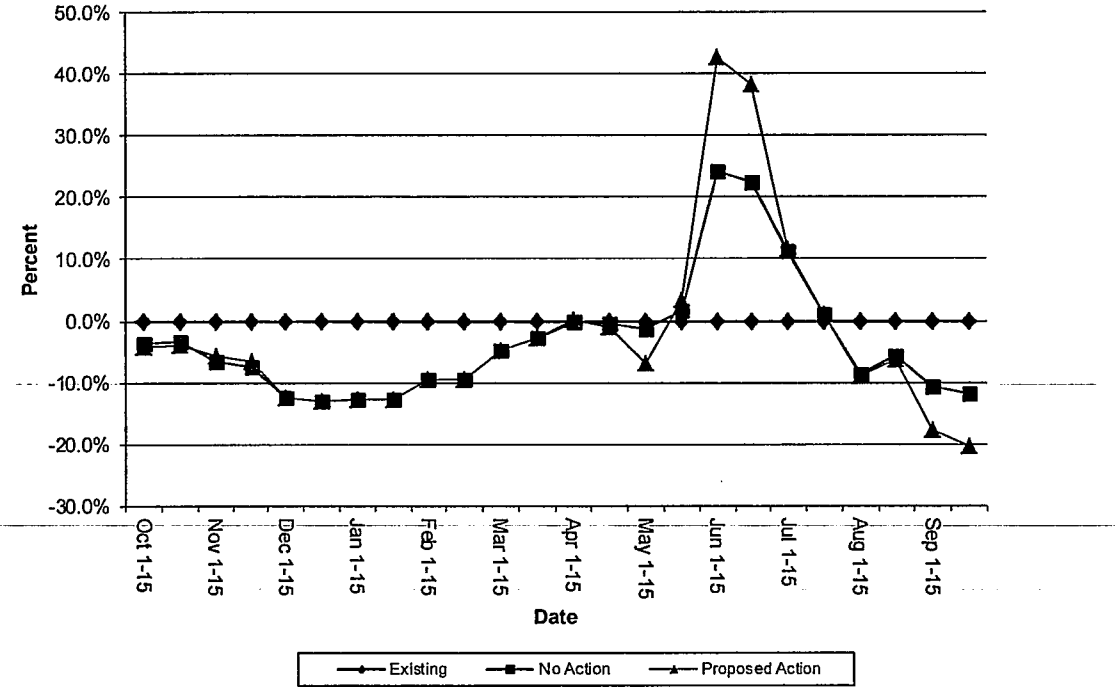


Figure 12. Percent change in rainbow trout (adult) habitat from existing conditions on the Colorado River above the Blue River for average water year, cumulative effects.

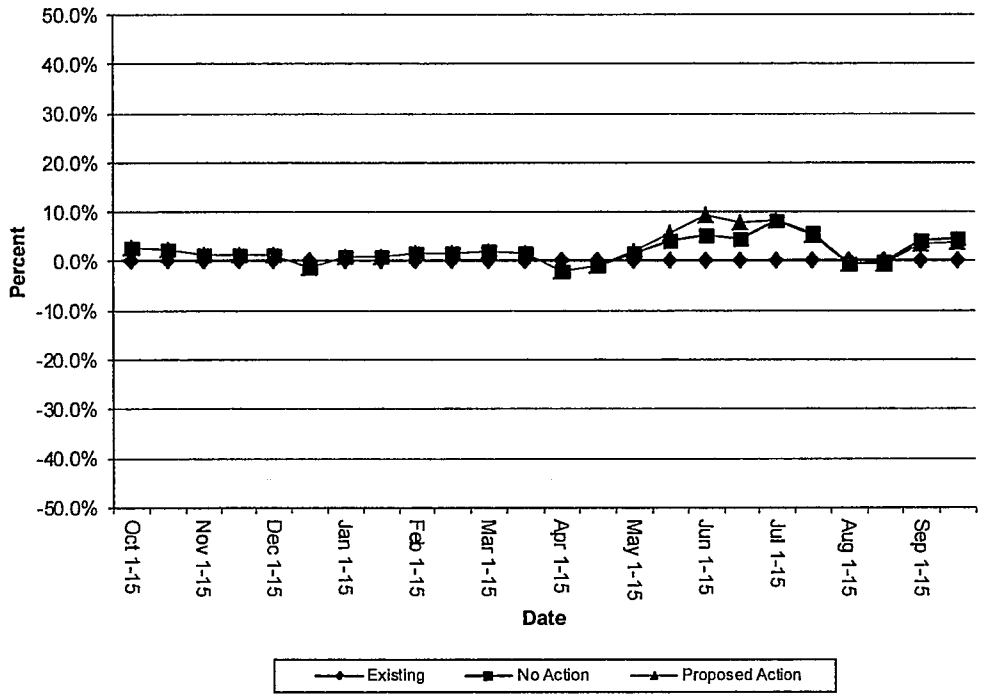
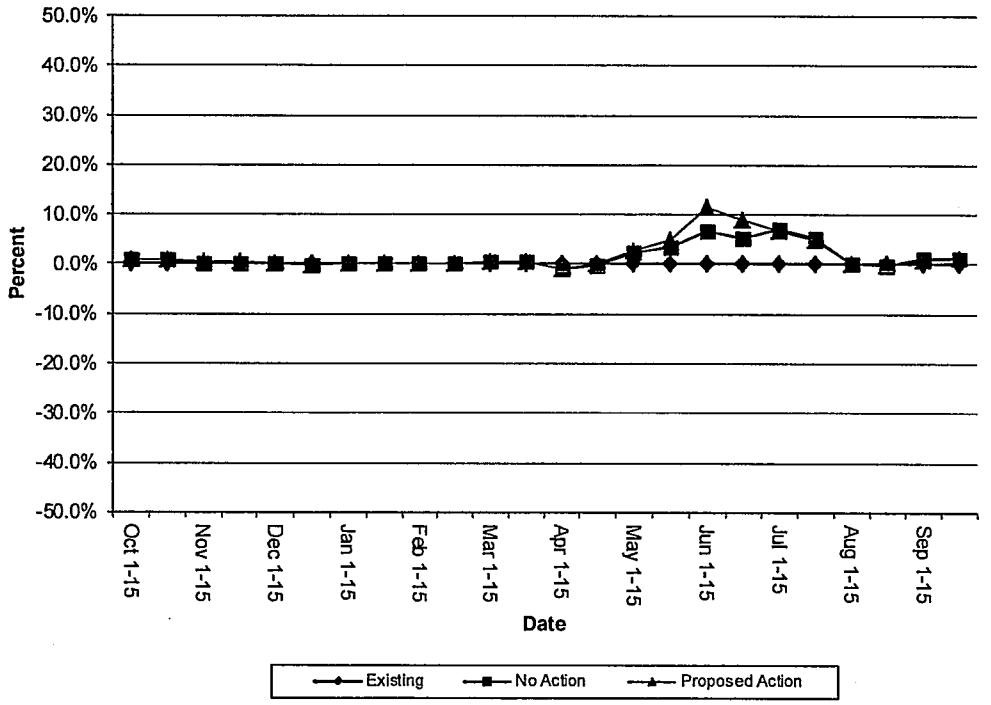


Figure 13. Percent change in brown trout (adult) habitat from existing conditions on the Colorado River above the Blue River for average water year, cumulative effects.



Dynamic temperature modeling of the Colorado River with the anticipated hydrologic conditions associated with reasonably foreseeable future actions in place was performed. Temperature modeling included future Granby Reservoir releases for with the 10825 Project that could occur as early as July 15 and continue through the end of September (see 10825 Project description below on page 74). The rate of release depends on the type of water year, but would range from 50 cfs in August to 29 cfs in September based on an average runoff year. Three years out of the 15 years of hydrology modeled showed simulated exceedence of WATs and/or DMs for the Proposed Action in the reach between Windy Gap and the Williams Fork, although exceedence of the temperature standard also occurred under simulated existing conditions in some years. The 5,412.5 AF releases from Granby Reservoir have a noteworthy cooling effect on river flows, particularly when releases begin in mid-July. Elevated stream temperatures exceeding the MWAT standard, and in particular the DM standard, would increase the stress on fish populations, although predicted exceedence as a result of the WGFP are estimated to occur only in about 3 out of 15 years assuming July and August air temperatures similar to 2007, which as previously stated, included the hottest August on record and the sixth hottest July on record.

Projected Colorado River water quality changes for DO, ammonia, inorganic phosphorus, and other modeled parameters in the future are not expected to adversely affect aquatic life or the stream fishery. DO concentrations would decrease by up to 0.1 mg/L from existing conditions under all alternatives, but the decrease would not lower the concentration below the standard. However, a DO concentration as low as 6.9 mg/L for a short reach above the Williams Fork would be below the aquatic life-spawning standard of 7.0 mg/L, but this would occur mid-summer, outside of the spawning season. Ammonia concentrations would

increase, but none of the alternatives would increase the ammonia concentration above the aquatic life chronic standard and, therefore, no impact to aquatic life is expected. Inorganic phosphorus concentrations are predicted to increase in the future, but with minimal effect to aquatic life.

Cumulative impacts to the Three Lakes fishery would be about the same as those described in the direct effects evaluation. Small reductions in DO concentrations are expected, but no change in trophic state for any of the lakes or reservoirs is expected. Because no change in trophic state is predicted, no measurable change in fish populations is likely. There would be no temperature change in the Three Lakes system under any alternative.

Several future actions by the Subdistrict, Denver Water, and others would benefit aquatic life:

Windy Gap Firming Project and Moffat Collection System Project Fish and Wildlife Enhancement Plans. In addition to the FWMP plans developed by the Subdistrict as a component of mitigation for the WGFP and by Denver Water for the proposed Moffat Collection System Project (Moffat Project) pursuant to regulations implementing CRS 37-60-122.2(2), both the Subdistrict and Denver Water cooperatively developed separate enhancement plans to further improve existing fish and wildlife resources (Municipal Subdistrict 2011b; Denver Water 2011a). These enhancement plans are intended to improve fish and wildlife resources over and above the levels existing without the WGFP and Moffat Project. The Fish and Wildlife Enhancement plans for the WGFP and Moffat Project were endorsed by the Colorado Wildlife Commission and CWCB at the same time the mitigation plans were adopted. The components of the enhancement plans are not intended to substitute for any mitigation required by the federal agencies for the projects. The goal of these plans is to coordinate the application of any required mitigation efforts with the voluntary and collaborative efforts of the stream enhancement projects to assure the maximum benefit for the stream environment. Key components of the enhancement plans are described below.

A primary feature of the joint Subdistrict and Denver Water enhancement plans is the Upper Colorado River Habitat Project (Habitat Project). 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. The Subdistrict has committed $3.0 million and Denver Water has committed $1.5 million in funding for the Habitat Project. In addition, $500,000 in funds from CPW and an additional $1.5 million from the Learning By Doing (LBD) Cooperative Effort described below may be available. Future funding of $1.0 million from the Subdistrict and $500,000 from Denver Water would be used for adaptive management and/or maintenance in the Habitat Project area.

The Habitat Project would be implemented through separate Intergovernmental Agreements (IGAs) between Denver Water/CPW and the Subdistrict/CPW. Denver Water and the Subdistrict would convey the committed funding to CPW, and CPW would design and implement the project. CPW would also enter into any agreements, as needed, with private landowners or other funding sources. Additionally, the Habitat Project would be managed by CPW in collaboration with the Habitat Project Stream Team, which includes the

Subdistrict, Denver Water, CPW, Grand County, and other parties that contribute financial resources to the Habitat Project including, but not limited to, landowners. Interested parties not contributing resources include Trout Unlimited and landowners that would serve on an Advisory Team. The Habitat Project would commence when the Subdistrict and Denver Water have received acceptable Records of Decision and permits for their respective projects and as agreed to in the IGAs.

The Habitat Project would be implemented in several phases beginning with setting specific goals to promote functionality of the river system, such as specific biological goals related to the health of the aquatic ecosystem, including fish and macroinvertebrates. The Stream Team would then evaluate the most effective and sustainable restoration opportunities based on site-specific field evaluations, data from the Grand County Stream Management Plan (SMP) (TetraTech et al. 2010), and the specific objectives for a given reach. Funds for proposed habitat improvements would be prioritized for public and privately owned stream segments and implemented over time as designs are completed. The CPW would be responsible for the long-term monitoring and maintenance of the stream restoration activities.

Habitat enhancement plans would be coordinated with the LBD Cooperative Effort to ensure consistency and coordination with the overall stream enhancement efforts in Grand County. This is a cooperative, iterative, and ongoing process to maintain, and when reasonably possible, restore or enhance the stream environment in the Fraser and Williams Fork river basins, and in the mainstem of the Colorado River from the outflow of Granby Reservoir to its confluence with the Blue River. The Grand County SMP is the framework for the overall LBD Cooperative Effort. The SMP would be used as a "living" document that would be revised as additional monitoring data are gathered and as management goals for each stream reach are agreed upon. The types of restoration opportunities include channel bank revegetation, enhancing fish passage, applying enhancement flows to existing low- and/or high-flow conditions, and in-stream habitat restoration.

In addition, West Slope stakeholders and CPW have expressed concern that the Windy Gap Reservoir has caused changes in water quality and sediment transport below the dam, which may be related to changes in populations of macroinvertebrates and mottled sculpin below the reservoir. Stakeholders also have expressed a desire for structural modifications that would allow free migration of fish around the Windy Gap dam. The Subdistrict has agreed to provide up to $250,000 to fund detailed studies of methods for bypass of flows, sediment, and/or fish around Windy Gap Reservoir. Issues to be studied include sediment transport, water quality (effects on temperature and/or nutrients), and fish passage. CPW would direct these studies to identify potential modifications that would provide tangible benefits to aquatic resources below Windy Gap Reservoir. If studies identify significant measurable benefits and there is consensus between the Subdistrict and other stakeholders to pursue the project, the Subdistrict would provide site access, in-kind service for design and construction of any facilities, and long-term operation and maintenance of the facility. All stakeholders would be responsible for investigation of potential sources of funding and procurement of funding for any identified improvements.

10825 Project. Water providers on the East Slope and West Slope have committed to permanently supply 10,825 AF of water per year during the late summer months to assist with the recovery of endangered fish in the "15-Mile Reach" of the Colorado River near Grand Junction per the Colorado River PBO. Previously, the 10825 water was provided on a

temporary and interim basis by Denver Water (from Williams Fork Reservoir) and by the CRWCD (from Wolford Mountain Reservoir). Reclamation is currently preparing an environmental assessment to evaluate the proposed project, which includes release of 5,412.5 AF of water from Ruedi Reservoir on the Roaring Fork River and 5,412.5 AF released from Granby Reservoir to the Colorado River (Reclamation 2011b). The Proposed Action would release 5,412.5 AF of water from Granby Reservoir each year during the late summer and fall, on a schedule that would be agreed upon in the spring of each year and an additional 5,412.5 AF would be released from Ruedi Reservoir. The Granby Reservoir releases would be made possible by the dry-up of a portion of the land currently irrigated by the Redtop Valley Ditch. Also, if the schedule of releases from Granby Reservoir are not consistent with needs in the 15-Mile Reach, excess storage capacity in Green Mountain Reservoir may be used to re-time the scheduled releases from Granby Reservoir, as necessary, and to optimize benefits in the 15-Mile Reach. The WGFP hydrologic model reflects that releases of 10,825 AF would no longer be made from Williams Fork (5,412.5) and Wolford Mountain (5,412.5) reservoirs for endangered fish in the 15-Mile Reach. However, the WGFP hydrologic model does not include the 5,412.5 AF from Granby Reservoir since these data were not available in time to incorporate into the Final EIS. The Granby Reservoir releases were used in the cumulative effects analysis for stream temperature modeling.

Colorado River Cooperative Agreement. As part of negotiations between West Slope parties and Denver Water, Grand County and Denver Water have reached a proposed agreement that addresses some of the issues related to Denver Water's existing operations in Grand County (Denver Water 2011c). In a *Proposed Colorado River Cooperative Agreement* (proposed agreement), Denver Water has committed to the LBD Cooperative Effort that provides environmental enhancements to benefit the aquatic environment in the Fraser, Williams Fork, and Upper Colorado rivers. The proposed agreement includes funding by Denver Water to reduce nutrient loadings in Grand County, environmental enhancements, up to 1,000 AF of bypass water from the Fraser River Collection System, 1,000 AF of releases from Williams Fork Reservoir, plus 2,500 AF of storage for environmental releases. In addition, Denver Water would contribute up to $2 million to Grand County for the costs of pumping Windy Gap water for environmental purposes. This measure is contingent upon an agreement between Grand County and the Subdistrict to allow Windy Gap water to be pumped, under certain conditions, into Granby Reservoir for later release to the Colorado River to improve streamflow. All of the measures would benefit the existing aquatic habitat in the Colorado River below Windy Gap Reservoir, as well as other streams within Denver Water's collection system.

Moffat Collection System Project. As part of the Moffat System Project, Denver Water has developed a FWMP that was adopted by the Colorado Wildlife Commission on June 9, 2011 and the CWCB on July 13, 2001. The mitigation plan includes measures on the West Slope in the Fraser River, Williams Fork, Blue River, and Colorado River basins (Denver Water 2011b). Components of the mitigation plan with potential direct effects to the Colorado River below Windy Gap Reservoir include up to 250 AF of bypassed diversions from its Fraser River Collection System when stream temperature exceeds standards on either Ranch Creek near Fraser, Colorado; the Fraser River near Tabernash, Colorado; or on the Colorado River between Windy Gap Reservoir and the Williams Fork. These releases have the potential to improve flows and moderate high stream temperatures in the Colorado River and portions of the Fraser River.

East Slope

No reasonably foreseeable water-based actions on the East Slope were identified that would add to the impacts of the Windy Gap Project. The changes in hydrology on the East Slope would be primarily related to less Windy Gap deliveries to the East Slope with reasonably foreseeable West Slope water-based projects online. The pattern of flows is expected to be similar to the direct effects. Small increases in streamflow predicted for East Slope streams would generally be less than 10 percent and any change in aquatic life is likely not measurable.

Hydrologic changes in Horsetooth and Carter reservoirs with reasonably foreseeable actions are unlikely to measurably affect fish populations in those reservoirs. Hydrologic and water quality changes at Ralph Price Reservoir with reasonably foreseeable actions in place would result in effects similar to direct effects, with slightly improved habitat following reservoir enlargement.

9.5.3. Wildlife Resources

Cumulative effects to wildlife focused on the loss or change in habitat associated with reasonably foreseeable land-based developments within 5 miles of each of the alternative reservoir locations. A 5-mile analysis area was used because many species of wildlife use a range of habitats over a wide area. Use of a broad study area provides an indication of the cumulative regional impact to wildlife within about an 80 square mile area surrounding each alternative reservoir site. Indirect effects to terrestrial wildlife from water-based reasonably foreseeable actions are not expected to measurably affect riparian vegetation that provides habitat for some wildlife species. Potential cumulative effects to wildlife are discussed for each alternative.

Alternative 2—Chimney Hollow Reservoir (Proposed Action)

Wildlife resources and habitat near the Chimney Hollow Reservoir have been affected by historical livestock operations and nearby land development such as construction of Carter Lake, Flatiron Reservoir, and other C-BT facilities, Bureau of Reclamation offices, rural residential development, and roads. Reasonably foreseeable future development includes about 1,440 acres of primarily residential development and other surface disturbances within about 5 miles of the Chimney Hollow Reservoir site. In addition to construction of Chimney Hollow Reservoir, these developments would result in a cumulative effect to about 2,240 acres of terrestrial wildlife habitat. Reasonably foreseeable future land developments are unlikely to completely eliminate existing wildlife habitat, but a reduction in wildlife value for some species is likely.

A cumulative loss of potentially suitable habitat for state species of concern—northern leopard frog and common gartersnake—is possible if riparian habitat is affected at future developments. The loss of grasslands at future developments could reduce potential foraging habitat for ferruginous hawk. A cumulative effect to other state species is unlikely because no suitable habitat to support these species is present in the region or there would be no effect on these specific species from construction of Chimney Hollow Reservoir.

Reasonably foreseeable land developments near Chimney Hollow Reservoir would affect about 66 acres of elk winter range. The loss of about 800 acres of elk winter range with construction of Chimney Hollow Reservoir would result in a cumulative regional loss of

about 866 acres of winter foraging habitat for elk. The loss of elk winter range represents about a 0.2 percent impact on available winter range within CPW Game Management Unit 20. Cumulative effects to mule deer winter range and winter concentration areas would include a loss of 800 acres from construction of Chimney Hollow Reservoir and an impact of about 1,290 acres from reasonably foreseeable land developments for total cumulative effect of about 2,090 acres. This represents a cumulative effect to about 0.6 percent of available mule deer winter range within CPW Game Management Unit 20.

Reasonably foreseeable future developments within about 5 miles of Chimney Hollow Reservoir could affect about 1,375 acres of bald eagle winter range. This, in addition to the loss of 7 acres of winter range from construction of Chimney Hollow Reservoir and facilities under the Proposed Action, would result in a cumulative impact to about 1,382 acres of bald eagle winter range.

The cumulative loss of undeveloped upland areas would reduce available habitat for migratory birds, particularly ground- nesting species. There would be a cumulative loss of terrestrial nongame wildlife habitat for small and medium sized mammals. The cumulative loss and change in wildlife habitat would fragment wildlife habitat, which could disrupt animal travel corridors, reduce available foraging and breeding habitat, and displace some wildlife species.

Alternative 3—Chimney Hollow Reservoir and Jasper East Reservoir

Chimney Hollow. Construction of a 70,000 AF Chimney Hollow Reservoir would result in a cumulative loss of terrestrial wildlife habitat of about 2,115 acres. This includes the loss of about 675 acres from construction of the reservoir, dam, and spillway and 1,440 acres of reasonably foreseeable land development within 5 miles of the reservoir site. The potential effects to wildlife would be similar to Alternative 2. The cumulative loss of elk winter range would be about 741 acres of elk winter range including the loss of 675 acres with construction of Chimney Hollow Reservoir and 66 acres from reasonably foreseeable developments. Cumulative effects to mule deer winter range and winter concentration areas would include a loss of 675 acres from construction of Chimney Hollow Reservoir and an impact of about 1,290 acres from reasonably foreseeable land developments in the region for a total cumulative effect of about 1,965 acres.

A 70,000 AF Chimney Hollow Reservoir would result in a loss of bald eagle winter range similar to Alternative 2 and a cumulative increase in open water foraging habitat of about 625 acres.

Jasper East. Wildlife habitat at the Jasper East Reservoir site has been influenced by irrigation and mowing of pasturelands, construction of the Willow Creek Canal, pump station, and forebay, and the presence of County Road 40, which bisects the property. Reasonably foreseeable future development within about 5 miles of the Jasper East Reservoir site includes about 1,590 acres of land development southwest of the Town of Granby and 980 acres of planned residential development at the C-Lazy-U Preserves located just north of the reservoir site. The cumulative effect to terrestrial wildlife habitat from construction of an approximately 485-acre Jasper East Reservoir and future land development would total about 3,005 acres. However, some developments such as the C-Lazy-U Preserve include areas of undisturbed open space that would continue to provide habitat value for wildlife.

A cumulative loss of potentially suitable habitat for sage grouse is possible from the loss of about 125 acres of sagebrush habitat at Jasper East in addition to an unknown loss of sagebrush from future development at C-Lazy-U Preserve.

Cumulative impacts to elk winter range include the loss of about 24 acres from reservoir construction and 1,230 acres from future land development. This represents a cumulative impact to about 1.5 percent of available elk winter range in Game Management Unit 18. The cumulative effect to moose winter range would be about 327 acres—16 acres from construction of Jasper East Reservoir and 311 acres from nearby future land developments. The cumulative effect to moose winter range would be about 1.2 percent of available range in Game Management Unit 18.

Reasonably foreseeable future land development south of Jasper East Reservoir could affect about 222 acres of bald eagle winter range including 55 acres of winter concentration area. Construction of Jasper East Reservoir would add about 3 acres to the cumulative effect on bald eagle winter range.

There would be a cumulative loss of terrestrial nongame wildlife habitat including potential fragmentation of wildlife habitat, which could disrupt animal travel corridors, reduce available foraging and breeding habitat, and displace some wildlife species

Alternative 4—Chimney Hollow Reservoir and Rockwell/Mueller Creek Reservoir

Chimney Hollow. The cumulative effect to wildlife resources at Chimney Hollow Reservoir under this alternative would be the same as described for Alternative 3.

Rockwell. Wildlife habitat in the 20,000 AF Rockwell Reservoir site has been affected in the past by low-density residential housing, roads, and livestock grazing. Reasonably foreseeable future development within about 5 miles of the Rockwell Reservoir site includes residential, commercial, and mixed development at Grand Elk and Granby Ranch. Future development encompasses areas of existing development, but further infill of these lands is expected. The total cumulative regional effect on terrestrial wildlife habitat including reasonably foreseeable land development and construction of Rockwell Reservoir would be about 5,105 acres. This includes the loss of about 335 acres from construction of the reservoir, dam, and spillway and 4,770 acres of reasonably foreseeable land development.

There would be a cumulative impact to about 740 acres of sage grouse production area consisting of the loss of about 290 acres from construction of Rockwell Reservoir and 450 acres from other reasonably foreseeable actions. The cumulative loss of sage grouse habitat could result in the complete loss of this declining population. A cumulative effect to other state species is unlikely because no suitable habitat is present in the region or there would be no effect from construction of Rockwell Reservoir.

A cumulative loss in elk winter range of about 3,173 acres would occur from the loss of about 73 acres from construction of Rockwell Reservoir and 3,100 acres from development on nearby lands. The cumulative impact to elk winter range would affect about 4.1 percent of the available winter range in Game Management Unit 18.

The Rockwell Reservoir pipeline to Windy Gap Reservoir would temporarily affect a bald eagle winter concentration area, but would not add to any permanent cumulative effects from other land developments in the region.

Much of the land within areas of reasonably foreseeable future development has already been disturbed, although additional development would further reduce these lands' suitability for wildlife use. Construction of Rockwell Reservoir site would contribute to the loss of upland terrestrial habitat, but would provide open water habitat for waterfowl and foraging habitat for bald eagles and osprey.

Alternative 5—Dry Creek Reservoir and Rockwell/Mueller Creek Reservoir

Dry Creek. The Dry Creek Reservoir site is mostly undeveloped land and currently supports a few scattered homes, unpaved roads, and a small llama ranch. Historically, livestock grazing also influenced the condition of the area. Reasonably foreseeable actions within about 5 miles of Dry Creek Reservoir would be about 1,460 acres of land that is under county development review for subdivision, dispersed residential development, commercial development, and/or special review for a proposed change in land use.

The total cumulative impact to terrestrial wildlife habitat would be about 2,091 acres. This consists of the loss of about 630 acres from construction of the Dry Creek Reservoir, dam, and spillway and 1,460 acres of reasonably foreseeable land development. Dry Creek Reservoir would provide about 590 acres of open water habitat for waterfowl, shore birds, bald eagles, and aquatic species. Future land developments are unlikely to completely eliminate existing wildlife habitat, but a reduction in wildlife value for some species is likely.

A cumulative loss of habitat for two state species of concern—northern leopard frog and common gartersnake—is possible if riparian habitat is affected at future developments. The loss of grasslands at future developments could reduce potential foraging habitat for ferruginous hawk. A cumulative effect to other state species is unlikely because no suitable habitat is present in the region or there would be no effect from construction of Dry Creek Reservoir.

The cumulative loss of undeveloped upland areas would reduce available habitat for migratory birds and in particular ground-nesting species because most of the reasonably foreseeable land development would be in open grasslands.

Cumulative effects to elk winter range would be 630 acres from construction of Dry Creek Reservoir and 52 acres from reasonably foreseeable land development for a total impact of about 682 acres. The loss of elk winter range represents less than a 0.2 percent impact on available winter range within CPW Game Management Unit 20. The cumulative effect on mule deer winter range and concentration areas would be about 1,934 acres consisting of impacts of 630 acres from reservoir construction and 1,304 acres from future development. This represents a cumulative effect to about 0.5 percent of available mule deer winter range within CPW Game Management Unit 20.

Reasonably foreseeable land developments near Dry Creek Reservoir could affect about 1,409 acres of bald eagle winter range. Construction of Dry Creek Reservoir would add 165 acres of impact to bald eagle winter range for a cumulative effect of 1,574 acres.

The cumulative loss of terrestrial habitat for wildlife in the region would reduce available foraging and breeding habitat for upland species, as well as fragmenting existing areas of available wildlife habitat.

Rockwell. Construction of a 30,000 AF Rockwell Reservoir would result in a cumulative impact to about 5,196 acres of terrestrial wildlife habitat from about 4,770 acres of reasonably foreseeable land development and the 425-acre Rockwell Reservoir.

There would be a cumulative impact to about 784 acres of sage grouse production area from the 334 acres lost from reservoir construction and 450 acres potentially disturbed by other reasonably foreseeable actions. The cumulative loss of sage grouse habitat could result in the complete loss of this declining population.

A cumulative loss in elk winter range of about 3,197 acres would occur from the loss of about 97 acres at Rockwell Reservoir and from development of 3,100 acres on nearby lands. The cumulative loss in elk winter range would affect about 4.5 percent of the available winter range in Game Management Unit 18.

The Rockwell Reservoir pipeline to Windy Gap Reservoir would temporarily affect a bald eagle winter concentration area, but would not add to any permanent cumulative effects from other land developments in the region.

9.5.4. Threatened and Endangered Species

Cumulative effects to threatened and endangered species considered the potential incremental impact from reasonably foreseeable land-based developments within 5 miles of each of the alternative reservoir locations for terrestrial wildlife and plant species. Hydrologic data under cumulative effect conditions was used to quantify impacts to aquatic species. Potential cumulative effects to threatened and endangered species are discussed for each of the species where possible direct effects were identified.

Canada Lynx

Reasonably foreseeable land developments within 5 miles of Rockwell Reservoir could affect about 1,432 acres of potential lynx habitat. Construction of Rockwell Reservoir in Alternatives 4 and 5 would affect less than 20 acres of forest within potential lynx habitat. The incremental effect to potential lynx habitat under Alternatives 4 and 5, in addition to possible effects from future nearby land development, would be small, but may contribute to the loss or disturbance of potential lynx habitat. Because much of the land in the area is of marginal value for lynx and areas of future development include areas with existing disturbance, the cumulative impact to lynx habitat may affect, but is unlikely to adversely affect, the lynx.

Preble's Meadow Jumping Mouse

There would be no cumulative effect to Preble's from construction of Chimney Hollow or Dry Creek Reservoir because no Preble's is present at either location.

Fish

Cumulative effects to Colorado River endangered fish would be similar to what was described for direct effects and would fall under the PBO. Colorado River depletions as a result of the alternative actions would be lower under cumulative effects, although total depletions would increase from other reasonably foreseeable actions. Greenback cutthroat trout would not be impacted under any alternative.

10.0 COMPARISON OF THE PROPOSED ACTION AND OTHER EVALUATED ALTERNATIVES

Table 12. Comparison of direct and indirect effects by alternative.

Impact Topic	Alternative 1 No Action Enlarge Ralph Price Reservoir	Alternative 2 Proposed Action Chimney Hollow Reservoir	Alternative 3 Chimney Hollow Reservoir and Jasper East Reservoir	Alternative 4 Chimney Hollow Reservoir and Rockwell Reservoir	Alternative 5 Dry Creek Reservoir and Rockwell Reservoir
[ALTERNATIVE IMPACTS ARE BASED ON A COMPARISON WITH EXISTING CONDITIONS]	Enlargement of Ralph Price Reservoir by 13,000 AF for storage of the City of Longmont's Windy Gap water	A 90,000 AF Chimney Hollow Reservoir with prepositioning to allow storage of C-BT water in Chimney Hollow	A 70,000 AF Chimney Hollow Reservoir and a 20,000 AF Jasper East Reservoir	A 70,000 AF Chimney Hollow Reservoir and a 20,000 AF Rockwell Reservoir	A 60,000 AF Dry Creek Reservoir and a 30,000 AF Rockwell Reservoir
SURFACE WATER HYDROLOGY					
West Slope					
WG diversions (avg. existing conditions=36,532 AF)					
*WG diversions (avg. annual)	43,573 AF	46,084 AF	48,052 AF	47,997 AF	48,483 AF
*WG diversions (avg. annual wet year)	63,870 AF	73,923 AF	78,940 AF	78,775 AF	77,543 AF
*WG diversions (avg. annual dry year)	Same as existing conditions	Same as existing conditions	Same as existing conditions	Same as existing conditions	Same as existing conditions
Avg. annual decrease in Colo. R. flow blw. WG Res.	8%	14%	14%	14%	14%
Avg. annual decrease in Colo. R. flow blw. Blue R.	2%	3%	3%	3%	3%
Avg. annual reduction in Willow Creek flow	7%	14%	12%	12%	12%
Change in Grand L./Shadow Mountain Res. storage	None	None	None	None	None
Average monthly decrease in Granby Res. storage	3 to 5%	7 to 13%	4 to 6%	4 to 6%	4 to 6%
East Slope					
Big Thompson R. at L. Estes (avg. mo. flow increase)	0 to 1%	1 to 9%	0 to 4%	0 to 4%	0 to 5%
Big Thompson R. at Loveland (max. mo. increase)	0 to 9.8 cfs	0 to 5.1 cfs	0 to 5.1 cfs	0 to 5.1 cfs	0 to 5.1 cfs
North St. Vrain Crk. (avg. monthly flow change)	-45 cfs to +18 cfs	No change	No change	No change	No change
St. Vrain Crk. at Longmont. (max. mo. flow increase)	0.8 to 11.3 cfs	0.5 to 6.4 cfs	0.5 to 6.4 cfs	0.5 to 6.4 cfs	0.5 to 6.4 cfs
Big Dry Crk. at Broomfield (max. mo. flow increase)	3.4 to 8.5 cfs	3.4 to 8.5 cfs	3.4 to 8.5 cfs	3.4 to 8.5 cfs	3.4 to 8.5 cfs
Coal Creek (max. mo. flow increase)	3.2 to 3.4 cfs	3.3 to 4.0 cfs	3.3 to 4.0 cfs	3.3 to 4.0 cfs	3.3 to 4.0 cfs
Avg. mo. decrease in Carter Lake storage	0 to 2%	0 to 1%	0 to 1%	0 to 1%	0 to 1%
Avg. mo. decrease in Horsetooth Res. storage	0 to 1%	3 to 8%	0 to 2%	0 to 2%	0 to 3%
WGFP firm yield	1,229 AF	26,559 AF	25,849 AF	25,849 AF	26,629 AF

Gross diversion prior to reductions due to agreements with Reclamation, evaporation, deliveries to Middle Park. Is not the same as deliveries to allottees.

Table 12 (cont'd). Comparison of direct and indirect effects by alternative.

Impact Topic	Alternative 1 No Action Enlarge Ralph Price Reservoir	Alternative 2 Proposed Action Chimney Hollow Reservoir	Alternative 3 Chimney Hollow Reservoir and Jasper East Reservoir	Alternative 4 Chimney Hollow Reservoir and Rockwell Reservoir	Alternative 5 Dry Creek Reservoir and Rockwell Reservoir
STREAM MORPHOLOGY AND FLOODPLAINS West Slope	Colorado River channel maintenance flows (0.8 x 1.5- to 25-year flows) below Windy Gap Reservoir at Hot Sulphur Springs would occur during about 2 to 9% less years. At the Kremmling gage channel maintenance flows would occur during 0 to 3% less years. Projected changes in peak flows and channel maintenance flows are unlikely to substantially affect channel morphology or change sediment transport. Flushing flows greater than 450 cfs would occur 23 days per year on average. Flows would remain adequate to transport fine sediment and prevent deposition. Changes in the magnitude, timing, and frequency of Granby Reservoir spills are not expected to alter channel morphology or sediment transport. Willow Creek flow equal to or greater than the 2-year peak flow discharge would occur slightly less frequently. The potential for flooding on the Colorado River and Willow Creek would decrease with lower flows.	Effects would be similar to No Action except that channel maintenance flows below Windy Gap Reservoir would occur slightly less frequently. Flushing flows greater than 450 cfs would occur 20 days per year on average. Adequate flow should be available to maintain channel capacity, provide periodic scouring, and transport sediment in the Colorado River and Willow Creek.	Effects would be similar to No Action except that channel maintenance flows below Windy Gap Reservoir would occur slightly less frequently. Flushing flows greater than 450 cfs would be similar to the Proposed Action. Jasper East Reservoir could potentially capture flood flows in this small watershed.	Effects would be similar to No Action except that channel maintenance flows below Windy Gap Reservoir would occur slightly less frequently. Flushing flows greater than 450 cfs would be similar to the Proposed Action. Rockwell Reservoir could potentially capture flood flows in this small watershed.	Effects would be similar to No Action except that channel maintenance flows below Windy Gap Reservoir would occur slightly less frequently. Flushing flows greater than 450 cfs would be similar to the Proposed Action. Rockwell Reservoir could potentially capture flood flows in this small watershed.
East Slope	Predicted changes in North St. Vrain Creek and St. Vrain Creek flows upstream of Lyons would be well within the historical range of flow and are unlikely to measurably affect stream morphology or sediment transport. A larger Ralph Price Reservoir could reduce the potential for downstream flooding. Relatively small increases in flows in the Big Thompson River and below WWTPs in St. Vrain Creek, Big Dry Creek, and Coal Creek would be unlikely to measurably affect channel morphology. These flow increases would not substantially increase the risk of flooding.	Effects would be similar to No Action except there would be no effect to North St. Vrain Creek or St. Vrain Creek upstream of Lyons. Chimney Hollow Reservoir could potentially capture flood flows in this small watershed.	Effects would be similar to No Action except there would be no effect to North St. Vrain Creek or St. Vrain Creek upstream of Lyons. Chimney Hollow Reservoir could potentially capture flood flows in this small watershed.	Effects would be similar to No Action except there would be no effect to North St. Vrain Creek or St. Vrain Creek upstream of Lyons. Chimney Hollow Reservoir could potentially capture flood flows in this small watershed.	Effects would be similar to No Action except there would be no effect to North St. Vrain Creek or St. Vrain Creek upstream of Lyons. Dry Creek Reservoir could potentially capture flood flows in this small watershed.

Table 12 (cont'd). Comparison of direct and indirect effects by alternative.

Impact Topic	Alternative 1 No Action Enlarge Ralph Price Reservoir	Alternative 2 Proposed Action Chimney Hollow Reservoir	Alternative 3 Chimney Hollow Reservoir and Jasper East Reservoir	Alternative 4 Chimney Hollow Reservoir and Rockwell Reservoir	Alternative 5 Dry Creek Reservoir and Rockwell Reservoir
SURFACE WATER QUALITY West Slope **Abbreviations:** TP = total phosphorus P = phosphorus TN = total nitrogen Mn = Manganese DO = dissolved oxygen TOC = total organic carbon Chlorophyll *a* = a measure of algae concentration Change in clarity = % change in Secchi Disk depth Trophic state = a measure of productivity	**Colorado River.** With average July 25 flows: DO would decrease 0.1 mg/L, ammonia would increase 1.3 µg/L, and inorganic P would increase up to 0.9 µg/L. Assuming diversions to the minimum 90 cfs streamflow for July 25: DO would decrease 0.5 mg/L, ammonia would increase 9.1 µg/L, and inorganic P would increase up to 5.1 µg/L. Modeling indicates an increase in the potential for exceedence of the chronic and acute temperature standards for aquatic life between Windy Gap and the Williams Fork from mid-July to August. Temperature modeling indicates annual increases in chronic temperature exceedence as high as 1 additional week above the WAT standard relative to existing conditions, and as high as 5 additional days above the DM standard relative to existing conditions. Temperature standard exceedence were modeled to increase from existing conditions in 4 out of the 15 years evaluated. Water quality would remain within standards, with the exception of increased potential for exceeding the temperature standard or being below the DO spawning standard at several locations when diversions reduce flow to the minimum streamflow. **Willow Creek.** No change in temperature and slight increase in nutrient and metal concentrations. Water quality would remain within standards. **Granby Reservoir.** TP concentrations would increase 6.3%; TN would increase 0.3%; no change in average chlorophyll *a*, clarity, and trophic state; minimum DO would decrease 2.2%. Dissolved manganese concentrations would continue to exceed standards. **Shadow Mountain Reservoir.** TP concentrations would increase 5.6%; TN would increase 1.1%; average chlorophyll *a* would increase 1.8%; and no change in clarity, trophic state, or minimum DO. No change in manganese concentrations, which currently exceed the standard. **Grand Lake.** TP concentrations would increase 6.0%, TN would increase 0.4%, average chlorophyll *a* would increase 4.2%, clarity would decrease 3.8%, no change in trophic state, and minimum DO would decrease 11.1%. Lower DO would contribute to continued exceedence of the manganese standard.	**Colorado River.** With average July 25 flows: DO would decrease 0.1 mg/L, ammonia would increase 1.7 µg/L, and inorganic P would increase up to 1.5 µg/L. Assuming diversions to the minimum 90 cfs streamflow for July 25: DO would decrease 0.6 mg/L, ammonia would increase 9.3 µg/L, and inorganic P would increase up to 5.7 µg/L. Modeling indicates an increase in the potential for exceedence of the chronic and acute temperature standards for aquatic life between Windy Gap and the Williams Fork from mid-July to August. Temperature modeling indicates annual increases in chronic temperature exceedence as high as 3 additional weeks above the WAT standard relative to existing conditions, and as high as 7 additional days above the DM standard relative to existing conditions. Temperature standard exceedence were modeled to increase from existing conditions in 4 out of the 15 years evaluated. Water quality standards for other parameters would be met except as noted for No Action. **Willow Creek.** Temperature would decrease 0.2°C and nutrient and metal concentrations would increase slightly. Water quality would remain within standards. **Granby Reservoir.** TP concentrations would increase 12.7%, TN would increase 0.7%, average chlorophyll *a* would increase 2.4%, no change in clarity or trophic state, and minimum DO would decrease 4.4%. The dissolved manganese concentrations would continue to exceed standards. **Shadow Mountain Reservoir.** TP concentrations would increase 11.3%, TN would increase 1.8%, average chlorophyll *a* would increase 1.8%, and no change in clarity or trophic state. Minimum DO would decrease 1.4%. A decrease in DO would contribute to continued exceedence of the manganese standard. **Grand Lake.** TP concentrations would increase 12.0%, TN would increase 1.6%, average chlorophyll *a* would increase 6.1%, clarity would decrease 3.8%, no change in trophic state, and minimum DO would decrease 7.4%. Lower DO would contribute to continued exceedence of the manganese standard.	**Colorado River.** With average July 25 flows: DO would decrease 0.1 mg/L, ammonia would increase 1.6 µg/L, and inorganic P would increase up to 0.9 µg/L. Assuming diversions to the minimum 90 cfs streamflow for July 25: DO would increase 0.5 mg/L, ammonia would increase 8.9 µg/L, and inorganic P would increase up to 5.0 µg/L. Temperature standard exceedence would be slightly less than the Proposed Action. Water quality standards for other parameters would be met except as noted for No Action. **Willow Creek.** Same as Proposed Action. **Granby Reservoir.** TP concentrations would increase 4.0%; TN would decrease 2.1%; and no change in average chlorophyll *a*, clarity, trophic state, or minimum DO. No change in DO. Manganese concentrations would continue to exceed the standard. **Shadow Mountain Reservoir.** TP concentrations would increase 8.1%; TN would increase 0.4%; average chlorophyll *a* would increase 1.8%; and no change in clarity, trophic state, or minimum DO. No change in manganese concentrations, which currently exceed the standard. **Grand Lake.** TP concentrations would increase 6.0%, TN would decrease 0.4%, average chlorophyll *a* would increase 4.2%, clarity would decrease 3.8%, no change in trophic state, and minimum DO would decrease 5.6%. Lower DO would contribute to continued exceedence of the manganese standard. **Jasper East Reservoir.** Predicted to be oligotrophic-mesotrophic and retain some TN and P, reducing nutrient delivery to Granby Reservoir.	**Colorado River.** With average July 25 flows: DO would decrease 0.1 mg/L, ammonia would increase 1.6 µg/L, and inorganic P would increase up to 0.9 µg/L. Assuming diversions to the minimum 90 cfs streamflow for July 25: DO would decrease 0.5 mg/L, ammonia would increase 8.9 µg/L, and inorganic P would increase up to 5.0 µg/L. Temperature standard exceedence would be slightly less than the Proposed Action. Water quality standards for other parameters would be met except as noted for No Action. **Willow Creek.** Same as Proposed Action. **Granby Reservoir.** TP concentrations would increase 3.2%; TN would decrease 2.8%; and no change in average chlorophyll *a*, clarity, trophic state, or minimum DO. No change in DO. Manganese concentrations would continue to exceed the standard. **Shadow Mountain Reservoir.** TP concentrations would increase 4.8%; TN would decrease 0.7%; and no change in average chlorophyll *a*, clarity, trophic state, or minimum DO. No change in manganese concentrations, which currently exceed the standard. **Grand Lake.** TP concentrations would increase 6.0%, TN would decrease 0.4%, average chlorophyll *a* would increase 2.0%, clarity would decrease 3.8%, no change in trophic state, and minimum DO would decrease 5.6%. Lower DO would contribute to continued exceedence of the manganese standard. **Rockwell Reservoir.** Predicted to be oligotrophic-mesotrophic and retain some TN and P, reducing nutrient delivery to Granby Reservoir.	**Colorado River.** With average July 25 flows: DO would decrease 0.1 mg/L, ammonia would increase 1.5 µg/L, and inorganic P would increase up to 0.8 µg/L. Assuming diversions to the minimum 90 cfs streamflow for July 25: DO would decrease 0.5 mg/L, ammonia would increase 8.9 µg/L, and inorganic P would increase up to 4.9 µg/L. Modeling indicates an increase in the potential for exceedence of the chronic and acute temperature standards for aquatic life between Windy Gap and the Williams Fork from mid-July to August. Temperature standard exceedence would be slightly less than the Proposed Action. Water quality standards for other parameters would be met except as noted for No Action. **Willow Creek.** Same as Proposed Action. **Granby Reservoir.** TP concentrations would increase 1.6%; TN would decrease 3.5%; and no change in average chlorophyll *a*, clarity, trophic state, or minimum DO. No change in DO. Manganese concentrations would continue to exceed the standard. **Shadow Mountain Reservoir.** TP concentrations would increase 3.2%; TN would decrease 1.1%; and no change in average chlorophyll *a*, clarity, trophic state, or minimum DO. No change in manganese concentrations, which currently exceed the standard. **Grand Lake.** TP concentrations would increase 4.8%, TN would decrease 0.8%, average chlorophyll *a* would increase 2.0%, no change in clarity or trophic state, and minimum DO would decrease 5.6%. Lower DO would contribute to continued exceedence of the manganese standard. **Rockwell Reservoir.** Same as Alternative 4.

Table 12 (cont'd). Comparison of direct and indirect effects by alternative.

Impact Topic	Alternative 1 No Action Enlarge Ralph Price Reservoir	Alternative 2 Proposed Action Chimney Hollow Reservoir	Alternative 3 Chimney Hollow Reservoir and Jasper East Reservoir	Alternative 4 Chimney Hollow Reservoir and Rockwell Reservoir	Alternative 5 Dry Creek Reservoir and Rockwell Reservoir
SURFACE WATER QUALITY East Slope Note: Water quality would not exceed standards in East Slope streams or reservoirs except as noted.	**N. St. Vrain Creek.** Depending on changes in flows, temperature on a monthly basis would increase up to 1°C or decrease up to 5°C. DO concentrations on a monthly basis would range from a decrease of 0.5 mg/L to an increase of 2.0 mg/L. **St. Vrain Creek.** Estimated ammonia concentrations below Longmont WWTP would increase the most in October (to 2.7 mg/L) and would be higher than action alternatives because of potentially higher maximum WWTP discharges. **Big Thompson River.** Nitrogen and phosphorus concentrations would increase slightly due to additional Windy Gap deliveries through the Adams Tunnel, but would be less than other alternatives because imports would be lower. Ammonia concentrations would decrease slightly below the Loveland WWTP. **Big Dry Creek and Coal Creek.** Increased WWTP discharges would increase ammonia concentrations and the potential for exceeding the water quality standard. **Cache la Poudre River.** Estimated ammonia concentrations below Greeley WWTP would increase the most in November (to 1.4 mg/L). **Carter Lake.** TP concentrations would increase 5.1%, TN would increase 1.8%, average chlorophyll *a* would increase 5.6%, clarity would decrease 3.6%, no change in trophic state or temperature, and a slight decrease in DO. **Horsetooth Reservoir.** TP concentrations would increase 5.1%; TN would increase 2.6%; average chlorophyll *a* would increase 5.7%; no change in clarity, temperature, or trophic state; and a slight decrease in DO. Lower DO concentrations would contribute to continued exceedence of the manganese standard. TOC may increase.	**N. St. Vrain Creek.** No effect. **St. Vrain Creek.** Estimated ammonia concentrations below Loveland WWTP would increase the most in October (to 2.5 mg/L). **Big Thompson River.** Nitrogen and phosphorus concentrations would increase slightly due to additional Windy Gap deliveries through the Adams Tunnel. Ammonia concentrations would decrease below the Loveland WWTP. **Big Dry Creek and Coal Creek.** Same as No Action. **Cache la Poudre River.** Estimated ammonia concentrations below Greeley WWTP would increase the most in January (to 1.4 mg/L). **Carter Lake.** TP concentrations would increase 9.1%, TN would increase 4%, average chlorophyll *a* would increase 11.1%, clarity would decrease 3.6%, no change in trophic state or temperature, and a slight decrease in DO. **Horsetooth Reservoir.** TP concentrations would increase 11.1%, TN would increase 5.8%, average chlorophyll *a* would increase 11.4%, clarity would decrease 3.8%, no change in trophic state or temperature, and a slight decrease in DO. Lower DO would contribute to continued exceedence of the manganese standard. TOC may increase. **Chimney Hollow Reservoir.** Predicted to be oligotrophic, slightly lower water quality than Alternatives 3 and 4.	**N. St. Vrain Creek.** No effect. **St. Vrain Creek.** Same as Proposed Action. **Big Thompson River.** Same as Proposed Action. **Big Dry Creek and Coal Creek.** Same as No Action. **Cache la Poudre River.** Same as Proposed Action. **Carter Lake.** TP concentrations would increase 3.0%, TN would increase 1.3%, no change in average chlorophyll *a*, clarity would decrease 3.6%, no change in trophic state or temperature, and a slight decrease in DO. **Horsetooth Reservoir.** TP concentrations would increase 4%; TN would increase 4.0%; average chlorophyll *a* would increase 5.7%; no change in clarity, temperature, or trophic state; and a slight decrease in DO. Lower DO concentrations would contribute to continued exceedence of the manganese standard. TOC may increase. **Chimney Hollow Reservoir.** Similar to Proposed Action, but with slightly better water quality.	**N. St. Vrain Creek.** No effect. **St. Vrain Creek.** Same as Proposed Action. **Big Thompson River.** Same as Proposed Action. **Big Dry Creek and Coal Creek.** Same as No Action. **Cache la Poudre River.** Same as Proposed Action. **Carter Lake.** Same as Alternative 3. **Horsetooth Reservoir.** TP concentrations would increase 4.0%; TN would increase 3.6%; average chlorophyll *a* would increase 5.7%; no change in clarity, temperature, or trophic state; and a slight decrease in DO. Lower DO concentrations would contribute to continued exceedence of the manganese standard. TOC may increase. **Chimney Hollow Reservoir.** Similar to Proposed Action, but with slightly better water quality.	**N. St. Vrain Creek.** No effect. **N. St. Vrain Creek.** No effect. **St. Vrain Creek.** Same as Proposed Action. **Big Thompson River.** Same as Proposed Action. **Big Dry Creek and Coal Creek.** Same as No Action. **Cache la Poudre River.** Same as Proposed Action. **Carter Lake.** TP concentrations would increase 3.0%, TN would increase 1.8%, average chlorophyll *a* would increase 5.6%, clarity would decrease 3.6%, no change in trophic state or temperature, and a slight decrease in DO. **Horsetooth Reservoir.** TP concentrations would increase 3.0%; TN would increase 3.6%; average chlorophyll *a* would increase 5.7%; no change in clarity, temperature, or trophic state; and a slight decrease in DO. Lower DO concentrations would contribute to continued exceedence of the manganese standard. TOC may increase. **Dry Creek Reservoir.** Predicted to be oligotrophic.

Table 12 (cont'd). Comparison of direct and indirect effects by alternative.

Impact Topic	Alternative 1 No Action Enlarge Ralph Price Reservoir	Alternative 2 Proposed Action Chimney Hollow Reservoir	Alternative 3 Chimney Hollow Reservoir and Jasper East Reservoir	Alternative 4 Chimney Hollow Reservoir and Rockwell Reservoir	Alternative 5 Dry Creek Reservoir and Rockwell Reservoir
SURFACE WATER QUALITY (CONT'D) East Slope	Ralph Price Reservoir. TP concentrations would decrease 3.9%, TN would decrease 5.9%, average chlorophyll *a* would decrease 33.0%, no change in clarity or trophic state, and a slight increase in DO.				
AQUATIC RESOURCES West Slope	Anticipated increases in Windy Gap diversions under No Action would be less than the Proposed Action. Thus, the effect on Colorado River and Willow Creek aquatic habitat would be slightly less than described for the Proposed Action. Fish habitat would increase in the spring and decrease in the late summer as a result of Windy Gap diversions. Temperature standard exceedence were modeled to increase from existing conditions in 4 out of the 15 years evaluated. Exceedance of the chronic and acute temperature standards were modeled to occur at a slightly lower frequency and duration than the Proposed Action. Higher stream temperatures may result in less fit individuals and possible fish mortality, particularly if the acute temperature standard is exceeded frequently. No change in fish populations are predicted for the Three Lakes.	The greatest effect to trout habitat in the Colorado River from WGFP diversions would occur between Windy Gap Reservoir and Williams Fork. Adult rainbow trout habitat would be more affected than brown trout habitat. The largest decrease in habitat would occur in August of average and wet years, although WGFP diversions in August of greater than 100 AF would increase from 6 times under existing conditions in the 47-year study period to 15 times. The greatest increase in habitat would occur in June. The potential for exceedence of the aquatic life temperature standards would increase primarily after July 15. Temperature standard exceedence were modeled to increase from existing conditions in 4 out of the 15 years evaluated, which may result in less fit individuals and possible fish mortality if the acute temperature standard is exceeded frequently. Predicted maximum periodic decreases in fish habitat are unlikely to impact fish populations at most locations. Willow Creek rainbow and brown trout habitat would decrease primarily in July. Streamflow changes are unlikely to affect macroinvertebrate populations. No change in fish populations are predicted for the Three Lakes.	Effects would be similar to the Proposed Action, but exceedence of the temperature standards would be slightly less than the Proposed Action.	Effects would be similar to the Proposed Action, but exceedence of the temperature standards would be slightly less than the Proposed Action.	Effects would be similar to the Proposed Action, but exceedence of the temperature standards would be slightly less than the Proposed Action.
East Slope	Projected increases in flow in the Big Thompson River, Big Dry Creek, and Coal Creek would slightly enhance fish habitat. A slight reduction in fish habitat in North St. Vrain Creek and St. Vrain Creek above Lyons is possible with reduced flow in some summer months, but higher flows in the fall and winter would benefit fish habitat. Changes in reservoir storage and water quality in Carter Lake and Horsetooth Reservoir would not measurably impact fish habitat. A larger Ralph Price Reservoir would benefit fish, but productivity would remain low.	Effects to fish in East Slope streams and reservoirs would be similar to No Action except there would be no impact in North St. Vrain Creek or St. Vrain Creek upstream of Lyons. Chimney Hollow could support a fishery similar to other Front Range reservoirs.	Effects would be similar to the Proposed Action. Jasper East Reservoir would support a fishery, but large fluctuations in water levels may reduce productivity.	Effects would be similar to the Proposed Action. Rockwell Reservoir would support a fishery, but large fluctuations in water levels may reduce productivity.	Effects would be similar to the Proposed Action. Dry Creek Reservoir would support a fishery similar to Chimney Hollow Reservoir. Rockwell Reservoir would support a fishery, but large fluctuations in water levels may reduce productivity.

Table 12 (cont'd). Comparison of direct and indirect effects by alternative.

Impact Topic	Alternative 1 No Action Enlarge Ralph Price Reservoir	Alternative 2 Proposed Action Chimney Hollow Reservoir	Alternative 3 Chimney Hollow Reservoir and Jasper East Reservoir	Alternative 4 Chimney Hollow Reservoir and Rockwell Reservoir	Alternative 5 Dry Creek Reservoir and Rockwell Reservoir
VEGETATION	Enlargement of Ralph Price Reservoir would inundate about 77 acres of mostly upland native forest. Impacts to riparian vegetation from reduced flows on the Colorado River, Willow Creek, and East Slope streams are expected to be negligible based on a minor effect on stream morphology, small changes in stream stage, and ground water levels. Water levels would be lower at Granby Reservoir, Carter Lake, and Horsetooth Reservoir, but would fall within the historical range of operations and are unlikely to affect the limited riparian vegetation bordering these reservoirs.	Construction of Chimney Hollow Reservoir would permanently impact 788 acres of vegetation and temporarily disturb 123 acres. Upland native shrublands, native and mixed grasslands, and native forest would be most impacted. Impacts to riparian vegetation would be similar to No Action although the decrease in Colorado River and Willow streamflow would be greater, as would the decrease in water levels in existing reservoirs.	Construction of Chimney Hollow Reservoir would permanently impact 669 acres of vegetation and temporarily disturb 131 acres. Jasper East Reservoir construction would permanently impact 436 acres and temporarily disturb 114 acres. Grasslands and irrigated meadows would be impacted the most at Jasper East Reservoir. The total permanent vegetation impacts for both reservoirs would be 1,157 acres. Impacts to riparian vegetation would be similar to No Action although the decrease in Colorado River and Willow streamflow would be greater, as would the decrease in water levels in existing reservoirs.	Same impacts as Alternative 3 for Chimney Hollow Reservoir. Construction of Rockwell Reservoir would permanently impact 304 acres of vegetation and temporarily disturb 151 acres. Upland native shrubs would be impacted the most. The total permanent vegetation impacts for both reservoirs would be 973 acres. Impacts to riparian vegetation would be similar to No Action although the decrease in Colorado River and Willow streamflow would be greater, as would the decrease in water levels in existing reservoirs.	Construction of Dry Creek Reservoir would permanently impact 647 acres and temporarily disturb 149 acres. Upland native forests, mixed grasslands, and native shrubland would be most affected. Construction of Rockwell Reservoir would permanently impact 378 acres and temporarily disturb 105 acres. The total permanent vegetation impacts for both reservoirs would be 1,025 acres. Impacts to riparian vegetation would be similar to No Action although the decrease in Colorado River and Willow streamflow would be greater, as would the decrease in water levels in existing reservoirs.
WETLANDS AND OTHER WATERS	Ralph Price Reservoir enlargement would inundate about 0.3 acre of wetlands and about 0.1 acre of North St. Vrain Creek. Dam construction could result in additional impacts to St. Vrain Creek.	About 1.6 acres of wetlands would be permanently impacted and about 0.1 acre would be temporarily disturbed. Permanent effects to other waters would be about 1.3 acres.	Chimney Hollow Reservoir would permanently impact 1.5 acres of wetlands and temporarily disturb about 0.1 acre. Permanent effects to other waters would be about 1.3 acres. Construction of Jasper East Reservoir would permanently affect 21.2 acres of wetlands and temporarily disturb 4.8 acres. Permanent effects to other waters would be about 6.3 acres. Total permanent wetland impacts for both reservoirs would be about 22.7 acres.	Wetland and water impacts at Chimney Hollow would be the same as Alternative 3. Permanent wetland impacts at Rockwell Reservoir would be 3 to 13.6 acres with a temporary wetland impact of 2 to 5 acres. Permanent effects to other waters would be 3.6 acres. Total permanent wetland impacts for both reservoirs would range from 4.5 to 15.1 acres pending field studies.	Dry Creek Reservoir construction would permanently impact 6.2 acres of wetlands and temporarily disturb 0.3 acre. Permanent effects to other waters would be 2.8 acres. Rockwell Reservoir permanent wetland impacts would be 3 to 15.6 acres with a temporary impact of 2 to 5 acres. Permanent effects to other waters would be 3.7 acres. Total permanent wetland impacts for both reservoirs would range from 9.2 to 21.8 acres.
WILDLIFE	Enlargement of Ralph Price Reservoir would result in a loss of 77 acres of elk and mule deer winter range and white-tailed deer, black bear, and mountain lion overall range; the loss of habitat for other terrestrial wildlife species and birds; and displacement of wildlife during construction. No known loss of raptor nests, but suitable habitat is present for several species. Bald eagles, osprey, and waterfowl may benefit from a larger reservoir. About 0.1 acre of potential habitat for northern leopard frog and gartersnake would be lost.	Construction of Chimney Hollow Reservoir would result in a loss of 810 acres of elk winter range, mule deer winter range and concentration areas, and black bear fall concentration areas. Expansion of mountain lion and black bear conflict areas are possible with planned recreation activity. Fragmentation of habitat that would alter local movement patterns by elk, deer, and other wildlife. Foraging and nest habitat would be lost for a variety of bird, mammal, and reptile species. No known raptor nests would be directly affected. A golden eagle nest on the hogback ¼ mile east of the reservoir is outside of the CPW-recommended buffer. About 7 acres of bald eagle winter range would be temporarily impacted, but the reservoir would provide bald eagle foraging	Chimney Hollow Reservoir construction would result in the permanent loss of 675 acres of elk winter range, mule deer winter range and concentration areas, and black bear fall concentration areas. Other effects at Chimney Hollow would be similar to the Proposed Action. Construction of Jasper East Reservoir would result in the loss of about 480 acres of moose and mule deer summer range and 24 acres of elk winter range. The new reservoir could displace or shift elk movement toward U.S. 34 or residential development. About 93 acres of black bear summer concentration area would be impacted. Habitat for ground-nesting and tree-nesting birds would be lost or disturbed. About 3 acres of bald eagle	Chimney Hollow Reservoir effects would be the same as Alternative 3. Rockwell Reservoir would result in the permanent loss of 312 acres of summer range for moose and mule deer and 73 acres of elk winter range. Habitat for primarily ground-nesting birds would be lost as well as a variety of terrestrial mammals. No known raptor nests would be impacted. Bald eagle winter range would be temporarily affected where the pipeline crosses the Colorado River. The reservoir would provide foraging habitat for bald eagle, osprey, and other water birds. Potential habitat for the state threatened boreal toad and state species of concern northern leopard frog and common gartersnake would be lost in	Dry Creek Reservoir would permanently impact 650 acres of elk winter range, mule winter range, and winter concentration areas. About 619 acres of black bear fall concentration area and overall mountain lion habitat would be lost. A red-tailed hawk nest and habitat for other migratory bird species would be lost. There would a permanent impact to 165 acres of bald eagle winter range, but the reservoir would provide foraging habitat. About 8.5 acres of known northern leopard frog habitat would be lost and about 30 acres of suitable common gartersnake habitat would be lost. Habitat for a variety of CNHP-tracked butterfly species would be lost.

Table 12 (cont'd). Comparison of direct and indirect effects by alternative.

Impact Topic	Alternative 1 No Action Enlarge Ralph Price Reservoir	Alternative 2 Proposed Action Chimney Hollow Reservoir	Alternative 3 Chimney Hollow Reservoir and Jasper East Reservoir	Alternative 4 Chimney Hollow Reservoir and Rockwell Reservoir	Alternative 5 Dry Creek Reservoir and Rockwell Reservoir
WILDLIFE (CONT'D)		habitat. Potential habitat for northern leopard frog (2.5 acres) and common gartersnake (50 acres) would be lost. Habitat for several CNHP-tracked butterfly species would be lost.	winter range would be lost. The new reservoir would provide foraging habitat for bald eagle, osprey, and waterfowl. About 125 acres of potential greater sage grouse habitat would be lost, which could affect eastward expansion of a known population. Sagebrush also could provide habitat for sage sparrow, a CNHP-tracked species.	riparian areas. The loss of 290 acres of sagebrush habitat within a sage grouse production and brood rearing area would adversely affect a declining population.	Impacts at the Rockwell Reservoir site would be similar to Alternative 4. Differences include a loss of 393 acres of moose and mule deer summer range and 97 acres of elk winter range. In addition, there would be a permanent impact to 334 acres of sage grouse breeding and brood rearing habitat.
THREATENED AND ENDANGERED	Depletion effects to Colorado River endangered fish would be similar to the Proposed Action. No other federally listed species would be impacted.	Increased WGFP diversions of 21,317 AF would result in an adverse effect to four Colorado River endangered fish species. The Subdistrict would pay a one-time depletion fee in accordance with the Recovery Program and previous programmatic biological opinion for depletions in the Colorado River. No other federally listed species would be impacted.	Depletion effects to Colorado River endangered fish would be similar to the Proposed Action.	Depletion effects to Colorado River endangered fish would be similar to the Proposed Action. The loss of about 5 acres of potential lynx habitat at Ralph Price Reservoir site may affect, but is unlikely to adversely affect, lynx.	Depletion effects to Colorado River endangered fish would be similar to the Proposed Action. The loss of about 9 acres of potential lynx habitat at Ralph Price Reservoir site may affect, but is unlikely to adversely affect, lynx

11.0 RECOMMENDED FISH AND WILDLIFE CONSERVATION MEASURES

A number of fish and wildlife conservation measures were identified to reduce the identified impact to fish and wildlife resources from the WGFP. The screening criteria used in the selection of alternatives described in the *Alternatives* chapter of the Final EIS were used to initially avoid and minimize the environmental impacts of the proposed project. In addition, comments received on the Draft EIS from the public; federal, state, and local agencies; and cooperating agencies provided additional feedback on mitigation measures that would help reduce identified resource impacts. Table 13 provides a summary of resource impacts and associated mitigation commitments.

The Subdistrict prepared a FWMP in collaboration with CPW staff (Appendix A). The FWMP (Municipal Subdistrict 2011a) summarizes the WGFP's impacts on fish and wildlife, the Subdistrict's plans to mitigate these impacts, and the benefits of the WGFP to fish and wildlife. The FWMP was developed to satisfy the requirements of CRS 37-60-122.2, which requires fish and wildlife resources affected by the construction, operation, or maintenance of water diversion, delivery, or storage facilities be mitigated to the extent, and in a manner, that is economically reasonable and maintains a balance between the development of the state's water resources and the protection of the state's fish and wildlife resources.

The FWMP was adopted by the Colorado Wildlife Commission on June 9, 2011 and by the CWCB on July 13, 2011 in accordance with CRS § 37-60-122.2. On October 6, 2011, Reclamation was notified by the State of Colorado (Hickenlooper, pers. comm. 2011) that the FWMP comprehensively addresses impacts to Colorado's fish and wildlife resources and is the official position of the state with regard to mitigation of impacts from this project. The FWMP identified the minimum commitments to mitigate fish and wildlife impacts of the WGFP. Key provisions of fish and wildlife mitigation include:

- Curtailment of WGFP diversions after July 15 when temperature in the Colorado River below Windy Gap Reservoir and above the Williams Fork exceeds the chronic or acute temperature standard.
- Flushing flows from the original Windy Gap Project (1980 MOU) would be modified to increase from 450 to 600 cfs. In any year when flows below Windy Gap have not exceeded 600 cfs for at least 50 consecutive hours in the previous two years, and total Subdistrict water supplies in Chimney Hollow and Granby reservoirs exceed 60,000 AF on April 1, the Subdistrict would cease all Windy Gap pumping for at least 50 consecutive hours to enhance peak flows below Windy Gap.
- The originally proposed prepositioning of C-BT water to Chimney Hollow Reservoir was modified to maintain higher water levels (>8,250 feet in elevation) in Granby Reservoir.
- To offset nutrient loading to the Three Lakes, the Subdistrict would implement point and nonpoint source nutrient mitigation measures upstream of Windy Gap Reservoir. This would serve to improve water quality in portions of Willow

Creek, the Fraser River, and Colorado River year-round and offset nutrient loading to the Three Lakes from WGFP pumping.

- The Subdistrict would participate in the Upper Colorado River Recovery Program and pay a fee to address depletions that would impact Colorado River endangered fish species.
- The Subdistrict would commit to continued participation and funding of the ongoing Nutrient Studies, with participation and collaboration by Reclamation, Northern Water, and Grand County, to better understand water quality issues in the Three Lakes system and provide guidance for future management decisions.
- All permanent wetland impacts would be replaced by purchasing wetland bank credits.
- Per an agreement with Larimer County Parks and Open Lands, Chimney Hollow Reservoir would be managed as open space. A plan for habitat restoration, enhancement, and wildlife management would be developed with Larimer County and CPW.
- A variety of best management practices would be implemented during and following construction to reduce erosion, protect water quality, suppress dust and noise, revegetate disturbed areas, and protect or avoid important wildlife habitat.

Reclamation will incorporate final mitigation measures into the Record of Decision (ROD) and will be responsible for enforcing those monitoring and mitigation measures. In the event that identified mitigation measures are unsuccessful in reducing or avoiding resource impacts as anticipated, Reclamation would coordinate with the Subdistrict and other appropriate entities to determine what steps should be taken to correct any deficiencies in planned mitigation or develop alternative methods to achieve mitigation objectives. If Reclamation receives credible information that the Subdistrict's operation of the WGFP is causing a violation of regulations established by the Water Quality Control Commission (WQCC) in accordance with CRS 25-8-101 et seq., Reclamation will immediately initiate discussions among the appropriate parties, including the WQCC and the entity or entities that submitted the information to Reclamation to develop a solution.

The Corps may require additional mitigation measures as part of their evaluation for compliance with Section 404 CWA requirements. The Corps will be responsible for enforcing mitigation measures that are included in the Section 404 permit for the WGFP.

It is probable that Reclamation's ROD and the Corps 404 permit will contain some of the same mitigation measures. In that case, Reclamation and the Corps will cooperate through their respective authorities to assure the objective of the mitigation measure is accomplished.

The Subdistrict has and will continue to work in collaboration with federal, state, and local agencies, as well as nonprofit groups and the Service to implement mitigation measures.

The Service concurs with the mitigation measures in the Final EIS as summarized below in Table 13 and the FWMP (Appendix A).

Table 13. Mitigation measures applicable to fish and wildlife.

	Resource Impacts	Mitigation/Environmental Commitments	Notes
1	**Surface Water Hydrology**		
1b	Reduced flows in Colorado River below Windy Gap diversion.	None. To assure that water diverted from the Colorado River is used as efficiently as possible; all Participants in the WGFP would be required to have water conservation plans in accordance with the requirements of CRS § 37-60-126 prior to the initial delivery of any water after construction of the WGFP. Reduced flows, as they affect temperatures in the Colorado River downstream of Windy Gap, are addressed in the FWMP developed with the CPW and adopted by the CWC in accordance with the requirements of CRS § 37-60-122.2. See also Sections 3a and 4a-d below. *See Corps note below.	Current minimum bypass flows below Windy Gap Reservoir would continue per existing agreements except as modified by the FWMP.
1c	Lower water levels in Granby Reservoir as a result of prepositioning.	In any year when Granby Reservoir is projected to fall below an elevation of 8,250 feet, modified prepositioning, which reduces the delivery of C-BT water from Granby Reservoir to Chimney Hollow Reservoir, would be implemented to maintain higher water levels in Granby Reservoir. Details of this measure would be developed by the Subdistrict and incorporated into a proposed agreement between Reclamation and the Subdistrict with evaluation by the Corps. The objective is to minimize the adverse effects of prepositioning on water levels in Granby Reservoir.	This measure would minimize any potential negative effects on aquatic resources and recreation in Granby Reservoir that may be caused by reduced water levels from prepositioning.
1d	Lower water levels in Carter Lake (~1 foot).	None. *See Corps note below.	Modified prepositioning as discussed in 1c above would result in less change in Carter Lake water levels (<1 foot lower) and thus only minor impacts.
1e	Lower water levels in Horsetooth Reservoir (6 feet lower on average).	None. *See Corps note below.	Modified prepositioning as discussed in 1c above would result in less change in Horsetooth Reservoir water levels (<2 feet lower) and thus only minor impacts.

	Resource Impacts	Mitigation/Environmental Commitments	Notes
3	**Stream Morphology and Floodplains**		
3a	A decrease in the frequency of 2-year peak discharge and in-channel maintenance flows in the Colorado River.	None. Any effect on fisheries from reduced flows are addressed in the FWMP developed by the Subdistrict and the CPW and adopted by the CWC in accordance with the requirements of CRS § 37-60-122.2. *See Corps note below.	Flushing flows from the original Windy Gap Project (1980 MOU) would be modified to increase from 450 cfs to 600 cfs. In any year when flows below Windy Gap have not exceeded 600 cfs for at least 50 consecutive hours in the previous two years, and total Subdistrict water supplies in Chimney Hollow and Granby Reservoirs exceed 60,000 AF on April 1, the Subdistrict would cease all Windy Gap pumping for at least 50 consecutive hours to enhance peak flows below Windy Gap. The frequency of higher volume flows would remain sufficient for maintaining channel morphology. The capacity of the Colorado River would exceed that needed to convey the sediment load.
3b	Small decrease frequency of 2-year peak discharge and in-channel maintenance flows in Willow Creek.	None. *See Corps note below.	Minor impact.
3c	Potential for flooding along the Colorado River and Willow Creek would decrease.	None. *See Corps note below.	Potential for flooding would decrease.
3d	Increased flows on East Slope streams below Participant WWTPs could have slight effects on stream morphology.	None. *See Corps note below.	Potential effects negligible.

	Resource Impacts	Mitigation/Environmental Commitments	Notes
3e	Flows in East Slope streams would increase slightly.	None. *See Corps note below.	Potential effects negligible.
4	**Surface Water Quality**		
4a	Colorado River temperature between Windy Gap Reservoir and Williams Fork may exceed the 18.2°C chronic MWAT or the 23.8°C DM state standard as a result of WGFP diversions that lower flows in the Colorado River. Impacts are most likely in the occasional years when WGFP diversions occur after July 15.	Effects of the WGFP on temperature in the Colorado River are addressed in the FWMP developed with the CPW in accordance with CRS § 37-60-122.2. Temperature mitigation measures include, among other things, installation of real-time temperature monitoring stations at two locations on the Colorado River below Windy Gap and curtailment of diversions in accordance with the requirements of Section 5.3.3 of the FWMP. In addition, the Subdistrict would use the Windy Gap Project Bypass Valve and Auxiliary Outlet to the maximum extent practicable to release colder water without causing adverse effects to the Windy Gap Project facilities or operations for the bypass of water that is otherwise bypassed from the Windy Gap Project. Other temperature mitigation measures are detailed in Section 5.3.3 of the FWMP. These requirements would be documented in the contract negotiations or in a separate operating or working agreement between Reclamation and the Subdistrict. *See Corps note below.	Details of temperature mitigation are found in the FWMP in Appendix A.
4b	Additional WGFP pumping would increase nutrient (nitrogen and phosphorus) loading in Granby Reservoir, Shadow Mountain Reservoir, and Grand Lake, resulting in increased chlorophyll *a* and manganese (Mn) concentrations and a decrease in dissolved (DO).	The Subdistrict would develop a proposed nutrient reduction mitigation plan for Reclamation and Corps evaluation. Currently, the Subdistrict's plan includes point source nutrient reductions from WWTP discharges in the Fraser River basin and nonpoint source nutrient reductions from agricultural land in the Willow Creek watershed. Other nutrient reduction measures would be implemented by the Subdistrict as necessary to meet the requirement to provide a documented nutrient reduction credit factor of 1:1 to satisfy Reclamation and Corps mitigation requirements.	Nutrient loading to the Three Lakes system from additional Windy Gap pumping would be offset by nutrient reductions that could occur in the Willow Creek, Fraser River, and Colorado River watersheds above Windy Gap. Nutrient reductions would result in a year-round improvement to water quality in streams where nutrient reduction measures are implemented.

	Resource Impacts	Mitigation/Environmental Commitments	Notes
4c	Decrease in Colorado River DO below Windy Gap Reservoir. DO concentrations are predicted to remain above the 6.0 mg/L standard. DO could fall below the fish spawning standard of 7.0 mg/L between Windy Gap Reservoir and Williams Fork at low flows; however, reduced DO below the spawning occurring as a result of the WGFP is most likely to occur during the summer months outside of the spring and fall spawning seasons.	Mitigation for temperature (4a) and aquatic resource effects should improve and maintain DO levels above the state standard. Any plan to monitor and mitigate DO changes would be evaluated by the Corps. If DO concentrations fall below the standards and result in water quality standards violations that are attributable to Windy Gap Project pumping, Reclamation, the Corps, and the Subdistrict will discuss the violations and, if necessary, identify and implement additional mitigation measures to address the DO violations. *See Corps note below.	
4d	Higher concentration of nutrients in the Colorado River below Windy Gap Reservoir as a result of WGFP pumping that reduces dilution flows.	None. *See Corps note below.	Nutrient mitigation described in 4b in the watershed upstream of the Windy Gap diversion would improve Fraser River and Colorado River water quality year-round.
4e	Slight increase in nutrient and metal concentrations in Willow Creek.	None. *See Corps note below.	Nutrient mitigation described in 4b in the Willow Creek watershed would reduce nutrient loading to the creek. The nutrient mitigation plan required by 4b must be reviewed and evaluated by Reclamation and the Corps.
4f	Increased ammonia concentrations in St. Vrain Creek, Big Dry Creek, and Coal Creek as a result of increased discharges from Participant WWTPs.	None. *See Corps note below.	WGFP Participants would take appropriate actions, if needed, to meet ammonia discharge limitations in accordance with Colorado water quality standards and as part of their NPDES Permit for WWTP discharges.

	Resource Impacts	Mitigation/Environmental Commitments	Notes
4g	Nutrient increases (TP, TN) resulting in higher chlorophyll *a* concentrations and a decrease in DO in Carter Lake and Horsetooth Reservoir.	None. In accordance with 4b above, plans to monitor and mitigate nutrient increases in the Three Lakes system should address this issue. The plan must be evaluated by Reclamation and the Corps. *See Corps note below.	Measures described in 4b would reduce nutrient loading to waters that would be moved from the West Slope to the East Slope. Any DO issues in Carter Lake or Horsetooth Reservoir would not be exacerbated as a result of the WGFP.
5	**Aquatic Resources**		
5a	Decrease in the amount and frequency of available fish habitat in the Colorado River and an increase in stream temperature.	The Subdistrict would provide mitigation in accordance with the FWMP developed with CPW in accordance with CRS § 37-60-122.2. Measures identified in 4a above would address the effects of temperature increases on aquatic resources. *See Corps note below.	Bypass flows required at Granby Reservoir and Windy Gap Reservoir by existing agreements would continue. In addition, the Subdistrict would increase flushing flows as described above in 3a. The Subdistrict's FWEP endorsed by the Wildlife Commission does include a component for stream restoration of the Colorado River below Windy Gap. While these measures are outside of proposed mitigation for the WGFP, they would improve existing aquatic habitat.
5b	Decrease in the amount and frequency of available fish habitat in Willow Creek.	None. *See Corps note below.	Projected changes in aquatic habitat and slightly cooler water temperatures are not predicted to impact existing aquatic populations.
5c	Lower water levels in Granby Reservoir would slightly reduce available fish habitat.	Modified prepositioning (1c), per the FWMP developed in accordance with CRS § 37-60-122.2, would reduce drawdowns and the loss of habitat in Granby Reservoir. *See Corps note below.	

	Resource Impacts	Mitigation/Environmental Commitments	Notes
5d	Lower water levels in Carter Lake and Horsetooth Reservoir would slightly reduce available fish habitat.	Only a small decrease in Carter Lake and Horsetooth Reservoir water levels and fish habitat would occur with modified prepositioning as discussed for 1c. *See Corps note below.	
6	**Vegetation**		
6a	Temporary impact to 123 acres of vegetation during construction of Chimney Hollow Reservoir.	The Subdistrict would provide mitigation in accordance with the FWMP developed in accordance with CRS § 37-60-122.2. Such measures include restoration of temporary disturbances, weed control, and habitat enhancement measures. *See Corps note below.	Revegetation and weed control on all disturbed areas would be conducted in accordance with an erosion control plan to be developed by the Subdistrict and evaluated by Reclamation and the Corps.
6b	Permanent loss of 788 acres of vegetation from inundation and dam at Chimney Hollow.	The Subdistrict would provide mitigation in accordance with the FWMP developed in accordance with CRS § 37-60-122.2. Habitat enhancement measures on lands bordering the reservoir would be used to improve the quality of remaining habitat. The Subdistrict would provide $50,000 to Larimer County to use in their ongoing habitat management plan. *See Corps note below.	The Subdistrict would work with Larimer County and CPW in developing a management plan for lands adjacent to Chimney Hollow Reservoir.
6c	Effects to riparian vegetation along the Colorado River from reduced streamflow.	None. *See Corps note below.	Expected effects to Colorado River riparian vegetation are predicted to be minor and not measurable because of small changes in stream stage and continued flows sufficient for channel maintenance. Additional flushing flows, as noted for 3a would help maintain riparian vegetation. While not a component of the mitigation plan the Subdistrict's FWEP includes funding for habitat restoration below Windy Gap Reservoir that may benefit riparian vegetation.

	Resource Impacts	Mitigation/Environmental Commitments	Notes
7	**Wetlands and Adjacent Riparian Habitats**		
7a	Temporary disturbance of about 0.2 acre of wetlands during Chimney Hollow Reservoir construction.	Avoid, minimize, and mitigate wetland impacts as specified in 33 CFR Part 332 (Mitigation Rule, 10-Apr-08) and as evaluated by Reclamation and the Corps. *See Corps note below.	Temporarily disturbed wetlands would be restored following construction.
7b	Permanent impact to about 2 acres of wetlands at Chimney Hollow Reservoir.	Avoid, minimize, and mitigate wetland impacts as specified in 33 CFR Part 332 (Mitigation Rule, 10-Apr-08) and as evaluated by the Corps. *See Corps note below. Wetlands would be mitigated by contribution to an approved wetland mitigation bank. Habitat enhancement at Chimney Hollow Reservoir as identified in the FWMP may include wetland and riparian habitat creation on the lake shoreline. Any wetland creation work would need to be evaluated by Reclamation and the Corps.	Under modified prepositioning, as described for 1c, there would be greater water level fluctuations and lower water levels in Chimney Hollow Reservoir; thus establishment of shoreline wetlands may be difficult.
7c	Permanent impact to about 0.5 acre of waters of the U.S. along Chimney Hollow.	Avoid, minimize, and mitigate water impacts as specified in 33 CFR Part 332 (Mitigation Rule, 10-Apr-08) and as evaluated by the Corps. *See Corps note below.	Creation of large open water reservoir.
7d	Effects on wetlands adjacent to the Colorado River and downstream of the Windy Gap diversion.	None. The Corps will evaluate potential indirect impacts to adjacent wetlands as part of compliance with Clean Water Act 404 requirements.	Expected effects to Colorado River wetlands are predicted to be minor and not measurable because of small changes in stream stage and continued flows sufficient for channel maintenance. Additional flushing flows, as noted for 3a would help maintain wetland vegetation. While not a component of the mitigation plan the Subdistrict's FWEP includes funding for habitat restoration below Windy Gap Reservoir that may benefit wetland vegetation.

	Resource Impacts	Mitigation/Environmental Commitments	Notes
8	**Wildlife**		
8a	Loss of 810 acres of elk winter range, mule deer winter range and concentration area, and black bear foraging area at Chimney Hollow.	The FWMP developed and adopted in accordance with CRS § 37-60-122.2 includes habitat improvements and management measures that compensate for the loss of habitat. The mitigation plan developed in accordance with CRS § 37-60-122.2 will be submitted to the Service to meet the requirements of the FWCA. *See Corps note below.	A FWMP was prepared by the Subdistrict in cooperation with the CPW and adopted by Colorado in accordance with CRS § 37-60-122.2 Larimer County, Subdistrict, and CPW would coordinate details of wildlife management in concert with the Chimney Hollow recreation plan.
8b	General loss of habitat for other terrestrial species, birds, amphibians, reptiles, and butterflies at Chimney Hollow.	The FWMP developed in accordance with CRS § 37-60-122.2 includes habitat enhancement and other management actions to protect and improve wildlife habitat at Chimney Hollow Reservoir. Vegetation clearing would be conducted outside of the nesting season of protected bird species or the area would be surveyed prior to disturbance. A buffer would be maintained around active golden eagle nests during the breeding season. The mitigation plan developed in accordance with CRS § 37-60-122.2 will be submitted to the Service to meet requirements for the FWCA. *See Corps note below.	
8c	Loss of 7 acres of bald eagle winter range at Chimney Hollow.	None. *See Corps note below.	This effect is minor as there is sufficient bald eagle wintering habitat in the area. A new reservoir would provide open water foraging habitat for bald eagles.

	Resource Impacts	Mitigation/Environmental Commitments	Notes
9	**Threatened and Endangered Species**		
9a	No impact at Chimney Hollow.	None. *See Corps note below.	
9b	Depletion to Colorado River impacts T&E fish.	Section 7 consultation and compliance consistent with the requirements of the Programmatic Biological Opinion (PBO). The Service issued a Biological Opinion on February 12, 2010 for the Preferred Alternative indicating WGFP coverage under the PBO with participation in the Upper Colorado River Recovery Program and payment of depletion fee for additional depletions attributable to the WGFP. Documentation of Section 7 consultation will be submitted to the Corps in order to meet requirements for the FWCA. *See Corps note below.	

* Any submittals required by this mitigation plan will be evaluated by the Corps for compliance with Section 404 Clean Water Act requirements. With some resource issues, the Corps may require additional mitigation measures.

12.0 SUMMARY OF FINDINGS AND FISH AND WILDLIFE SERVICE POSITION

This report evaluates the effects of the alternative actions for the WGFP on aquatic life, wildlife, threatened and endangered species, and associated habitat. Project-related benefits and adverse impacts to fish and wildlife species and their habitats are described, and conservation measures to avoid and minimize impacts are recommended.

The WGFP Preferred Alternative and other action alternatives result in similar impacts to Colorado River fisheries because the diversion amounts at Windy Gap Reservoir would be similar. The No Action Alternative would also increase Colorado River diversions in the future as demand for Windy Gap water increases. All of the alternatives would result in a decrease in available fish habitat in the spring and summer and a projected increase in Colorado River stream temperatures below Windy Gap Reservoir. All of the alternatives would result in the loss of terrestrial wildlife habitat from construction of reservoirs and related facilities. Construction of Chimney Hollow Reservoir under the Preferred Alternative would disturb the least amount of habitat, but there would be a loss of elk and mule deer winter range, black bear foraging habitat, and habitat for migratory birds.

The mitigation measures developed by Reclamation and the Subdistrict for the Preferred Alternative, as described in the Final EIS and FWMP, would reduce the potential for adverse environmental impacts from the WGFP, while at the same time improving the reliability of the Windy Gap Project water supplies. The Service concurs that the proposed mitigation and monitoring measures listed in Table 13 and described in the FWMP (Appendix A), adequately addresses identified fish and wildlife impacts from implementation of the Preferred Alternative to construct Chimney Hollow Reservoir with prepositioning. The Service recommends that Reclamation monitor the implementation and effectiveness of mitigation measures to ensure that future impacts to fish and wildlife resources resulting from operation of the WGFP are mitigated by the project participants.

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Appendix A

Fish and Wildlife Mitigation Plan

Windy Gap Firming Project

Fish and Wildlife Mitigation Plan

Prepared for:
The Colorado Wildlife Commission
In accordance with CRS 37-60-122.2

Prepared by:
Municipal Subdistrict
Northern Colorado Water Conservancy District

June 9, 2011

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EXECUTIVE SUMMARY

The Municipal Subdistrict of the Northern Colorado Water Conservancy District (Subdistrict), on behalf of 13 East Slope Windy Gap Project participants, is pursuing a project that will improve the reliability of the water supplies and deliveries from the existing Windy Gap Project. The purpose of this Fish and Wildlife Mitigation Plan (FWMP) for the Windy Gap Firming Project (WGFP) is to comply with the requirements of Colorado State law (CRS 37.60.122.2), including the Procedural Rules for the Wildlife Commission (Chapter 16).

The WGFP is also required to comply with the National Environmental Policy Act (NEPA) by preparing a Final Environmental Impact Statement (FEIS) and with Section 404(b) (1) of the Clean Water Act by applying for a "404 Permit." As part of the 404 permit process, a 401 certification from the Colorado Department of Public Health and Environment is required.

The WGFP participants are committed to comply with all mitigation measures required by the FWMP, the FEIS (and associated Record of Decision), the 404 Permit, and the 401 Certification.

The Subdistrict is also submitting a separate Fish and Wildlife Enhancement Plan (Enhancement Plan) in cooperation with Denver Water to enhance fish and wildlife resources over and above the levels existing without the WGFP and Moffat Project.

In addition to the required mitigation measures in the FWMP and enhancements in the Enhancement Plan, the Subdistrict is participating with several East Slope and West Slope water users, numerous state and federal agencies, and West Slope private entities to enhance the flows in the Colorado River in Grand County by managing and coordinating the release of approximately 5,400 AF of water (1/2 of 10825 Water) that will benefit the Upper Colorado River Endangered Fish Recovery Program.

The goal of the Subdistrict and the WGFP participants is to mitigate for environmental impacts of the WGFP through the measures identified in this Fish and Wildlife Mitigation Plan and to improve the aquatic and riparian habitat of the Colorado River in Grand County with measures identified in the separate Enhancement Plan, while at the same time improving the reliability of the Windy Gap Project water supplies.

This FWMP for the WGFP addresses two main impact areas. On the East Slope the proposed action primarily consists of the construction and operation of a new 90,000 AF water storage facility, Chimney Hollow Reservoir. Although there will be no new construction on the West Slope and all future operations of the Windy Gap Project will be within historic water rights limitations, there will be increased diversions of Colorado River water over the actual amounts historically diverted.

The associated impacts to the Colorado River stream and aquatic resources are addressed in this plan.

With respect to the Colorado River below the Windy Gap diversion, both the WGFP and Denver Water's Moffat Collection Project (Moffat Project) diversions can sometimes have cumulative, or combined, impacts to the river. Since the Moffat Project is also seeking approval through the state and federal regulatory processes, both the Subdistrict and Denver Water have agreed to cooperate in a process of simultaneous development of the mitigation and enhancement plans pursuant to CRS 37-60-122.2. The WGFP Enhancement Plan is being provided to the Wildlife Commission concurrently with this FWMP in a separate document.

WINDY GAP FIRMING PROJECT
FISH AND WILDLIFE MITIGATION PLAN

1.0 INTRODUCTION

The Windy Gap Firming Project (WGFP) is a proposed water supply project that would provide more reliable water deliveries to Front Range and West Slope communities and industries. The Municipal Subdistrict, Northern Colorado Water Conservancy District, acting by and through the WGFP Water Activity Enterprise (Subdistrict) is seeking to construct the project on behalf of the 13 WGFP Participants. Project Participants include the City and County of Broomfield; the towns of Erie and Superior; the cities of Evans, Fort Lupton, Greeley, Lafayette, Longmont, Louisville, and Loveland; the Little Thompson Water District; the Central Weld County Water District; and the Platte River Power Authority.

This Fish and Wildlife Mitigation Plan (FWMP) was developed to satisfy the requirements of Colorado Revised Statute (CRS) 37-60-122.2 and outlines the actions that Project Participants will implement to mitigate the impacts that the WGFP may have on fish and wildlife. The FWMP also addresses concerns regarding WGFP impacts that were identified by CDOW staff in a detailed review of the DEIS impacts. The Subdistrict has also prepared a separate Fish and Wildlife Enhancement Plan (Enhancement Plan), pursuant to CRS 37-60-122.2 to address issues raised by Colorado Division of Wildlife and other stakeholders regarding the current condition of the aquatic environment on the Colorado River, which includes proposed enhancement measures to enhance fish and wildlife resources over and above levels existing without the WGFP.

2.0 PROJECT BACKGROUND

2.1 COLORADO-BIG THOMPSON PROJECT

The Colorado-Big Thompson Project was developed by the U.S. Bureau of Reclamation on behalf of the Northern Colorado Water Conservancy District between 1938 and 1957. The project was designed to provide water for agricultural, municipal, and industrial beneficial uses. The C-BT Project provides supplemental water to 33 cities and towns and is used to help irrigate more than 600,000 acres of northeastern Colorado farmland. On average, about 220,000 AF of water is delivered to northeast Colorado.

Twelve reservoirs, 35 miles of tunnels, 95 miles of canals, and 700 miles of power transmission lines comprise the complex C-BT collection, distribution, and power systems. Willow Creek Reservoir, Shadow Mountain Reservoir, Grand Lake, and

Lake Granby on the west of the Continental Divide collect and store C-BT water from the upper Colorado River basin. Water is pumped from Lake Granby into Shadow Mountain Reservoir where it flows by gravity into Grand Lake. From there, the 13.1-mile Adams Tunnel transports the water under the Continental Divide to the East Slope.

Once the water reaches the East Slope, it is used to generate electricity as it descends almost one-half mile through five power plants on its way to Colorado's Front Range. Carter Lake, Horsetooth Reservoir, and Boulder Reservoir store the water. C-BT water is delivered as needed via canals and pipelines to supplement native water supplies in the South Platte River Basin.

2.2 WINDY GAP PROJECT

During the 1960s, the cities of Boulder, Greeley, Longmont, Loveland, Fort Collins, and the Town of Estes Park determined that additional water supplies were needed to meet their projected municipal demands. The Municipal Subdistrict, Northern Colorado Water Conservancy District, consisting of the incorporated areas of the six entities, was formed in 1970 to develop the Windy Gap Project. Prior to project construction, the Platte River Power Authority acquired all of the City of Fort Collins' allotment contracts, as well as one-half of the City of Loveland's and one-half of the Town of Estes Park's contracts. Allotment contracts are used to allocate 480 units of Windy Gap Project water. Each Windy Gap unit represents a yield of up to 100 AF and, similar to C-BT units, can be bought and sold. The Windy Gap unit holders have changed since the original project was completed.

The Windy Gap Project consists of a diversion dam on the Colorado River, a 445-AF reservoir, a pumping plant, and a 6-mile pipeline to Lake Granby. Currently, Windy Gap Project water is stored and conveyed through C-BT Project facilities prior to delivery to Windy Gap Project allottees. Middle Park Water Conservancy District contractees on the West Slope use Windy Gap water to replace out-of-priority diversions by release of water directly from Lake Granby to the Colorado River.

2.2.1 Windy Gap Project Environmental Impact Statement

In April 1981, Reclamation completed the Final EIS on the effects of using C-BT Project facilities for the "storage, carriage and delivery" of Windy Gap Project water. The 1981 Record of Decision (ROD) for the original Windy Gap Project EIS allowed Reclamation to negotiate a contract with the Subdistrict and the NCWCD for the storage, conveyance, and delivery of Windy Gap Project water using facilities of the C-BT Project.

The original EIS determined that about 56,000 AF of water could be diverted annually from the Colorado River and that about 48,000 AF would be available for delivery to East Slope Windy Gap unit holders after subtracting 3,000 AF for MPWCD and allowances for various storage and conveyances losses. Windy Gap diversions are limited to a rate of 600 cfs and occur primarily during the months of

April to July. Total Windy Gap diversions are measured at the Adams Tunnel and are limited to a maximum of 90,000 AF in any one year and a maximum of 650,000 AF during any consecutive 10-year period pursuant to the *Agreement Concerning the Windy Gap Project and Azure Reservoir and Power Project*, dated April 30, 1980 and the Windy Gap water rights.

2.2.2 Mitigation Measures Included in the Original Windy Gap EIS

The 1981 Windy Gap Project EIS and ROD, as well as subsequent agreements, included a variety of mitigation measures to compensate and offset the effects associated with construction of the Windy Gap Project and its water diversions. Operational mitigation measures are still in place and funding and compensatory mitigation measures have been paid. Mitigation measures are summarized below.

Minimum Streamflow. A Memorandum of Understanding between the Municipal Subdistrict, Northern Colorado Water Conservancy District, NCWCD, and Colorado Division of Wildlife (June 23, 1980) established the following minimum streamflows on a 24-mile reach of the Colorado River downstream of the Windy Gap Project to the mouth of the Blue River that apply when the Windy Gap Project is pumping:

- From the Windy Gap Diversion Point to the mouth of the Williams Fork River: 90 cfs
- From the mouth of the Williams Fork River to the mouth of Troublesome Creek: 135 cfs
- From the mouth of Troublesome Creek to the mouth of the Blue River: 150 cfs

If flows are less than those specified above, Windy Gap must curtail diversions except that the project cannot be required to bypass more than the natural inflow. Additionally, bypass of at least 450 cfs for at least 50 hours during the period of April 1 through June 30 is required at least once every 3 years.

Endangered Species. Endangered Species Act Section 7 consultation with the U.S. Fish and Wildlife Service concluded with a Biological Opinion (March 13, 1981) determination that Windy Gap depletions, with the conservation measures listed below is not likely to jeopardize the existence of the endangered squawfish or humpback chub. The Subdistrict agreed to payment of $100,000 for a habitat project and $450,000 for biological investigations on the Colorado River as conservation measures to compensate for the adverse effects of the Windy Gap Project. Specific conservation and recovery measures included:

- The establishment of backwater habitat areas along the mainstem of the Colorado River
- Support of a field research team for 3 years to evaluate habitat improvement techniques for endangered fish
- Bypass flow agreements with CDOW for trout habitat to benefit Colorado River endangered fish downstream of the project area

Azure Agreement. Western Slope objections to the Windy Gap project were resolved in the *Agreement Concerning the Windy Gap Project and the Azure Reservoir and Power Project* dated April 30, 1980, entered into by the Subdistrict and several West Slope entities that had been opposed to the project because of anticipated West Slope impacts. Following negotiations between the Subdistrict and the Colorado River Water Conservation District (CRWCD), a settlement was reached and mitigation measures acceptable to the parties were identified. Other parties to this agreement included: the Northwest Colorado Council of Governments (NWCCOG), Grand County, MPWCD, Three Lakes Water and Sanitation District, the towns of Granby and Hot Sulphur Springs, Winter Park Water and Sanitation District, and 30 ranchers. The purpose of this agreement was to provide compensation to West Slope entities from the transbasin diversion of water and associated impacts. Principal agreements included:

- A commitment by the Subdistrict to fund the construction of the Azure Reservoir and Power Plant, or if infeasible, fund an alternative project or a cash payment to the CRWCD
- Payment of $25,000 to Grand County for salinity studies of the Colorado River
- Payment of $150,000 to the Town of Hot Sulphur Springs for assistance in improving its water treatment facility and $270,000 for improving its wastewater treatment facility
- Payment of $500,000 to plan, construct, and design facilities needed for ranchers to maintain their diversion structures on the Colorado River
- An agreement by the Subdistrict to subordinate its Windy Gap decrees to all present and future in-basin irrigation, domestic, and municipal uses, excluding industrial uses, on the Colorado and Fraser rivers and their tributaries above the Windy Gap Reservoir site
- An agreement by the Subdistrict to volumetric limits on diversions, which included a maximum single-year diversion of 90,000 AF/year and a maximum of 650,000 AF during any consecutive 10-year period. Per the 1985 *Supplement to the 1980 Azure Settlement Agreement*, these diversion limitations apply to deliveries through the Adams Tunnel, as opposed to diversions at Windy Gap Reservoir
- An agreement by the Subdistrict to bypass flows necessary to meet senior downstream water rights
- An agreement by the NCWCD to allow Grand County's use of a rock and gravel quarry on their property
- An agreement by the Subdistrict to cooperate with CDOW and others to allow public use for recreation at Windy Gap Reservoir

In return for these mitigation measures, West Slope interests agreed to drop objections to the Windy Gap conditional water right decrees and cooperate with all the necessary permitting requirements to allow construction of the project. The 1985 *Supplement to the 1980 Azure Settlement Agreement* was later signed on March 29, 1985 by the Subdistrict, CRWCD, NWCCOG, Grand County

commissioners, and the MPWCD. This agreement was implemented after the planned Azure Reservoir was determined infeasible. The 1985 agreement included the following compensation to West Slope entities:

- Payment of $10.2 million, which was used to fund construction of Wolford Mountain Reservoir on Muddy Creek north of Kremmling, and release of obligations for funding of the Azure Project
- The Subdistrict's agreement to set aside annually, but non-cumulatively, at no cost to the MPWCD, 3,000 AF of water in Lake Granby that is produced each year from Windy Gap supplies, for beneficial use without waste in the MPWCD for all beneficial uses, except instream uses and industrial uses
- Subordination of Windy Gap water rights to either Rock Creek or Wolford Mountain projects; Wolford Mountain Reservoir was completed in 1996

The 1980 and 1985 agreements were incorporated as integral parts of the Windy Gap water rights decrees.

2.3 WINDY GAP FIRMING PROJECT

The proposed WGFP would entail construction of a new water storage reservoir that would provide more reliable water deliveries to Front Range and West Slope communities and industry. Due to limitations and constraints with the existing system, the current Windy Gap facilities, which were completed in 1985, are unable to deliver the anticipated firm yield of water. Water deliveries from the West Slope are limited by storage capacity in Lake Granby and by the delivery capacity of the Adams Tunnel, which delivers water from Grand Lake to the East Slope. As a result, a group of the Windy Gap Project unit holders, working through the Subdistrict, have initiated the proposed WGFP which will firm all or a portion of their individual Windy Gap units to meet a portion of existing and future municipal and industrial water requirements. The proposed action is to add water storage and related facilities to the existing Windy Gap operations that would be capable of delivering a firm annual yield of about 30,000 AF to Project Participants.

The intent of the WGFP is to improve the reliability of the Windy Gap Project and the existing Windy Gap water rights by increasing the firm yield from the existing Windy Gap Project water supply. The Subdistrict's Proposed Action is the construction of Chimney Hollow Reservoir to store Windy Gap Project water. To improve yield, the Subdistrict also is requesting integration of the Colorado-Big Thompson Project (C-BT) and Windy Gap Project operations so that C-BT water can be stored in Chimney Hollow Reservoir. The Proposed Action would require new connections to C-BT East Slope facilities and continued use of C-BT storage and conveyance systems and other existing pipelines, canals, and diversions to deliver Windy Gap water to Project Participants.

The Preferred Alternative includes construction of the 90,000-AF Chimney Hollow Reservoir with a surface area of about 740 acres. This alternative includes

prepositioning, which is the storage of C-BT water, as well as Windy Gap water, in the new reservoir. Water would be conveyed to Chimney Hollow Reservoir via a new pipeline connection to existing East Slope C-BT facilities at the upper end of the existing Flatiron Penstocks, where a new buried pipeline would deliver water to Chimney Hollow Reservoir or Carter Lake. Connections between Chimney Hollow Reservoir and Carter Lake would allow delivery of water to Participants using existing infrastructure. Reservoir construction would require relocation of about 3.8 miles of an existing 115-kV transmission line.

The new Chimney Hollow Reservoir would be located on Subdistrict land, and these lands, along with adjacent Larimer County open space lands, would be managed by Larimer County for recreation. Combined Subdistrict and Larimer County lands would provide about 3,400 acres including the reservoir for recreation and fish and wildlife habitat. Anticipated recreation features include a parking area, trails, boat dock and ramps, picnic facilities, and vault toilets. No overnight camping would be allowed.

2.3.1 Relationship of the Original Windy Gap EIS to Current Firming Project EIS

The WGFP EIS evaluates the potential effects of alternatives associated with firming the yield of the water diverted under the terms of the original Windy Gap Project EIS. The proposed WGFP would not exceed the average annual diversion of 56,000 AF evaluated in the 1981 EIS and ROD or any other diversion-related limitations or water rights. Additional reservoir storage capacity is needed in the WGFP because of the limitations in the C-BT system to store Windy Gap water when it is available. The WGFP EIS evaluates the direct, indirect, and cumulative effects of any new physical disturbances or changes in operation needed by the WGFP. As described above, the original EIS included a number of mitigation measures to offset impacts, several of which are ongoing.

3.0 OTHER CONCURRENT OR RELATED ACTIVITIES

3.1 MOFFAT COLLECTION SYSTEM PROJECT

The Moffat Collection System Project is currently proposed by Denver Water (Denver) to develop 18,000 AF/year of new annual yield to the Moffat Treatment Plant to meet future raw water demands on the East Slope. This project is anticipated to result in additional diversions, primarily from the upper Fraser River and Williams Fork River basins. Denver's proposed additional Fraser River diversions would be located upstream of the Windy Gap Project diversion site on the Colorado River and would directly affect the availability of water for the WGFP. The Moffat Collection System Project Draft EIS prepared by the Corps was released for public review in 2009.

Diversions for the WGFP and Moffat Project would result in changes to flows in the Colorado River below the Windy Gap dam. Denver Water and the Subdistrict have

agreed to cooperate with each other and with the Colorado Department of Natural Resources (DNR) and CDOW in concurrent development of the mitigation plans required under CRS 37-60-122.2 for the two projects. They have jointly developed stream temperature monitoring stations as mitigation (refer to Section 5.3.3 of this FWMP). Additionally, Denver Water and the Subdistrict have proposed enhancement with significant resources and funding to improve current conditions in the river. The WGFP Enhancement Plan is being provided to the Wildlife Commission concurrently with this FWMP in a separate document.

3.2 UPPER COLORADO RIVER ENDANGERED FISH RECOVERY PROGRAM

Reclamation is preparing an Environmental Assessment (EA) to assess the effects of proposed contracts that would provide for permanent release of 10,825 AF/yr of water to the 15-Mile Reach of the upper Colorado River. As a condition of a 1999 Programmatic Biological Opinion (PBO) (U.S. Fish and Wildlife Service 1999), a group of East and West Slope water users is committed to make releases of "10825 water" in late summer and fall in support of the recovery of endangered fish species in the 15-Mile Reach near Grand Junction. The EA will document whether a Finding of No Significant Impact (FONSI) can be issued for the proposed contracts.

The Proposed Action Alternative would use releases from Ruedi Reservoir and Lake Granby, and to a limited extent, storage in and releases from Green Mountain Reservoir when excess capacity is available, to provide 10,825 AF/yr of water for the 15-Mile Reach.

The Proposed Action Alternative involves release of 5,412.5 AF/year from Lake Granby. Releases from Lake Granby would range from 20 to 50 cfs during the period from July 15 to September 30, depending upon the hydrologic year type. This alternative was not included in the hydrologic analyses for either the WGFP or Moffat Project. Accordingly, the flows in the Colorado River below Lake Granby would be increased over flows shown in the Draft EIS for each project.

3.2.1 Coordination of 10825 Project Releases from Lake Granby

Each year, a total of 5,412.5 AF of water is to be released from Lake Granby. The water will be released to benefit the 15-Mile Reach on a fixed delivery schedule to be agreed upon by the parties in the future, and pursuant to applicable federal and state laws. The parties anticipate that the release pattern will depend on the type of hydrologic year (dry, average, or wet) and will be based on the target stream flow in the Colorado River between Lake Granby and Kremmling during late summer and early fall. Releases from Lake Granby will be pursuant to a municipal-recreation contract with a Grand Valley municipal entity within or downstream of the 15-Mile Reach.

Under some hydrologic conditions, releases from Lake Granby made to meet targeted stream flow in the Colorado River downstream of Lake Granby may not coincide with the FWS requirements for the 10825 water at the 15-Mile Reach. In these instances, water released from Lake Granby will be stored in Green Mountain

Reservoir by exchange or substitution pursuant to a contract with Reclamation (subject to availability of storage capacity and exchange potential). This water will then be released at the request of the Service to benefit the 15-Mile Reach.

An Operations Group will be established, consisting of representatives from the water users, FWS, Reclamation, and the State of Colorado Division 5 Engineer. The Operations Group will meet each spring to develop a plan for releasing the 10,825 AF of water during the coming 12 months, and at other times as necessary to fulfill the purposes of this Project. The Subdistrict will propose that CDOW be added as a member of the Operations Group.

4.0 REGULATORY PROCESS

The WGFP is required to obtain numerous federal and state permits, licenses, and approvals. The primary regulatory processes related to the C.R.S. 37-60-122.2 requirement for fish and wildlife mitigation are described below.

4.1 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) REVIEW

The Subdistrict is seeking approval from Reclamation for approval of a physical connection to C-BT Project facilities and for operations of the Chimney Hollow Reservoir in order to implement the project. As the lead federal agency, Reclamation prepared a Draft Environmental Impact Statement (Reclamation 2008) for the proposed project. The U.S. Army Corps of Engineers (Corps), Western Area Power Administration (Western), and Grand County are cooperating agencies. A Final EIS is expected to be published in mid-2011. If impacts to fish and wildlife are identified in the FEIS that were not identified in the DEIS, Reclamation will coordinate with CDOW and other state agencies as required under the Fish and Wildlife Coordination Act and will make adjustments to project mitigation as appropriate.

4.2 SECTION 404 PERMIT

Because the proposed WGFP would involve the discharge of dredged and fill material into wetlands or other waters of the U.S., a permit is required from the Corps under Section 404 of the Clean Water Act. The Subdistrict, acting by and through the Windy Gap Firming Project Water Activity Enterprise, has notified the Corps that it will seek a Section 404 permit for the WGFP. Issuance of a permit would be a Corps federal action.

4.3 COLORADO FISH AND WILDLIFE MITIGATION PLAN

This FWMP is prepared to satisfy the requirements of C.R.S. 37-60-122.2. The first portion of this statute states:

> (1)(a) The general assembly hereby recognizes the responsibility of the state for fish and wildlife resources found in and around state waters which are affected by the construction, operation, or maintenance of water diversion, delivery, or storage facilities. The general assembly hereby declares that such

fish and wildlife resources are a matter of state-wide concern and that impacts on such resources should be mitigated by the project applicants in a reasonable manner. It is the intent of the general assembly that fish and wildlife resources that are affected by the construction, operation, or maintenance of water diversion, delivery, or storage facilities should be mitigated to the extent, and in a manner, that is economically reasonable and maintains a balance between the development of the state's water resources and the protection of the state's fish and wildlife resources.

FWMPs for water projects considered under C.R.S. 37-60-122.2 are to be developed by the project applicant, working in cooperation with CDOW, and submitted to the Colorado Wildlife Commission (CWC). If the CWC and applicant agree on the mitigation plan, the CWC forwards the mitigation plan to the Colorado Water Conservation Board (CWCB) for adoption as the official state position on the mitigation actions required of the applicant.

4.3.1 Mitigation and Enhancement Plans

C.R.S. 37-60-122.2 makes a specific distinction between mitigation of impacts caused by the proposed project, and enhancing fish and wildlife resources over existing conditions. This distinction is further defined in the Procedural Rules for the Wildlife Commission (Chapter 16), and clarified in a memorandum dated December 9, 2010 to the Director of the Colorado Division of Wildlife and the Wildlife Commission from the First Assistant Attorney General, Natural Resources and Environment Section. Accordingly, this FWMP includes mitigation measures to address the direct impacts that have been identified for the proposed project. The Subdistrict has also prepared a separate Enhancement Plan, in accordance with CRS 37-60-122.2 to address issues raised by Colorado Division of Wildlife and other stakeholders regarding the current condition of the aquatic environment on the Colorado River, which includes proposed enhancement measures to enhance fish and wildlife resources over and above levels existing without the WGFP. The Subdistrict, as an applicant for one or more federal permits, or licenses, is required by C.R.S. 37-60-122.2 to submit a proposed mitigation plan, but submittal of an enhancement plan is voluntary.

4.3.2 Consultation, Coordination and Public Input

The Subdistrict consulted with Colorado Division of Wildlife (CDOW) U.S. Fish and Wildlife Service (FWS) representatives during preparation of this Plan. In addition, CDOW and FWS were provided an opportunity to review and comment on the Wildlife Resource Technical Report (ERO 2008) and Aquatic Resource Technical Report (Miller Ecological 2008) prepared as part of the EIS process. Both of these reports provide additional details on the impacts of the alternatives evaluated in the EIS. The CDOW and FWS also were given an opportunity to review and comment on the draft EIS.

CRS 37-60-122.2 requires CDOW and Colorado Water Conservation Board review and input on mitigation for fish and wildlife impacts resulting from a federally

approved water project. The review process is intended to provide a balanced review between fish and wildlife protection and water development.[1] Although the procedures for CRS 37-60-122.2 do not require public review and input, the Subdistrict and CDOW have been involved in extensive efforts to allow for public participation. To date, the Wildlife Commission has provided the following public meetings to solicit input on the potential impacts and mitigation for the Moffat Project:

- Wildlife Commission Workshop, October 7, 2010, Las Animas – CDOW presented the proposed fish and wildlife impacts of the WGFP
- Wildlife Commission Public Meetings ("1313" Meetings), October 13, 2010 in Loveland and October 21, 2010 in Granby – Wildlife Commissioners solicited public comment on the potential impacts of the WGFP
- Stakeholder Workshops, January 24-25, 2011, Winter Park – CDOW solicited input on enhancement options for fixing the upper Colorado River between Windy Gap and the Kemp-Breeze State Wildlife Area to ensure a functioning river that supports fish and wildlife resources given anticipated future flows. (Refer to the *WGFP Enhancement Plan* for details.)
- Public Comment Period on Draft Enhancement and Mitigation Plans, Feb. 10-24, 2011 – CDOW invited public review and comment on the February 9th draft plans. The input will be reviewed by CDOW, Denver Water and the Subdistrict while preparing the final plans.
- Wildlife Commission Meeting, March 10, 2011 – Member of the public provided comments on the February 9th draft plans and review process.
- Wildlife Commission Meeting, May 6, 2011 – Members of the public provided comments on the April 7th plans submitted to the Wildlife Commission.

Input from all of these processes has been used to help prepare this plan.

5.0 PROPOSED FISH AND WILDLIFE MITIGATION PLAN

This section constitutes the Mitigation Plan for fish and wildlife impacts that are expected to be caused by the proposed WGFP. Mitigation measures have been developed to address impacts identified in the Draft EIS. The mitigation measures are also intended to address concerns regarding WGFP impacts that were identified by CDOW staff in a detailed review of the DEIS impacts. The impacts are based on a comparison of the existing conditions scenario to the Preferred Alternative, which consists of a 90,000 AF reservoir at the Chimney Hollow site. A detailed description of existing conditions in the project area and the analysis and identification of project impacts are included in the Draft EIS. The Draft EIS and associated Technical Reports prepared in conjunction with the DEIS are the only studies that

[1] See Testimony of Clyde Martz, Direction of the Department of Natural Resources, Senate Testimony HB 87-1158, April 9, 1987

have been conducted that specifically analyze the incremental impacts of the WGFP.

5.1 WGFP PROJECT AREA

The WGFP would have effects on both the east and west sides of the Continental Divide. The West Slope project area shown on Figure 1 includes the Colorado River below Lake Granby, which is affected by changes in Lake Granby spills and increased Windy Gap diversions at the existing Windy Gap Reservoir. Willow Creek below Willow Creek Reservoir is also included in the project area because of small changes in Willow Creek Feeder Canal diversions. Lake Granby is included because water levels would decrease as a result of storage of a portion of Windy Gap water in Chimney Hollow Reservoir. Shadow Mountain Reservoir and Grand Lake are included in the project area because of potential water quality effects, but there would be no change in lake levels.

The East Slope project area shown in Figure 2 includes the Chimney Hollow Reservoir site located west of Carter Lake, which is also shown on Figure 3. Hydrologic changes would occur in the Big Thompson River below Lake Estes from the import of additional Windy Gap water and from slight increases in flow that would occur below Participant wastewater treatment plants (WWTPs) on the Big Thompson River, St. Vrain Creek, Big Dry Creek, and Coal Creek. Carter Lake and Horsetooth Reservoir would experience a change in reservoir levels with the WGFP.

Proposed mitigation measures for the West Slope (Colorado River) area and the East Slope (South Platte Tributaries and Chimney Hollow Reservoir) are described below in separate sections.

5.2 AVOIDANCE AND MINIMIZATION

The Preferred Alternative for the WGFP was selected to minimize environmental impacts as a result of a detailed alternatives analysis conducted by Reclamation and a Section 404(b)(1) alternatives analysis prepared in coordination with the Corps. The alternatives analysis evaluated over 170 project elements which included both structural and non-structural alternatives. The Preferred Alternative consists of a 90,000 AF reservoir at the Chimney Hollow site and has been designed to minimize direct effects to wetlands and other waters of the U.S.

As part of the federal and state permits and approvals, the Subdistrict will implement a variety of best management practices (BMPs) during design and construction to reduce impacts to the environment, including fish and wildlife. Some of the environmental permits and approvals with BMPs and environmental protection measures include:

- Migratory Bird Treaty Act Compliance
- CDPHE Fugitive Dust Control Plan

- CDPHE Stormwater Management Plan
- CDPHE Section 401 Water Quality Certification

The CDOW has developed BMPs and actions to minimize adverse impacts to wildlife resources. The BMPs were specifically developed for the oil and gas industry; however, they can also be applicable to other major construction projects. These BMPs will be considered by the Subdistrict when preparing final design and construction plans. The Subdistrict will consult with the CDOW to implement the appropriate BMPs to avoid or minimize impacts on fish and wildlife resources.

5.3 PROPOSED MITIGATION MEASURES FOR WEST SLOPE (COLORADO RIVER) IMPACTS

Table 1 summarizes West Slope impacts and the proposed mitigation measures for each identified impact. The table also includes a column that outlines issues and concerns regarding WGFP impacts that were identified by CDOW staff in a detailed review of the DEIS impacts. The mitigation measures identified in the table are described in more detail in this section.

5.3.1. Modified Prepositioning to Maintain Higher Water Levels in Lake Granby

This measure addresses Impact CR-3, as well as CR-16, CR-23, ES-1, ES-2, and ES-29.

In any year when Lake Granby is projected to fall below an elevation of 8,250 feet, modified prepositioning, which reduces the delivery of C-BT water from Lake Granby to Chimney Hollow Reservoir, will be implemented to maintain higher water levels in Lake Granby.

Details of this measure will be developed by the Subdistrict and incorporated into a proposed agreement between Reclamation and the Subdistrict with a concurrence by the Corps. The objective is to minimize the adverse effects of prepositioning on water levels in Lake Granby. This measure will minimize any potential negative effects on aquatic resources and recreation in Lake Granby that may be caused by reduced water levels from prepositioning.

5.3.2 Improvements to Flushing Flows in the Colorado River

This measure addresses Impact CR-6, as well as CR-2, CR-14, CR-15 and CR-17.

The Windy Gap Project is currently required to bypass 450 cfs for 50 hours once in every 3 years, if such flows are naturally available in accordance with the *Memorandum of Understanding Between Municipal Subdistrict, Northern Colorado Water Conservancy District and Division of Wildlife, Colorado Department of Natural Resources, Relating to Minimum Stream Flow in Association with the Windy Gap Diversion Project*, dated June 23, 1980. The Subdistrict will modify project operations as follows:

- The flushing flow provision of the 1980 MOU will be modified to increase the required flushing flow from 450 cfs to 600 cfs.
- In any year when flows below Windy Gap have not exceed 600 cfs for at least 50 consecutive hours in the previous two years, and total Subdistrict water supplies in Chimney Hollow and Granby Reservoirs exceed 60,000 AF on April 1, the Subdistrict will cease all Windy Gap pumping for at least 50 consecutive hours to enhance peak flows below Windy Gap.

The intent of this measure is to enhance peak flows below Windy Gap . The Subdistrict will coordinate with CDOW and other water suppliers, including Denver Water, to maximize benefits of the higher flows and minimize any potential negative impacts to aquatic resources.

5.3.3 Temperature Mitigation

This measure addresses Impact CR-9, as well as CR-11 and CR-24.

- Monitoring Stations. The Subdistrict will work with Denver Water to install, operate and maintain two continuous real-time temperature-monitoring stations on the Colorado River; one at the Windy Gap gage and one upstream of the confluence with the Williams Fork River.

- Temperature Thresholds. For the purposes of this mitigation plan, the threshold temperatures will be the following, as measured at the temperature monitoring stations identified above:

  1. MWAT Chronic Threshold: 18.2°C (64.8° F), based on current Maximum Weekly Average Temperature (MWAT) Chronic Standard
  2. DM Acute Threshold: 23.8°C (74.8° F), based on current Daily Maximum (DM) Acute Standard

- MWAT Chronic Threshold Exceedances - Reduction or Curtailment of WGFP Pumping . For the period after July 15th of each year:

  1. At such times as the Weekly Average Temperature (WAT) exceeds the MWAT Chronic Threshold,, the Subdistrict will reduce or curtail WGFP pumping at the Windy Gap diversion to the extent necessary to maintain temperatures within the MWAT Threshold. Reduced pumping may not be sufficient to maintain temperatures below the threshold.

2. Pumping for the original Windy Gap Project, now and after the WGFP is in operation, may occur at any time that the Windy Gap water rights are in priority and sufficient space is available in Lake Granby that such water pumped will not be reasonably expected to spill from the reservoir. Therefore, WGFP pumping will be defined as pumping that occurs at such times as the Northern Colorado Water Conservancy District determines, based on its most probable forecasts of inflows to Lake Granby, that a spill of water from Lake Granby is reasonably foreseeable. All other pumping will be considered to be for the original Windy Gap Project.

- DM Acute Threshold Exceedances - Reduction or Curtailment of Pumping for the WGFP and the original Windy Gap Project .

  1. At such times as the Daily Maximum temperature is within 1 °C of the DM Acute Threshold, the Subdistrict will reduce or curtail pumping for the original Windy Gap Project or the WGFP at the Windy Gap diversion to the extent necessary to maintain temperatures within the DM Threshold. Reduced pumping may not be sufficient to maintain temperatures below the threshold. In the future, the 1 degree buffer may be altered, based on experience, to maintain compliance with the DM Threshold.

- Limitations on Reduction or Curtailment of Windy Gap pumping. The temperature mitigation measures identified above will be suspended in the event that and at such times as there is no material causal relationship between Windy Gap Project or Windy Gap Firming Project operations and any exceedence of the MWAT Chronic threshold or DM Acute threshold at the monitoring stations identified above. For the purposes of this Paragraph a "material causal relationship" is defined as either an actual measureable impact on temperature using readily available monitoring technology or a modeled impact on temperature that is not *de minimus* and is based on a computer model or studies accepted by the Colorado Division of Wildlife. The Subdistrict will cooperate with future studies to determine what factors, other than flow changes, have effects on water temperatures in the Colorado River below Windy Gap.

- Use of the Windy Gap Bypass Valve and Auxiliary Outlet. The Subdistrict will use the Windy Gap Project Bypass Valve and Auxiliary Outlet to the maximum extent practicable, without causing adverse effects to the Windy Gap Project facilities or operations for the bypass of water that is otherwise bypassed from the Windy Gap Project. This measure is intended to make releases of water from these outlets deeper in the reservoir that may be colder than water bypassed over the spillway.

5.3.4 Nutrient Mitigation to Offset Impacts to Grand Lake Water Quality

This measure addresses Impact CR-10, as well as CR-12, CR-13, CR-26, and ES-8.

The Subdistrict will develop a proposed nutrient reduction mitigation plan for Reclamation and Corps approval. The plan includes point source nutrient reductions from WWTP discharges in the Fraser River and nonpoint source nutrient reductions from agricultural land in the Willow Creek watershed. Other nutrient reduction measures would be implemented as necessary to meet the requirement to provide a documented nutrient reduction credit factor of 1:1 to satisfy Reclamation and the Corps mitigation requirements.

5.3.5 Participation in Upper Colorado River Recovery Program

This measure addresses Impact CR-20.

The Subdistrict will complete Section 7 consultation and compliance consistent with the requirements of the Programmatic Biological Opinion (PBO). The Service issued a Biological Opinion on February 12, 2010 for the Preferred Alternative indicating WGFP coverage under the PBO with Participation in Upper Colorado River Recovery Program and payment of a depletion fee for additional depletions attributable to the WGFP.

Documentation of Section 7 consultation will be submitted to the Corps in order to meet requirements for the Fish and Wildlife Coordination Act.

5.3.6 Curtailment of Windy Gap Diversions during Gore Race

This measure addresses Impact CR-22 and CR-25.

WGFP diversions would be suspended during the Gore Race in August if flows drop below preferred range (1,250 cfs).

5.4 PROPOSED MITIGATION MEASURES FOR EAST SLOPE (SOUTH PLATTE TRIBUTARIES AND CHIMNEY HOLLOW RESERVOIR) IMPACTS

Table 2 summarizes East Slope impacts and the proposed mitigation measures for each identified impact. The table also includes a column that outlines issues and concerns regarding WGFP impacts that were identified by CDOW staff in a detailed review of the DEIS impacts. The mitigation measures identified in the table that are relevant to fish and wildlife resources are described in more detail in this section.

5.4.1 Revegatiation and Weed Control on Areas Impacted by Construction

This measure addresses Impact ES-11.

Revegetation and weed control on all disturbed areas in accordance with an erosion control plan to be developed by the Subdistrict and approved by Reclamation and the Corps. Plan will be developed in coordination with CDOW and incorporate CDOW Oil & Gas BMPs where appropriate.

5.4.2 Wetlands Mitigation

This measure addresses Impact ES-13, ES-14, and ES-15.

Avoid, minimize and mitigate wetland impacts as specified in the 33 CFR Part 332 (Mitigation Rule, 10-Apr-08) and as approved by the Corps. Wetlands would be mitigated by contribution to an approved wetland mitigation bank.

5.4.3 Wildlife Habitat Mitigation at Chimney Hollow Reservoir Site

This measure addresses Impact ES-16 and ES-17.

Subdistrict will develop a plan to replace the values provided by habitat lost or altered by construction of Chimney Hollow Reservoir. Mitigation of impacts to wildlife resources will involve a combination of mitigation strategies and tools, including:

- Restoring habitats temporarily disturbed during reservoir and facility construction
- Working with Larimer County to restore or enhance degraded habitat surrounding Chimney Hollow Reservoir
- Working with CDOW and Larimer County to establish hunting access on the Chimney Hollow property
- Conducting management and education activities to minimize human-wildlife conflicts
- Implementing a migratory bird management plan
- Implementing seasonal restrictions and buffer zones

Details of this plan will include:

Restoration of Temporary Disturbances. The temporary loss of 123 acres of wildlife habitat will be mitigated through reclamation and revegetation of all habitats disturbed during construction and relocation of the transmission line and towers. Temporary loss of vegetation communities due to construction of dams, pipelines, staging, and access roads will be restored with plantings and seed mixes that replicate the vegetation cover types. Vegetation restoration of the transmission line corridor will involve working closely with Western to incorporate strategies for maintenance of stable low-growing vegetative communities that include mechanical cutting, removal of timber, on-site treatment of slash, and planting sustainable, low-growing shrubs and grasses. Plantings and seed mixes will focus on restoring diverse vegetation communities that provide wildlife forage, particularly during fall and winter. A reclamation plan will be developed as part of the construction program and the Stormwater Management Plan.

Habitat Enhancement. Subdistrict will work with Larimer County to develop a land management plan that will include habitat enhancement of vegetation communities surrounding Chimney Hollow Reservoir, which involves planting native species beneficial to wildlife where appropriate. The Subdistrict will provide $50,000 to Larimer County to use in their ongoing habitat management plan. A weed control plan would be developed in cooperation with Larimer County prior to implementing habitat enhancement to improve the quality of lands not specifically within the areas of vegetation enhancement. Weed management will focus on monitoring restored habitats and implementing an integrated weed management approach of mechanical, chemical, and biological control strategies. Integrated weed management strategies also will be used to control existing areas of noxious and invasive species, particularly large patches of thistle and cheatgrass. The weed management plan will be developed prior to construction disturbances and updated periodically through implementation of wildlife enhancement.

Hunting Opportunities. Larimer County will develop a management plan for the Chimney Hollow area. As part of this process, the Subdistrict and Larimer County will work with CDOW and Larimer County to explore opportunities to provide seasonal hunting on portions of the Chimney Hollow Reservoir site and open space to assist with game management and provide additional recreation.

Minimization of Human-Wildlife Conflicts. The displacement of elk and bear into surrounding residential areas as they search for lost food resources will be offset by the habitat enhancement activities and hunting opportunities described above. Additionally, the Subdistrict will work with Larimer County and CDOW to reduce/eliminate wildlife attractants from recreation facilities and establish education/outreach programs and information kiosks/signs informing the public on the dangers of close interactions with wildlife, and methods to avoid and minimize potentially dangerous encounters.

Implementing Migratory Bird Avoidance Plan. The active nesting season for most migratory bird species in Colorado is between April 1 and August 15. Over the past few years, FWS and CDOW have suggested that the best way to avoid a violation of the Migratory Bird Treaty Act (MBTA) is to remove vegetation outside of the active breeding season. The Subdistrict will develop BMPs in accordance with CDOW guidance to avoid disturbing active bird nests at the Chimney Hollow Reservoir site. *Note: Implementing these BMPs demonstrates a good faith effort to avoid incidental violation of the MBTA, but does not guarantee that migratory birds will not still nest in some areas despite these efforts.*

Seasonal Restrictions and Buffer Zones for Raptors. Avoidance and mitigation options for nesting raptors at the Chimney Hollow Reservoir site consists of: 1) conducting nest surveys prior to construction, 2) establishing

reasonable site-specific buffers and seasonal restrictions, 3) implementing seasonal restrictions to avoid and minimize disturbance, and 4) removing inactive nests from the transmission line corridor, construction footprints, reservoir pool area, or other areas of permanent impacts. Currently, there are no expected permanent impacts to existing raptor nests; however, there is the possibility that a new active raptor nest could be established in areas slated for disturbance or inundation. The intent of any mitigation is to encourage individual raptor pairs to nest at selected and more secure locations. BMPs will be developed in accordance with CDOW guidance to avoid, minimize and mitigate potential impacts.

5.4.4 Air Quality Mitigation

This measure addresses Impact ES-23 and ES-24.

Subdistrict will develop a fugitive particulate emissions control plan and BMPs to minimize air quality and noise impacts to wildlife.

5.5 MITIGATION COSTS AND SCHEDULE

Estimated mitigation costs are shown in the following table. Total project costs are estimated to be $273,000,000, which includes construction costs of about $237,000,000. The mitigation schedule will be contingent on the issuance of permits and licenses, construction timetables, project completion, and the ability of the Subdistrict to fill the reservoir. The schedule provided in the following table provides a timetable based on these contingencies.

Mitigation Insurance Policy - The mitigation listed above is based on the Draft EIS for the WGFP that was released for public comment in August of 2008. Since that time and based on comments to the Draft EIS, Reclamation has conducted additional studies related to the preparation of the Final EIS, that in part are designed to further refine the analysis of environmental impacts of the proposed action. If new impacts to fish and wildlife resources are identified in the Final EIS that were not discussed in the Draft EIS and not addressed in this mitigation plan, the Subdistrict will propose mitigation for these new impacts. The additional mitigation will be developed in cooperation with the CDOW prior to submittal to Reclamation for its consideration as a permit condition. The Subdistrict will reserve $600,000 for any new impacts to fish and wildlife resources identified by the Final EIS and required by Reclamation. If Reclamation does not identify new impacts requiring mitigation, the Subdistrict will have no further obligation to reserve this money.

West Slope

Mitigation Measure	Scheduled Start	Scheduled End	Estimated Cost
Modified prepositioning to reduce Lake Granby fluctuations	Concurrent with project start up	Permanent change in WGFP operation	$0 May have minor effect project yield
Improvements to flushing flows in Colorado River	Concurrent with project start up	No end date	May have effects on project yield but cost cannot be estimated.
Temperature mitigation	Temperature monitoring would begin within one year after issuance of permits. Curtailed diversions occur when Chimney Hollow Reservoir is completed and diversions increase	Diversion curtailments per the established criteria would continue as long as the WGFP is in operation	$50,000 for monitoring stations May have effects on project yield but cost cannot be estimated.
Nutrient mitigation to offset impacts to Grand Lake water quality – will also improve water quality in Colorado River below Windy Gap	Monitoring of baseline conditions will begin in 2011 and nutrient removal will begin concurrent with project start up	Monitoring will continue until 1:1 nutrient offset has been verified. Operation of nutrient reduction projects will continue as long as the WGFP is in operation	$4.3 million (estimated)
Participation in Upper Colorado River Recovery Program	Payment upon issuance of permits; expected by 2011	One time upfront fee	$405,000 (estimated)
Curtailed diversions for annual Gore Race, if needed	Concurrent with project start up	Permanent change in WGFP operation	

East Slope

Mitigation Measure	Scheduled Start	Scheduled End	Estimated Cost
Revegetation and weed control on areas impacted by construction	Immediately upon completion of specific habitat-disturbing activity	Three years post-restoration or until success criteria are met	$25,000
Wetland mitigation	Within one year of issuance of permit	One time upfront fee	$115,000
Wildlife habitat mitigation at Chimney Hollow Reservoir site	Concurrent or following construction depending on location	Three years post-construction or until success criteria are met	$50,000 (estimated)
Air quality mitigation	Concurrent or following construction depending on location	Until completion of construction	$0

6.0 CONCLUSIONS

The FWMP presents a broad range of mitigation actions to address the potential fish and wildlife impacts of the WGFP. If accepted by the Colorado Wildlife Commission and CWCB, this mitigation plan will represent the official state position on mitigation for the WGFP. Since the state-adopted FWMP is not enforceable by itself, the Subdistrict anticipates that Reclamation and the Corps will determine these mitigation measures are adequate and will impose them within their regulatory requirements for Reclamation's approvals and the Section 404 Permit, respectively.

REFERENCES

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ERO (ERO Resources Corporation). 2000. Preble's Meadow Jumping Mouse Trapping Survey for Chimney Hollow; Larimer County, Colorado. Prepared for Northern Colorado Water Conservancy District. October 9.

ERO (ERO Resources Corporation). 2003. Preble's Meadow Jumping Mouse Habitat Assessment for the proposed Chimney Hollow Reservoir Site. Prepared for U.S. Bureau of Reclamation and Municipal Subdistrict, Northern Colorado Water Conservancy District.

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Reclamation (U.S. Bureau of Reclamation). 2008. Windy Gap Firming Project Draft EIS.

Table 1: WEST SLOPE - Colorado River

Item No.	EIS Impacts	CDOW Issues	Proposed Mitigation	Mitigation Agency
Surface Water Hydrology				
CR-1	Reduced spills from Lake Granby to the Colorado River as a result of fewer Windy Gap spills.	Fewer spills may mean decreased sediment transport in the Colorado River downstream to the Fraser River confluence.	None Reclamation minimum flow releases below Lake Granby would be maintained.	
CR-2	Reduced flows in Colorado River below Windy Gap diversion.	Reduced flows impact other resources: -Stream Morphology and Sediment Transport -Surface Water Quality -Aquatic Resources (habitat) -Recreational Fishing -Riparian Health	See Proposed Mitigation for Stream Morphology and Surface Water Quality. Note: Current minimum bypass flows below Windy Gap Reservoir will continue per existing agreements. To assure that water diverted from the Colorado River is used as efficiently as possible, Reclamation will require that all participants in the Windy Gap Firming Project have Water Conservation Plans in accordance with the requirements of CRS 37-60-126 prior to the initial delivery of any water after construction of the WGFP.	Reclamation
CR-3	Lower water levels in Lake Granby as a result of prepositioning.	Lower water levels in Granby (when fisherman access to water is considered) reduce mysid impacts on kokanee growth - a beneficial impact.	In any year when Lake Granby is projected to fall below an elevation of 8,250 feet, modified prepositioning, which reduces the delivery of C-BT water from Lake Granby to Chimney Hollow Reservoir, will be implemented to maintain higher water levels in Lake Granby. Details of this measure will be developed by the Subdistrict and incorporated into a proposed agreement between Reclamation and the Subdistrict with a concurrence by the Corps. The objective is to minimize the adverse effects of prepositioning on water levels in Lake Granby.	Reclamation
Groundwater				
CR-4	Small changes in Colorado River and Willow Creek stream stage would not significantly impact alluvial groundwater levels.	Addressed in terms of stage change as percentage of total flow. Negligible impact on fisheries and riparian zone.	None	
CR-5	Small changes in surface water quality in West Slope streams and reservoirs would have minor effect on groundwater quality.	Addressed in terms of stage change as percentage of total flow. Negligible impact on fisheries and riparian zone. Corrected by NPDES permits.	None	
Stream Morphology and Floodplain				
CR-6	Decrease in frequency of 2-year peak discharge and in channel maintenance flows in the Colorado River.	Effects of lower flows on stream morphology and sediment transport and potential impacts on aquatic ecosystem, including riparian vegetation, fish and macroinvertebrates.	Note: Mitigation from the original Windy Gap Project would be modified (current flushing flow of 450 cfs below Windy Gap Reservoir for 50 hours from April 1 to June 30 every 3 years would be increased to 600 cfs). At any time when flushing flows have not occurred in previous 2 years, and total Subdistrict water supplies available in Granby and Chimney Hollow Reservoirs exceed 60,000 acre-feet, the Subdistrict will, in coordination with CDOW, cease pumping for 50 hours to enhance peak flows below Windy Gap.	CDOW, Reclamation
CR-7	Small decrease in frequency of 2-year peak discharge and in channel maintenance flows in Willow Creek.		None	CDOW, Reclamation
CR-8	Potential for flooding along the Colorado River and Willow Creek would decrease.		None	

Windy Gap Firming Project Proposed Mitigation

Table 1: WEST SLOPE - Colorado River

Item No.	EIS Impacts	CDOW Issues	Proposed Mitigation	Mitigation Agency
Surface Water Quality				
CR-9	Colorado River temperature between Windy Gap Reservoir and Williams Fork may exceed 18.2 degree centigrade chronic maximum weekly average temperature (MWAT) or 23.8 degree centigrade daily maximum (DM) acute state standard as a result of WGFP diversions that lower flows in the Colorado River. Impact is most likely in the occasional years when WGFP diversions occur after July 15.	Add DM (daily maximum) temperature to the list of monitored statistics. Criteria for use of MWAT and DM; associated decision tree needs to be developed.	1. Install and maintain, for the life of the WGFP, two real time temperature gages in the Colorado River. One will be located downstream of WG Reservoir and one immediately upstream of the Williams Fork at locations agreed to by Reclamation, the Corps, and the Colorado Division of Wildlife. 2. After July 15 if the MWAT temperature threshold (18.2°C, 64.8° F) is exceeded at either station, WGFP pumping will be reduced or curtailed as necessary to maintain temperatures below the threshold. 3. If the DM temperature is within 1°C of the threshold (23.8°C, 74.8° F) at either station, WG and WGFP pumping will be reduced or curtailed as necessary to maintain temperatures below the threshold. 4. The Subdistrict will use the Windy Gap Project Bypass Valve and/or Auxiliary Outlet, to the maximum extent practicable, to release colder water for required project bypasses.	CDOW, Reclamation
CR-10	Additional WGFP pumping would increase nutrient (nitrogen and phosphorus) loading in Lake Granby, Shadow Mountain Reservoir, and Grand Lake, resulting in increased chlorophyll a, and manganese (Mn)		The Subdistrict will develop a proposed nutrient reduction mitigation plan for Reclamation and Corps approval. The plan includes point source nutrient reductions from WWTP discharges in the Fraser River and nonpoint source nutrient reductions from agricultural land in the Willow Creek watershed. Other nutrient reduction measures would be implemented as necessary to meet the requirement to provide a documented nutrient reduction credit factor of 1:1 to satisfy Reclamation and the Corps mitigation requirements.	Reclamation, Corps
CR-11	Decrease in Colorado River DO below Windy Gap Reservoir. DO concentrations predicted to remain above 6.0 mg/L standard. DO could fall below fish spawning standard of 7.0 mg/L between Windy Gap Reservoir and Williams Fork at low flows.		Mitigation for temperature (CR-9) and aquatic resources effects should improve and maintain DO levels above state standard.	CDOW, Reclamation
CR-12	Higher concentration of nutrients in the Colorado River below Windy Gap Reservoir as a result of WGFP pumping that reduces dilution flows.		Nutrient mitigation described in CR-10 in the Windy Gap watershed will reduce nutrient loading to the Colorado River below Windy Gap. The nutrient mitigation plan required by CR-10 must be reviewed and approved by Reclamation and the Corps.	Reclamation, Corps
CR-13	Slight increase in nutrient and metal concentrations in Willow Creek.		Nutrient mitigation described in CR-10 in the Willow Creek watershed will reduce nutrient loading to the creek. The nutrient mitigation plan required by CR-10 must be reviewed and approved by Reclamation and the Corps. Metal concentrations will remain within state standards.	Reclamation, Corps
Aquatic Resources				
CR-14	Decrease in the amount and frequency of available fish habitat in the Colorado River and an increase in stream temperature.	Decrease in habitat during pumping may not be limiting - the decrease is probably related to forgone changes in channel morphology and other factors (upstream development, water quality, other factors in addition to Windy Gap). Concerns about current condition of fishery, including recent trend of lower fish populations, loss of pteronarcys, sculpin, and other aquatic life.	See proposed mitigation for Surface Water Quality (CR-9).	Reclamation, Corps, CDOW
CR-15	Decrease in the amount and frequency of available fish habitat in Willow Creek.		None	
CR-16	Lower water levels in Lake Granby would slightly reduce available fish habitat.	Negligible impact under expected operations.	See proposed mitigation for Surface Water Hydrology (CR-3)	Reclamation

Table 1: WEST SLOPE - Colorado River

Item No.	EIS Impacts	CDOW Issues	Proposed Mitigation	Mitigation Agency
Vegetation				
CR-17	Effects to riparian vegetation along Colorado River from reduced streamflow.		None.	Reclamation, Corps, CDOW
Wetlands				
CR-18	Effects on wetlands adjacent to the Colorado River and downstream of the Windy Gap diversion.		None	
Wildlife				
CR-19	Change in streamflow in the Colorado River and Willow Creek is unlikely to affect terrestrial wildlife resources.		None	
Threatened and Endangered Species				
CR-20	Depletion to Colorado River impacts T&E fish.		Section 7 consultation and compliance consistent with the requirements of the Programmatic Biological Opinion (PBO). The Service issued a Biological Opinion on February 12, 2010 for the Preferred Alternative indicating WGFP coverage under the PBO with participation in Upper Colorado River Recovery Program (UCRRP) and payment of depletion fee for additional depletions attributable to the WGFP. Documentation of Section 7 consultation will be submitted to the Corps in order to meet requirements for the Fish and Wildlife Coordination Act.	Continued participation in the Upper Colorado River Endangered Fish Recovery Program per the USFWS Biological Opinion.
Recreation				
CR-21	Reduction in preferred kayaking flow days in Byers Canyon. In 29 of 47 years in the period of record there would be no change. In other years there would be a slight decrease in average number of days per year with preferred kayaking flows.		None	
CR-22	Preferred rafting and kayaking flows in Big Gore and Pumphouse would decrease. A decrease and increase in the number of days within preferred flow range that averages less than 3 days per year.		None , except WGFP diversions would be suspended during Gore Race in August if flows drop below preferred range (1,250 cfs).	Reclamation
CR-23	Access to Lake Granby boat ramps at Arapaho Bay, Stillwater, and Sunset could diminish in some months.	Proposed change in project operation in dry years will keep Granby higher.	None. Modified prepositioning discussed in CR-3 would maintain higher water levels in Lake Granby during years when the reservoir is anticipated to fall below elevation 8,250 msl thereby improving boat ramp access.	Reclamation
CR-24	Effects on recreational fishing in the Colorado River downstream of the Windy Gap diversion from habitat loss and temperature impacts between Windy Gap and the Blue River.	Includes float fishing.	Proposed mitigation for Surface Water Quality should reduce effects on recreational fishing.	Reclamation, Corps, CDOW

Table 1: WEST SLOPE - Colorado River

Item No.	EIS Impacts	CDOW Issues	Proposed Mitigation	Mitigation Agency
Socioeconomics				
CR-25	Lost recreational boating value in the Colorado River in some years due to lower flows. Although preferred boating flows are not always met, rafting and kayaking opportunities would remain (i.e. flows would rarely drop below minimum flows needed for boating).			
CR-26	Reduction in aesthetic value in Grand Lake if algae concentrations increase.	Additional issues in Shadow Mountain.	Nutrient mitigation measures discussed in CR-10 would offset nutrient loading from increased WGFP pumping.	Reclamation, Corps

Table 2: EAST SLOPE - South Platte Tributaries and Chimney Hollow Reservoir

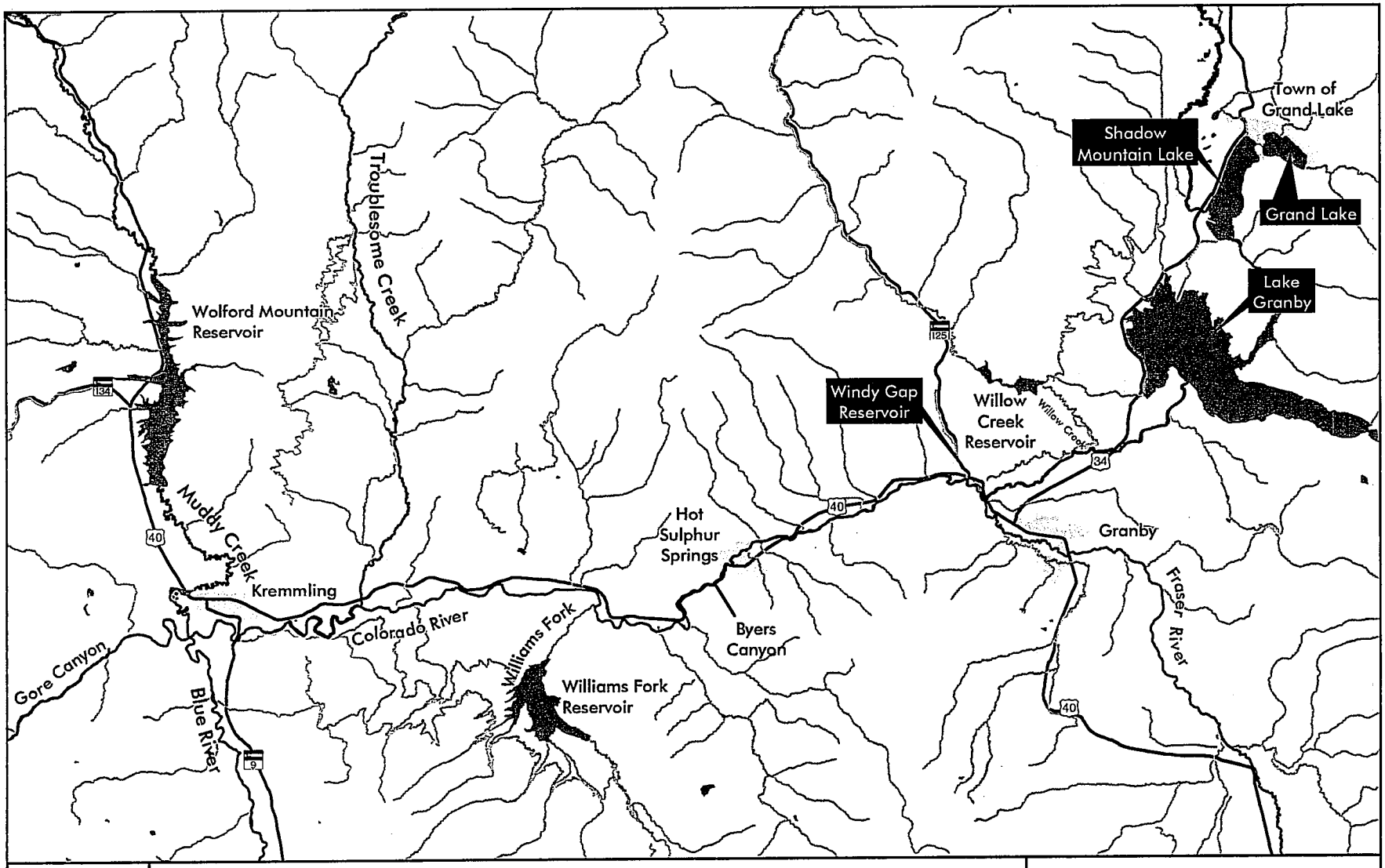
Item No.	EIS Impacts	CDOW Issues/Concerns	Proposed Mitigation	Mitigation Agency
Surface Water Hydrology				
ES-1	Lower water levels in Carter Lake (~1').	Earlier fill is better for walleye.	None. However, modified prepositioning as discussed in CR-3 would result in smaller changes in water levels (<1' lower).	Reclamation
ES-2	Lower water levels in Horsetooth Reservoir (6' lower on avg.).	Higher nutrients and lower DO may complicate 303D listing status.	None. However, modified prepositioning as discussed in CR-3 would result in smaller changes in water levels (<2' lower).	Reclamation
Groundwater				
ES-3	Small changes in East Slope stream stage that would not significantly impact alluvial groundwater levels.	Addressed in terms of stage change as percentage of total flow. Negligible impact on fisheries and riparian zone.	None	
ES-4	Small changes in surface water quality in East Slope streams and reservoirs would have minor effect on groundwater quality.	Addressed in terms of stage change as percentage of total flow. Negligible impact on fisheries and riparian zone. Corrected by NPDES permits.	None	
Stream Morphology and Floodplain				
ES-5	Increased flows on East Slope streams below WWTPs could have slight effect on channel morphology.		None	
ES-6	Flows in East Slope streams would increase slightly.		None	
Surface Water Quality				
ES-7	Increased ammonia concentrations in St. Vrain Creek, Big Dry Creek, Coal Creek as a result of increased discharges from Participant WWTP's.	Based on standards and NDPES permits. Participants must meet ammonia discharge limitations in accordance with Colorado water quality standards and as part of their NPDES Permit for WWTP discharges.	None	
ES-8	Nutrient increases (TP, TN) resulting in higher chlorophyll a concentrations and a decrease in DO in Carter Lake and Horsetooth.		None. In accordance with CR-10, plans to monitor and mitigate nutrient increases in the Three Lakes system should address this issue and the plans must be approved by Reclamation and the Corps.	Reclamation, Corps
Aquatic Resources				
ES-9	Construction of Chimney Hollow Reservoir would create potential flat water fishing opportunities if a fishery is established in Chimney Hollow.	Construction of reservoir will replace terrestrial environment with aquatic environment, displacing terrestrial wildlife and allowing the replacement by aquatic wildlife.	None	
ES-10	Lower water levels in Carter Lake and Horsetooth Reservoir would slightly reduce available fish habitat.	Negligible impact under expected operations.	None. However, modified prepositioning as discussed in CR-3 would result in smaller changes in water levels.	

Table 2: EAST SLOPE - South Platte Tributaries and Chimney Hollow Reservoir

Item No.	EIS Impacts	CDOW Issues/Concerns	Proposed Mitigation	Mitigation Agency
Vegetation				
ES-11	Temporary impact to 123 acres of vegetation during construction of Chimney Hollow Reservoir.	Includes pipeline ROW and contractor staging area. Reveg with wildlife friendly seed mixes. 1298 Final BMPs	Revegetation, and weed control on all disturbed areas in accordance with an erosion control plan to be developed by the Subdistrict and approved by Reclamation and the Corps. Plan will be developed in coordination with CDOW and incorporate CDOW Oil & Gas BMPs where appropriate.	Reclamation, Corps, CDOW
ES-12	Permanent loss of 788 acres of vegetation from inundation and dam at Chimney Hollow.	Hunting Access	None. Larimer County maintains land management plan for Chimney Hollow open space area which includes forestry, vegetation management, and weed control.	CDOW
Wetlands				
ES-13	Temporary disturbance of about 0.2 acres of wetlands during Chimney Hollow Reservoir construction.	Corps issue-compensatory mitigation.	Avoid, minimize and mitigate wetland impacts as specified in the 33 CFR Part 332 (Mitigation Rule, 10-Apr-08) and as approved by Reclamation and the Corps.	Corps
ES-14	Permanent impact to about 2 acres of wetlands at Chimney Hollow Reservoir.	Corps issue-compensatory mitigation.	Avoid, minimize and mitigate wetland impacts as specified in the 33 CFR Part 332 (Mitigation Rule, 10-Apr-08) and as approved by the Corps. Wetlands would be mitigated by contribution to an approved wetland mitigation bank.	Corps
ES-15	Permanent impact to about 0.5 acres of waters of the U.S. along Chimney Hollow.	Corps issue-compensatory mitigation.	Avoid, minimize and mitigate wetland impacts as specified in the 33 CFR Part 332 (Mitigation Rule, 10-Apr-08) and as approved by Reclamation and the Corps.	Corps
Wildlife				
ES-16	Loss of 810 acres of elk winter range, mule deer winter range and concentration area, and black bear foraging area at Chimney Hollow.	Access for hunting; improve vegetation to draw elk and/or bears.	Subdistrict will work with CDOW and Larimer County to allow hunting access on property to minimize displacement of game animals to other areas.	
ES-17	General loss of habitat for other terrestrial species, birds, amphibians, reptiles, and butterflies at Chimney Hollow.	Includes reservoir inundation area and pipeline ROW. ≈ 2 mile loss of riparian habitat in inundated stream channel.	Revegetation and weed control on all disturbed areas in accordance with an erosion control plan to be developed by the Subdistrict and approved by Reclamation and the Corps. Plan will be developed in coordination with CDOW and incorporate CDOW Oil & Gas BMPs where appropriate. Implement migratory bird mananagement plan and seasonal restrictions and buffer zones.	
ES-18	Loss of 7 acres of bald eagle winter range at Chimney Hollow. This effect is minor as there is sufficient bald eagle wintering habitat in the area. New reservoir would provide open water foraging habitat for bald eagles.		None	
Threatened and Endangered Species				
ES-19	No impact at Chimney Hollow.		None	
Geology				
ES-20	Potential for uncovering fossils during Chimney Hollow Reservoir construction.		Paleontological survey would be conducted prior to construction and the Denver Museum contacted if important fossils discovered. Paleontological resources will be dealt with in accordance with the programmatic agreement or memorandum of agreement between Reclamation, the State Historic Preservation Officer, the Subdistrict, and possibly the Advisory Council.	Reclamation
Soils				
ES-21	Temporary and permanent loss of soil during Chimney Hollow Reservoir construction.	BMPs for pipelines, dam construction. SWMP (CDPHE) by contractor.	Erosion control and revegetation.	Reclamation
ES-22	Shoreline erosion at Chimney Hollow Reservoir.		None	
Air Quality				
ES-23	Dust and vehicle emissions during Chimney Hollow Reservoir construction.	Adaptive management, blasting for three years.	A fugitive particulate emissions control plan and BMPs would be developed and must be approved by the Corps in order to meet requirements for Colorado Air Quality Control Standards.	Reclamation
ES-24	Increased ambient noise from construction of Chimney Hollow Reservoir.	Displacement of wildlife.	BMPs to minimize noise.	

Table 2: EAST SLOPE - South Platte Tributaries and Chimney Hollow Reservoir

Item No. Land Use	EIS Impacts	CDOW Issues/Concerns	Proposed Mitigation	Mitigation Agency
ES-25	A portion of Chimney Hollow would be located on private property or Larimer County property.	Near CH dam - toes of 35 acre parcels on ridge, purchase of horizontal land on edge of CH.	Private land acquisition or the necessary access rights and easements.	Reclamation
ES-26	A portion of Chimney Hollow Reservoir facilities would be located on Reclamation property.	Facilities around Flatiron Reservoir on USBR land - easement w/USBR.	Easements or appropriate permits from Reclamation would be acquired.	Reclamation
ES-27	Sandstone quarry operations could be affected by southern access road to Chimney Hollow Reservoir.	Road uncertain, could be used for hunting access; seasonal closure?	Quarry access would be maintained.	Reclamation
ES-28	Increased construction traffic on CR 18E and CR 31 and impacts to roads during reservoir construction and from recreation access to Chimney Hollow Open Space managed by Larimer County.	Potential for elk/car/truck encounters- add signing.	The Subdistrict would comply with all County road and permitting requirements.	Reclamation
Recreation				
ES-29	Access to the South Bay-South boat ramp in Horsetooth could be impacted.		None. Modified prepositioning discussed in CR-3 would maintain higher water levels in Lake Granby during years when the reservoir is anticipated to fall below elevation 8,250 msl thereby improving boat ramp access.	Reclamation
Cultural Resources				
ES-30	Twenty-four eligible or potential eligible cultural resources could be impacted by construction of Chimney Hollow Reservoir.		Compliance with Section 106 of the National Historic Preservation Act including additional evaluation and mitigation will be conducted in coordination with Reclamation, the Corps of Engineers, and SHPO. Cultural resources will be dealt with in accordance with a Programmatic Agreement or MOA to be developed and signed by Reclamation, the SHPO, and the Subdistrict.	Reclamation, Corps, SHPO
Visual Quality				
ES-31	Temporary impacts from construction of Chimney Hollow Reservoir.	Mostly human, not wildlife.	Revegetation and BMPs.	Reclamation
ES-32	Permanent changes in landscape.		Revegetation, weed control, maintenance.	Reclamation
ES-33	Relocation of transmission line.	115KV line, inline construction, tall poles - raptor protection included in WAPA design standards.	Visual sensitivity analysis conducted in siting relocated transmission line. , Nonspecular, nonreflective wire would be used and possibly nonreflective steel poles. All site disturbances would be revegetated following construction.	Reclamation
Socioeconomics				
ES-34	Property Acquisition.		None Any properties required to be purchased for the project would be purchased for just compensation following an appraisal in accordance with the Water Conservancy Act (CRS 27-45-101 to 153) and other applicable state laws.	



ERO
ERO Resources Corp.
1842 Clarkson Street
Denver, CO 80218
(303) 830-1188
Fax: (303) 830-1199

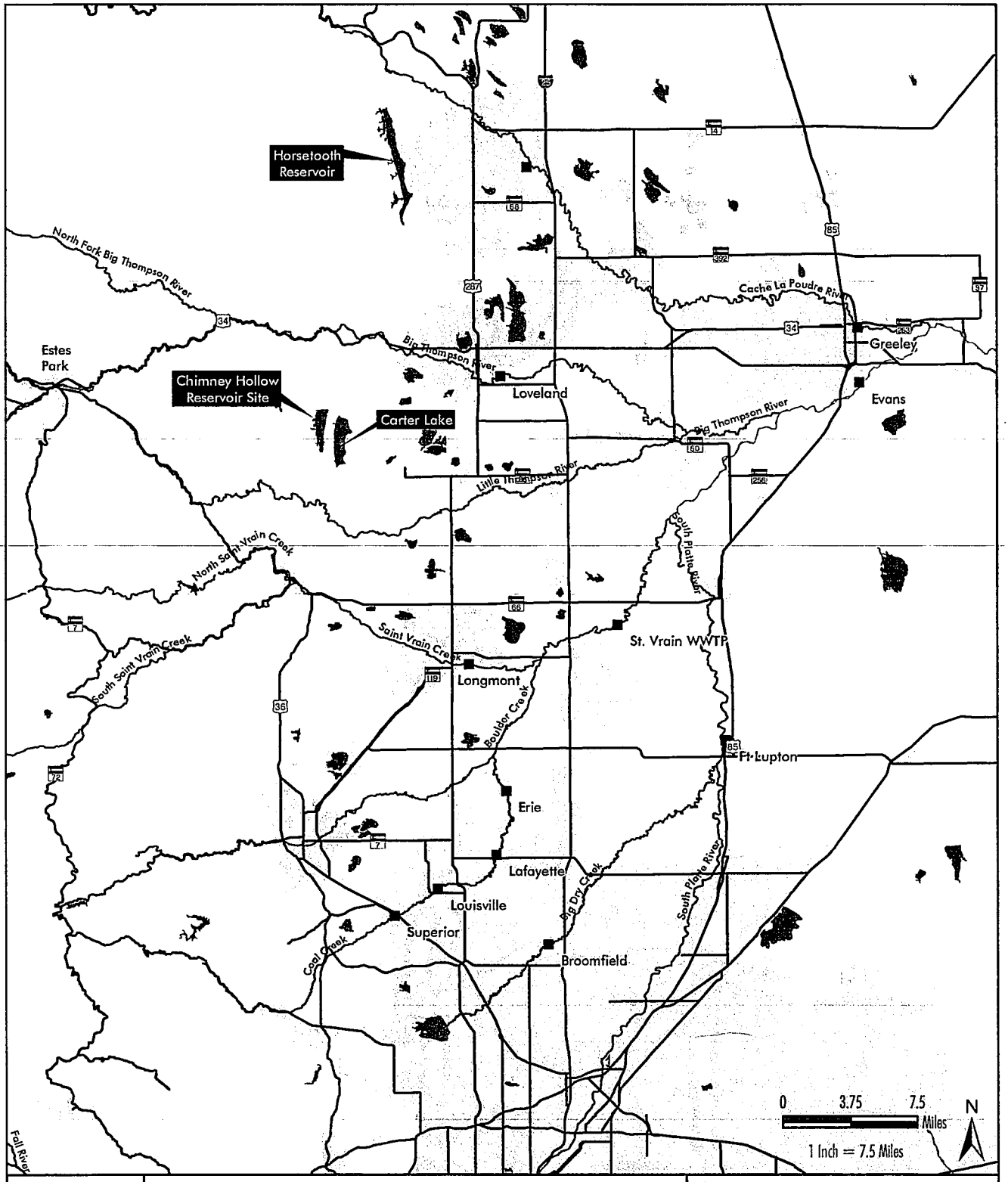
City
Lake or Reservoir
Major Streams
Minor Streams
Highway

0 2 4 Miles
1 Inch = 4 Miles

N

Figure 1
West Slope Project

Prepared for: Windy Gap Firming Project
File: 2390 EIS\WM_WestSlopeWaterResource.mxd (JP)
July 2009

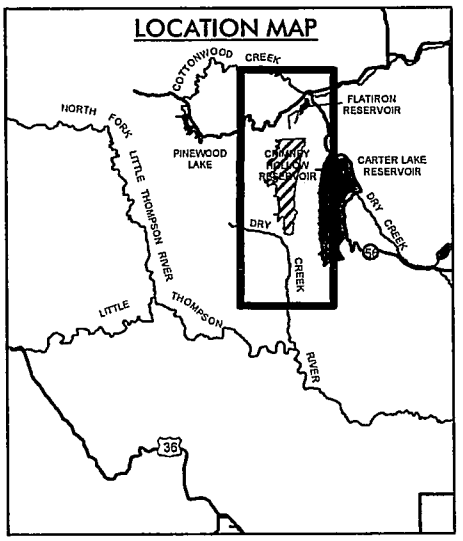


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- Waste Water Treatment Plant
- Lake or Reservoir
- Highway
- Major Streams
- City

Figure 2
East Slope Project

Prepared for: Windy Gap Firming Project
File: 2390 EIS\WM_EastSlopeWaterResource.mxd (JP)
June 2009



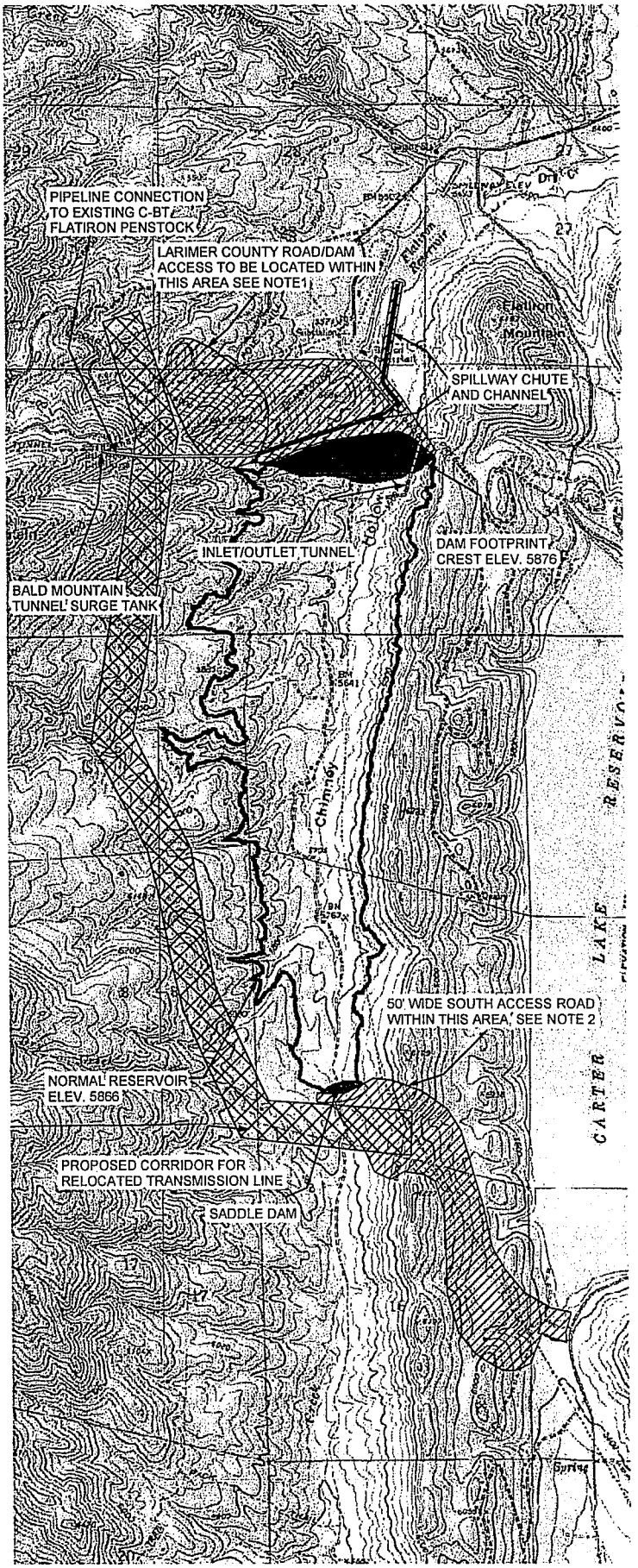
NOTES:

1. FINAL LOCATION OF DAM CREST ACCESS ROAD TO BE DETERMINED THROUGH LARIMER COUNTY PARK PLANNING PROCESS.
2. SOUTH ACCESS ROAD DURING CONSTRUCTION - GATED WITH NO PUBLIC ACCESS FOLLOWING CONSTRUCTION.

0 2,000 4,000 Feet

N

"USGS MAP OF THE CARTER LAKE RESERVOIR QUADRANGLE, BOULDER AND LARIMER COUNTIES, COLORADO"
SITE SPECIFIC TOPOGRAPHY BASED ON AERIAL SURVEY, APRIL 2003



WINDY GAP FIRMING PROJECT

Figure 3
Chimney Hollow Reservoir (90,000 AF)

Windy Gap Firming Project

Appendix B

U.S. Fish and Wildlife Service Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
764 Horizon Drive, Building B
Grand Junction, Colorado 81506-3946

OFFICIAL FILE COPY
RECLAMATION
Date FEB 18 2010

Code	Surname	Date
1340		
Tully		

Copy to

IN REPLY REFER TO:
ES/GJ-6-CO-99-F-033-CP104
TAILS 65413-2010-F-0033

February 12, 2010

Memorandum

To: Area Manager, Eastern Colorado Area Office, Bureau of Reclamation, Loveland, Colorado

From: Acting Western Colorado Supervisor, Ecological Services, Grand Junction, Colorado Patrick J. Gelatt

Subject: Windy Gap Firming Project Section 7 Consultation for Colorado River Water Depletions

This responds to your November 17, 2009, request for formal consultation for the subject project under section 7 of the Endangered Species Act (ESA). In accordance with section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.), and the Interagency Cooperation Regulations (50 CFR 402), the Fish and Wildlife Service (Service) transmits this correspondence to serve as the final biological opinion for Colorado River water depletions associated with the Windy Gap Firming Project (WGFP). This biological opinion only addresses the Colorado River endangered fishes, other species will be addressed separately.

The Municipal Subdistrict, Northern Colorado Water Conservancy District, acting through the Windy Gap Firming Project Water Activity Enterprise (Subdistrict) is proposing to improve the firm yield from the existing Windy Gap Project. The proposed action is to divert additional water from the Colorado River at Windy Gap Reservoir and deliver it through the existing Colorado Big-Thompson Project facilities to a new reservoir east of the continental divide in Larimer County, about 8 miles southwest of Loveland, Colorado. The proposed Chimney Hollow Reservoir would have a capacity of 90,000 acre-feet. This reservoir will provide storage dedicated to the WGFP participants, which will allow additional diversions from the Colorado River to meet participants' needs on the eastern slope.

The original Windy Gap Project was addressed in a March 13, 1981, biological opinion, based on an estimated average annual diversion of 57,300 acre-feet. Since the Windy Gap Project was completed, it has not been able to divert the anticipated amount of water due to junior water rights and inadequate storage in Granby Reservoir. In 1999, the average annual depletions of the Windy Gap project were determined to be 18,779 acre-feet. The purpose of the WGFP is to firm up the project's yield by providing more storage.

Official File Copy
File Code ENV 7.00
Project 245
Control No.
Folder I.D.

WGFP

A Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin was initiated on January 22, 1988. The Recovery Program was intended to be the reasonable and prudent alternative for individual projects to avoid the likelihood of jeopardy to the endangered fishes from depletions from the Upper Colorado River Basin. In order to further define and clarify the process in the Recovery Program, a section 7 agreement was implemented on October 15, 1993, by the Recovery Program participants. Incorporated into this agreement is a Recovery Implementation Program Recovery Action Plan (RIPRAP) which identifies actions currently believed to be required to recover the endangered fishes in the most expeditious manner.

On December 20, 1999, the Service issued a final programmatic biological opinion (PBO) 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. The Service has determined that projects that fit under the umbrella of the Colorado River PBO would avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletion impacts. The Colorado River PBO states that in order for actions to fall within the umbrella of the PBO and rely on the RIPRAP to offset its depletion, the following criteria must be met.

1. A Recovery Agreement must be offered and signed prior to conclusion of section 7 consultation.

2. A fee to fund recovery actions will be submitted as described in the proposed action for new depletion projects greater than 100 acre-feet(AF)/year. The 2010 fee is $18.99 per acre-foot and is adjusted each year for inflation.

3. Reinitiation stipulations will be included in all individual consultations under the umbrella of this programmatic.

4. The Service and project proponents will request that discretionary Federal control be retained for all consultations under this programmatic.

The original Windy Gap Project fits these criteria because a Recovery Agreement was signed in March of 2000 and the depletions existed when the Recovery Program was initiated. Because it was not a new depletion, no additional fees were submitted for compliance with the PBO. Hydrologic modeling for the PBO determined that the existing average annual depletion caused by the Windy Gap Project between 1981 and 1999 was 18,779 AF. The proposed WGFP would cause an additional average annual depletion of 21,317 AF/year. The average annual water depletion from the Colorado River as a result of the Windy Gap Project, including the additional depletions of the proposed firming project is 40,096 AF/year.

The subject project will cause a new average annual depletion of 21,317 AF of water from the upper Colorado River basin. In order to rely on the Recovery Program to offset the subject depletions, the project sponsors are to make a one-time monetary contribution for water depletions greater than 100 AF to help fund their share of the costs of recovery actions. If the

entire fee is paid at once, the one-time payment is calculated by multiplying the project's average annual new depletion (21,317 AF) by the water users share of Recovery Program costs (the charge) in effect at the time payment is made. For Fiscal Year 2010 (October 1, 2009, to September 30, 2010), the charge is $18.99 per AF for the average annual depletion which equals a total contribution of $404,809.83 for this project's share of the Recovery Program costs. This amount will be adjusted annually for inflation on October 1 of each year based on the Consumer Price Index. If payment is made in Fiscal Year 2010 for 10 percent of the estimated depletions, ten percent of the Fiscal Year 2010 total contribution ($40,480.98), or total payment, will be provided to the Service's designated agent, the National Fish and Wildlife Foundation, at the time of issuance of the Federal approvals from the Bureau of Reclamation. Payment for the remaining 19,185.3 AF of depletions (90 percent) will be due at the time the construction commences at the rate in effect at that time. The payment will be included by the Bureau of Reclamation as a permit stipulation. The funds will be used for acquisition of water rights (or directly-related activities) to meet the instream flow needs of the endangered fishes; or to support other recovery activities for the endangered fishes described in the RIPRAP. All payments should be made to the Foundation.

National Fish and Wildlife Foundation
Attn: Donna McNamara, Finance Department
1133 15th Street, NW, Suite 1100
Washington DC 20005

Each payment is to be accompanied by a cover letter that identifies the project and biological opinion number (ES/GJ-6-CO-99-F-033-CP104) that requires the payment, the amount of payment enclosed, and check number. A copy of the cover letter and a copy of the payment check shall be sent to the Service office issuing this biological opinion. The cover letter also shall identify the name and address of the payor, the name and address of the Federal agency responsible for authorizing the project, and the address of the Service office conducting the section 7 consultation. This information will be used by the Foundation to notify the payor, the lead Federal agency, and the Service that payment has been received. The Foundation is to send notices of receipt to these entities within 5 working days of its receipt of payment.

The Recovery Agreement was signed by the Service and the Subdistrict in March 2000. The Subdistrict agreed to make a one-time contribution to the Recovery Implementation Program to fund recovery actions specified in the Colorado River PBO. Reclamation has agreed to condition its approval documents to retain jurisdiction should section 7 consultation need to be reinitiated. **Therefore, the Service concludes that the subject project meets the criteria to rely on the RIPRAP to offset depletion impacts and is not likely to jeopardize the continued existence of the species and is not likely to destroy or adversely modify designated critical habitat.**

REINITIATION NOTICE

This concludes formal consultation on the subject action. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or

control over the action has been retained (or is authorized by law) and under the following conditions.

a. The amount or extent of take specified in the incidental take statement for the Colorado River PBO is exceeded. The Service has determined that no incidental take, including harm, is anticipated to occur as a result of the depletions contemplated in this opinion because of the implementation of recovery actions. The implementation of the recovery actions contained in the Colorado River PBO will further decrease the likelihood of any take caused by depletion impacts.

b. New information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not considered in the Colorado River PBO. In preparing the Colorado River PBO, the Service describes the positive and negative effects of the action it anticipates and considered in the section of the opinion entitled "Effects of the Action." New information would include, but is not limited to, not achieving a "positive response" or a significant decline in population, as described in Appendix D of the Colorado River PBO. Significant decline shall mean a decline in excess of normal variations in population (Appendix D). The current population estimate of adult Colorado pikeminnow in the Colorado River is 600 individuals, with a confidence interval of ± 250. Therefore, with the criteria established in Appendix D, a negative population response would trigger reinitiation if the population declined to 350 adults. The Recovery Program has developed recovery goals for the four endangered fishes. If a population meets or exceeds the numeric goal for that species, it will be considered to exhibit a positive response. The Service retains the authority to determine whether a significant decline in population has occurred, but will consult with the Recovery Program's Biology Committee prior to making its determination. In the event of a significant population decline, the Service is to first rely on the Recovery Program to take actions to correct the decline. If nonflow recovery actions have not been implemented, the Service will assess the impacts of not completing these actions prior to reexamining any flow related issues.

New information would also include the lack of a positive population response by the year 2015 or when new depletions reach 50,000 AF/year. According to the criteria outlined in Appendix D of the Colorado River PBO, a positive response would require the adult Colorado pikeminnow population estimate to be 1,100 individuals (±250) in the Colorado River (Rifle, Colorado to the confluence with the Green River). When the population estimate increases above 1,100, a new population baseline is established at the higher population level.

c. The Recovery Action Plan actions listed as part of the proposed action in the Colorado River PBO are not implemented within the required time frames. This would be considered a change in the action subject to consultation; section 7 regulations (50 CFR 402.16 (c)) state that reinitiation of consultation is required if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion. The Recovery Action Plan is an adaptive management plan because additional information, changing priorities, and the development of the States' entitlement may require modification of the Recovery Action Plan. Therefore, the Recovery Action Plan is reviewed annually and updated and changed when necessary and the required time frames include changes in timing approved by means of the normal procedures of the Recovery

Program, as explained in the description of the proposed action. In 2003 and every 2 years thereafter, for the life of the Recovery Program, the Service and Recovery Program will review implementation of the Recovery Action Plan actions to determine timely compliance with applicable schedules.

d. The Service lists new species or designates new or additional critical habitat, where the level or pattern of depletions covered under the Colorado River PBO may have an adverse impact on the newly listed species or habitat. If the species or habitat may be adversely affected by depletions, the Service will reinitiate consultation on the Colorado River PBO as required by its section 7 regulations. The Service will first determine whether the Recovery Program can avoid such impact or can be amended to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for such depletion impacts. If the Recovery Program can avoid the likelihood of jeopardy and/or adverse modification of critical habitat no additional recovery actions for individual projects would be required, if the avoidance actions are already included in the Recovery Action Plan. If the Recovery Program is not likely to avoid the likelihood of jeopardy and/or adverse modification of critical habitat then the Service will reinitiate consultation and develop reasonable and prudent alternatives.

For purposes of any future reinitiation of consultation, depletions have been divided into two categories.

Category 1:

a) existing depletions, both Federal and non-Federal as described in the project description, from the Upper Colorado River Basin above the confluence with the Gunnison River that had actually occurred on or before September 30, 1995 (average annual depletion of approximately 1 million AF/year);

b) depletions associated with the total 154,645 AF/year volume of Green Mountain Reservoir, including power pool (which includes but is not limited to all of the 20,000 AF contract pool and historic user's pool), the Colorado Big-Thompson replacement pool; and

c) depletions associated with Ruedi Reservoir including Round I sales of 7,850 AF, Round II sales of 6,135 AF/year as discussed in the Service's biological opinion to Reclamation dated May 26, 1995, and as amended on January 6, 1999, and the Fryingpan Arkansas Project replacement pool as governed by the operating principles for Ruedi Reservoir but excluding 21,650 AF of the marketable yield.

Category 1 depletions shall remain as Category 1 depletions regardless of any subsequent change, exchange, or abandonment of the water rights resulting in such depletions. Category 1 depletions associated with existing facilities may be transferred to other facilities and remain in Category 1 so long as there is no increase in the amount of total depletions attributable to existing depletions. However, section 7 consultation is still required for Category 1 depletion projects when a new Federal action occurs which may affect

endangered species except as provided by the criteria established for individual consultation under the umbrella of the Colorado River PBO. Reinitiation of this consultation will be required if the water users fail to provide 10,825 AF/year on a permanent basis.

Category 2:

Category 2 is defined as all new depletions up to 120,000 AF/year, this includes all depletions not included in Category 1 that occur after 1995 regardless of whether section 7 consultation has been completed. This category is further divided into two 60,000 AF/year blocks of depletions.

The recovery actions are intended to avoid the likelihood of jeopardy and/or adverse modification of critical habitat and to result in a positive response as described in Appendix D of the Colorado River PBO for both 60,000 AF blocks of depletions in Category 2. However, prior to depletions occurring in the second block, the Service will review the Recovery Program's progress and adequacy of the species response to the Recovery Action Plan actions. According to the criteria outlined in Appendix D, a positive response would require the adult Colorado pikeminnow population estimate to be maintained at approximately 1,100 individuals in the Colorado River (Rifle, Colorado to the confluence with the Green River), unless the criteria in Appendix D is changed because of new information. If the adult Colorado pikeminnow population is maintained at approximately 1,100 adults or whatever is determined to be the recovery goal in the Colorado River, a new population baseline would be established to determine a positive or negative population response.

When population estimates for wild adult humpback chub are finalized, they will also be used to determine population response. As outlined in Appendix D, Colorado pikeminnow and humpback chub population estimates will serve as surrogates for razorback sucker and bonytail to assess the status of their populations for 10 years. Recovery goals for all four species were completed August 1, 2002. If a population meets or exceeds the numeric goal for that species, it will be considered to exhibit a positive response. However, short of reaching a specific recovery goal, trends in certain population indices provide an interim assessment of a species' progress toward recovery. This review will begin when actual depletion levels from the first depletion block reach 50,000 AF/year or the year 2015, whichever comes first.

Calculation of actual depletions is to be accomplished using Cameo gage records and State Division of Water Resources data (Appendix B of the Colorado River PBO). The review will include a determination if all the recovery actions have been satisfactorily completed, that all ongoing recovery actions are continuing, and the status of the endangered fish species. If it is determined that the recovery actions have all been completed and the status of all four endangered fish species has improved (based on criteria in Appendix D), then the Service intends that the Colorado River PBO would remain in effect for new depletions up to 120,000 AF/year (total of both 60,000 AF blocks of Category 2 depletions).

Monitoring, as explained in Appendix D, will be ongoing to determine if a population estimate of 1,100 (± one confidence interval) adult Colorado pikeminnow is maintained. If it is not

maintained, this would be considered new information and section 7 would have to be reinitiated. Population baselines will be adjusted as population estimates change. If the adult Colorado pikeminnow population estimates increase, a new population baseline will be established to determine a positive or negative population response. If the population estimate for Colorado pikeminnow in the year 2015 is greater than 1,100 adults, then the higher number will be used to establish a new population baseline. These numeric values may be revised as new information becomes available. Revisions will be made to Appendix D as needed.

If the 50,000 AF or 2015 review indicates that either the recovery actions have not been completed or the status of all four fish species has not sufficiently improved, the Service intends to reinitiate consultation on the Recovery Program to specify additional measures to be taken by the Recovery Program to avoid the likelihood of jeopardy and/or adverse modification of critical habitat for depletions associated with the second 60,000 AF/year block. Any additional measures will be evaluated every 5 years. If other measures are determined by the Service or the Recovery Program to be needed for recovery prior to the review, they can be added to the Recovery Action Plan according to standard procedures, outlined in that plan. If the Recovery Program is unable to complete those actions which the Service has determined to be required for the second 60,000 AF/year, consultation on projects with a Federal nexus may be reinitiated in accordance with ESA regulations and this opinion's reinitiation requirements. The Service may also reinitiate consultation on the Recovery Program if fish populations do not improve according to the criteria in Appendix D or if any positive response achieved prior to the 50,000 AF or the year 2015 is not maintained. Once a positive response is achieved, failure to maintain it will be considered a negative response.

If the Service reinitiates consultation, it will first provide information on the status of the species and recommendations for improving population numbers to the Recovery Program. The Service will reinitiate consultation with individual projects only if the Recovery Program does not implement recovery actions to improve the status of the listed fish species. The Service will reinitiate consultation first on Category 2 projects and second on Category 1 projects. The Service will only reinitiate consultations on Category 1 depletions if Category 2 depletion impacts are offset to the full extent of the capability of the covered projects as determined by the Service, and the likelihood of jeopardy to the listed fishes and/or adverse modification of critical habitat still cannot be avoided. The Service intends to reinitiate consultations simultaneously on all depletions within the applicable category.

If new information becomes available, if a new species becomes listed, if incidental take occurs, if the total average annual amount of water depleted by this project changes, or if any other project element changes which alters the operation of the project from that which is described in your correspondence and which may affect any endangered or threatened species in a manner or to an extent not considered in this biological opinion (see 50 CFR 402.16), formal section 7 consultation should be reinitiated. **Reclamation has agreed to condition its approval documents to retain jurisdiction should section 7 consultation need to be reinitiated.**

If you have any questions regarding this consultation or would like to discuss it in more detail, please contact me at (970) 243-2778, extension 26.

Sincerely,

Patricia S. Gelatt
Acting Western Colorado Supervisor

Attachment

cc: FWS/UCREFRP, Denver

PGelatt:BRWindyGapFirmingProjectCRBOCP104.doc:021210:KM

RECOVERY AGREEMENT

This RECOVERY AGREEMENT is entered into this 14th day of January, 2000, by and between the United States Fish and Wildlife Service (USFWS) and the Municipal Subdistrict, Northern Colorado Water Conservancy District (Subdistrict).

WHEREAS, in 1988 the Secretary of Interior, the Governors of Wyoming, Colorado, and Utah, and the Administrator of the Western Area Power Administration signed a Cooperative Agreement to implement the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program); and

WHEREAS, the Recovery Program is intended to recover the endangered fish while providing for water development in the Upper Basin to proceed in compliance with state law, interstate compacts, and the Endangered Species Act; and

WHEREAS, the Colorado Water Congress has passed a resolution supporting the Recovery Program; and

WHEREAS, on December 2, 1999, USFWS issued a Programmatic Biological Opinion (1999 Opinion) concluding that implementation of specified elements of the Recovery Action Plan (Recovery Elements), along with existing and a specified amount of new depletions, are not likely to jeopardize the continued existence of the endangered fish or adversely modify their critical habitat in the Colorado River subbasin within Colorado, exclusive of the Gunnison River subbasin; and

WHEREAS, the 1999 Opinion in the section entitled "Reinitiation Notice" divided depletions into Category 1 or Category 2 for reinitiation purposes; and

WHEREAS, Subdistrict is the owner of the Windy Gap Project (Water Project), which causes or will cause depletions to the Colorado River subbasin within Colorado, exclusive of the Gunnison River subbasin; and

WHEREAS, Subdistrict desires certainty that its depletions can occur consistent with Section 7 and Section 9 of the Endangered Species Act (ESA); and

WHEREAS, USFWS desires a commitment from Subdistrict to the Recovery Program so that the program can actually be implemented to recover the endangered fish and to carry out the Recovery Elements.

NOW, THEREFORE, Subdistrict and USFWS agree as follows[1]

---

[1] Individual Recovery Agreement may be changed to fit specific circumstances.

1. USFWS agrees that implementation of the Recovery Elements specified in the 1999 Opinion will avoid the likelihood of jeopardy and adverse modification under Section 7 of the ESA for depletion impacts caused by Subdistrict's Water Project. Any consultations under Section 7 regarding Water Project's depletions are to be governed by the provisions of the 1999 Opinion.

   USFWS agrees that, except as provided in the 1999 Opinion, no other measures or action shall be required or imposed on Water Project to comply with Section 7 or Section 9 of the ESA with regard to Water Project's depletion impacts or other impacts covered by the 1999 Opinion. Subdistrict is entitled to rely on this Agreement in making the commitment described in paragraph 2.

2. Subdistrict agrees not to take any action which would probably prevent the implementation of the Recovery Elements. To the extent implementing the Recovery Elements requires active cooperation by Subdistrict, Subdistrict agrees to take reasonable actions required to implement those Recovery Elements. Subdistrict will not be required to take any action that would violate its decrees or the statutory authorization for Water Project, or any applicable limits on Subdistrict's legal authority. Subdistrict will not be precluded from undertaking good faith negotiations over terms and conditions applicable to implementation of the Recovery Elements.

3. If USFWS believes that Subdistrict has violated paragraph 2 of this Recovery Agreement, USFWS shall notify both Subdistrict and the Management Committee of the Recovery Program. Subdistrict and the Management Committee shall have a reasonable opportunity to comment to USFWS regarding the existence of a violation and to recommend remedies, if appropriate. USFWS will consider the comments of Subdistrict and the comments and recommendations of the Management Committee, but retains the authority to determine the existence of a violation. If USFWS reasonably determines that a violation has occurred and will not be remedied by Subdistrict despite an opportunity to do so, the USFWS may request reinitiation of consultation on Water Project without reinitiating other consultations as would otherwise be required by the "Reinitiation Notice" section of the 1999 Opinion. In that event, the Water Project's depletions would be excluded from the depletions covered by the 1999 Opnion and the protection provided by the Incidental Take Statement.

4. Nothing in this Recovery Agreement shall be deemed to affect the authorized purposes of Subdistrict's Water Project or USFWS' statutory authority.

5. The signing of this Recovery Agreement does not constitute any admission by Subdistrict regarding the application of the ESA to the depletions of Subdistrict's Water Project. The signing of this Recovery Agreement does not constitute any agreement by either party as to whether the flow recommendations for the 15-Mile Reach described in the 1999 Opinion are biologically or hydrologically necessary to recover the endangered fish.

6. This Recovery Agreement shall be in effect until one of the following occurs:

   a. USFWS removes the listed species in the Upper Colorado River Basin from the endangered or threatened species list and determines that the Recovery Elements are no longer needed to prevent the species from being relisted under the ESA; or

   b. USFWS determines that the Recovery Elements are no longer needed to recover or offset the likelihood of jeopardy to the listed species in the Upper Colorado River Basin; or

   c. USFWS declares that the endangered fish in the Upper Colorado River Basin are extinct; or

   d. Federal legislation is passed or federal regulatory action is taken that negates the need for [or eliminates] the Recovery Program.

7. Subdistrict may withdraw from this Recovery Agreement upon written notice to USFWS. If Subdistrict withdraws, USFWS may request reinitiation of consultation on Water Project without reinitiating other consultations as would otherwise be required by the "Reinitiation Notice" section of the 1999 Opinion.

Eric D. Wilkinson
General Manager
Municipal Subdistrict, Northern
Colorado Water Conservancy District

January 14, 2000
Date

Ralph O. Morgenweck
Regional Director, Region 6
U.S. Fish and Wildlife Service

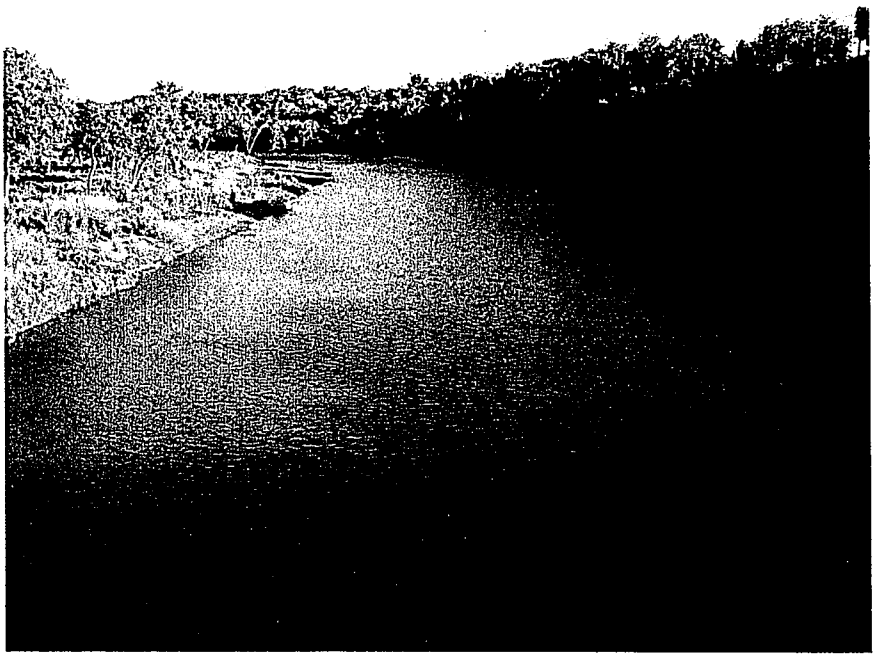
March 20, 2000
Date

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

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Appendices

Appendix A—Alternatives Analysis Results
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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.

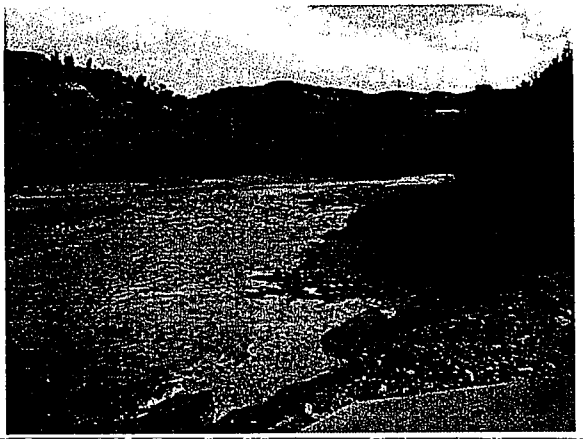
As the lead federal agency, Reclamation prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act

(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).

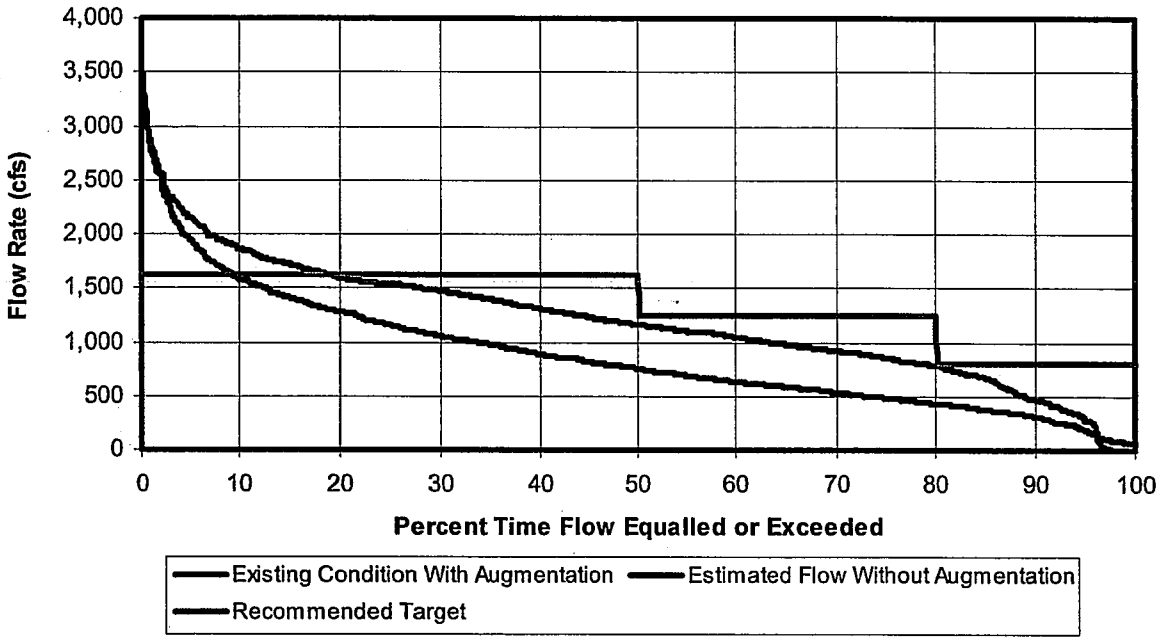


Figure 1. 15-Mile Reach Historical and Target Flow between August 1 and October 31 (Water Years 1998-2008).

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.

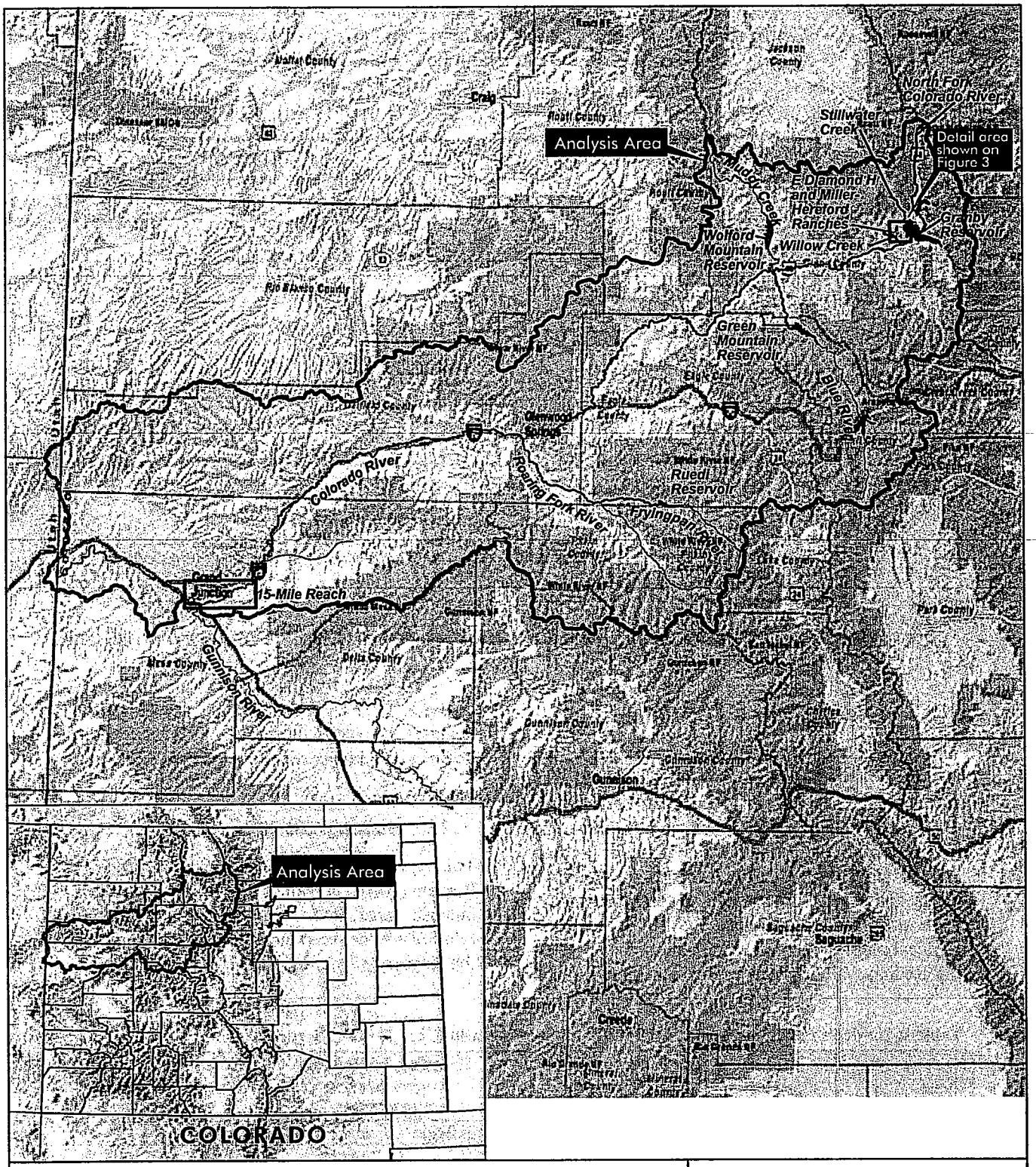
1.4 Background

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

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February 2012

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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.

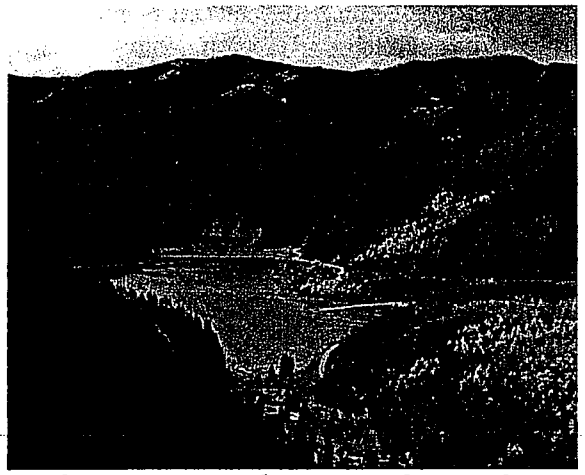
Granby Reservoir, located on the Colorado River about 4.5 miles northeast of the town of Granby, Colorado, collects and stores water from the upper Colorado River Basin. Reclamation pumps C-BT water from Granby Reservoir into Shadow Mountain Reservoir, at the same elevation as Grand Lake, from where 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.

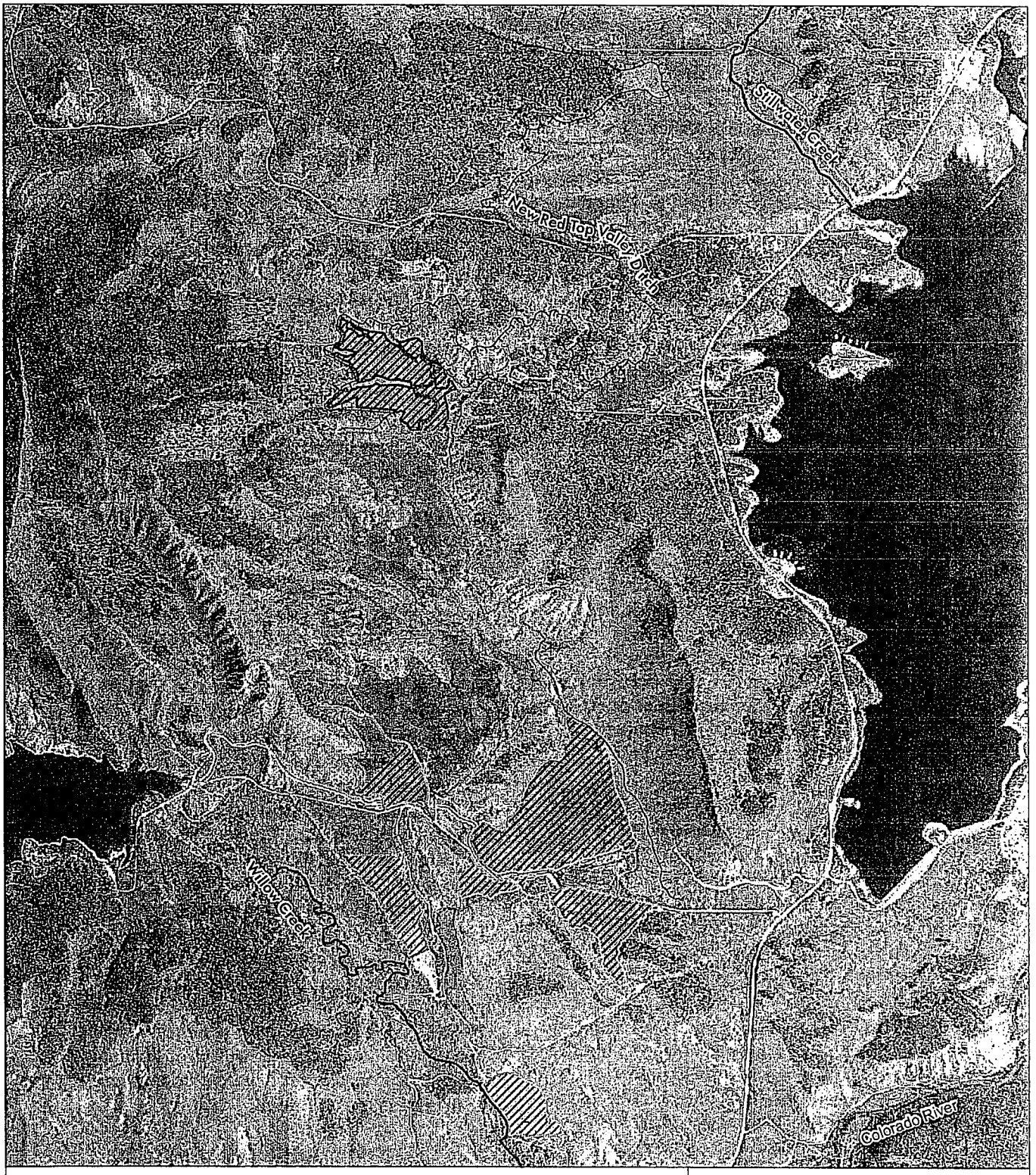
2.3.1 Ruedi Reservoir Releases

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

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June 2011

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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

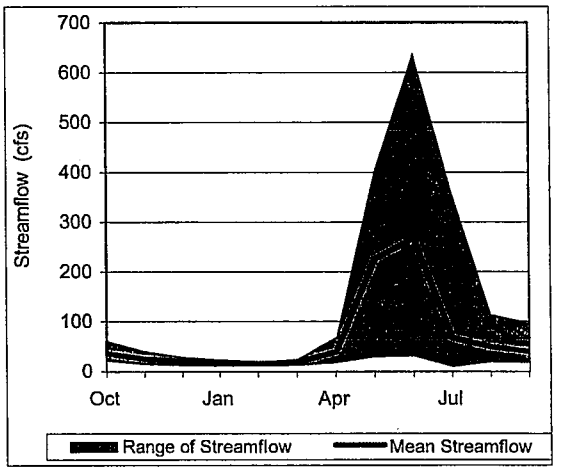
3.5.1.1 North Fork Colorado River below Redtop Valley Ditch

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)



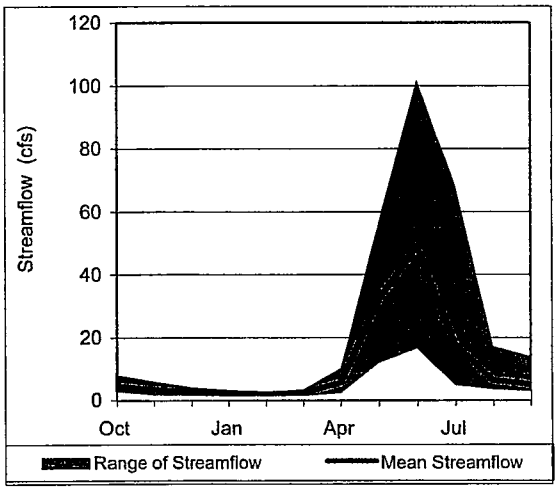
Source: Grand River Consulting 2012.

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.

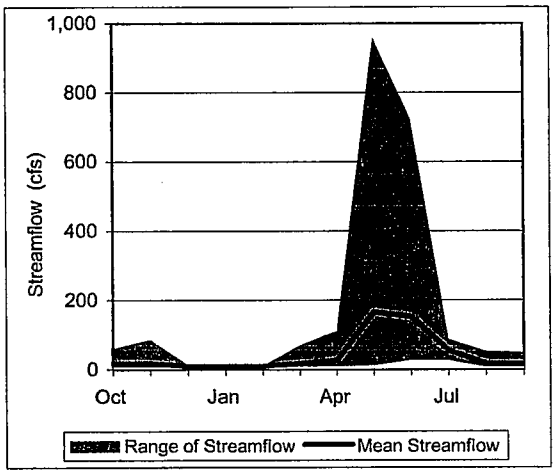
3.5.1.3 Willow Creek

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.

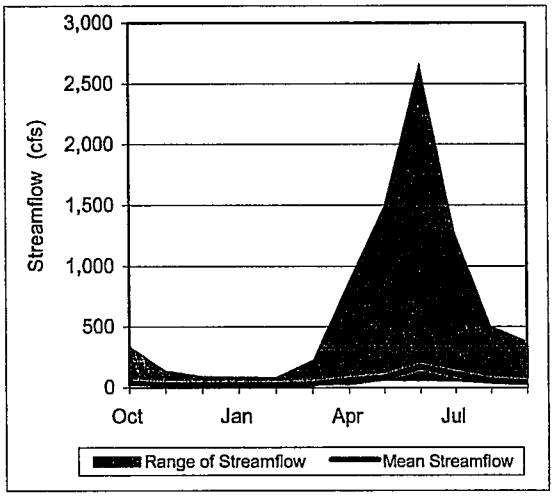
The 10825 Project would affect flow in Willow Creek only during the May through July irrigation season. Peak flow in the creek occurs between late May and early July and is about 500 cfs in an average year (Figure 6).

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:

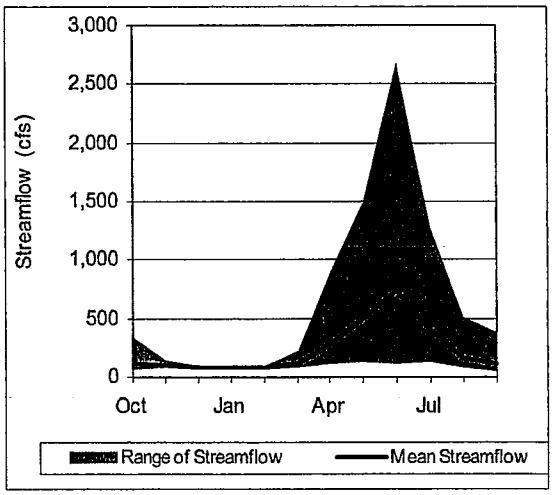
- 90 cfs from the Windy Gap diversion point to the mouth of the Williams Fork River
- 135 cfs from the mouth of the Williams Fork River to the mouth of Troublesome Creek
- 150 cfs from the mouth of Troublesome Creek to the mouth of the Blue River

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).

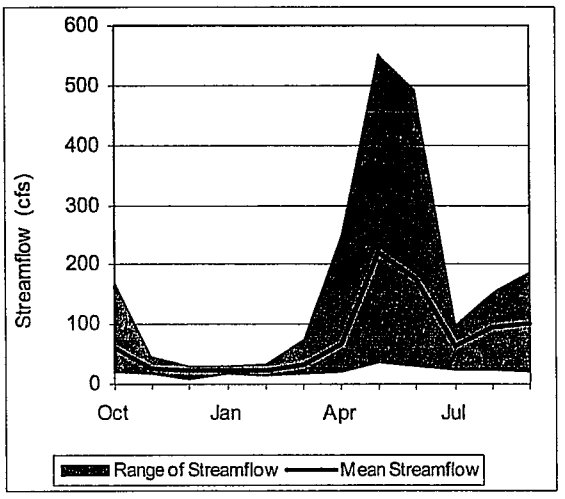


Source: Grand River Consulting 2012.

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.

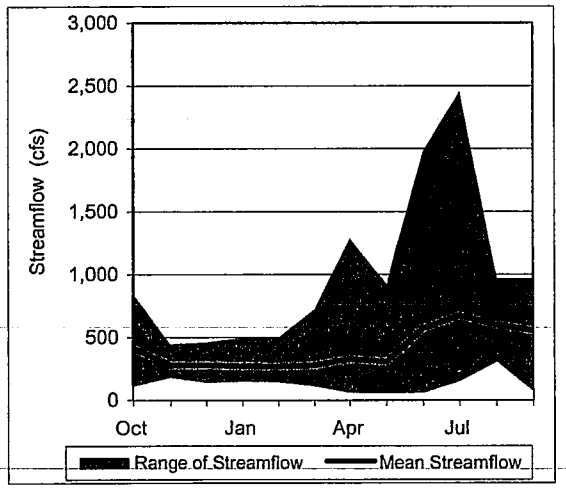
3.5.1.7 Blue River below Green Mountain Reservoir

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.

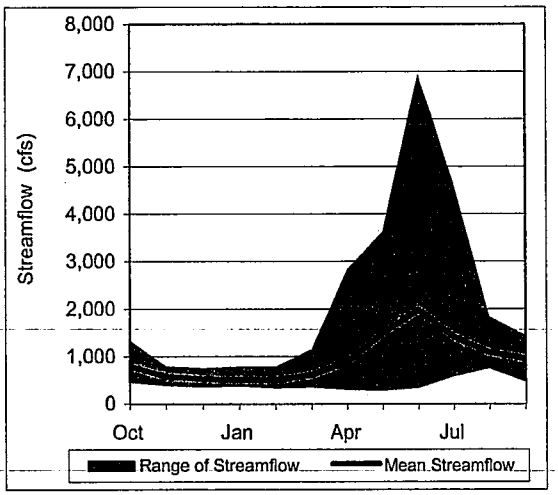
The mean monthly historical streamflow and the range of historical monthly streamflows for the 1991 through 2008 study period for the Blue River below Green Mountain Reservoir USGS gage 09057500 are shown in Figure 10. The flow of the Blue River below Green Mountain Reservoir USGS gage 09057500 is typically 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.

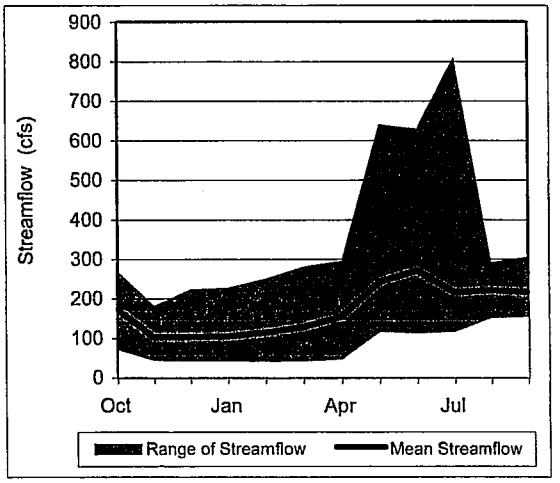
4. Reclamation will continue to attempt to make release adjustments of no more than 50 cfs increments when feasible and consistent with the multiple Fry-Ark Project purposes.

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.

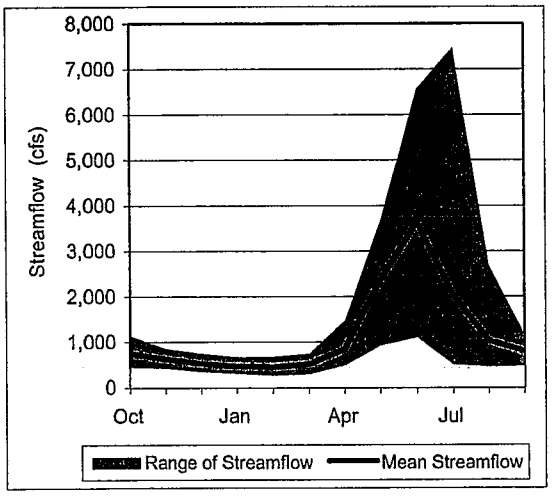
A CWCB instream flow right was decreed for the Roaring Fork River from the confluence with the Fryingpan River downstream to the confluence with the Crystal River. This instream flow right is for 145 cfs from April through September and 75 cfs from October through March. The instream flow right for the 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.

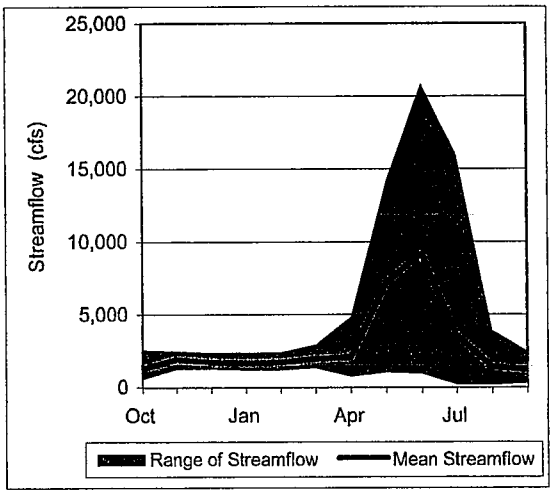
The Service directs the release of water from its pools in upstream reservoirs in accordance with the numeric targets described in Chapter 1 and other considerations. In addition, voluntary releases have been made under Coordinated Reservoir Operations. Reservoir releases for the Recovery Program have 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

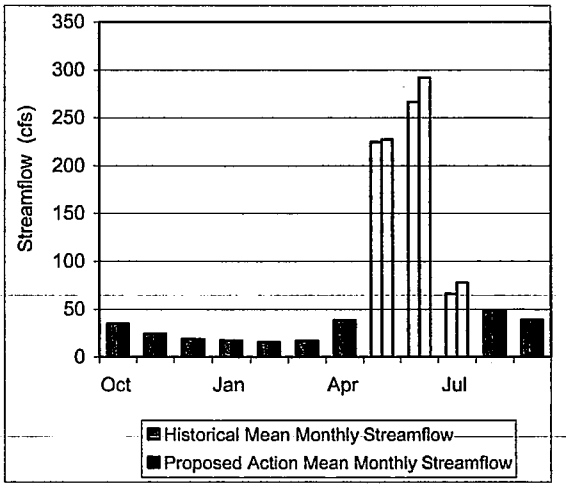
because actual operations are uncertain. For analysis purposes, future Redtop Valley Ditch diversions were limited to 80 cfs for the Proposed Action. Because Redtop Valley Ditch diversions are unlikely to exceed 80 cfs, an increase in streamflow of the North Fork Colorado River would occur equal to the 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.



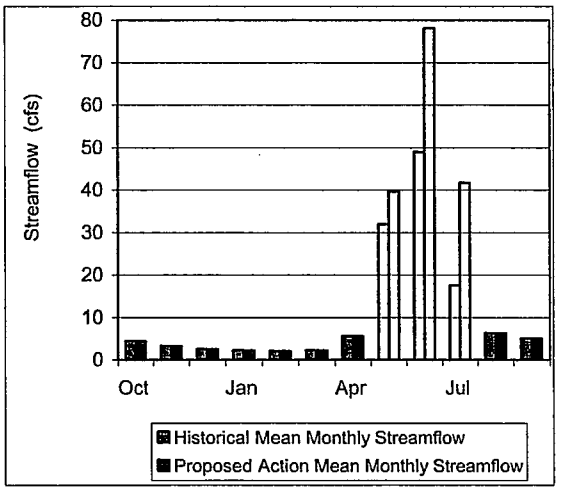
Source: Grand River Consulting 2012.

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.

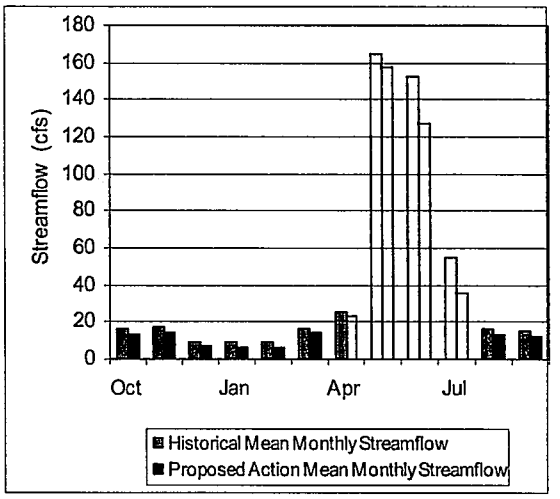
Operating assumptions used in this assessment may overestimate the amount of Redtop Valley Ditch water that is diverted from the North Fork Colorado River and flows into Stillwater Creek. If the diversion of less water to minority shareholders was required, less water would be diverted into the Redtop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

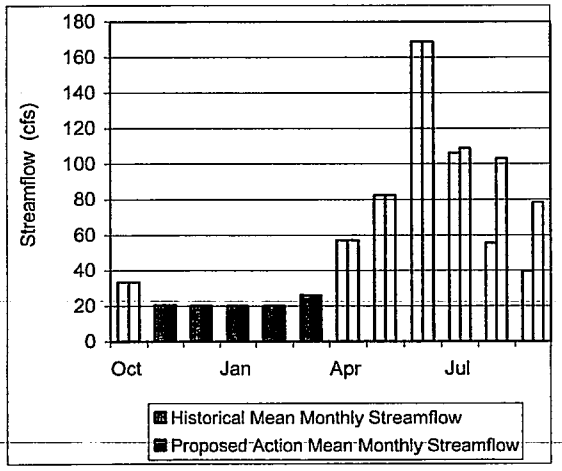
3.5.2.1.4 Colorado River below Granby Reservoir and at Windy Gap Reservoir

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).

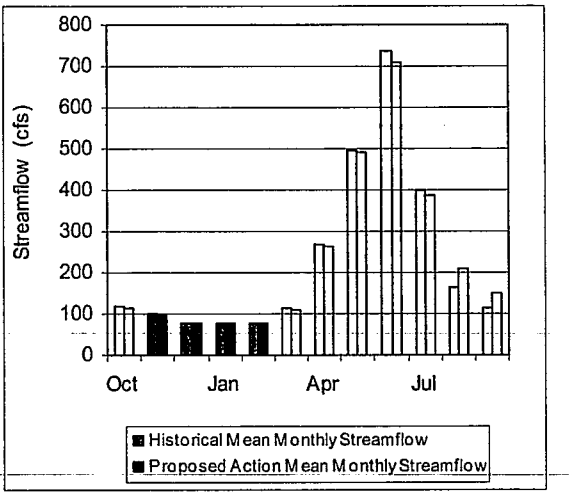
Streamflow in the Colorado River at Windy Gap Reservoir would increase during August and September in response to releases of 10825 water from Granby Reservoir. The mean monthly streamflow in this segment is shown in Figure 19. Estimated river stage would increase by up to 0.1 feet as a result of increased 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.

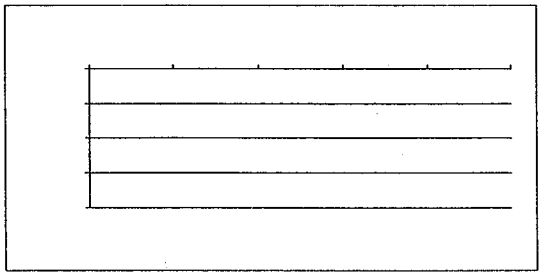
Shadow Mountain Reservoir is on the 303(d) list for concentrations of dissolved oxygen below the Water Quality Standard (WQS) for aquatic life of 6.0 mg/L. Based on data from three different sources, dissolved oxygen concentrations were not in attainment from top to bottom of the reservoir for four dates.

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

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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 angl'ng 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.

ATTACHED DOCUMENT IS CURRENT AS OF DATE OF APPLICATION – JUNE 11, 2012.

DOCUMENT IS CURRENTLY IN NEGOTIATIONS AND IS NOT A FINALIZED DOCUMENT

Discussion Draft

June 4, 2012

Intergovernmental Agreement between the Northern Colorado Water Conservancy District, Grand County, Middle Park Water Conservancy District and Colorado River Water Conservation District

1. Delivery of 5,412.5 acre feet of water from Granby Reservoir

   a. The Parties agree that the Colorado-Big Thompson Project should be operated by an unprejudiced agency in a fair and efficient manner, equitable to all parties having interests therein, and in conformity with Paragraphs (a) through (l) of the "Manner of Operations of Project Facilities and Auxiliary Features" of Senate Document No. 80. The Parties agree that Reclamation has been designated as the agency to fulfil that role.

   b. The Parties agree to support and not challenge the implementation of the Granby 5412.5 Contract(s).

   c. The parties agree that Northern Water shall enter into a contract for the delivery of C-BT Water to an entity or entities in Mesa County, Colorado in the amount of 5,412.5 acre feet annually.

      i. The parties agree that the contract is subject to the written consent of the United States, which consent will be at the end of the contract.

      ii. The parties do not object to the inclusion of the following language to implement the United States' consent (such language is general background language that is not intended to modify, change, or amend the applicable law):

         1. The United States hereby consents to the [description of specific contract].
         2. As the owner of Granby Reservoir and the Colorado-Big Thompson Project, the United States, Department of the Interior, Bureau of Reclamation ("Reclamation"), hereby concurs with and approves this contract among the Northern Colorado Water Conservancy District and the [applicable West Slope municipal entities].
         3. Reclamation hereby confirms its determination that the contract is consistent with all applicable legal authority and maintains the appropriate balance amongst all parties having interests in the Colorado-Big Thompson Project operations

required by Senate Document No. 80, the 1938 Repayment Contract and the Blue River Decrees.

4. This Consent is in addition to, and shall not modify or amend, the 1938 Repayment Contract in any respect. This Consent shall not be a basis for any direct or indirect interpretation or construction of any provision of the 1938 Repayment Contract for any purpose. This Consent does not establish any factual or legal precedent, concession, or determination by the District or the United States. The United States and the District do not, by virtue of this Consent, waive or relinquish any legal or factual position.

d. Northern Water and the River District each will support proposed legislation in Congress to provide 5,412 acre-feet of water for the endangered fish and an additional 2,000 acre-feet to address concerns associated with the delivery of 5,412.5 acre feet from Granby Reservoir, from Ruedi Reservoir on a non-reimbursable basis.

e. Deliveries of 5412.5 acre feet under the Recovery Program. Northern Water agrees to coordinate with Grand County, River District and Middle Park as part of the Learning by Doing Cooperative Effort ("Cooperative Effort") on the timing, schedule and amounts of release of 5412.5 acre feet of water each year for delivery to an entity or entities in Mesa County, Colorado, as referred to in Paragraph *. above, for Municipal-Recreational purposes, doing so in a manner that will also benefit and meet the FWS requirements for the Recovery Program [add formal title of RProgram].

f. Perpetual Deliveries If the Recovery Program No Longer Exists. Northern Water agrees to deliver 5,412.5 acre feet of water per year in perpetuity from Granby Reservoir pursuant to municipal-recreational contracts with an entity or entities in Mesa County, Colorado, if the releases are no longer required for protection of the endangered fish under the Upper Colorado River Basin Recovery Program. The Parties agree that the delivery of 5,412.5 acre feet in perpetuity is not contingent on or related to the successful permitting and construction of the Windy Gap Firming Project. The Parties further agree that an additional benefit that will be realized from the perpetual delivery of the 5412.5 acre feet is to maintain and enhance the condition of the aquatic environment in Grand County and that the water will be used for no other purpose within Grand County. The storage and delivery of water pursuant to this paragraph shall be at no cost or charge to any entities on the West Slope. Northern Water agrees to continue the Cooperative Effort on the timing, schedule and amounts of the releases of water from Granby Reservoir if the Recovery Program no longer exists as described in paragraph 1.*. The Parties to this Agreement will attempt to coordinate the releases under the circumstances described in this paragraph so as to maximize the benefits realized from efforts to maintain and enhance the conditions of the aquatic environment in Grand County.

*Alt Language for the above - The Parties agree that it is their intent to provide for deliveries of 5,412.5 acre feet of water per year in perpetuity from Granby Reservoir. If the releases are no longer required for protection of the endangered fish under the Upper Colorado River Basin Recovery Program, up to 5,412.5 acre feet of water will be released from Granby Reservoir with the release pattern determined as part of the Learning by Doing Cooperative Effort. The Parties will work cooperatively to make any arrangements necessary to facilitate these releases, including the possibility to continue exchanges to GMR as described below in *.*

g. Exchanges to GMR. When releases from Granby Reservoir for Municipal-Recreational contract are not also needed to meet targeted stream flows in the 15 Mile Reach these releases will be stored in Green Mountain Reservoir by exchange pursuant to any federal contracts or approvals which may be required, consistent with the EA and ROD issued by Reclamation for the 10825 water, for later delivery to the 15 Mile Reach. If the Recovery Program no longer exists as described in paragraph 1..*., then the Parties will maintain the ability to exchange water to GMR, and the timing, schedule and amounts of release of the 5412.5 acre feet of water each year to an entity or entities in Mesa County, Colorado will be made in a manner that will maximize the benefits to the aquatic environment in Grand County , as determined by the Cooperative Effort.

h. 5412.5 Acre Feet of Water Additive. Water released from Granby Reservoir pursuant to this Agreement shall be in addition to the bypass of water under the 1961 Principles to Govern the Release of Water at Granby Dam to Provide Fishery Flows Immediately Downstream in the Colorado River ("1961 Principles") and any other water released from, or bypassed by, Granby Reservoir, including but not limited to, the water made available to Middle Park Water Conservancy District and Grand County pursuant to the WGFP IGA.

2. Support of Green Mountain Reservoir Administration Solution. The Parties agree to work cooperatively to implement a stipulated resolution of the Green Mountain Reservoir Administration Fill Dispute, consistent with Exhibit _____[Draft Administrative Protocol].

3. Shoshone Outage Protocol and Permanent Shoshone Solution. The Parties agree to work cooperatively to implement a stipulated resolution of the Shoshone Outage Protocol, consistent with Exhibit _____[Draft Administrative Protocol]. Northern Water agrees that it will participate in good faith in negotiations to achieve permanent management of the flow of the Colorado River to address certain flow changes that result during a Shoshone Outage.

4. Wild & Scenic Commitment. Northern Water shall pay $200,000.00 and the River District shall pay $100,000.00 to the Endowment Fund of the Upper Colorado River Wild and Scenic Stakeholder Group for use to protect Wild and Scenic resources identified in the Colorado River from Kremmling to No Name. Northern Water's contribution provided herein shall satisfy its obligation to contribute endowment funds for Wild and Scenic purposes under this Agreement. The River District's contribution provided in this Agreement and the River District's contribution provided for in the WGFP IGA shall satisfy the River District's obligation to contribute endowment funds for the Upper Colorado River Wild & Scenic Stakeholder Group. Northern Water will contribute 80% of the amount contributed by the River District, not to exceed $20,000 annually adjusted annually by the Denver-Boulder-Greely CPI-U, for annual operating costs of the Upper Colorado River Wild and Scenic Stakeholder Group.

5. CWCB Instream Flow. Northern Water will support the entry of decrees in Cases No. 11CW159, 11CW160, 11CW161, Water Division No. 5, in accordance with the applicable law for a CWCB instream flow on the Colorado River mainstem from the confluence of the Blue and Colorado Rivers to a point immediately upstream of the confluence of the Eagle and Colorado Rivers provided the right is subject to substantively the same terms and conditions as are set forth in the Findings of the CWCB in declaring its intent to appropriate dated _____2011.

6. Grand County RICD. Northern Water will not oppose the entry of a decree in Case No. 10CW298 consistent with the draft decree dated _____ 2012 and stipulation attached as Exhibit * to this Agreement.

7. Compact Curtailment Plan. The Signatories agree to cooperate in good faith toward the development of a plan to avoid and address a potential curtailment of existing Colorado water rights under the provisions of the 1922 Colorado River Compact and the 1948 Upper Colorado River Compact.

8. *No Opposition to Colorado River Cooperative Agreement. Northern Water agrees not to oppose or otherwise interfere with the efforts to obtain such court decrees and administrative approvals as are necessary for implementation of the agreement between the Denver Water Board and West Slope parties known as the Colorado River Cooperative Agreement. Northern Water further agrees that it will not oppose applications for reasonable diligence or to make absolute in whole or in part the conditional water rights in Case No. 11CW152.*

9. No Opposition to Windy Gap Firming Project IGA. Northern Water will not interfere with the management and delivery of Windy Gap Project Water stored in the C-BT Project if the management and delivery of Windy Gap Project Water is pursuant to

the WGFP Agreement and the Amendatory Contract between Northern Water, the Subdistrict, and the United States.

10. No Waiver. *The Parties do not agree:*

A. Whether amendment of the Blue River Decree or Senate Document No. 80 is required to authorize the storage of C-BT Project water in Chimney Hollow Reservoir;

B. Whether a change of water right is required to allow the storage of Windy Gap Firming Project Water or C-BT Project water in Chimney Hollow Reservoir; or

C. Whether Section 390b(d) of the Water Supply Act of 1958 requires Congressional approval for the Windy Gap Firming Project.

D. Notwithstanding these disagreements, the West Slope Parties will not object to, litigate or otherwise dispute in any forum the storage of C-BT Project water in Chimney Hollow Reservoir or the storage of Windy Gap Firming Project water in Chimney Hollow Reservoir in accordance with, and subject to the following provisions:

i. The total active volume of C-BT Project water stored in the combination of Granby Reservoir and Chimney Hollow Reservoirs will not exceed 465,568 acre-feet. For the purposes of this Paragraph, the amount of C-BT Project water in storage in Granby Reservoir shall be the amount of C-BT Project water stored above the invert of the Farr Pumping Plant Intake and below the normal high water line.

ii. In any year in which the April 1st or subsequent projection by Northern Water anticipates a spill at Granby Reservoir, Northern Water will not release or cause the release of C-BT Project water then in storage in Chimney Hollow Reservoir to satisfy delivery requirements to Colorado-Big Thompson Project Allottees if such release would allow the capture and storage of additional C-BT Project water in Granby Reservoir.

iv. The Parties do not waive any rights regarding any other changes to the historical operations of the C-BT Project or Windy Gap Project.

11. No Waiver – CBT. *The Parties agree that the dispute concerning storage of C-BT Project water in Chimney Hollow Reservoir has not been litigated. The Parties agree that, in entering into this Agreement and not litigating or otherwise objecting in any forum to the legal issues specified in Paragraph *, above, that this Agreement shall never give rise to any claim, defense, or theory of acquiescence, bar, merger, issue or claim preclusion, promissory estoppel, equitable estoppel, waiver, laches, unclean hands or any other*

similar position or defense concerning any factual or legal position regarding the parties respective position regarding the storage of CB-T Project water and the Parties' respective interpretations of Senate Document No. 80, the 1961 Principles, the 1938 Repayment Contract, Reclamation Law, the Blue River Decrees, or Colorado law. The parties further agree that they do not intend this Agreement to have the effect of precedent or preclusion on any factual or legal issue in any other matter. The parties expressly reserve their rights to assert any legal or factual position or challenge the legal or factual position taken by any other party on any other matter.

12. *No Waiver – WGFP. The Parties agree that the dispute concerning storage of Windy Gap Project Water in Chimney Hollow Reservoir has not been litigated. The parties agree that in entering into this Agreement and not litigating or otherwise objecting in any forum to the legal issues specified in Paragraph VII.A, above, that this Agreement shall never give rise to any claim, defense, or theory of acquiescence, bar, merger, issue or claim preclusion, promissory estoppel, equitable estoppel, waiver, laches, unclean hands or any other similar position or defense concerning any factual or legal position regarding the parties respective position regarding the storage of Windy Gap Firming Project water in Chimney Hollow Reservoir and the Parties' respective interpretations of federal or Colorado law. The Parties further agree that they do not intend this Agreement to have the effect of precedent or preclusion on any factual or legal issue in any other matter. The parties expressly reserve their rights to assert any legal or factual position or challenge the legal or factual position taken by any other party on any other matter.*

13. Preservation of Rights. This Agreement does not limit, change or expand the role of or protections afforded to all Parties with interests in the Colorado-Big Thompson Project as described in the Manner of Operations provisions of Senate Document 80 [Add definition], the 1961 Principles, and the Blue River Decrees [Add definition].

14. Preservation of Governmental Power. Except as specifically provided herein, nothing in this Agreement shall be construed as a limitation on or waiver of any review, approval, or permit authority, or a predetermination of any action taken thereunder, by any governmental or quasi-municipal entity.

15. Open Space. Upon execution of this Agreement, Northern Water agrees to negotiate with Grand County in good faith to place deed restrictions to protect open space on Northern Water's lands, including compliance with the existing Grand County Rural Land Use Process that allows cluster development in conformance with C.R.S. § 30-28-403, as exists now or may be amended in the future.

16. Public Access. Northern Water agrees to provide public access to that portion of Willow Creek located on Northern Water's lands, for as long as Northern Water owns the lands adjacent to Willow Creek, provided that the public access will be managed by the Colorado Division of Parks and Wildlife or other entity acceptable to Northern Water.