RECLAMATION
Managing Water in the West

EA No. EC-1300-08-04

Green Mountain Reservoir Substitution and Power Interference Agreements

Final Environmental Assessment

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

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Acronyms

ACHP	Advisory Council on Historic Preservation
AF	acre-feet
Authority	Upper Eagle Valley Water Authority
BLM	Bureau of Land Management
Breckenridge	Town of Breckenridge
C-BT	Colorado-Big Thompson Project
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Health and the Environment
CDSS	Colorado Decision Support System Model
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
Continental-Hoosier System	Continental-Hoosier Transmountain Diversion System
CWCB	Colorado Water Conservation Board
Denver Water	Denver Board of Water Commissioners
D.O.	Dissolved oxygen
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
HUP	Historic Users Pool
Kw	Kilowatt
MOA	Memorandum of Agreement
MPWCD	Middle Park Water Conservancy District
MW	megawatt
NCWCD	Northern Colorado Water Conservancy District
NDIS	Natural Diversity Information Source
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
OHV	off-highway vehicle
ORV	Outstandingly Remarkable Value

PACSM	Platte and Colorado Simulation Model
ppt	parts per thousand
Reclamation	Bureau of Reclamation
River District	Colorado River Water Conservation District
RMP	Resource Management Plan
SHPO	State Historic Preservation Officer
Springs Utilities	Colorado Springs Utilities
Subdistrict	Municipal Subdistrict of the NCWCD
SWSI	Statewide Water Supply Initiative
TMDL	Total Maximum Daily Load
TVS	Total Value Standards
UAA	Use Attainability Analysis
USACE	U.S. Army Corps of Engineers
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
Vail	Vail Summit Resorts
WAPA	Western Area Power Administration
WGFP	Windy Gap Firming Project
WQCC	Water Quality Control Commission
WQCD	Water Quality Control Division
WRCC	Western Regional Climate Center

1.0 Purpose and Need

1.1 Introduction

In response to a request from Colorado Springs Utilities (Springs Utilities), the Bureau of Reclamation (Reclamation), an agency of the Department of the Interior, is considering entering into a Green Mountain Reservoir Substitution Agreement with Springs Utilities and a Power Interference Agreement with Springs Utilities and Western Area Power Administration (WAPA). The execution of the proposed agreements would allow Springs Utilities to provide a reliable source of municipal water to the citizen owners and customers of Springs Utilities.

This Environmental Assessment (EA) was prepared by Reclamation, the lead federal agency, 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), and Reclamation's Draft NEPA Handbook (U.S. Department of the Interior 2000). This EA is not a decision document, but rather it is a disclosure of the potential environmental consequences of the No Action and Proposed Action alternatives. Implementation of the Green Mountain Reservoir Substitution and Power Interference Agreements requires approval by Reclamation. This EA provides the basis for Reclamation's review and evaluation of potential effects of the agreements, as well as reviewing the range of reasonable alternatives.

WAPA, an agency of the U.S. Department of Energy, with statutory authority over the proposed project, was invited to participate in the NEPA process as a cooperating agency (40 CFR 1501.6 and 1508.5). WAPA has accepted formal cooperating agency status and retains review and comment responsibility on the project.

1.2 Project Purpose and Need

Springs Utilities is obligated to provide substitution water for diversions from the Blue River in years when Green Mountain Reservoir may not fill. Springs Utilities currently does this on an annual basis subject to the terms of the Blue River Decree, which specifically allows for releases to be made from water stored on the Blue River and the Williams Fork River to meet the substitution obligation. The purpose of the Substitution Agreement is to allow Springs Utilities to comply with the Blue River Decree by approving the 2003 Memorandums of Agreement (MOAs) as Springs Utilities' substitution operation plan. This would specifically approve the additional water sources of Wolford Mountain Reservoir and Homestake Reservoir, which are beyond those sources authorized in the Blue River Decree. The need for the additional sources of substitution water is to provide additional operational flexibility in meeting substitution obligations to complete the fill of Green Mountain Reservoir during dry years. Reclamation must operate and maintain Green Mountain Reservoir to fulfill its purpose of assuring replacement water and power generation to the West Slope of Colorado.

In addition to the Substitution Agreement, during both substitution and non-substitution years, Springs Utilities repays WAPA for interfering with power generation from the Green Mountain Reservoir power plant. In the past, this has been accomplished through informal, annual, as-needed agreements with WAPA. The purpose of the Interference

Agreement is to provide a long-term, formalized agreement for the arrangement and conditions of repayment. The need for the agreement is to ensure that Springs Utilities repays WAPA for the interference of power generation from the Green Mountain Reservoir hydroelectric plant.

1.3 Study Area

Figure 1-1 presents a vicinity map of the Study Area for the EA. The Study Area primarily encompasses the Continental-Hoosier System as shown in Figure 1-2. In addition, the Study Area is defined by potentially affected reaches of streams and reservoirs that may experience fluctuating flows or water levels. A more detailed Study Area used to describe existing conditions and evaluate impacts is described in Chapter 3 and presented in Figure 3-1.

1.4 Background

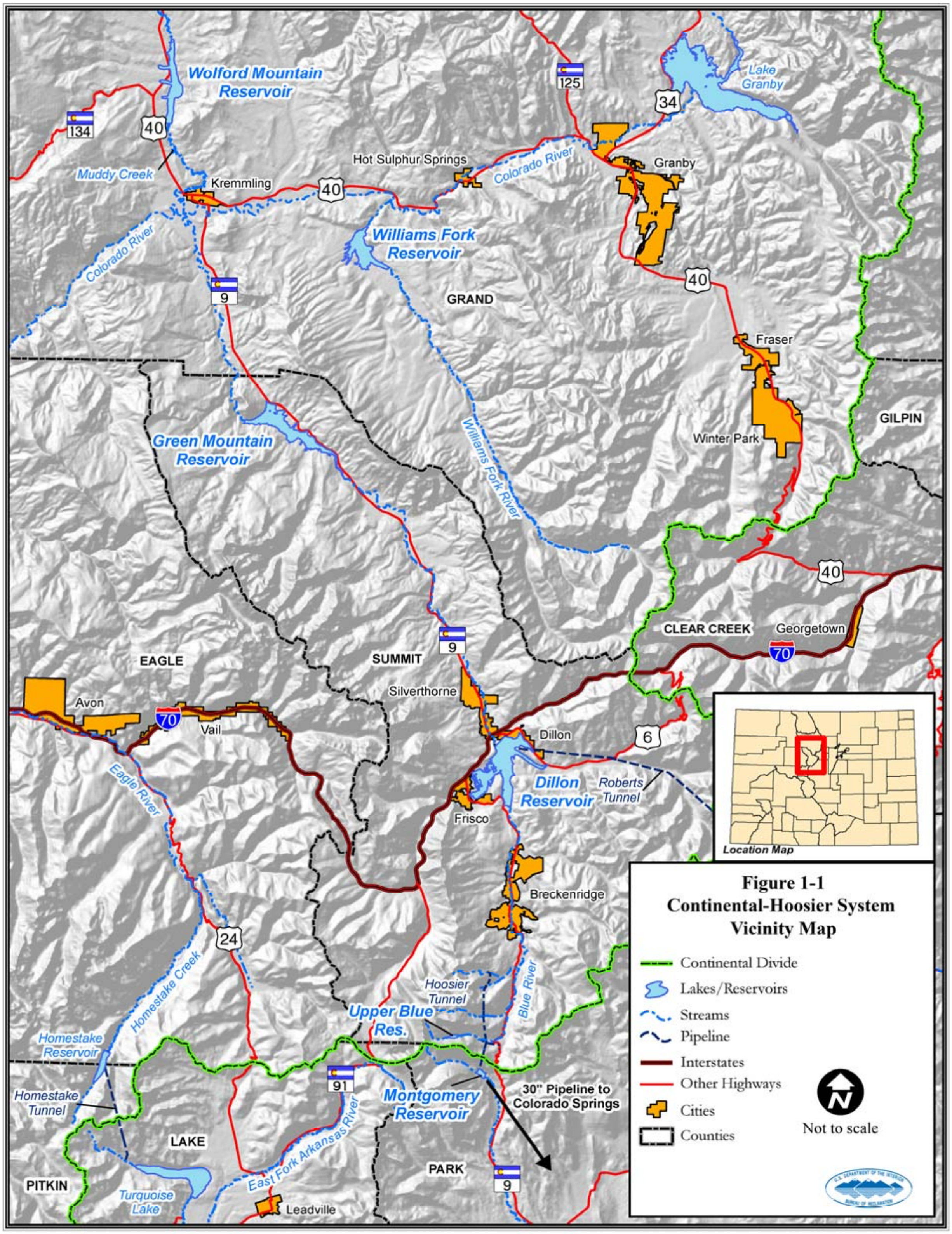
This section provides a description of Springs Utilities' existing operations as well as the relationship between these operations, Reclamation's and WAPA's operations at Green Mountain Reservoir, and the Blue River Decree. A description of the prior appropriation system is included in this section to facilitate an understanding of Springs Utilities' water rights.

1.4.1 Prior Appropriation System

A legal framework called the **prior appropriation system** regulates the use of surface water in Colorado and operates on a first in time/first in right basis. "Prior" means water users with earlier water rights (senior water rights) can fill their needs before others (junior water rights) in times of short supply. "Appropriation" occurs when a public agency, private person, or business places water to a beneficial legal use per a plan to divert, store, or otherwise capture and control the water. Only previously unappropriated water can be appropriated. The prior appropriation system provides a legal procedure by which water users can obtain a court decree for their water rights. This process of court approval is called adjudication, which sets the priority date of the water right, its source of supply, amount, point of diversion, type and place of use, and terms and conditions that govern the operation of the water right. Adjudication also confirms that the water right will not cause injury to existing water right holders. The prior appropriation system lays out an orderly process for state officials to distribute water according to decreed water priority rights, shutting off junior rights as needed to satisfy senior rights (Colorado Foundation for Water Education 2004).

1.4.2 Reclamation and Green Mountain Reservoir

Reclamation owns, operates and maintains the Colorado-Big Thompson Project (C-BT) which stores, regulates, and diverts water from the Colorado River on the western slope of the Continental Divide to the eastern slope of the Rocky Mountains. It provides supplemental water for irrigation of land, municipal and industrial use, hydroelectric power, and water-oriented recreation opportunities. To preserve existing and future water uses and interests on the West Slope, Green Mountain Reservoir was constructed on the Blue River. Spring runoff is stored in this reservoir and later released for C-BT-authorized purposes on the West Slope. Reclamation has rights to fill Green Mountain Reservoir with a 1935 water right, which are senior to Springs Utilities' 1948 water rights.


Wolford Mountain Reservoir
Lake Granby
125
34
134
40
Muddy Creek
Kremmling
Hot Sulphur Springs
Colorado River
Granby
Williams Fork Reservoir
9
GRAND
Fraser
Winter Park
GILPIN
Green Mountain Reservoir
Williams Fork River
CLEAR CREEK
Georgetown
70
EAGLE
SUMMIT
Silverthorne
Avon
Vail
Dillon
6
Eagle River
Dillon Reservoir
Roberts Tunnel
Frisco
Location Map
Breckenridge
24
Homestake Creek
Hoosier Tunnel
Blue River
Upper Blue Res.
Homestake Reservoir
Homestake Tunnel
91
Montgomery Reservoir
30" Pipeline to Colorado Springs
LAKE
East Fork Arkansas River
PARK
PITKIN
Turquoise Lake
Leadville
Figure 1-1
Continental-Hoosier System
Vicinity Map
Continental Divide
Lakes/Reservoirs
Streams
Pipeline
Interstates
Other Highways
Cities
Counties
Not to scale

A hydroelectric power plant is located at the base of the Green Mountain Reservoir Dam and uses the regulated streamflow of the Blue River and the water released from storage in Green Mountain Reservoir to generate electricity. Historically, power interference has been administered on a year–to-year basis.

Springs Utilities' operations on the Blue River impacts Reclamation's ability to produce hydropower; therefore Springs Utilities is required to replace the power that would have been generated by the water that Springs Utilities diverts under its 1948 water rights. During the months the Blue River System is operated, Springs Utilities provides Reclamation with daily operations data. Reclamation then determines the amount of power interference calculated at a rate of 210 kilowatt-hours per acre-feet (AF) of depletion. Since Springs Utilities owns and operates power generation facilities, power interference is typically repaid with power. Springs Utilities coordinates with WAPA to deliver the required amount of replacement power at a time and location determined by WAPA. Springs Utilities may also pay WAPA in cash.

1.4.3 Western Area Power Administration

WAPA was created under the Department of Energy Organization Act of 1977. At this time, the power marketing functions of Reclamation were transferred to WAPA including the construction, operation, and maintenance of transmission lines, and attendant facilities. The operation and maintenance of Reclamation power plants was not transferred to WAPA. WAPA markets power under the same authority that was exercised by Reclamation before the power marketing function was transferred to WAPA. WAPA takes delivery of Reclamation's generation at the power plant switch yards and then transmits the energy to preference power customers.

1.4.4 Springs Utilities' Collection Systems and Customers

The service area for Springs Utilities' customers includes the City of Colorado Springs and portions of the suburban residential areas surrounding the City. The military installations of Fort Carson Army Post, Peterson Air Force Base, and the United States Air Force Academy also receive water and other utility services from Springs Utilities. The water system serves water to an estimated 423,317 people in the Pikes Peak region. This represents the City's population, as well as persons living in the Ute Pass communities west of the City, and military bases and other areas outside the City limits. In 2007, the overall water system delivered 78,389 AF (25,543 million gallons) of potable water to Springs Utilities' customers.

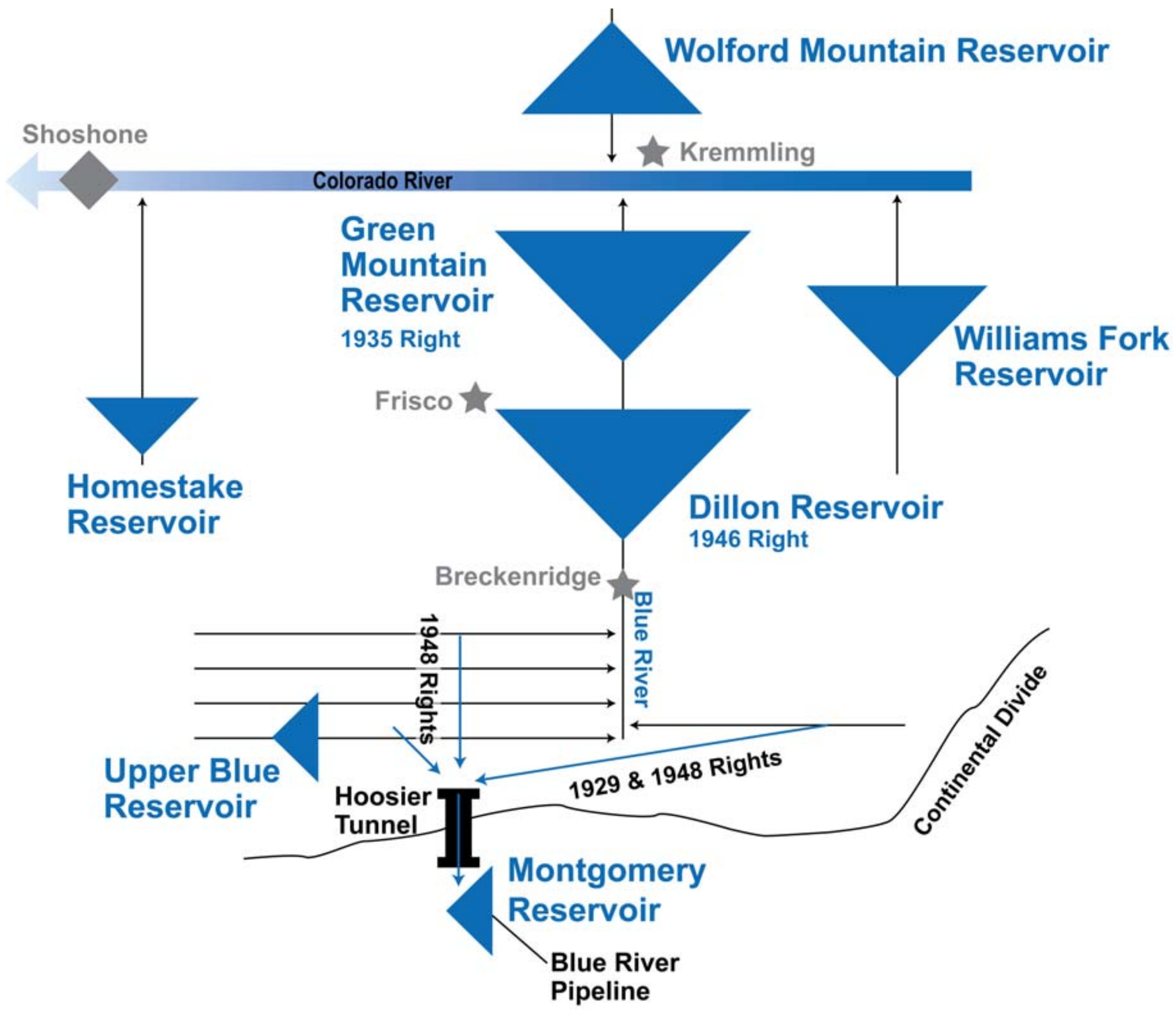
Springs Utilities' water collection system is defined as all facilities that divert, collect, store and transport water prior to treatment. Springs Utilities' extensive water collection and transmission system is made up of 25 reservoirs and/or storage accounts, more than 200 miles of major pipelines and four major pump stations. The entire system stretches through a total of nine counties: Chaffee, Lake, Eagle, El Paso, Teller, Park, Summit, Pueblo and Crowley.

Springs Utilities' collection system is comprised of local and non-local water systems. Because Colorado Springs is not located near a major source of water supply such as a river or lake, local water supplies are limited. As a result, Springs Utilities must also utilize non-local systems to meet its water demands. The non-local water supply systems utilized by Springs Utilities pertinent to this EA include the following: water diverted from the headwaters of the Blue River through its Continental-Hoosier Transmountain Diversion System (Continental-Hoosier System) facilities; and the Homestake Project (Figure 1-2).

Continental-Hoosier Transmountain Diversion System

The Continental-Hoosier System, commonly referred to as the "Blue River System," was completed in the early 1950s and is Springs Utilities' first transmountain diversion system. The Continental-Hoosier System is a major contributor to Colorado Springs'

Figure 1-2 Continental-Hoosier System and Other Relevant Upper Colorado River Facilities



water supply, bringing an average of about 8,500 AF per year to Colorado Springs. This system diverts water from the headwaters of the Blue River and its tributaries above the Town of Breckenridge, Colorado. The Blue River is a tributary of the Colorado River.

The Continental-Hoosier System is located upstream of Denver Water's Dillon Reservoir and Reclamation's Green Mountain Reservoir (Figure 1-2). The Continental-Hoosier System includes storage in the Upper Blue Reservoir, and diversion points on Crystal Creek, Spruce Creek, McCullough Creek, East and West Hoosier Creeks, Silver Creek, and the Blue River. Water diverted from these points, along with water released from the Upper Blue Reservoir, is transported through a series of canals, tunnels and siphons to the Hoosier Tunnel. The Hoosier Tunnel transports the water beneath the Continental Divide to Montgomery Reservoir, located on the Middle Fork of the South Platte River above the town of Alma, Colorado. From Montgomery Reservoir, water is delivered by gravity through a 30-inch, 70-mile long Blue River pipeline to the City of Colorado Springs (Springs Utilities 2006; Springs Utilities 2007).

Springs Utilities owns two water rights for the West Slope portion of this system. The 1929 water rights are for a portion of the flow in East and West Hoosier Creeks. The remaining diversions are made under Springs Utilities 1948 water rights. Diversions under the 1948 rights are also governed by the Blue River Decree, which relates to Reclamation's 1935 Green Mountain Reservoir rights (Section 1.4.5 Blue River Decree). As Springs Utilities' 1929 rights are senior to Reclamation's 1935 Green Mountain Reservoir rights, diversions under these rights are not subject to substitution replacement operations under the Blue River Decree.

Water Reuse and Conservation

Springs Utilities also has a longstanding and extensive nonpotable water system that uses reclaimed wastewater, untreated raw surface water, and untreated groundwater. This system meets nonpotable irrigation demands including; parks, golf courses, cemeteries, schools, businesses, and military facilities, as well as industrial uses for power generation and wastewater treatment plant process water. The nonpotable water delivered through this system comprises about 13% of the total water provided by Springs Utilities.

Conservation has been an integral part of water resource planning and management in Colorado Springs for more than 60 years. In the 1996 Water Resource Plan, conservation was identified as one of four components for meeting future demands. A Water Conservation Master Plan was completed in 1999, followed by the Drought Response Plan in 2001. Most recently, Springs Utilities completed its Water Conservation Plan for 2008-2012, which was approved by the Colorado Water Conservation Board (CWCB) in January 2008. Currently, Springs Utilities' water conservation portfolio includes customer education, demonstration projects, community partnerships, rates and metering, regulatory requirements, financial incentives, and low-income programs. Conservation programs contribute significantly to water resource planning and management, while education, demonstrations and partnerships serve as a strong foundation for an active and accountable water conservation program. Since 2001, Springs Utilities' customers have reduced their water use by 28% per account, leading to a total annual water usage decrease of about five billion gallons (about 15,000 AF).

1.4.5 Blue River Decree

Reclamation's 1935 Green Mountain Reservoir water rights were adjudicated in Federal District Court in Consolidated Case Nos. 2782, 5016, and 5017. The decrees and stipulations in these cases are collectively known as the Blue River Decree. This decree and its related stipulations allow Springs Utilities to exercise its 1948 water rights (junior) in relation to Reclamation's 1935 Green Mountain Reservoir rights (senior). The Blue River Decree also provides for replacement of water and power to mitigate impacts to Reclamation's operations resulting from Springs Utilities' exercising of its 1948 water rights. The Blue River Decree requires the approval of the Secretary of the Interior for Springs Utilities to exercise its 1948 water rights, to assure that such exercise would not adversely affect the ability of Green Mountain Reservoir to fulfill its functions.

One major provision of the Blue River Decree is that Springs Utilities must replace the power that would have been generated by Reclamation in Green Mountain Reservoir's hydroelectric turbines had Springs Utilities not diverted water. In other words, Springs Utilities must pay for power interference. Springs Utilities has historically provided the replacement power year-to-year by mutual agreement with the WAPA at a time and location requested by WAPA. Springs Utilities has carried out this operation under the authority of the Blue River Decree.

Another major provision of the Blue River Decree is that Springs Utilities, and other junior water rights owners specifically identified in the Blue River Decree, must implement water substitution plans to help assure the filling of Green Mountain Reservoir. Each year, Reclamation determines, based on snow pack and other forecasting, whether it is reasonably probable that Green Mountain Reservoir will fill as provided for in the Blue River Decree. If a fill is reasonably probable, then it is projected to be a non-substitution year, and Reclamation allows Springs Utilities to divert under its 1948 rights. Typically, during non-substitution years, Reclamation mails a letter between April 1st and May 15th notifying Springs Utilities that the most Probable Forecast is that Green Mountain Reservoir will fill, and therefore Springs Utilities may divert its 1948 water rights. Because the hydrology of the basin has generally been sufficient to assure the filling of Green Mountain Reservoir, this procedure, historically, has been the typical operation in most years.

If Reclamation determines that it is reasonably probable that Green Mountain Reservoir will not fill, then it is projected to be a substitution year, and Springs Utilities may not divert Blue River water without a plan for substitution approved by the Secretary of the Interior. The Decree specifically identifies and authorizes water stored on the Blue River and the Williams Fork River as acceptable substitution supplies.

Typical substitution operation under the terms of the Blue River Decree includes the following:

- A volume of replacement water equal to or greater than the anticipated fill deficit is diverted and held in storage during the fill season, or carried over from a previous storage season.
- At the end of the fill season, the actual fill deficit is determined and the amount of replacement water required from each diverting entity is calculated.

- The entity releases its replacement water according to a schedule of releases set by Reclamation.

1.4.6 Substitution Year Operations

Historical Substitution Year Operations

Typically, Springs Utilities has operated during substitution years by proposing an annual plan for substitution to Reclamation after receiving notice that Green Mountain Reservoir is not expected to fill. Springs Utilities has used replacement storage on the Blue River and Williams Fork River as authorized Blue River Decree replacement supply sources during several of the substitution years. Springs Utilities has also used, with Reclamation's approval, replacement storage from Wolford Mountain Reservoir on Muddy Creek during more recent substitution years. However, this source is not specifically identified in the Blue River Decree, but was utilized as part of interim agreements pending approval of the 2003 MOAs by Reclamation (see description in Section 1.4.7 Substitution Memorandum of Agreement). Thus, this source is not considered part of the existing operating conditions. Because each substitution year that has occurred has resulted in a different annual plan for substitution, each year's substitution operation and implementation has been different. The operations in the substitution years that have occurred during the period of 1964 through 2005 are described below and are based on Springs Utilities' Annual Blue River Reports and related correspondence. Additionally, the amount and supply source of the substitution water is summarized in Table 1-1. These substitution years serve as examples of the different sets of existing conditions that result from using the year-by-year substitution plans and substitution sources identified in the Blue River Decree.

Table 1-1: Summary of Historical Substitution Year Operations

1964 Substitution Year	
Total Green Mountain Reservoir Shortage	23,531 AF
Springs Utilities' Replacement from Dillon Reservoir	1,583 AF
Springs Utilities' Net 1948 Diversions	8,997 AF
Total Green Mountain Reservoir Shortage	Unknown
Springs Utilities' Replacement from Upper Blue Reservoir	589 AF
Springs Utilities' Net 1948 Diversions	2,182 AF
1981 Substitution Year	
Total Green Mountain Reservoir Shortage (est.)	36,000 AF
Springs Utilities' Replacement (full replacement provided by Denver Water)	0 AF
Springs Utilities' Net 1948 Diversions	5,425 AF
1994 Substitution Year	
Total Green Mountain Reservoir Shortage	4,740 AF
Springs Utilities' Replacement from Williams Fork Reservoir	474 AF
Springs Utilities' Net 1948 Diversions	8,390 AF

<u>1964 Substitution Year</u>

Denver Water's Dillon Reservoir filled for the first time in 1964. Springs Utilities and Denver Water entered into a one year water supply agreement, which was approved by Reclamation. Under this agreement, Springs Utilities diverted water physically available under the 1948 rights. Denver Water reserved water in and released water from Dillon Reservoir to replace the shortage in Green Mountain Reservoir. Replacement was based on Springs Utilities' pro-rata share of depletions.

<u>1977 Substitution Year</u>

This year was declared a substitution year by Reclamation. Based on direction in the annual letter from Reclamation, Springs Utilities started storing water in Upper Blue Reservoir only, but not diverting through Hoosier Tunnel. Then, in early June, Reclamation notified Springs Utilities that the reserved amounts in Dillon Reservoir and Upper Blue Reservoir were sufficient to fill Green Mountain Reservoir. Thus, Springs Utilities began diverting water until it was no longer in-priority and was called out on June 20, 1977. On July 6, 1977 Reclamation notified Springs Utilities by telephone that Green Mountain Reservoir would fill without the water stored in the Upper Blue Reservoir and Springs Utilities began transferring the Upper Blue Reservoir water through Hoosier Tunnel. On July 13, 1977 Reclamation reversed itself and conveyed by telephone that it needed about 600 AF from Springs Utilities to complete the fill of Green Mountain Reservoir. Springs Utilities held 614 AF in the Upper Blue Reservoir to cover the deficit, and on September 7, 1977, Reclamation notified Springs Utilities that it owed 589 AF to Green Mountain Reservoir, which was released from Upper Blue Reservoir.

<u>1981 Substitution Year</u>

In contrast to the 1977 substitution year, the Probable Fill letter from Reclamation approved diversions under Springs Utilities' 1948 water rights without any reference to holding the water in storage. Therefore, Springs Utilities diverted under the 1948 rights through the entire runoff period until Shoshone called the 1948 right out of priority. There were no communications from Reclamation or from the Division 5 Office of the State Engineer to curtail diversions (other than the Colorado River Call). Simultaneously, Denver Water had proposed and operated a 55,000 AF replacement and exchange from Williams Fork Reservoir to Dillon Reservoir. Reclamation may have concluded that since Denver Water had reserved 55,000 AF, which was more than sufficient to fill Green Mountain Reservoir, substitution water from Springs Utilities was not needed.

<u>1994 Substitution Year</u>

Initially there was no request from Reclamation for Springs Utilities to store water or to curtail their 1948 rights. Later in the season, Reclamation informed all parties that Green Mountain Reservoir would not fill. Denver Water paid back the total Green Mountain Reservoir shortage of 4,740 AF with releases from Williams Fork Reservoir and Springs Utilities agreed to repay Denver Water a pro-rata share of the shortage (474 AF) with releases to the South Platte River from Springs Utilities' Homestake Pipeline.

<u>Recent Substitution Years</u>

Substitution was required for the filling of Green Mountain Reservoir during 2001, 2002, and 2004. In addition, the years 2003 and 2005 were initially declared substitution years, but hydrologic conditions were such that Green Mountain Reservoir filled without any substitution operations or releases necessary. Although 2001 was initially declared a non-substitution year, Reclamation reversed this position mid-year. Springs Utilities did not gain approval from Reclamation for its proposed substitution operation in 2001, and, accordingly, diversions under Springs Utilities' 1948 water rights were curtailed. Substitution operations during the years 2002 through 2005 were proposed or carried out under interim agreements that partially implemented the Proposed Action. Operations during some of these years included releases from Wolford Mountain Reservoir to cover Springs Utilities' substitution obligations.

Summary of Substitutions

Since the entry of the Blue River Decree, during non-substitution years, Springs Utilities has diverted water under its 1948 rights after notice from Reclamation that Green Mountain Reservoir will most probably fill. During substitution years, Springs Utilities has typically diverted water under its 1948 rights after submitting an annual substitution plan under the authority of the Blue River Decree and receiving approval from Reclamation on behalf of the Secretary of the Interior. Water owed to Green Mountain Reservoir during substitution years has been repaid at various times from Dillon Reservoir, Williams Fork Reservoir, and Upper Blue Reservoir, as expressly authorized in the Blue River Decree. Use of Dillon and Williams Fork Reservoirs as replacement sources for Springs Utilities has been subject to agreement between Springs Utilities and Denver Water. For water diverted during both substitution and non-substitution years, Springs Utilities has repaid power interference through informal, year-to-year agreements with WAPA.

1.4.7 Substitution Memorandums of Agreement

In May 2003, Springs Utilities entered into a MOA, which formalized a long-term substitution plan and sets forth the terms and conditions among the parties to the MOA regarding substitution operations by Springs Utilities. A copy of the 2003 MOA is available on Reclamations' project website at: http://www.usbr.gov/g//nepa/quarterly.cfm#ecao. The parties to this MOA are Springs Utilities, Colorado River Water Conservation District (River District), the Denver Board of Water Commissioners (Denver Water), Northern Colorado Water Conservancy District (NCWCD), Summit County, Vail Summit Resorts (Vail), and the Town of Breckenridge (Breckenridge). Springs Utilities also signed a Supplemental MOA in October 2003 to address protection of the Upper Blue River entities' exchanges under certain conditions. The parties to this agreement include Summit County, Vail, and Breckenridge. Reclamation is not a party to the MOAs. The NEPA process, through this EA, must be completed prior to Reclamation's decision to approve the substitution plan set forth in the MOAs.

Springs Utilities has proposed that Reclamation approve and adopt the 2003 MOAs to serve as a flexible and reliable substitution plan that will meet the requirements of the Blue River Decree. In addition to operations that are specifically authorized in the Blue River Decree, the 2003 MOAs provide for the addition of two new sources of substitution water: Wolford Mountain Reservoir and Homestake Reservoir. The 2003 MOAs contain additional provisions not directly related to the substitution operation required for the filling of Green Mountain Reservoir, and documents some substitution operations that are already specifically authorized by the Blue River Decree. Chapter 2 of this EA provides a description of the Proposed Action.

The proposed project also formalizes a long-term power interference agreement with Reclamation and WAPA. Under the agreement, Springs Utilities would compensate for lost hydropower with power generated from their own facilities, at a time and location determined by WAPA.

In separate but related actions, Colorado Springs has filed applications in Colorado Water Court and in Federal Court to formally decree and adjudicate its long-term Substitution Plan (discussed in Section 1.5 Required Permits and Approvals).

1.5 Required Permits and Approvals

Federal, state, and local permits and approvals may be required to implement the proposed project. However, the project does not involve ground disturbing activities and therefore, would not require an extensive list of permits and/or authority. This EA provides information for the other regulatory agencies having jurisdictional responsibility for lands and resources affected by the project. Permits and/or approvals required to implement and/or are related to the project include:

Bureau of Reclamation – Formal approval of a long-term Substitution Agreement per the conditions of the 2003 MOAs between Reclamation and Springs Utilities. Formal approval of a long-term Power Interference Agreement between WAPA, Reclamation, and Springs Utilities.

Western Area Power Administration – Formal approval of a long-term Power Interference Agreement between WAPA, Reclamation, and Springs Utilities.

Colorado Water Court System – Final determination in the Springs Utilities' substitution filing (Case No. 03CW320) in Colorado Water Court Division 5. This filing does not impact the NEPA process, but runs concurrent to the project.

Federal Court System – Final determination in the Springs Utilities' filing in Federal District Court parallel to the Colorado Water Court for the same purpose. Again, this filing does not impact the NEPA process, but runs concurrent to the project.

County Permits – Additional county permits may be required. Summit County may require a 1041 permit per the County's Land Use and Development Code regulations (Chapter 10: Areas and Activities of State Interest).

1.6 Agency and Public Input

In accordance with the NEPA (40 CFR 1501.7), Reclamation initiated the scoping process to provide for 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 and state agencies to solicit concerns and comments on the project, and determine the level of anticipated participation from each agency, and is described in the scoping summary report prepared for this project (URS 2008).

During the scoping period, Reclamation held a public scoping meeting on March 6, 2008 in Silverthorne, Colorado. The scoping period extended from March 6 to April 4, 2008. The NEPA scoping process, original scoping letters, and specific comments gathered by Reclamation during the process are detailed in the scoping summary report and in Chapter 4 Coordination and Consultation (URS 2008).

1.7 Environmental Resources

Chapter 3 Affected Environment and Environmental Consequences describes a summary of the resources Reclamation identified to be included for further evaluation in the EA, and those considered but excluded from further evaluation along with a brief explanation. In summary, resource issues and impact topics evaluated in Chapter 3 include:

- Hydroelectric generation
- Hydrology
- Water quality
- Aquatic resources
- Wetlands/riparian resources
- Special status species associated with aquatic resources and wetland and riparian areas
- Recreation
- Socioeconomics

Resource issues and impacts topics considered, but excluded from further evaluation in the EA include:

- Geology
- Soils
- Farmlands
- Air quality
- Noise
- Transportation
- Land use
- Visual resources
- Hazardous materials
- Terrestrial upland communities and wildlife
- Terrestrial special status species
- Environmental justice
- Cultural and Indian Trust resources

2.0 Alternatives

2.1 Introduction

Compliance with the NEPA requires that the environmental effects of a proposed federal action (i.e., Proposed Action) be studied and compared with the environmental effects of an alternative that does not require the proposed federal action (No Action alternative). For this specific project, the No Action alternative is the same as existing conditions, which is operations per the Blue River Decree using a combination of water from the Blue River and Williams Fork River, as described in Chapter 1, Section 1.4 Background. This EA compares the Proposed Action and the No Action alternatives, as described in Sections 2.2 and 2.3, respectively. The CEQ characterizes the alternatives screening process in an EA as a process to identify reasonable alternatives to be evaluated and appropriate mitigation measures to be incorporated into the alternatives (Section 40 CFR 1508.9[a]). The preliminary alternative screening analysis conducted for this EA is described in Section 2.2.

2.2 Alternative Screening Process

In accordance with NEPA, a reasonable range of preliminary alternatives was evaluated during the screening process. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint using common sense, rather than simply desirable from the standpoint of the applicant ("Forty Most Asked Questions Concerning NEPA," Question 2a). Under NEPA, the comparison of a full spectrum of alternatives should provide "a clear basis for choice among options for the decision maker and the public" (40 CFR 1502.14).

Preliminary alternatives were configured using a variety of potential water supply sources and infrastructure components (i.e., new storage sites, pipelines, pump station). Potential water sources identified must be available (physically and legally) from a sustainable source in amounts sufficient to be practicably developed. Unlike the Proposed Action, all of the preliminary alternatives that were considered required the construction of new facilities. These alternatives were carefully screened based on numerous evaluation criteria related to purpose and need, existing technology, logistics, water rights, costs, environmental impacts, and complying with the requirements of the Blue River Decree. Examples of alternatives that were considered, but screened out are described below.

Additional Storage on the Blue River

Springs Utilities has conditional water rights on the Blue River that could be developed at their original decreed locations or transferred to new storage facilities. The development of additional storage on the Blue River would be used to divert and store water in wet years and hold it for substitution releases in substitution years. Two options for Blue River storage were identified and evaluated during the screening process. The first option included the development of approximately 3,166 AF of storage in one or more new reservoirs in the upper reaches of tributaries to the Blue River using Springs Utilities conditional storage rights. The second option for storage that was considered during screening involved the construction of approximately 5,000 AF of new gravel lake storage on the Blue River below Dillon Reservoir or on the Williams Fork River below Williams Fork Reservoir.

Although construction of additional storage on the Blue River is feasible, it would require regulatory approval from the Army Corps of Engineers (USACE) through the NEPA process, as well as 401 Certification through the Colorado Department of Health and Environment, Water Quality Control Division (CDPHE WQCD). Additionally, there would likely be lengthy water rights litigation required for the development of the additional storage. Both Blue River storage options include construction of new structural components and the cost and environmental impacts were deemed to be far greater than implementing the non-structural Proposed Action.

Montgomery Reservoir Pump-Back

Another structural alternative that was considered during the screening process was a pump-back project from Springs Utilities' Montgomery Reservoir, located on the headwaters of the South Platte River. Under this scenario, the pump-back would operate during substitution years by diverting water through the Hoosier Tunnel and storing it in Montgomery Reservoir. When substitution releases are required, the pump station would pump the necessary amount of water from that stored in Montgomery Reservoir back through the Hoosier Tunnel to be discharged into the Blue River, where it would then flow down to Green Mountain Reservoir to complete its filling. This alternative would consist of a new pump station constructed at Montgomery Reservoir, and a new pipeline through the Hoosier Tunnel. This alternative would also require the extension of power to the Montgomery Reservoir site. Additionally, conditional storage rights may need to be obtained to operate this alternative.

The same type of federal action required by Reclamation for the Proposed Action would be required for a pump-back since Montgomery Reservoir is not approved as a substitution source under the Blue River Decree. Water rights litigation in Colorado Water Court Division 5 would also be required for this alternative to allow this operation to be approved for use as a source of substitution water for Green Mountain Reservoir. This option would require the construction of new structural components and the cost and environmental impacts were deemed to be far greater than implementing the non-structural Proposed Action.

2.3 No Action Alternative

Water Substitution

If Reclamation does not approve the Proposed Action, Springs Utilities would operate during substitution years strictly per the Blue River Decree (refer to Chapter 1, Section 1.4.5 Blue River Decree) according to annual substitution plans approved by the Secretary of the Interior as needed. The Blue River Decree authorizes substitution operations using a combination of water from the Blue River and Williams Fork River. Denver Water would be willing to continue to provide replacement water in the future on behalf of Springs Utilities in substitution years for water Springs Utilities is obligated to provide to Green Mountain Reservoir, depending on Denver Water's own operational needs and water supply requirements (Denver Water 2008). Based on this information for the purposes of this analysis, it is assumed that Denver Water would provide replacement water. If Denver Water chose not to provide replacement water, Springs Utilities might have to identify other replacement sources for approval by the Secretary of Interior, and the comparative impacts of the No Action and action alternatives likely would change. Springs Utilities would not use Wolford Mountain or Homestake Reservoirs as sources of replacement water under the No Action alternative. The terms and conditions agreed to in the May 2003 MOA are not part of the No Action alternative. Approval of the October 2003 MOA is also not part of the No Action alternative.

For the purposes of the analysis of hydrologic effects, Springs Utilities' substitution payback under the No Action alternative is modeled as follows. Water is released first from Upper Blue Reservoir to Dillon Reservoir in August. Releases to Dillon Reservoir decrease Springs Utilities' substitution obligation while increasing Denver Water's substitution obligation by a commensurate amount. If contents in Upper Blue Reservoir are not sufficient to payback Springs Utilities' entire substitution obligation, it is assumed that Denver Water would payback any remaining obligation with releases from William Fork Reservoir and/or Dillon Reservoir. To be conservative and reflect the maximum possible change in Middle Fork South Platte River streamflows and contents in Montgomery and Elevenmile Canyon reservoirs, it was assumed that Springs Utilities would provide Denver Water with water released from Montgomery Reservoir to the degree Springs Utilities' substitution obligation exceeds contents in Upper Blue Reservoir.

Power Interference Substitution

Under the No Action alternative, replacement of power at the Green Mountain Reservoir power plant would continue to be accomplished through informal, as-needed, annual agreements between WAPA, Reclamation, and Springs Utilities as authorized in the Blue River Decree (see discussion in Chapter 1, Section 1.4.2 Reclamation and Green Mountain Reservoir). Springs Utilities' operations on the Blue River impacts Reclamation's ability to produce hydropower; therefore Springs Utilities is required to replace the power that would have been generated by the water that Springs Utilities diverts under their 1948 water rights. Springs Utilities reserves the right to pay WAPA monetarily or with power. Since Springs Utilities owns and operates power generation facilities, power interference may be repaid with power. Springs Utilities coordinates with WAPA to deliver the required amount of replacement power at a time and location determined by WAPA.

2.4 Proposed Action

Water Substitution

Under the Proposed Action, Reclamation would enter into up to a 40-year Substitution Agreement with Springs Utilities. This agreement would approve Springs Utilities' substitution plan according to the terms and conditions set forth in the 2003 MOAs. The elements of the May 2003 MOA that are specific to the Proposed Action are the use of Wolford Mountain Reservoir and Homestake Reservoir as sources of replacement water in a manner consistent with the terms and conditions of the 2003 MOAs. Reclamation may approve the use of these additional water sources on a long-term basis, but Springs Utilities must submit for approval of its substitution plan specific for that substitution year. Another component of the Proposed Action (May 2003 MOA) is that Springs Utilities provides up to 250 AF stored in the Upper Blue Reservoir to the Colorado River Water Conservation District (River District) each year in return for a like-amount of water stored in Wolford Mountain Reservoir. The 250 AF is intended for water users in the Blue River Basin including Summit County, Vail, Summit Resorts, and Breckenridge. A storage account in an amount up to 1,750 AF is maintained by the River District at

Wolford Mountain Reservoir for the benefit of Springs Utilities to store Upper Blue Reservoir water booked into Wolford Mountain Reservoir. This account is referred to throughout the rest of this document as Springs Utilities' account in Wolford Mountain Reservoir.

For the purposes of the analysis of hydrologic effects, Springs Utilities' substitution payback under the Proposed Action is modeled as follows. Springs Utilities would divert water in dry years when Reclamation determines that Green Mountain Reservoir would likely not fill and substitute this water using water stored on the Blue and Williams Fork rivers per the terms of the Blue River Decree and if needed, from Wolford Mountain Reservoir and Homestake Reservoir per the terms of the 2003 MOAs. The first 2,100 AF of replacement water would be provided from Springs Utilities to Denver Water from Springs Utilities' Upper Blue Reservoir and their South Platte River supplies such as Montgomery Reservoir, if necessary. The amount provided to Denver Water would be added to the Denver Water replacement obligation and released by Denver Water in accordance with the Denver Water substitution agreements and decree. The next increment of Springs Utilities' replacement obligation (up to 1,750 AF) would be comprised of releases from water accrued by exchange in the substitution account maintained for Springs Utilities at Wolford Mountain Reservoir. Any remaining replacement obligation would be made with releases from Homestake Reservoir. The MOA outlines the use Wolford Mountain Reservoir and Homestake Reservoir as alternate replacement sources to Green Mountain Reservoir operations. Therefore, releases from Springs Utilities' account in Wolford Mountain Reservoir and Homestake Reservoir would be made in replacement of all uses of Green Mountain Reservoir in lieu of releasing water from Green Mountain Reservoir.

To reflect the exchange of 250 AF between Upper Blue Reservoir and Wolford Mountain Reservoir in the model, releases of 250 AF are made from Upper Blue Reservoir every November. For modeling purposes, this water is assumed to be diverted above Dillon Reservoir in the same month and fully consumed. In actuality, all or a portion of the 250 AF may be used for augmentation purposes, in which case it would be used to replace out-of-priority depletions to the Blue River or its tributaries, directly or by exchange. This use would be fully consumptive. Alternatively, some or all of the water may be diverted or stored, directly or by exchange and may or may not be fully consumed in the month of diversion. In return for this water, 250 AF is booked into an account in Wolford Mountain Reservoir up to a maximum of 1,750 AF and is available for substitution payback. Per the terms of the MOA, no evaporative losses are charged to the 250 AF account in Upper Blue Reservoir or Springs Utilities' account in Wolford Mountain Reservoir.

Springs Utilities' Continental-Hoosier System diversions deplete the Blue River, therefore, these diversions affect the ability to meet the CWCB instream flow requirements above Dillon Reservoir, which are junior to Springs Utilities' water rights and the Blue River Decree. However, in order to ensure this alternative protects the natural environment in a manner consistent with the instream flow requirements above Dillon Reservoir, during substitution years, Springs Utilities' would refrain from diverting to the extent necessary in order to maintain flows at the instream flow levels.

Compliance for this mitigation will be to maintain a flow of 5 cfs just upstream of Goose Pasture Tarn Reservoir. Flows at this location will be estimated based on the USGS gage 09046490 Blue River at Blue River, which is located just downstream of Goose Pasture Tarn Reservoir, plus diversions to storage at Goose Pasture Tarn. The location of compliance was chosen because Springs Utilities' Continental-Hoosier System is the primary diversion upstream of Goose Pasture Tarn Reservoir whereas downstream of this point, flows are influenced by reservoir operations at Goose Pasture Tarn and diversions and returns flows associated with water users other than Springs Utilities.

Based on model results, which are explained in Chapter 3, there would be 13 substitution years during the 56-year study period with total substitution obligations ranging from 139 AF to 4,318 AF. Based on the frequency of substitution years during the study period (one in every 4 to 5 years), there would be approximately 9 to 10 substitution years during the 40-year life of the contract with Reclamation.

Power Interference Substitution

Under the Proposed Action, a long-term Power Interference Agreement would be formalized with Reclamation and WAPA. Under the agreement, Springs Utilities would compensate for lost hydropower with power generated from their own facilities, at a time and location determined by WAPA. Springs Utilities reserves the right to pay WAPA monetarily or with power.

3.0 Affected Environment and Environmental Consequences

3.1 Introduction and Methodology

This chapter describes the affected environment and discloses the potential environmental consequences associated with implementing the No Action and Proposed Action alternatives as described in Chapter 2. Resources evaluated in this chapter include: hydrology, hydroelectric generation, water quality, aquatic resources, wetland and riparian resources, recreation, and socioeconomics. A summary of those impacts is shown in Table 3-25 in Section 3.10. As described in Section 3.2 Issues and Impacts Topics Considered but Excluded from Further Evaluation, there are no effects expected to impact geology, soils, farmlands, air quality, noise, transportation, land use, visual resources, hazardous materials, terrestrial upland communities, wildlife, terrestrial special status species, environmental justice, and cultural and Indian trust resources. Therefore, impacts to these topics have been considered but eliminated from further evaluation.

The No Action alternative represents a continuation of operations as outlined in the Blue River Decree. In addition, replacement of power at the Green Mountain Reservoir hydroelectric plant would continue to be accomplished through informal, as-needed, annual agreements between WAPA, Reclamation, and Springs Utilities as authorized in the Blue River Decree. The No Action alternative 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 Section 3.1.1.

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.

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

Beneficial: positive change in the condition or appearance of the resource, or a change that moves the resource toward a desired condition.

Adverse: negative change that detracts from the resource's appearance or condition, or a change that moves the resource away from a desired condition.

Direct: effect caused by the Proposed Action and occurs in the same time and place.

Indirect: effect caused by the Proposed Action but occurs later in time or farther removed in distance

Cumulative: incremental effect 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, results in a cumulative effect on the environment. Potential future actions were considered reasonably foreseeable and 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, and
- 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 water-based future actions were identified through available data on known projects or actions under consideration in the vicinity of the Study Area. Future actions meeting the criteria described above are described in the Section 3.3. Because the Proposed Action would not result in any new infrastructure or ground disturbance, reasonably foreseeable actions were limited to those water-based actions that would have overlapping effects with the Proposed Action on water resources.

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

Short-term: lasting no longer than one year of substitution.

Intermediate-term: lasting no more than one year beyond a substitution year. In the case of a series of consecutive substitution years, the length of time would not extend for more than one year beyond the last substitution year in the series.

Long-term: lasting more than one year beyond the substitution year or series of substitution years up to the length of the contract, which is up to 40 years.

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

No impact: no discernable effect.

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

Minor: effect that is slight, but detectable, with some perceptible effects of disturbance.

Moderate: effect is readily apparent and has measurable effects of disturbance.

Major: effect is readily apparent and has significant effects of disturbance.

3.1.2 Climate Change

Numerous studies have been conducted on the relationship between climate change and water resources in the West. Most climate models project that temperatures will continue to rise in the West. For instance, in Colorado temperatures have increased about 2°F in the past 30 years and future winter projections indicate fewer extreme cold months, more extreme warm months, and more strings of consecutive warm winters (Western Water Assessment 2008; National Research Council 2007).

Results from hydrological modeling of the impact of rising temperatures on water resources in mountainous western regions, including Colorado, vary widely (Hoerling and Eischeid 2007; Garfin and Lenart 2007; Woodhouse 2007; IPCC 2008; Western Water Assessment 2008). The general scientific consensus is that increased temperatures would change the composition of winter precipitation and the timing of spring snowmelt. In other words, as temperatures rise the West would receive less snow and the snow that does accumulate would melt earlier in the spring than in past years. In Colorado, the onset of stream flows from melting snow has shifted earlier by two weeks between 1978 and 2004 and the projected timing of runoff is projected to shift earlier in the spring, reducing late-summer flows (Western Water Assessment 2008). Additionally, western snowmelt runoff is expected to decrease due to the higher evaporation and transpiration rates that accompany increased temperatures (Garfin and Lenart 2007; Letheby 2007; Nijhuis 2006a and 2006b; USDA 2007; USGS 2005; Watershed Management Council Networker 2005; IPCC 2008). It is estimated that nearly 75% of water supplies in western states are derived from snowmelt; thus, water managers will likely have to address greater extremes in water systems in the foreseeable future. Water managers may best cope with the combination of these anticipated changes by flexible operations that can incorporate increasing amounts of new scientific information as it becomes available (Woodhouse 2007; Garfin and Lenart 2007). Climate change and global warming may be considered reasonably foreseeable; however currently there is no accepted scientific method of transforming the general concept of increasing temperatures into incremental changes in streamflow or reservoir levels. Thus, hydrologic changes in response to global climate change have not been quantitatively described in this EA.

3.1.3 Reasonably Foreseeable Water-Based Actions Considered in Cumulative Effects Analysis

Water-based actions refer to proposed water storage and diversion projects, water rights changes, and Section 404 activities. The Cumulative Effects Analysis focused on water-based actions because the Proposed Action does not involve land-disturbing activities or other on-the-ground changes. The following reasonably foreseeable water-based actions were considered in the evaluation of cumulative effects.

Windy Gap Firming Project

The Subdistrict of the NCWCD, on behalf of several of the Windy Gap Project unit holders and the Middle Park Water Conservancy District, is proposing to improve the firm yield from the existing Windy Gap Project water supply by constructing the Windy Gap Firming Project (WGFP). The Subdistrict's Proposed Action is the construction of a 90,000 AF Chimney Hollow Reservoir located just west of Carter Lake on the East Slope. This project is anticipated to result in additional surface diversions at the Windy Gap Project diversion site on the Colorado River, which is downstream of the confluence of the Colorado and Fraser rivers. The WGFP is anticipated to generate approximately 26,000 AF/yr of firm yield for the project participants. The cumulative effect of the WGFP would be reduced flows in the Colorado River downstream of the Windy Gap Project diversion in average and wet years from April through August.

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 the year 2030. The Moffat Collection System Project is currently proposed by Denver Water to develop 18,000 AF/yr of new, annual yield to the Moffat Treatment Plant to meet future raw water demands on the East Slope. The remainder of the deficit would be comprised of savings from implementing various conservation measures. The alternatives include additional storage in the Moffat Collection System. This project is anticipated to result in additional diversions, primarily from the upper Fraser River and Williams Fork River basins. The Moffat Collection System Project and Denver Water's increase in demand would cumulatively reduce flows in the Colorado River, Williams Fork River, and Blue River in average and wet years primarily during runoff.

Other Increased Water Use in Grand and Summit Counties

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 2007). Most growth in Grand County is likely to occur in the Fraser River basin while future increases in water use in Summit County would occur primarily in the Blue River basin. The largest growth in water demands in the Blue River basin is expected to occur in areas below Dillon Reservoir including the Towns of Silverthorne, Eagles Nest and Mesa Cortina. Build-out municipal and industrial demands are estimated to be 16,168 AF for Grand County and 17,940 AF 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.

In addition, Springs Utilities has claimed absolute and conditional rights of exchange in Case No. 03CW314 in connection with the Continental-Hoosier System. These exchange rights would allow 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 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 it depends 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 Springs Utilities' operational needs and potential benefits to their system. Although Springs Utilities may have the physical and legal ability to exercise an exchange, they may choose not to based on other factors related to their overall system operation.

Reduction of Xcel Energy's Shoshone Power Plant 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 eight miles east of Glenwood Springs. Denver Water and Xcel Energy have negotiated an agreement to periodically invoke a relaxation of the Shoshone call at times flows are less than 1,408 cfs at the point of diversion. The agreement to relax the call could result in a one-turbine call of 704 cfs, which would be managed in such a way to avoid a Cameo call by the Grand Valley Water users. The Cameo call refers to a suite of senior water right located near Grand Junction. The Shoshone call could 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% on July 1 that year, and the March 1 Natural Resources Conservation Service (NRCS) forecast for Colorado River flows at Kremmling or Dotsero are at or below 85% 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.

Key projects/water rights that would benefit from a reduction of the Shoshone call include the Continental-Hoosier Project, Green Mountain Reservoir, Wolford Mountain Reservoir, Moffat Collection System (Moffat Tunnel, Williams Fork Reservoir, 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 also be less. Increased in-priority diversions and reduced reservoir releases for exchange and/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 could be affected 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.

Because of the very high elevation of the Continental-Hoosier system, the snow pack and stream system has generally remained frozen during the period of a potential Shoshone call relaxation described in this section. Therefore, there is very little water that could be diverted by the Continental-Hoosier system under a relaxed call scenario.

Changes in Releases from Williams Fork and Wolford Mountain Reservoirs to Meet USFWS Flow Recommendations for Endangered Fish in the 15-Mile Reach

The Programmatic Biological Opinion for the recovery of endangered fish includes a provision for East and West Slope water users to split equally the delivery of 10,825 AF of water to the 15-Mile Reach of the Colorado River east of Grand Junction. An agreement exists between Denver Water, the Colorado Water Conservation Board (CWCB) and the USFWS, for the interim provision of water to the 15-Mile Reach of the Colorado River near Grand Junction as part of the Recovery Program. A similar agreement exists between River District, CWCB, and the USFWS. These agreements provide for the total release of 10,825 AF of water annually from both Williams Fork and Wolford Mountain Reservoirs (5,412.5 AF from each reservoir) to meet USFWS flow recommendations for the 15-Mile Reach.

These contracts expire in 2009 and 2010, respectively, and both Denver Water and the River District do not plan to continue making these releases from Williams Fork and Wolford Mountain Reservoirs in the future. This action affects the timing and quantity of reservoir storage and releases and the flows in Williams Fork River and Muddy Creek below the reservoirs. Fish releases from these reservoirs have historically been made in the late summer and fall when flows drop below the USFWS flow recommendations. When fish releases are not made from Williams Fork and Wolford Mountain Reservoirs, flows in the Williams Fork River and Muddy Creek would be less by a commensurate amount in the fall. The reduction in fish flow releases would be offset by a corresponding change in the amount of water stored in these reservoirs on average. Less water would need to be stored during the runoff season to replace these releases. As a result, cumulative changes in Williams Fork and Wolford Mountain reservoir storage and releases due to this action would affect the timing of flows below these reservoirs, but would have little affect on the annual quantity of flow on average.

Increases in Wolford Mountain Reservoir Contract Demands

According to the River District, the demand for contract water out of Wolford Mountain Reservoir is expected to increase in the future. River District staff indicated there is currently about 8,750 AF/yr of available contract water in Wolford Mountain Reservoir that would likely be contracted for in the future. In addition, Middle Park Water Conservancy District (MPWCD) has 3,000 AF/yr of contract water in Wolford Mountain Reservoir, which would also likely be contracted for in the future. The specific entities that would contract for this water in the future and the locations of the depletions are not known at this time. Releases from Wolford Mountain Reservoir would need to be made to meet contract demands when depletions (consumptive use) are out-of-priority, which would likely be during winter months (September through March) and in summer months of dry years depending on whether the Shoshone Power Plant rights are calling.

This future action cumulatively affects the timing and quantity of Wolford Mountain Reservoir contents and releases and the flows in Muddy Creek below the reservoir. Because releases for contract demands would increase in the future, flows in Muddy Creek would increase on average by a commensurate amount primarily during winter months and in summer months of dry years. However, more water would be stored during the runoff season to replace these releases, so flows during runoff would decrease on average below the reservoir.

Expiration of Denver Water's Contract with Big Lake Ditch in 2013

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.

The following information on the operation of Big Lake Ditch and the terms and conditions of the contract with Denver Water was provided by Denver Water. 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, the Big Lake Ditch can no longer divert water under the enlargement decree for 111 cfs for irrigation in the Reeder Creek drainage.

This action cumulatively affects the timing and quantity of flows in Williams Fork River and the Colorado River. The abandonment of all Big Lake Ditch diversions to the Reeder Creek basin would allow Denver Water to divert additional water for storage in Williams Fork Reservoir when their water rights are in priority. Big Lake Ditch diversions would decrease, deliveries to the Reeder Creek drainage would be curtailed, and all Big Lake Ditch return flows would accrue to the Williams Fork River instead of the Colorado River below the confluence with the Williams Fork River. The change in Big Lake Ditch diversions and return flows would result in less depletion and a corresponding increase in flows on average in the Williams Fork River basin. Changes in flow would be greatest from June through October when differences in Big Lake Ditch depletions and return flows are greatest.

3.2 Issues and Impact Topics Considered but Excluded from Further Evaluation

Resource issues and impacts topics considered, but excluded from further evaluation in the EA are described below. In general, these issues and impact topics were dismissed from further evaluation because the Proposed Action does not involve land-disturbing activities or other on-the-ground changes. Additionally, none to minimal surface water changes would occur under the Proposed Action (refer to Section 3.3 Hydrology), therefore no impacts are anticipated to any of these resources.

Geology

The Study Area lies within the central Rocky Mountain geographic region, which consists of steep mountain uplands complemented by areas of glacial drift. The underlying geology consists of sandstone, siltstone, shale and limestone substrates (USGS 2002). The Study Area occurs within Seismic Risk Zone 1 (on a scale of 0 to 3, with Zone 3 having the highest risk) (Algermissen et al. 1990). Since no ground disturbing activities would occur within the Study Area, no impacts to geologic resources, such as aggregate material or minerals, would occur. Additionally, impacts to the project from geologic hazards, such as earthquakes, are not anticipated.

Soils

The Study Area generally contains medium-to-fine textured loamy soils that occur on mountainsides and ridges, interspersed with areas of exposed bedrock. Since the Proposed Action does not include ground disturbing activities, soil loss or displacement from wind or water erosion is not anticipated. Fluctuating water levels in the reservoirs would be minimal; thus, shoreline instability, sloughing, and slippage are unlikely to occur as a result of the Proposed Action.

Farmlands

Agricultural production in the Study Area is limited by a cold climate and associated short growing season. Additionally, agriculture has steadily declined in the project vicinity as land is increasingly converted to recreational and residential use. Four categories of important farmlands are federally regulated by the United States Department of Agriculture (USDA) under the Farmland Protection Policy Act: (1) Prime farmlands, (2) Unique farmlands, (3) Farmlands of statewide importance, and (4) Farmlands of local importance. Important farmlands are a distinction made by the USDA as soils that support the crops necessary for the preservation of the nation's domestic food and other supplies, specifically the capacity to preserve high yields of food, seed, forage, fiber, and oilseed with minimal agricultural amendment of the soil, adequate water, and a sufficient growing season. Several USDA and other federal natural resource programs, permits, and regulations require the identification of important farmlands.

No lands are classified as Prime and Unique Farmlands in Summit or Grand counties (NRCS 2008a). Similarly, a majority of farmlands are not classified as Prime or Unique in Park and Eagle counties (NRCS 2008b). Many irrigated farmlands in the Study Area, however, are recognized as farmlands of statewide importance (NRCS 2008a and 2008b). The Proposed Action does not include construction of new facilities. Thus, farmlands in the Study Area would not be directly impacted. Additionally, the amount of water that is diverted from rivers and streams within the Study Area for agricultural uses would not be depleted as a result of the Proposed Action.

Air Quality, Noise, and Transportation

No new structures would be built within the Study Area as part of the Proposed Action. Thus, temporary noise impacts associated with construction activities would not occur. Similarly, temporary air impacts resulting from fugitive dust emissions generated from construction activity would not occur. Increased traffic or traffic disruptions associated with construction activity would also not occur. Traffic associated with operations and maintenance of existing facilities within the Study Area is expected to be minimal.

Land Use

Several different land uses (e.g., recreational, agricultural, forest, urban, etc.) occur within the Study Area. No above-ground structures would be built within or adjacent to the Study Area as part of the Proposed Action, thus the existing land uses would not be altered or impacted.

Visual Resources

Scenic quality is defined as the harmonious relationship between physical, biological, and cultural attributes that, when viewed by people, elicits psychological and physiological benefits (USDA 1995). In general, streams in the Study Area 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 no to minimal flow changes and thus would not impact the visual quality of streams and reservoirs in the Study Area.

Hazardous Materials

Hazardous materials are defined in various ways under a number of state and federal 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 sites 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. Since the Proposed Action does not include ground disturbing activities, hazardous materials that may occur within the Study Area would not be exposed.

Terrestrial Upland Communities, Wildlife, and Special Status Species

Upland communities in the Study Area vary in accordance with elevation. Areas above 10,000 feet generally consist of Engelmann spruce, subalpine fir, and alpine meadows. Lodgepole pine, aspen, blue spruce, and Douglas-fir are examples of tree species found in the plant communities below 10,000 feet. Shrubland communities that occur between 6,000-8,000 feet include mountain mahogany, sage and pinon-juniper associations. Grasses in the Study Area include various species of fescue, brome, wheatgrass, and bluegrass. Upland communities in the Study Area support terrestrial wildlife such as big game (e.g., mule deer [*Odocoileus hemionus*], American elk [*Cervus elaphus*]) and small and medium-sized mammals (e.g., mountain cottontail [*Sylvilagus nuttalii*], Colorado chipmunk [*Tamias quadrivittatus*]). These upland areas may also support special status species such as Gunnison's prairie dog (*Cynomys gunnisoni)* and mountain plover (*Charadrius montanus*). No construction activities associated with the Proposed Action would occur in the Study Area that would disturb or displace wildlife or reduce associated habitat.

Environmental Justice

As required by Executive Order 12898, *General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The Study Area is not comprised of definable minority or low-income populations (U.S. Census Bureau [Census] 2000a). The Proposed Action would not result in disproportionate impacts to any populations within the Study Area.

Cultural Resources and Indian Trust Resources

On January 23, 2007, Reclamation and the Colorado State Historic Preservation Officer (SHPO) signed a Programmatic Agreement to document the means to determine and evaluate the impacts on historic properties from reservoir operations and storage contracts as required by Section 106 of the National Historic Preservation Act (NHPA) and stipulated in 36 CFR 800. The Advisory Council on Historic Preservation (ACHP) declined an invitation to participate in this agreement.

Changes in operational strategies within the Study Area in response to project demands would affect timing, depth, and duration of drawdown within the water system network. However, because the water level and flow fluctuations associated with the Proposed Action are within the boundaries of normal flows and levels already experienced within the Study Area, there would be no impact to cultural resources.

Indian trust assets are owned by American Indians but are held in trust by the United States. Requirements are included in the Secretary of the Interior's Secretarial Order 3206, American Indian Tribal Rites, Federal-Tribal Trust Responsibilities, the Endangered Species Act; and Secretarial Order 3175, Departmental Responsibilities for Indian trust resources. There are no known Indian trust assets within the Study Area; therefore there would be no effects on Indian trust resources, resulting from the Proposed Action.

3.3 Hydrology

This section describes the existing surface water resources in the Study Area and the effects of the Proposed Action and No Action alternatives on streamflow quantity and reservoir storage content. Potentially affected river segments and reservoirs in the Study Area are shown in Figure 3-1. For each of the affected river basins in the Study Area, regional surface water characterizations are provided that include an overview of the drainage basins (geographic location, drainage area, elevation range, major tributaries, and flow sources) and a summary of surface water use. Additionally, monthly average historical stream graphs are provided for USGS stream gages that are representative of river reaches within the Study Area. Monthly time series graphs showing historical reservoir storage contents are also provided. Simulated streamflow and reservoir storage content are summarized and environmental consequences associated with the Proposed Action and No Action alternatives are compared. This section also describes the cumulative effects of the Proposed Action in relation to other reasonably foreseeable projects in the Study Area.

Issues raised during scoping that specifically relate to surface water resources are also addressed in this section. These issues include the following:

- Effects on Colorado River stream flows below the Windy Gap Project diversion point due to utilizing Williams Fork Reservoir as a source of substitution replacement.
- Effects on Springs Utilities' diversions from the West Slope to the East Slope.
- Effects on the operation and use of the Green Mountain Reservoir Historic User's Pool (HUP).
- Effects on future projects, such as the Green Mountain Reservoir Pumpback Project.
- Effects of Bureau of Land Management's (BLM) Wild and Scenic River designations on stream reaches within the Study Area.
- Adequacy of a monthly time step model for evaluating environmental consequences.

3.3.1 Affected Environment

The Study Area encompasses portions of the Colorado River and South Platte River basins (refer to Figure 3-1). Potentially affected river segments include sections of the Blue River, Williams Fork River, Muddy Creek, Colorado River, Homestake Creek, Eagle River, Middle Fork South Platte River, and South Platte River. Potentially affected reservoirs include Upper Blue Reservoir, Dillon Reservoir, Green Mountain Reservoir, Williams Fork Reservoir, Wolford Mountain Reservoir, Homestake Reservoir, Montgomery Reservoir, and Elevenmile Canyon Reservoir. The study area did not extend below Elevenmile Canyon Reservoir because flow changes downstream of this point would be negligible. Changes in contents in Elevenmile Canyon Reservoir and additional releases under the No Action and Proposed Action alternatives would likely be negligible in comparison to Denver Water's storage and operations. Each of these river segments and reservoirs is discussed in the following sections.

3.3.1.1 Blue River Basin

Historical Streamflow

Potentially affected river segments in the Blue River basin include the Blue River and tributaries in the upper Blue River basin from Springs Utilities' Continental-Hoosier System diversion points downstream, as shown in Figure 3-1.

The Blue River flows generally northwest, toward Dillon Reservoir, then on toward the Colorado River, forming a long valley between the Williams Fork Mountains to the north and east, and the Gore Range to the south and west. Springs Utilities' Continental-Hoosier System is located in the upper Blue River basin. The total drainage area of the basin is 680 square miles (Hydrosphere 1989). 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 (WRCC 2005). Stream flows are highly variable by season across the basin. Most of the annual stream flow results from snow melt between the months of May and July.

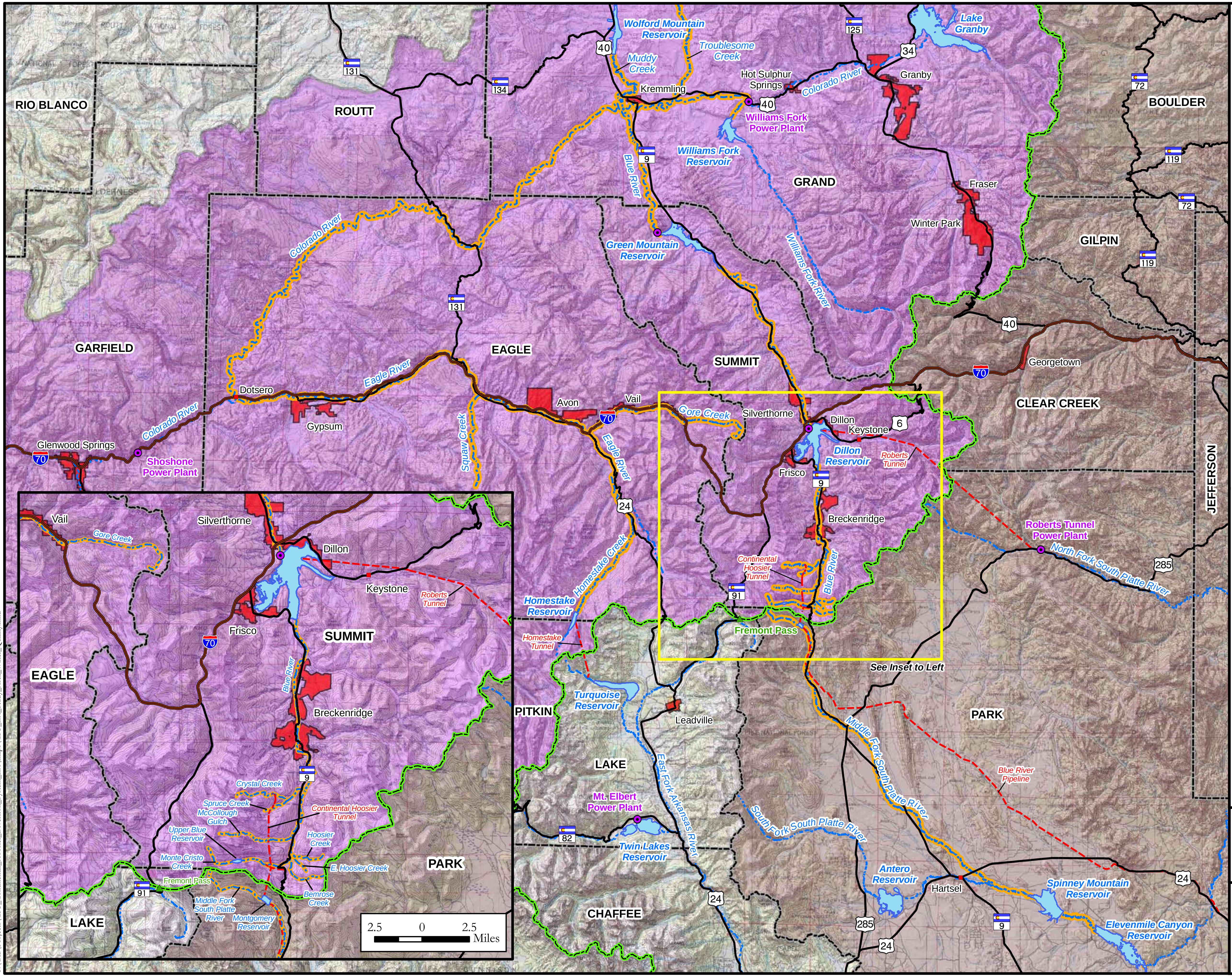
The following table lists the CWCB minimum instream flow rights on the Blue River and tributaries that Springs Utilities diverts from above Dillon Reservoir. There are other CWCB instream flow requirements above Dillon Reservoir that are not included in this table, because those rights are outside of the Study Area. The listed CWCB rights were decreed in 1985 and 1986 and are junior to Springs Utilities' Continental-Hoosier System rights and the Blue River Decree.

CWCB Minimum Instream Flow Rights above Dillon Reservoir		
Reach	**Flow (cfs)**	**Period**
Crystal Creek from Lower Crystal Lake to confluence with Spruce Creek	0.5	October through April
	2	May through September
Spruce Creek headwaters to confluence with Blue River	0.5	October through March
	2	April through September
Confluence of Monte Cristo and Bemrose Creeks to Hwy 9 Bridge	1	October through April
	2	May through September
Hwy 9 Bridge to Goose Pasture Tarn	2	October through April
	5	May through September
5,200 ft upstream of Swan R. to confluence with Swan R.	10	November through April
	20	May through October
Swan River to Dillon Reservoir	16	November through April
	32	May through October

The following table lists the CWCB minimum instream flow rights on the Blue River below Dillon Reservoir. These rights were decreed in 1987 and are junior to Springs Utilities' Continental-Hoosier System rights and the Blue River Decree.

Mean daily historical streamflows and the range of historical daily stream flows are shown in Figures 3-2, 3-3, and 3-4 for the Blue River near Dillon gage (09046600), Blue River below Dillon gage (09050700) and Blue River below Green Mountain Reservoir gage (09057500), respectively.

Blue River CWCB Minimum Instream Flow Rights below Dillon Reservoir		
Reach	**Flow (cfs)**	**Period**
Dillon Reservoir outlet to confluence with Straight Creek	50	Year Round
Confluence with Straight Creek to confluence with Willow Creek	55	May through July
	52	August through September
	50	October through April
Confluence with Willow Creek to confluence with Rock Creek	75	April through September
	58	October through March
Confluence with Rock Creek to confluence with Boulder Creek	115	May through August
	90	September, April
	78	October
	67	November through March
Confluence with Boulder Creek to confluence with Slate Creek	125	May through August
	90	September through October
	70	November through February
	78	March
	90	April
Confluence with Slate Creek to Green Mountain Reservoir inlet	125	May through September
	90	October, November, March, April
	85	December through February
	90	March through April
Green Mountain Reservoir outlet to Colorado River	60	May through July 15
	85	July 16 through April



- Affected River Segments
- Streams
- Pipeline
- South Platte River Basin
- Upper Colorado River Basin
- Lakes/Reservoirs
- Power Plants
- Interstates
- Other Highways
- Counties
- Continental Divide

Reference:
1:250,000-scale quad maps from USGS.
1:100,000-scale quad maps originally from USGS (1980s) and created with TOPO!, 2006 National Geographic Maps, All Rights Reserved.

Notes:
Only portions of each river basin within the study area are shown.

8.5 0 8.5 Miles
1:538,560

Green Mountain Reservoir Substitution and Power Interference Agreements EA

Figure 3-1
Study Area

DRAFT

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Figure 3-2
Blue River near Dillon Gage 09046600
Daily Mean Historical Streamflow (1958-2005)

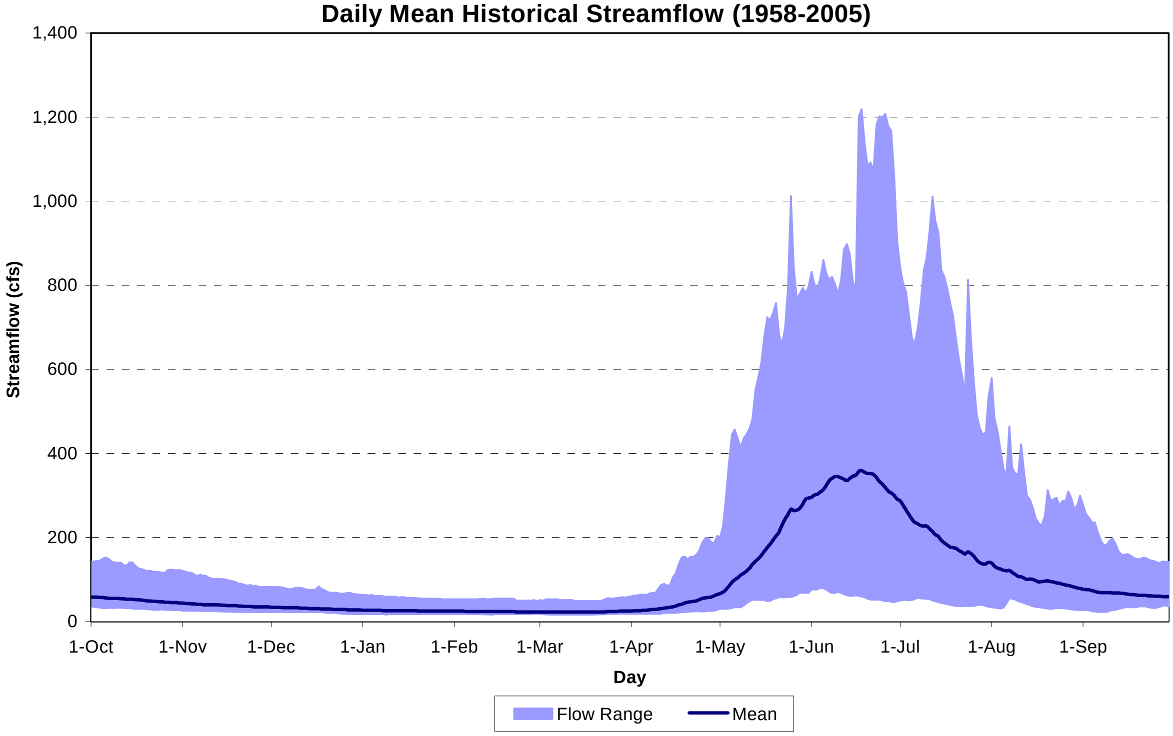


Figure 3-3
Blue River below Dillon Gage 09050700
Daily Mean Historical Streamflow (1963-2005)

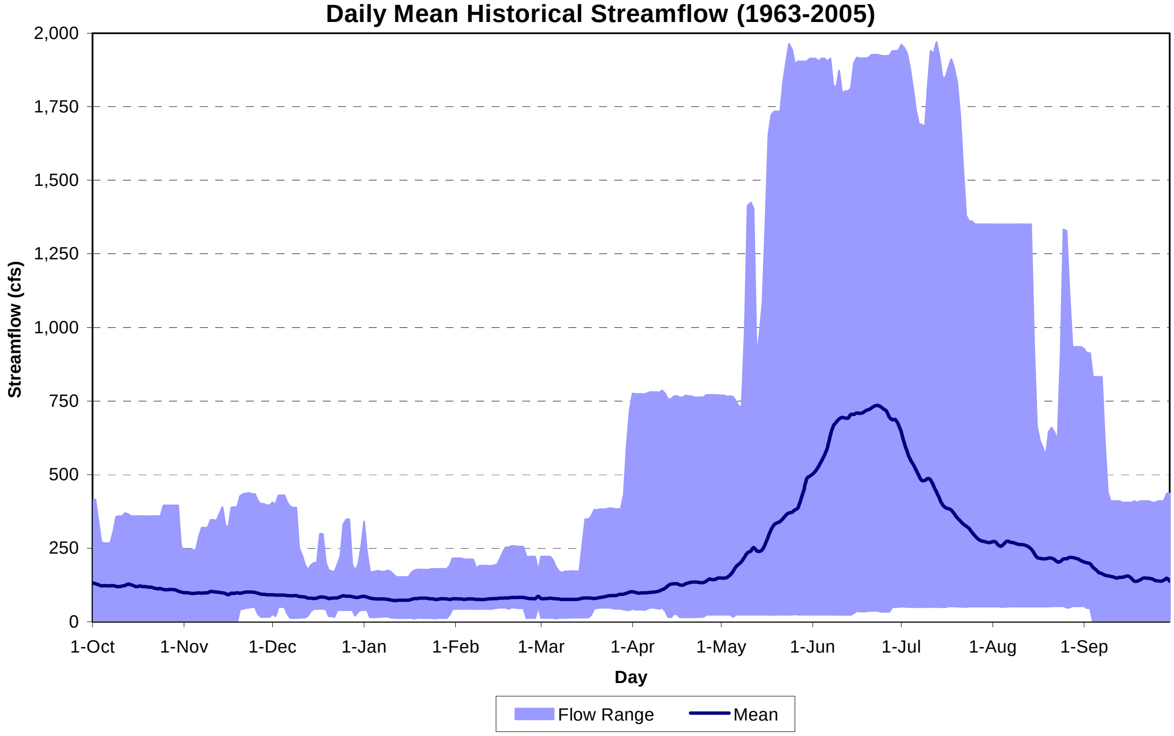
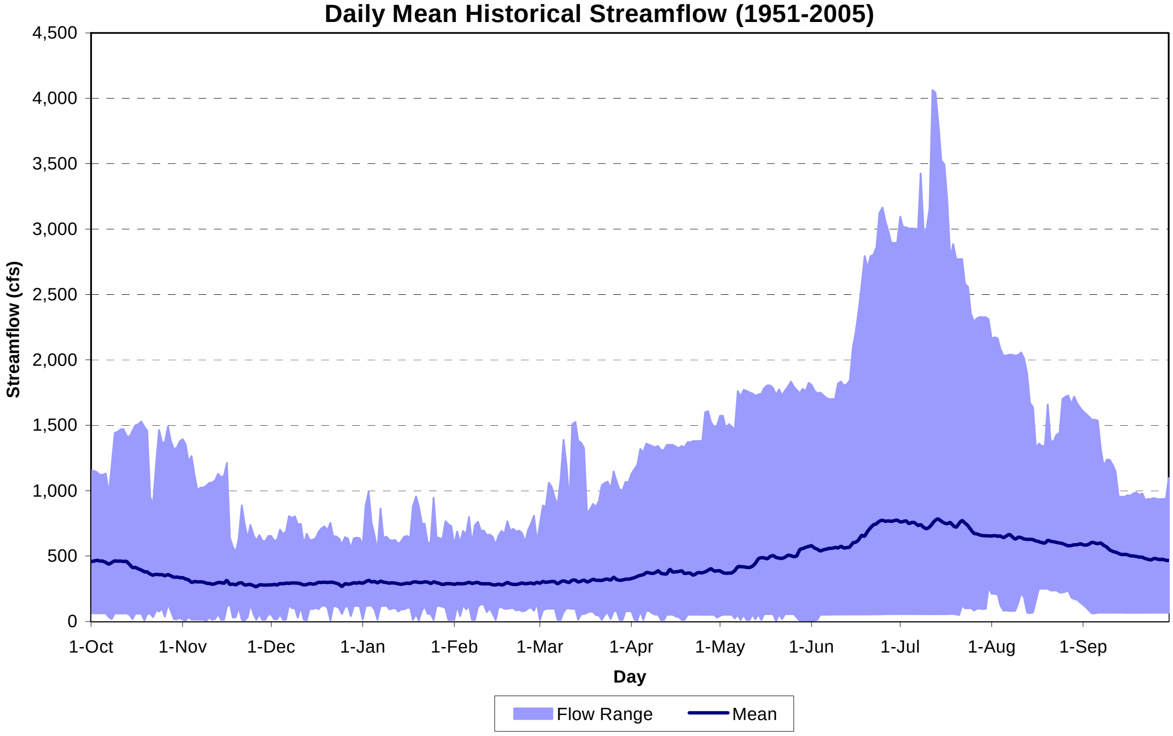


Figure 3-4
Blue River below Green Mountain Reservoir Gage 09057500
Daily Mean Historical Streamflow (1951-2005)



Wild and Scenic Rivers Designation

In the summer of 2006, the Kremmling and Glenwood Springs Field Offices of the BLM began the eligibility phase of a Wild and Scenic Rivers evaluation as part of their Resource Management Plan (RMP) revision process. The Wild and Scenic Rivers study process is composed of two main components: the eligibility phase, and the suitability phase. The eligibility phase involves identifying eligible rivers and stream segments, and determining a tentative classification (Wild, Scenic, or Recreational). To be eligible for designation, a river must be free flowing and contain at least one Outstandingly Remarkable Value (ORV) that is scenic, recreational, geological, fish-related, wildlife-related, historic, cultural, botanical, hydrological, paleontological, or scientific. Upon conclusion of the eligibility phase, the BLM prepared a Wild and Scenic Eligibility Report that identified a few river segments within the EA Study Area (portions of the Colorado and the Blue Rivers) that were eligible for inclusion in the National Wild and Scenic Rivers System (BLM 2007). The suitability phase is now being conducted and a Draft Suitability Plan is expected to be made available to the public in the fall of 2009.

Three segments of the Blue River have been preliminarily classified as recreational and wild for purposes of being deemed eligible for Wild and Scenic River status. These segments and their associated ORVs include:

- Segment 1 from the border of BLM and USFS land (approximately 1.5 miles downstream of Green Mountain Reservoir) to the border between BLM and private land (approximately 2.5 miles downstream of Green Mountain Reservoir) – scenic (unique canyon), recreational fishing, recreational floatboating, geological (unique canyon), wildlife (bald eagle and river otter).

- Segment 2 downstream of Segment 1 from the BLM land boundary downstream of the confluence with Spring Creek to the BLM land boundary located upstream of the confluence with Spruce Creek – recreational fishing, recreational floatboating, and wildlife (bald eagle and river otter).
- Segment 3 includes several small sections of the Blue River as it occurs on BLM land from approximately ¼-mile upstream of the confluence with Dry Creek to approximately 1 mile upstream of the confluence with the Colorado River – recreational fishing, recreational floatboating, wildlife (bald eagle and river otter), and biodiversity (riparian communities).

The BLM also has an established fishing access and boat take-out at the downstream end of Segment 3.

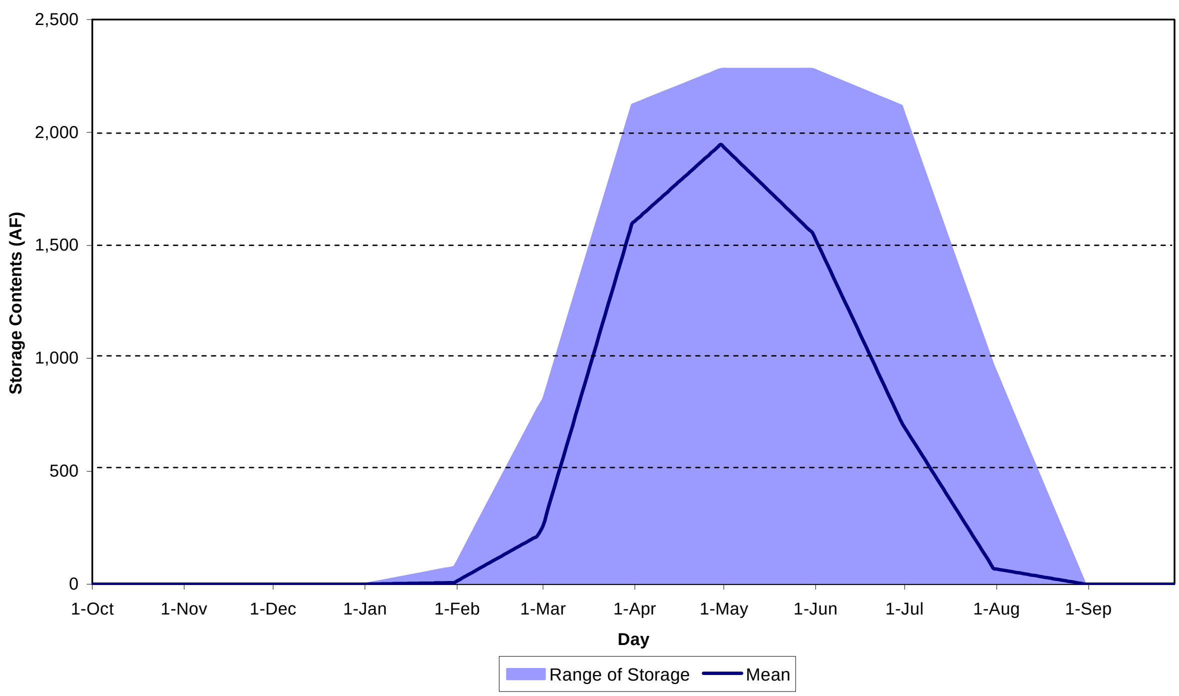
Historical Reservoir Operations and Contents

Upper Blue Reservoir

Upper Blue Reservoir is a 2,113 AF reservoir located on Monte Cristo Creek, a tributary to the Blue River in the upper Blue River basin. The reservoir was completed in 1967 as a component of Springs Utilities' Continental-Hoosier System. Water is stored in Upper Blue Reservoir during runoff and the reservoir generally fills by the end of June. Water is typically released from August through October to meet Springs Utilities' substitution obligation or for delivery through Hoosier Tunnel to Montgomery Reservoir on the Middle Fork South Platte River. Mean daily historical storage contents and the range of contents for Upper Blue Reservoir are shown in Figure 3-5. Daily contents were interpolated based on historical end-of-month contents.

The water rights associated with Upper Blue Reservoir are junior in priority to Green Mountain Reservoir. Under the Blue River

Figure 3-5
Upper Blue Reservoir Daily Mean Historical Storage Summary (1967-2005)



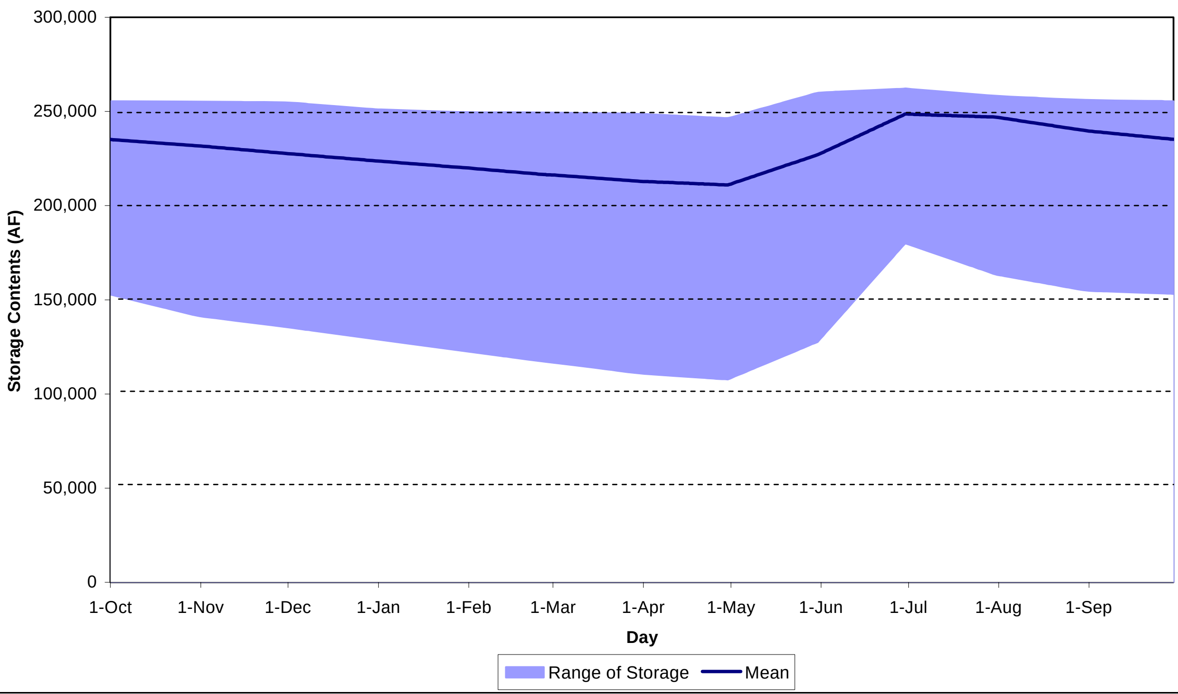
Decree, Springs Utilities can store water at Upper Blue Reservoir on an out-of-priority basis against Green Mountain Reservoir's senior first fill storage right. To the extent that Green Mountain Reservoir does not fill, Springs Utilities must provide substitution water to Green Mountain Reservoir. Blue River Decree operations are discussed in more detail under the section for the Green Mountain Reservoir.

Dillon Reservoir

Dillon Reservoir is a 257,305 AF reservoir located at the confluence of the Blue River, Snake River and Ten Mile Creek approximately 20 miles upstream of Green Mountain Reservoir. The reservoir, which was completed in 1963 is owned and operated by Denver Water primarily for municipal use. Dillon Reservoir and Roberts Tunnel are components of Denver Water's Roberts Tunnel Collection System. Dillon Reservoir is a major component of Denver Water's long-term carryover storage and is operated in conjunction with Denver Water's North and South System facilities to meet their demands. Water stored in Dillon Reservoir is conveyed through Roberts Tunnel to the North Fork of the South Platte River. Denver Water must bypass 50 cubic feet per second (cfs) or inflow, whichever is less, to the Blue River from Dillon Reservoir pursuant to their right-of-way agreement with the USFS and the terms of the 1984 FERC Order granting a license exemption to Denver Water's Blue River Hydroelectric Project. Mean daily historical storage contents and the range of contents for Dillon Reservoir are shown in Figure 3-6. Daily contents were interpolated based on historical end-of-month contents.

There are two power plants associated with the Roberts Tunnel Collection System. The Dillon Power Plant generates power from Dillon Reservoir releases to the Blue River. The Roberts Tunnel Power Plant generates power from Dillon Reservoir releases through Roberts Tunnel.

Figure 3-6
Dillon Reservoir Daily Mean Historical Storage Summary (1966-2005)



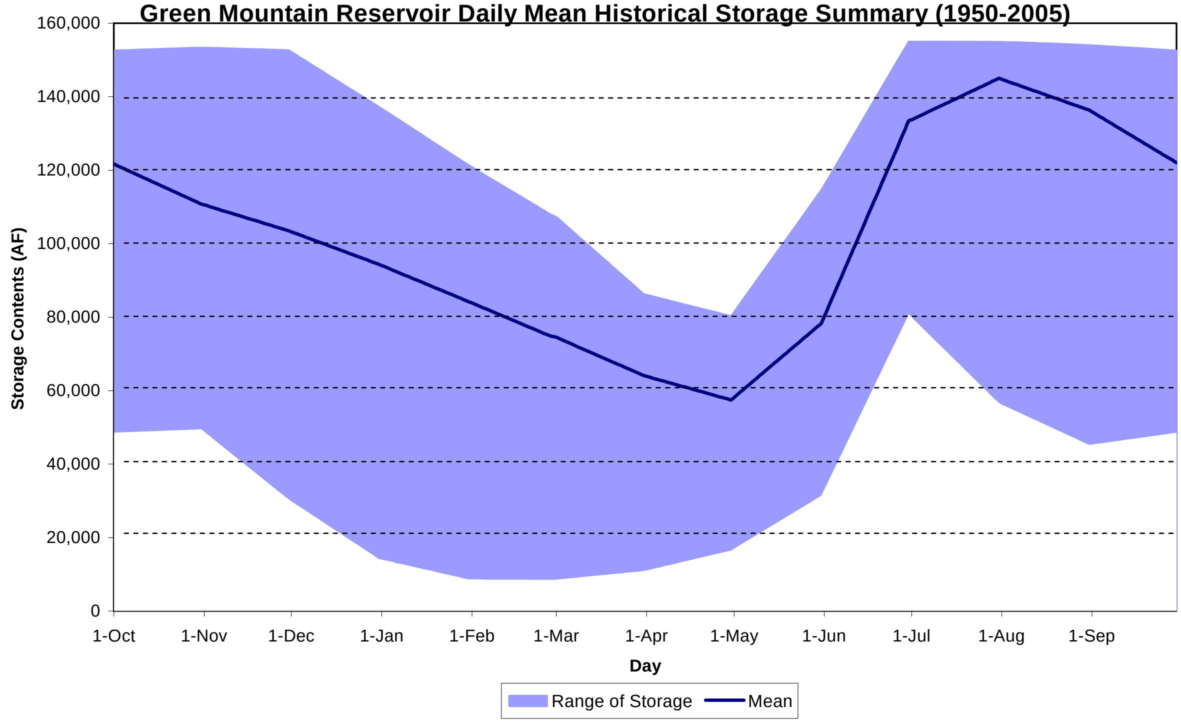
The water rights associated with Dillon Reservoir and Roberts Tunnel are junior in priority to Green Mountain Reservoir. Under the Blue River Decree, Denver Water can divert and store water at Roberts Tunnel and Dillon Reservoir on an out-of-priority basis against Green Mountain Reservoir's senior first fill storage and direct flow power rights. To the extent that Green Mountain Reservoir does not fill in a given runoff year, Denver Water must provide substitution water to Green Mountain Reservoir. Blue River Decree operations are discussed in more detail under section for the Green Mountain Reservoir.

<u>Green Mountain Reservoir</u>

Green Mountain Reservoir is a 153,639 AF reservoir located on the Blue River approximately 13 miles upstream of the confluence with the Colorado River. The reservoir was completed in 1943 as a component of the Colorado-Big Thompson (C-BT) Project. 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 and to preserve existing and future water uses and interests on the West Slope. It is also authorized to generate power. The reservoir has an operating pool of 152,000 AF, of which 52,000 AF is dedicated to replacement of C-BT Project transmountain diversions, and the remaining 100,000 AF is for power and West Slope purposes.

Green Mountain Reservoir stores flows during runoff from the Blue River and water diverted from Elliot Creek, which is delivered to the reservoir via the Elliot Creek Feeder Canal. Water is released from the reservoir later in the year for various authorized purposes. Releases from the reservoir are made through the Green Mountain Power Plant for power generation. Mean daily historical storage contents and the range of contents for Green Mountain Reservoir are shown in Figure 3-7. Daily contents were interpolated based on historical end-of-month contents.

Figure 3-7
Green Mountain Reservoir Daily Mean Historical Storage Summary (1950-2005)



The Blue River Decree (Consolidated Case Nos. 2782, 5016, and 5017) specifies the relative priorities of the storage and hydroelectric rights for Green Mountain Reservoir and the upstream rights at Dillon Reservoir, the Roberts Tunnel and the Continental-Hoosier System. Under the Blue River Decree, Springs Utilities and Denver Water can divert and store water at their facilities, which are upstream of Green Mountain Reservoir, on an out-of-priority basis against Green Mountain Reservoir's senior first fill storage and direct flow power rights. The Interim Policy, which was first adopted by the State Engineer in 2003, is the current administration of the Blue River Decree. The Interim Policy currently defines the administrative and accounting principles concerning Green Mountain Reservoir and specifically outlines the paper fill of Green Mountain Reservoir under its senior storage right. The terms and conditions of the Interim Policy and the manner in which it is reflected in the Colorado Decision Support System (CDSS) Model are described in the technical memorandum, *Model Selection and Parameters* (ERC 2008) included in Appendix A.

3.3.1.2 Williams Fork River Basin

Historical Streamflow

The potentially affected river segment in the Williams Fork River Basin extends from Williams Fork Reservoir downstream to the confluence with the Colorado River, as shown in Figure 3-1. The Williams Fork River flows generally northwest, forming a relatively narrow basin between the Fraser River basin to the east and the Blue River basin to the west. The southern end of the basin is delimited by the Continental Divide, which separates the Williams Fork River basin from Clear Creek. The total drainage area of the basin is 230 square miles at the USGS gage 09038500 Williams Fork downstream of Williams Fork Reservoir. Annual precipitation varies with elevation across the basin, ranging from approximately 14 inches at Williams Fork Dam to about 24 inches near Jones Pass (WRCC 2005).

Mean daily historical streamflows and the range of historical daily streamflows are shown in Figure 3-8 for the Williams Fork River below Williams Fork Reservoir gage (09038500).

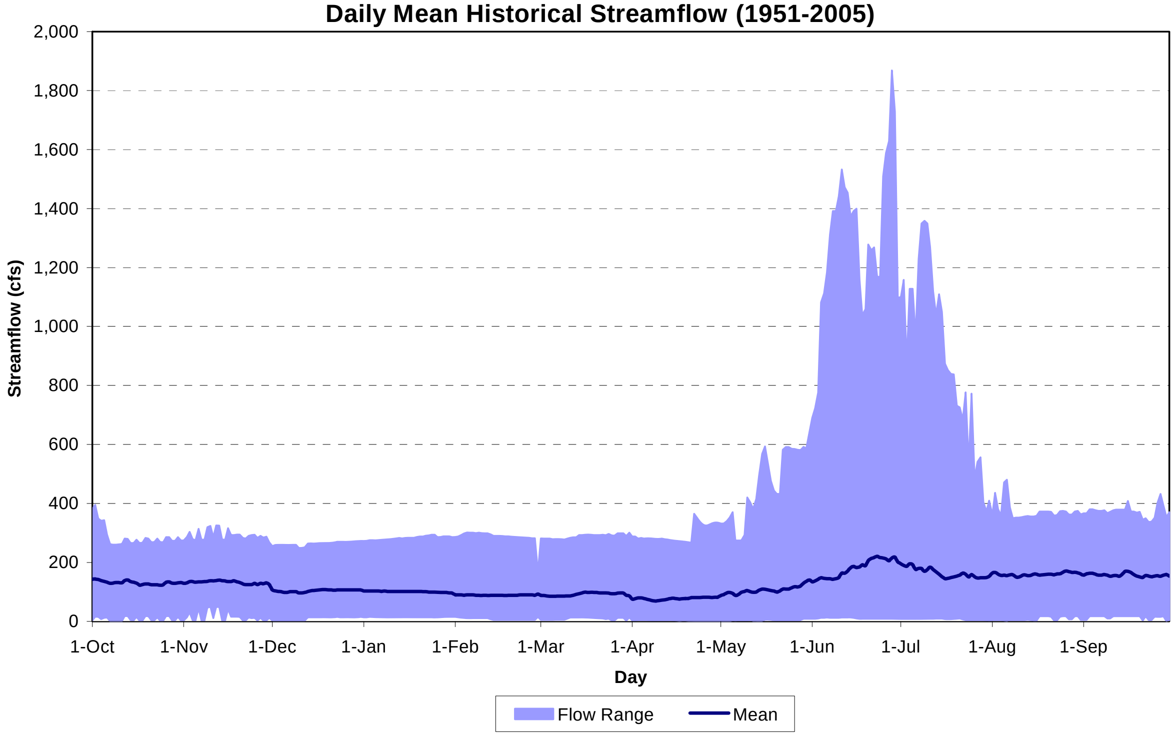
Historical Reservoir Operations and Contents

Williams Fork Reservoir

Williams Fork Reservoir is a 96,822 AF reservoir located on Williams Fork River approximately three miles upstream of the Colorado River confluence. The reservoir, which was completed in 1959, is the only significant reservoir in the basin. The reservoir's primary purpose is to provide replacement water for out-of-priority diversions by Denver Water and to generate power. A power plant is located at Williams Fork Reservoir, and as a condition of Denver Water's FERC license, Denver Water must bypass 15 cfs or inflow, whichever is less, at all times. Williams Fork Reservoir stores flows during runoff from Williams Fork River. Power operations generally influence reservoir releases during much of the year. Replacement water is released later in the year to allow out-of-priority diversions by Denver Water and to meet substitution obligations.

Denver Water's headwater diversions are protected by Williams Fork Reservoir such that when the Denver Water rights are out-of-priority with respect to senior diverters downstream of Williams Fork Reservoir, the reservoir releases water for the satisfaction

Figure 3-8
Williams Fork River below Williams Fork Reservoir Gage 09038500
Daily Mean Historical Streamflow (1951-2005)



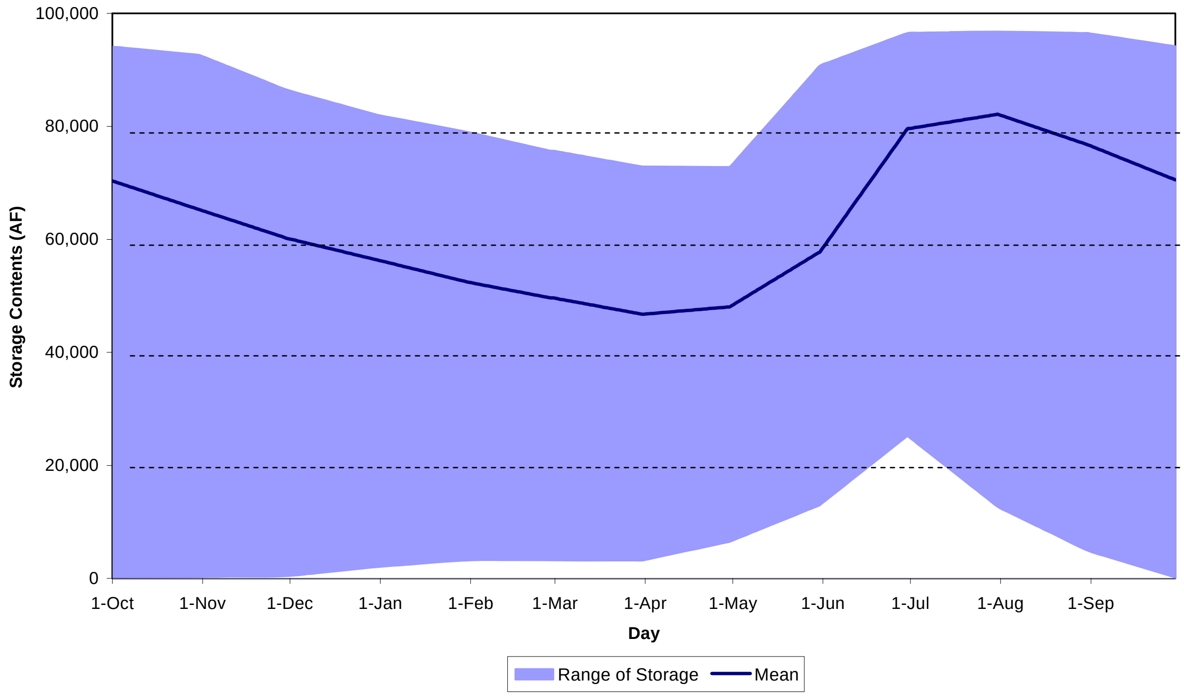
of those rights. Williams Fork Reservoir is operated similarly to replace out-of-priority on diversions at Denver's Moffat Collection system, Roberts Tunnel, and Dillon Reservoir. Denver Water also has an obligation to provide up to 2,200 AF of replacement water to the Henderson Mill out of Williams Fork Reservoir. Releases from Williams Fork Reservoir are also made in substitution for releases from Green Mountain Reservoir in years that Green Mountain Reservoir does not fill and Denver Water has a substitution obligation. To the extent that Green Mountain Reservoir does not fill in a given runoff year, water from Williams Fork Reservoir may be released (substituted) to downstream water demands in place of releases from Green Mountain Reservoir. Mean daily historical storage contents and the range of contents for Williams Fork Reservoir are shown in Figure 3-9. Daily contents were interpolated based on historical end-of-month contents.

3.3.1.3 Muddy Creek Basin

Historical Streamflow

The affected river segment in the Muddy Creek Basin extends from Wolford Mountain Reservoir downstream to the confluence with the Colorado River, as shown in Figure 3-1. Muddy Creek is a north side tributary of the Colorado River that enters the mainstem at Kremmling. Muddy Creek drains the Rabbit Ears Range to the north, the north end of the Gore Range to the west, and a relatively low ridge dividing the Muddy Creek valley from the Troublesome Creek basin to the east. The drainage area of the basin is 270 square miles at the USGS gage 09041400 Muddy Creek below Wolford Mountain Reservoir. Muddy Creek generally experiences earlier runoff peaks and lower unit runoff compared with the Williams Fork, Blue and Eagle River basins. Average annual precipitation at Kremmling is approximately 12 inches, but exceeds 25 inches near the headwaters (WRCC 2005). Mean daily historical

Figure 3-9
Williams Fork Reservoir Daily Mean Historical Storage Summary (1960-2005)



streamflows and the range of historical daily streamflows are shown in Figure 3-10 for the Muddy Creek.

The following table lists the CWCB minimum instream flow rights on Muddy Creek from the outlet of Wolford Mountain Reservoir to the headgate of Deberard Ditch, which were decreed in 1998. In addition, Wolford Mountain Reservoir must bypass 20 cfs or inflow, whichever is less at all times as a permit condition.

Muddy Creek CWCB Minimum Instream Flow Rights below Wolford Mountain Reservoir

Reach	Flow (cfs)	Period
Wolford Mountain Reservoir to Deberard Ditch	20	July 15 to April 3
	70	May 1 to May 14
	105	May 15 to June 30
	70	July 1 to July 14

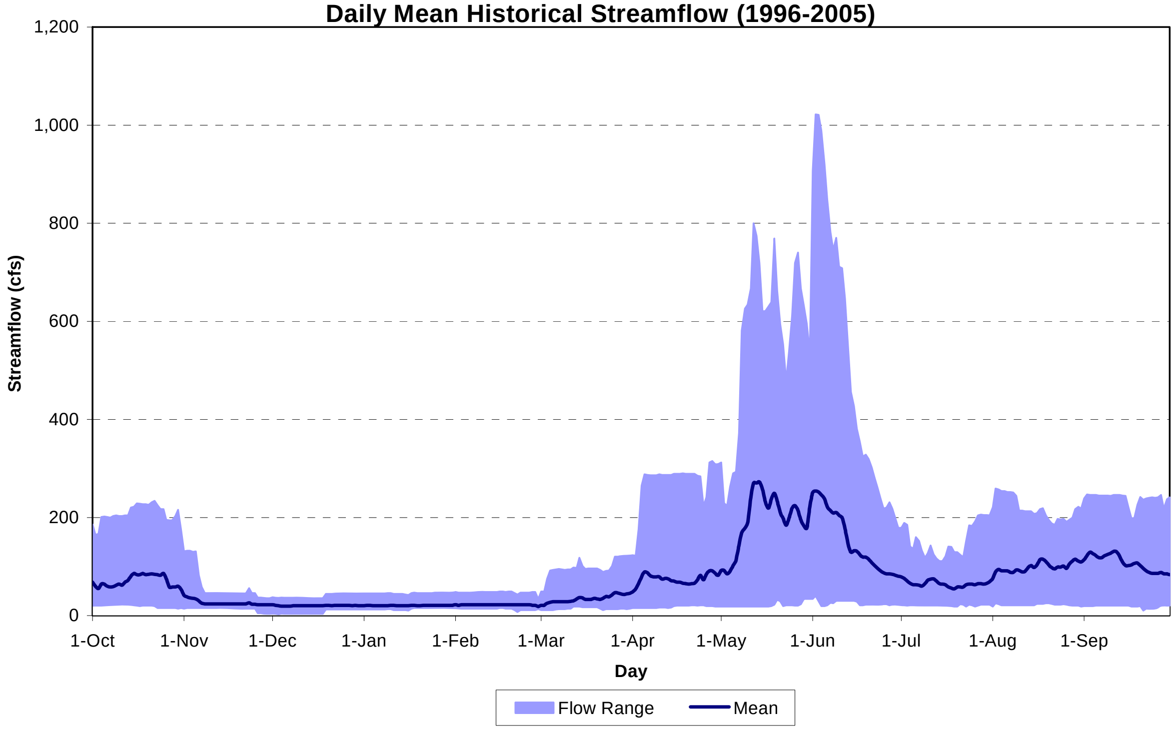
Historical Reservoir Operations and Contents

Wolford Mountain Reservoir

Wolford Mountain Reservoir is a 65,985 AF reservoir located on Muddy Creek approximately 12 miles upstream of the Colorado River confluence. The reservoir, which was completed in 1995, is jointly owned and operated by the River District and Denver Water. Under the Amended Lease Agreement between Denver Water and the River District, which is dated July 21, 1992, Denver Water acquired the ownership of 40% of the capacity of the reservoir and water right.

Wolford Mountain Reservoir operations reflect permit requirements as well as a history of agreements between Denver Water and the River District, and the negotiated settlement of Case 91CW252, in which the two parties applied for substitution and exchange rights to allow substitution and exchange rights to allow Denver Water to substitute water stored in Wolford Mountain Reservoir for water otherwise storable in Green Mountain Reservoir. Releases from Wolford Mountain Reservoir are made in substitution for releases from Green Mountain Reservoir in years that Green Mountain Reservoir does

Figure 3-10
Muddy Creek below Wolford Mountain Reservoir Gage 09041500
Daily Mean Historical Streamflow (1996-2005)



not fill and Denver Water has a substitution obligation. In addition to Denver Water's operations, Wolford Mountain Reservoir is operated by the River District to meet endangered Colorado River fish flows and other West Slope water uses. Mean daily historical storage contents for Wolford Mountain Reservoir are shown in Figure 3-11. Daily contents were interpolated based on historical end-of-month contents.

3.3.1.4 Colorado River Basin

Historical Streamflow

The affected river segment of the Colorado River extends from the confluence with the Williams Fork River downstream to the confluence with the Eagle River, as shown in Figure 3-1. Major tributaries in this reach include the Williams Fork River, Troublesome Creek, Muddy Creek, Blue River, and Eagle River.

The Azure Settlement Agreement dated June 23, 1980 established instream flow requirements on the reach of the Colorado River downstream of the Windy Gap diversion to the confluence with the Blue River. These instream flow requirements are as follows:

- From the Windy Gap diversion point to the confluence with the Williams Fork River, 90 cfs;
- From the confluence with the Williams Fork River to the confluence with Troublesome Creek, 135 cfs; and
- From the confluence with Troublesome Creek to the confluence with the Blue River, 150 cfs.

The instream flow requirements that pertain to this Study Area extend from the confluence with the Williams Fork River downstream to the confluence with the Blue River.

Mean daily historical streamflows and the range of historical daily streamflows are shown in Figure 3-12 for the Colorado River near Kremmling gage (09058000)

Figure 3-11
Wolford Mountain Reservoir Daily Mean Historical Storage Summary (1996-2005)

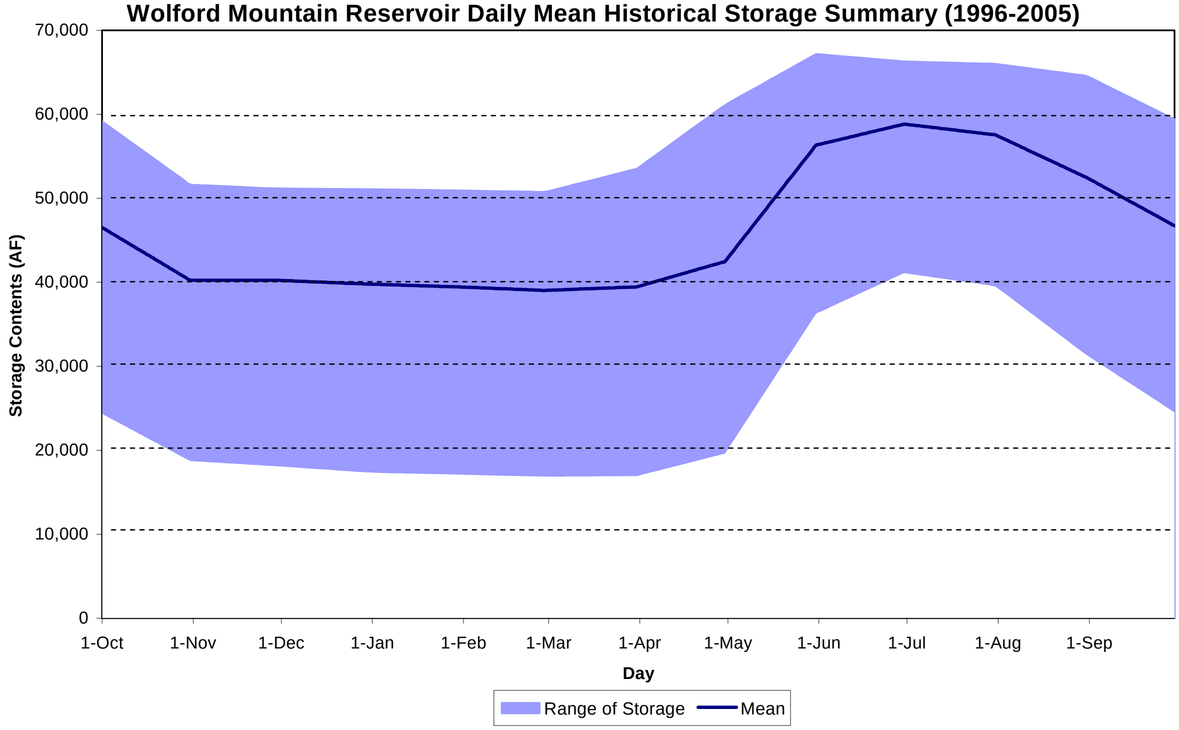
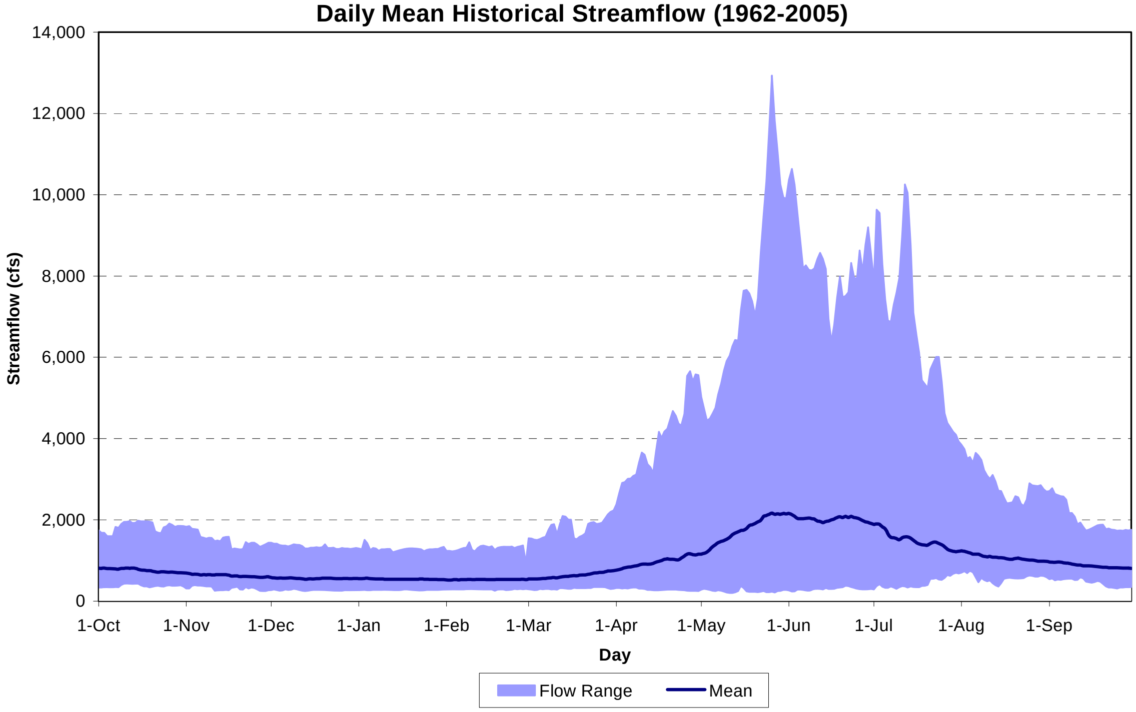


Figure 3-12
Colorado River near Kremmling Gage 09058000
Daily Mean Historical Streamflow (1962-2005)



Wild and Scenic Rivers Designation

As discussed under Section 3.3.1.1 for the Blue River, three segments of the Colorado River located between Windy Gap and the mouth of Gore Canyon, have been preliminarily classified as recreational for purpose of being deemed eligible for Wild and Scenic River status. These segments and their associated ORVs include:

- Colorado River Segment 3 (Byers Canyon to Mouth of Gore Canyon) - recreational fishing, recreational scenic driving, wildlife (bald eagle and river otter).
- Colorado River Segment 4 (Gore Canyon) - scenic, recreational fishing, recreational floatboating, recreational scenic driving, geological, wildlife (bald eagle and river otter), historic.
- Colorado River Segment 5 (Pumphouse to State Bridge) - scenic, recreational fishing, recreational floatboating, recreational scenic driving, geological, wildlife (bald eagle and river otter), historic, paleontological (BLM 2007).

3.3.1.5 Eagle River Basin

Historical Streamflow

The potentially affected river segments in the Eagle River basin include Homestake Creek downstream of Springs Utilities' Homestake Project to the confluence with the Eagle River and the Eagle River from the confluence of Homestake Creek to the confluence with the Colorado River, as shown in Figure 3-1. The Eagle River flows generally northwest to the confluence with Gore Creek and then east to the confluence with the Colorado River near the Town of Dotsero. The Eagle River basin is bounded by the Blue River basin to the north and east and the Roaring Fork River basin to the south and west. The total drainage area of the basin is approximately 944 square miles at the USGS gage 09070000 Eagle River below Gypsum. Precipitation varies with elevation across the Eagle River basin, ranging from 11 inches near the Colorado River confluence to in excess of 25 inches on the high ridges at the southern end of the basin (WRCC 2005).

The following table lists the CWCB minimum instream flow rights on the Eagle River below Homestake Creek. These rights were decreed in 1978 and 1980.

In addition to the CWCB instream flow rights listed above, the Homestake Project must bypass water such that 24 cfs or inflow, whichever is less, is met at the Gold Park gage on Homestake Creek as a permit condition.

Mean daily historical streamflows and the range of historical daily streamflows are shown in Figure 3-13 for the Homestake Creek at Gold Park gage (09064000).

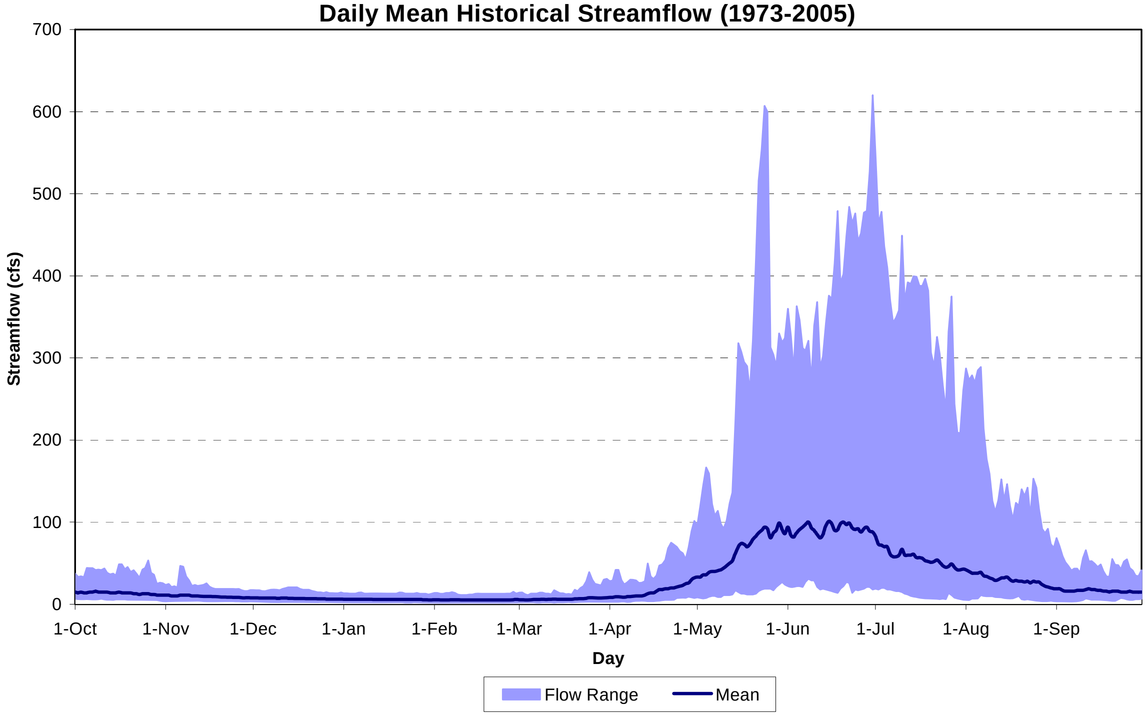
Historical Reservoir Operations and Contents

<u>Homestake Reservoir</u>

Springs Utilities' and Aurora's Homestake Project is a transmountain diversion project that diverts water from the East Fork and

Eagle River CWCB Minimum Instream Flow Rights below the Confluence with Homestake Creek		
Reach	**Flow (cfs)**	**Period**
Confluence with Homestake Creek to confluence with Cross Creek	11	October through April
	25	May through September
Confluence with Cross Creek to confluence with Gore Creek	2	October through April
	50	May through September
Confluence with Gore Creek to confluence with Lake Creek	3	October through April
	85	May through September
Confluence with Lake Creek to confluence with Brush Creek	4	October through April
	110	May through September
Confluence with Brush Creek to confluence with Colorado River	5	October through April
	130	May through September

Figure 3-13
Homestake Creek at Gold Park Gage 09064000
Daily Mean Historical Streamflow (1973-2005)



Middle Fork of Homestake Creek, French Creek, Fancy Creek, Missouri Creek and Sopris Creek for storage in Homestake Reservoir and delivery through Homestake Tunnel to Turquoise Lake, which is located in the Arkansas River Basin. Water delivered to the east slope is used for municipal purposes by Springs Utilities and the City of Aurora. Annual diversions through Homestake Tunnel averaged approximately 23,970 AF from 1967 through 2007 (Springs Utilities 2008).

Homestake Reservoir is a 43,539 AF reservoir located on the Middle Fork of Homestake Creek, which is a tributary to the Eagle River. The reservoir was completed in 1966 and is equally owned and operated by Springs Utilities and the City of Aurora. Homestake Reservoir is the primary West Slope storage facility for the Homestake Project. Water stored in Homestake Reservoir during runoff is typically released in March and April and in summer months to a lesser degree for delivery through Homestake Tunnel to Lake Fork Creek upstream of Turquoise Reservoir. Mean daily historical storage contents and the range of contents for Homestake Reservoir are shown in Figure 3-14. Daily contents were interpolated based on historical end-of-month contents.

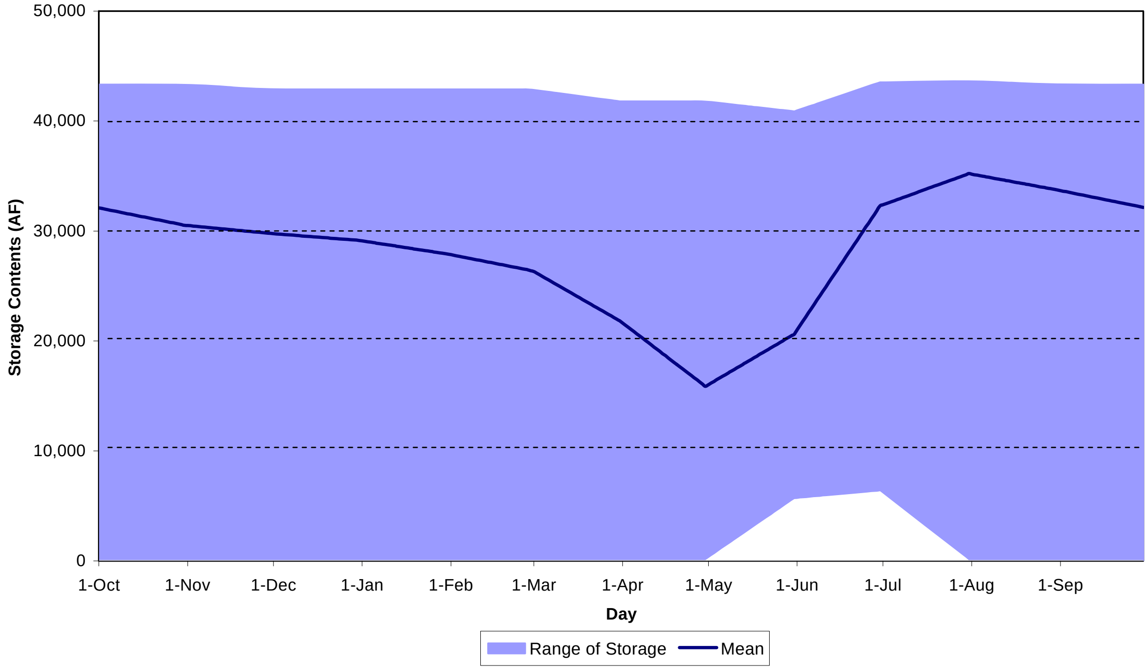
3.3.1.6 South Platte River Basin

Historical Streamflow

The potentially affected river segments in the South Platte River basin include the Middle Fork South Platte River from Montgomery Reservoir to the confluence with the South Fork South Platte River and the South Platte River from the confluence with the Middle Fork and South Forks of the South Platte River to Elevenmile Canyon Reservoir, as shown in Figure 3-1.

The headwaters of the South Platte River lie in the western perimeter of Colorado's South Park on the east side of the Mosquito Range. Although the western peaks receive

Figure 3-14
Homestake Reservoir Daily Mean Historical Storage Summary (1970-2005)



over 30 inches of precipitation annually, normal precipitation at the Town of Hartsel near Elevenmile Canyon Reservoir is approximately 11 inches. Three major streams flow generally southeast across the plain of South Park. From north to south they are Tarryall Creek, Middle Fork South Platte River, and South Fork South Platte River. Three miles east of the Town of Hartsel, the Middle Fork joins the South Fork to form the South Platte River.

The following table lists the CWCB minimum instream flow rights on the Middle Fork South Platte River downstream of Montgomery Reservoir. These rights were decreed in 1978 and 1980.

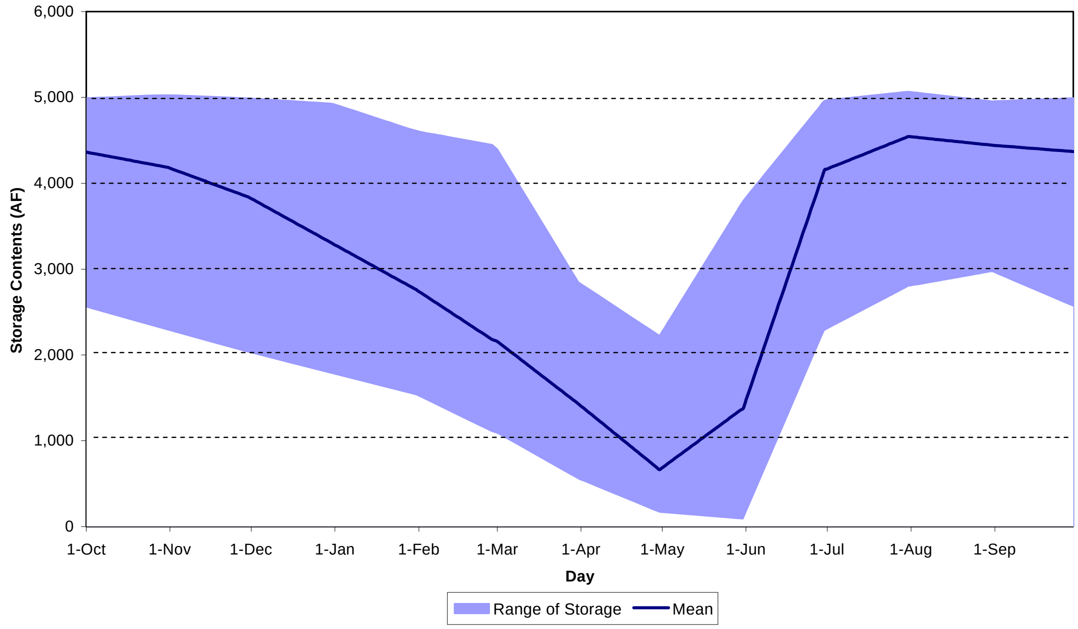
<u>Montgomery Reservoir</u>

Montgomery Reservoir is a 5,088 AF reservoir located on the Middle Fork South Platte River, which is a headwaters tributary to the South Platte River. The reservoir is owned by Spring Utilities and is used to store flows diverted from the Middle Fork South Platte River and to regulate water supplies from the Blue River basin that are delivered through the Hoosier Tunnel. Water is only occasionally diverted from the Middle Fork South Platte River because of the reservoir's relatively junior water right. From Montgomery Reservoir, water is conveyed through the Blue River Pipeline to Springs Utilities' North Slope reservoirs. Mean daily historical storage contents and the range of contents for Montgomery Reservoir are shown in Figure 3-15. Daily contents were interpolated based on historical end-of-month contents.

Middle Fork South Platte River CWCB Minimum Instream Flow Rights below Montgomery Reservoir

Reach	Flow (cfs)	Period
Montgomery Reservoir to confluence with Buckskin Creek	4	Year round
Confluence with Buckskin Creek to confluence with Sacramento Creek	6	October through April
	12	May through September
Confluence with Sacramento Creek to confluence with South Fork South Platte River	8	October through April
	16	May through September

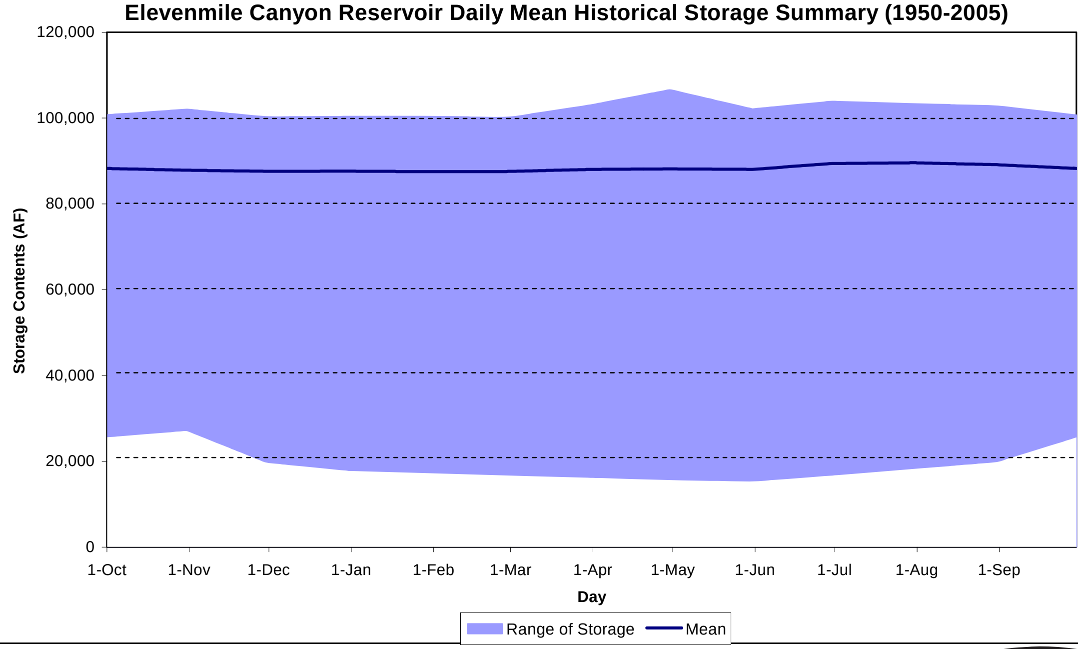
Figure 3-15
Montgomery Reservoir Daily Mean Historical Storage Summary (1963-2005)



Elevenmile Canyon Reservoir

Elevenmile Canyon Reservoir is a 98,000 AF reservoir located on the South Platte River at the eastern edge of South Park. The reservoir, which was completed in 1932, is owned and operated by Denver Water. Elevenmile Canyon Reservoir is operated for long-term drought storage and typically remains full during most years. During a drought, water is released from the reservoir to meet Denver Water's demands. The reservoir may require multiple seasons to fill after being drawn down because of the reservoir's relatively junior water rights. Mean daily historical storage contents and the range of contents for Elevenmile Canyon Reservoir are shown in Figure 3-16. Daily contents were interpolated based on historical end-of-month contents.

Figure 3-16
Elevenmile Canyon Reservoir Daily Mean Historical Storage Summary (1950-2005)



3.3.1.7 Grand County Stream Management Plan

Grand County is currently involved in an ongoing effort to develop a Stream Management Plan (SMP) for the County. Phase 1 of the SMP was completed in the spring of 2007 and included an inventory and review of existing data and information for streams within the County. Phase 2 of the SMP, *Grand County's Stream Management Plan, Phase 2, Environmental and Water Users Flow Recommendations*, which was completed in April 2008, includes recommendations of environmental stream flows and flows to support non-consumptive water uses. The stream reaches evaluated in the SMP that overlap with the Study Area for this EA are listed below.

- Reach WR: Williams Fork River below Williams Fork Reservoir to the Colorado River
- Reach CR5: Colorado River below Williams Fork River to the KB Ditch
- Reach CR6: Colorado River below KB Ditch to the Blue River confluence
- Reach CR7: Colorado River below Blue River confluence to Grand-Eagle County Line
- Reach MC2: Muddy Creek below Wolford Mountain Reservoir to the Colorado River
- Reach BR: Blue River downstream of Green Mountain Reservoir

Phase 2 of the SMP defined environmental flows as flows that were determined to best maintain the ecological needs of the stream in relation to its fisheries. For the Colorado River, the preferred range for summer environmental flows is 250 to 450 cfs below the confluence with the Williams Fork River. As major tributaries (Williams Fork River, 40 to 140 cfs; Muddy Creek, 60 to 90 cfs; Blue River, 200 to 250 cfs) enter the Colorado River, the preferred range for summer environmental flows increases to 600 to 1000 cfs (Grand County 2008).

Flow recommendations for water users were defined as preferred flow regimes for irrigators, municipalities and industry, and recreation use.

An independent review of the SMP flow recommendations has not been conducted, and the recommendations are currently being evaluated by basin stakeholders as to their validity and applicability, however, they were recognized in the analysis of environmental consequences.

3.3.2 Environmental Consequences

The effects on streamflows and reservoir contents from the Proposed Action and No Action alternatives were determined using hydrologic modeling. The State's CDSS Model was used to simulate streamflows and reservoir operations for the No Action and Proposed Action alternatives. The CDSS Model is a surface water allocation model of the Upper Colorado River Basin. A description of the CDSS Model including information on the study period, network configuration, water rights, diversions, demands, and operational rights is provided in the technical memorandum, *Model Selection and Parameters* (ERC 2008), and the reports, *Upper Colorado River Basin Information* (CWCB 2007a) and *Upper Colorado River Basin Water Resources Planning Model User's Manual* (CWCB 2007b). Pertinent modeling assumptions and variables for the No Action and Proposed Action alternatives are described in Chapter 2, Sections 2.3 and 2.4.

The study period selected extends 56 years from 1950 through 2005. This time frame was evaluated because it includes a variety of hydrologic conditions. The selected study period contains a balance of dry years (1954, 1966, 1977, 1981, and 2002), wet years (1957, 1983, 1984, 1995, and 1996), and average years. Of particular concern for this EA was the inclusion of several dry years, since hydrologic effects associated with the Proposed Action would occur primarily in substitution years, which generally correspond with dry years. Starting the model a few years prior to the mid 1950's drought period minimizes the influence of initial conditions on model results for those years. The study period ends in 2005 because the CDSS Model data sets currently available extend through 2005. A monthly time step was considered adequate for the purposes of this EA based on the magnitude and timing of hydrologic effects anticipated under the Proposed Action. As discussed in the following sections, differences in the timing of substitution releases within a month between the No Action and Proposed Action alternatives are not likely, in which case a more refined time step was not warranted. In addition, flow changes under the Proposed Action would occur primarily in dry years in the fall (August and September) when there is typically less variability in flows over the month since runoff is over and flows are generally lower. Potential differences in hydrologic effects (percentage change in flows, reservoir contents, etc.) estimated on a monthly basis versus daily basis are not expected to be so great as to warrant a daily model.

While the majority of the Study Area for this EA is located in the upper Colorado River basin, a small portion is located in the upper South Platte River basin, including Springs Utilities' Montgomery Reservoir, Denver Water's Elevenmile Canyon Reservoir and the Middle Fork South Platte River. The CDSS Model does not include the South Platte River basin; therefore, potential hydrologic effects in that portion of the Study Area were based on an assessment of historical end-of-month contents and releases for Montgomery Reservoir provided by Springs Utilities and data provided by Denver Water from their Platte and Colorado Simulation Model (PACSM) for Elevenmile Canyon Reservoir.

Direct and indirect effects were determined based on the difference between simulated conditions under the Proposed Action and No Action alternatives. Simulated flow and reservoir content data at key locations in the Study Area for the entire study period is presented in Appendix B for the No Action and Proposed Action alternatives. The hydrologic data presented in Tables 3-2 through 3-19 consists of simulated maximum monthly streamflow and reservoir end-of-month content increases and decreases and average monthly streamflows and reservoir end-of-month contents for the five driest years and all substitution years for the Proposed Action compared with the No Action alternative. Total natural flow from April through September at the USGS gage Colorado River near Kremmling (#09058000) was ranked from low to high to define the five driest in the 56-year study period because that gage is centrally located within the West Slope Study Area. The five driest years of the study period are 1954, 1966, 1977, 2002, and 2004.

3.3.2.1 No Action Alternative

Under the No Action alternative, Springs Utilities would continue to operate according to the Blue River Decree during substitution years. Therefore, river flows and reservoir contents would continue to fluctuate as they have historically as a result of Springs Utilities substitution operations.

This alternative is expected to have no direct, indirect or cumulative impacts on streamflows or reservoirs.

3.3.2.2 Proposed Action

The impacts of the Proposed Action are evaluated as compared to the No Action alternative. Therefore, in the discussion of the impacts to follow, unless otherwise noted, a "decrease" in a quantity (i.e. flow, storage amount, etc.) means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an "increase" in a quantity means that the quantity for the Proposed Action is greater than the comparable quantity for the No Action alternative.

Substitution Operations

The majority of hydrologic changes under the Proposed Action would occur in substitution years. Model results indicate there would be 13 substitution years during the 56-year study period with total substitution obligations ranging from 139 AF to 4,318 AF. Substitution years would include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004. All of these years are within the driest 30 percent of years in the study period. There is no substitution obligation in years that Green Mountain Reservoir fills, which is approximately 80% of the time during the 56-year study period.

There would be no change in Springs Utilities *total* substitution obligation between the No Action and Proposed Action alternatives in substitution years because there would be no difference in the deficit at Green Mountain Reservoir in those years. In addition, Springs Utilities would divert the same amount of water under the Proposed Action from the Blue River at their Continental-Hoosier System diversion points. There would be no increase in Springs Utilities diversions from the West Slope to the East Slope through the Hoosier or Homestake Tunnels under the Proposed Action. In fact, Springs Utilities diversions to the East Slope would decrease in non-substitution years because up to 250 AF in Upper Blue Reservoir would be released to West Slope users in the Blue River basin, which would not occur under the No Action alternative. While Springs Utilities' total substitution obligation would not change under the Proposed Action, the timing and sources of water used for substitution payback would change.

In years the substitution obligation is less than 2,100 AF and the total contents in Upper Blue Reservoir are sufficient to fully payback the substitution obligation, there would be no difference in the location or amount of substitution payback under the Proposed Action. There may be slight differences in the timing of substitution releases under the Proposed Action since releases from Upper Blue Reservoir would be coordinated to provide environmental benefits in the late summer and early fall per the terms and conditions of the 2003 MOA. Since substitution releases under the No Action alternative typically occur in the late summer and early fall, changes in the timing of releases under the Proposed Action are expected to be small. In years the obligation is less than 2,100 AF, Springs Utilities would release water from their Upper Blue Reservoir to Denver Water's Dillon Reservoir under both the No Action and Proposed Action alternatives. In return, Springs Utilities' entire substitution obligation would be paid back by Denver Water with releases from Williams Fork Reservoir and/or Dillon Reservoir.

The biggest difference in the payback of the substitution obligation under the Proposed Action would occur when the substitution obligation is greater than 2,100 AF. The substitution bill is greater than 2,100 AF in approximately seven of the substitution years during the 56-year study period. In those years, contents in Upper Blue Reservoir would not be sufficient to fully pack back the substitution obligation. Therefore, under the Proposed Action more water would be released from Springs Utilities' accounts in Wolford Mountain and Homestake Reservoirs while Denver Water's substitution releases for Springs Utilities from either Dillon Reservoir and/or Williams Fork Reservoir would decrease.

Table 3-1 shows substitution releases from Upper Blue Reservoir under the No Action and Proposed Action alternatives. Monthly substitution releases from Upper Blue Reservoir would decrease by a maximum of 252 AF. Monthly substitution releases from Upper Blue Reservoir would decrease by 153 AF on average and 248 AF in the driest years. Under the Proposed Action, substitution releases would decrease by up to 250 AF in August because that amount of water must be reserved in Upper Blue Reservoir for West Slope users in the Blue River basin each year. Water for these users would typically be released in November under the Proposed Action as opposed to August for substitution payback under the No Action alternative. When contents in Upper Blue Reservoir are sufficient to fully payback the substitution obligation and release 250 AF for West Slope users in the Blue River Basin, there would be no difference in the substitution release from Upper Blue Reservoir between the alternatives. Decreases in substitution releases from Upper Blue Reservoir would occur in 8 years out of the 56-year study period.

Under the Proposed Action, releases from Springs Utilities' account in Wolford Mountain Reservoir would occur in 7 years out of the 56-year study period and range up to 1,750 AF under the Proposed Action, as shown in Table 3-1. Monthly substitution releases would be 340 on average and 426 AF in the driest years. Under the No Action alternative, no substitution releases from Wolford Mountain Reservoir on behalf of Springs Utilities would be made from Denver Water's account. Substitution releases for Springs Utilities would be allocated among the releases from Denver Water's Williams Fork and/or Dillon Reservoirs

Under the Proposed Action, releases from Springs Utilities' account in Homestake Reservoir would occur in only 1 year out of the 56-year study period in the amount of 469 AF, as shown in Table 3-1. Under the No Action alternative, substitution releases would not be made from Springs Utilities' Homestake Reservoir account.

Table 3-1 shows Denver Water's substitution releases for Springs Utilities under the No Action and Proposed Action alternatives. Denver Water's monthly substitution release for Springs Utilities would decrease by a maximum of 2,220 AF. Monthly substitution releases for Springs Utilities would decrease by 374 AF on average and 424 AF in the driest years. Denver Water's substitution releases for Springs Utilities would decrease in 7 years out of the 56-year study period. Under the Proposed Action, Springs Utilities would release water from their accounts in Wolford Mountain and Homestake Reservoirs to payback their substitution obligation in excess of 2,100 AF, therefore, Denver Water's substitution release from either Williams Fork Reservoir and/or Dillon Reservoir for Springs Utilities would decrease.

Table 3-1
Springs Utilities Substitution Summary
Modeled Differences Between No Action and Proposed Action Alternatives (AF)

	Maximum Decrease in August			Maximum Increase in August			Dry Year Average in August[3]			Substitution Year Average in August[1]		
Springs Utilities Substitution Obligation	**No Action**	**Proposed Action**	**Difference**	**No Action**	**Proposed Action**	**Difference**	**No Action**	**Proposed Action**	**Difference**	**No Action**	**Proposed Action**	**Difference**
Total Substitution Obligation	4319.0	4318.0	-1.0	2759.0	2767.0	8.0	2424.4	2427.4	3.0	1830.4	1832	1.6
Upper Blue Reservoir Release	848.0	596.0	-252.0	724.0	726.0	2.0	1379	1131.2	-247.8	1113.1	960.2	-152.9
Wolford Mountain Reservoir Release from Springs Utilities Account	-----	-----	0.0	0.0	1750.0	1750.0	0	426	426.4	0	340	339.8
Homestake Reservoir Release	-----	-----	0.0	0.0	469.0	469.0	0.0	0.0	0.0	0.0	36.1	36.1
Denver Water Substitution Release for Springs Utilities[2]	4320.0	2100.0	-2220.0	724.0	726.0	2.0	2424.8	2001.0	-423.8	1830.5	1456.3	-374.2

[1] Substitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.

[2] Denver Water's substitution release for Springs Utilities includes the amount released from Upper Blue Reservoir to Dillon Reservoir.

[3] The dry year average is the average of the five driest years in the study period, which include 1954, 1966, 1977, 2002, and 2004.

The decrease in Denver Water's substitution release from either Williams Fork or Wolford Mountain Reservoirs depends on Denver Water's total substitution bill. In a substitution year, Denver Water reserves the first 1,000 AF of its substitution obligation in Dillon Reservoir. This water is available to augment releases from Dillon Reservoir if necessary to meet the bypass flow requirement of 50 cfs. This water would be the last water released for substitution payback and is generally not needed since inflow to Dillon Reservoir is almost always greater than 50 cfs. In the model, this water is released from Dillon Reservoir to the river at the end of March to fully payback Denver Water's substitution obligation. However, under actual operations this water reverts to Denver Water ownership. If this water is not released to the river, flows below Dillon Reservoir would be slightly lower in March than estimated in the model in substitution years and contents in Dillon Reservoir slightly higher until the reservoir fills. The difference between actual and modeled operations of the 1,000 AF in Dillon Reservoir would not affect Springs Utilities' substitution obligation or the manner in which their substitution payback is made. Because Green Mountain Reservoir generally releases through the winter months to meet storage targets, the release of 1,000 AF from Dillon Reservoir in March would also not affect modeled storage contents in Green Mountain Reservoir. After the 1,000 AF is reserved in Dillon Reservoir, substitution releases are alternated between Wolford Mountain and Williams Fork reservoirs, with the first 5,000 AF released from Wolford Mountain Reservoir. Williams Fork Reservoir provides the next 10,000 AF of substitution water, in Wolford Mountain Reservoir the next increment up to an annual maximum of 26,000 AF in total from Wolford Mountain Reservoir (Denver Water 2003). The next 25,000 AF is released from Williams Fork Reservoir and any remaining obligation is met with releases from Dillon Reservoir. For modeling purposes, all releases from Denver Waters' facilities (i.e., Denver Water's substitution obligation plus Springs Utilities' obligation) are aggregated and released according to the schedule of releases described above. However, for the No Action alternative, Springs Utilities' releases are allocated among releases from Dillon Reservoir and/or Williams Fork Reservoir to be consistent with the Blue River Decree.

In years that the last increment of Denver Water's substitution obligation is released from Wolford Mountain Reservoir, there would be no change in the total substitution release from Wolford Mountain and Williams Fork Reservoirs under the Proposed Action. In those years, the total amount released from Wolford Mountain Reservoir for substitution payback would be the same; however, the releases would be allocated from different accounts in that reservoir and from Williams Fork Reservoir. Under the No Action alternative, water would be released from Denver Water's Williams Fork Reservoir for Springs Utilities and a larger proportion of Denver Waters' release would be allocated to Wolford Mountain Reservoir, whereas, under the Proposed Action, water would be released from Springs Utilities' Wolford Mountain Reservoir account. The only exception to this would be when Springs Utilities account in Wolford Mountain is not sufficient to fully payback their obligation and an additional substitution release is needed from Homestake Reservoir.

In years that the last increment of Denver Water's substitution obligation is released from Williams Fork Reservoir, substitution releases from Wolford Mountain Reservoir would increase, while substitution releases from Williams Fork Reservoir would decrease by a commensurate amount. The total amount released from these reservoirs would be the same under both alternatives unless Springs Utilities' account in Wolford Mountain is not sufficient to fully payback their obligation and an additional substitution release is needed from Homestake Reservoir.

Blue River Basin

<u>Blue River</u>

Flow changes along the Blue River are shown in Tables 3-2 through 3-4. Refer to Table 3-2 for a summary of monthly average changes in flows in the Blue River downstream of the Continental-Hoosier System and upstream of Dillon Reservoir. Under the Proposed Action, flows would increase in November due to the additional release from Upper Blue Reservoir to West Slope users in the Blue River basin. In one September out of the 56-year study period, flows under the Proposed Action would increase by 4.2 cfs because 250 AF less would be stored in Upper Blue Reservoir that month. This type of flow change would occur infrequently because there is typically little to no water available for diversion to storage in Upper Blue Reservoir that late in

Table 3-2
Blue River below the Continental-Hoosier System
Modeled Differences in Flow Between No Action and Proposed Action Alternatives (cfs)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Avg
Maximum Monthly Flow Decrease[1]													
No Action Flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	27.8	N/A	51.0	N/A	
Proposed Action Flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	27.6	N/A	46.5	N/A	
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	0.0	-4.6	0.0	
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.8%	0.0%	-8.9%	0.0%	
Maximum Monthly Flow Increase[1]													
No Action Flow	N/A	19.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	63.5	19.6	
Proposed Action Flow	N/A	23.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	63.5	23.8	
Flow Change	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	
Percent Change	0.0%	21.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	21.4%	
Dry Year Monthly Average Flow (Average of 1954, 1966, 1977, 2002, 2004)													
No Action Flow	25.3	16.7	14.6	12.3	11.9	11.5	19.8	35.6	28.7	31.4	49.2	21.2	23.2
Proposed Action Flow	25.3	20.9	14.6	12.3	11.9	11.5	19.8	35.6	28.6	31.4	45.2	21.2	23.2
Flow Change	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-4.0	0.0	0.0
Percent Change	0.0%	25.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%	0.0%	-8.2%	0.0%	0.0%
Average Flow During Substitution Years[2]													
No Action Flow	23.0	16.9	14.7	12.2	11.4	11.2	20.4	46.0	49.8	43.1	56.6	28.4	27.8
Proposed Action Flow	23.0	21.1	14.7	12.2	11.4	11.2	20.4	46.0	49.8	43.1	54.1	28.7	28.0
Flow Change	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-2.5	0.3	0.2
Percent Change	0.0%	24.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-4.5%	1.1%	0.6%

[1]A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004
N/A: Not applicable.

the year. Under the Proposed Action, flows would decrease in August of substitution years when the total substitution obligation is greater than the contents in Upper Blue Reservoir less 250 AF. This amount of water must be reserved in Upper Blue Reservoir for release later in the year.

Springs Utilities' Continental-Hoosier System diversions deplete the Blue River, therefore, these diversions affect the ability to meet the CWCB instream flow requirements above Dillon Reservoir, which are junior to Springs Utilities' water rights and the Blue River Decree. However, in order to ensure the Proposed Action protects the natural environments in a manner consistent with the CWCB instream flow requirements above Dillon Reservoir, during substitution years, Springs Utilities would refrain from diverting to the extent necessary in order to maintain flows at the instream flow levels as described in Section 2.4. Therefore, there would be no impact on these instream flow requirements as a result of the Proposed Action. Compliance for this mitigation will be to maintain a flow of 5 cfs just upstream of Goose Pasture Tarn Reservoir. Flows at this location will be estimated based on the USGS gage 09046490 Blue River at Blue River, which is located just downstream of Goose Pasture

Table 3-3
Blue River below Dillon Reservoir at USGS Gage 09050700
Modeled Differences in Flow Between No Action and Proposed Action Alternatives (cfs)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Avg
Maximum Monthly Flow Decrease[1]													
No Action Flow	N/A	N/A	N/A	N/A	52.9	N/A	N/A	225.6	121.1	390.8	454.7	N/A	
Proposed Action Flow	N/A	N/A	N/A	N/A	52.4	N/A	N/A	217.7	117.0	386.8	448.8	N/A	
Flow Change	0.0	0.0	0.0	0.0	-0.5	0.0	0.0	-7.8	-4.1	-3.9	-5.9	0.0	
Percent Change	0.0%	0.0%	0.0%	0.0%	-1.0%	0.0%	0.0%	-3.5%	-3.4%	-1.0%	-1.3%	0.0%	
Maximum Monthly Flow Increase[1]													
No Action Flow	N/A	N/A	N/A	51.9	68.2	N/A	N/A	1,061.1	1,711.1	N/A	174.8	N/A	
Proposed Action Flow	N/A	N/A	N/A	51.9	68.2	N/A	N/A	1,061.2	1,711.1	N/A	174.8	N/A	
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Dry Year Monthly Average Flow (Average of 1954, 1966, 1977, 2002, 2004)													
No Action Flow	73.0	66.8	58.5	58.0	60.0	60.3	50.0	50.0	71.9	185.3	151.6	59.8	78.8
Proposed Action Flow	73.0	66.8	58.5	58.0	60.0	60.3	50.0	50.0	71.9	185.3	150.5	59.8	78.7
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.2	0.0	-0.1
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.8%	0.0%	-0.1%
Average Flow During Substitution Years[2]													
No Action Flow	58.8	56.5	53.3	53.2	54.2	55.8	50.0	50.0	103.3	141.3	155.9	53.8	73.8
Proposed Action Flow	58.8	56.5	53.3	53.2	54.2	55.8	50.0	50.0	103.3	141.3	155.4	53.8	73.8
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.5	0.0	0.0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.3%	0.0%	-0.1%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004
N/A: Not applicable.

Tarn Reservoir, plus diversions to storage at Goose Pasture Tarn.

Refer to Table 3-3 for a summary of monthly average changes in flows in the Blue River downstream of Dillon Reservoir. Changes in flow downstream of Dillon Reservoir would occur due to small differences in reservoir end-of-month contents when Dillon Reservoir fills and spills. These flow changes would occur due to the release of 250 AF from Upper Blue Reservoir for West Slope users in the Blue River basin under the Proposed Action.

Since this water would be used to extinction it would not be available for storage in Dillon Reservoir. Therefore, Dillon Reservoir contents would decrease by 250 AF in substitution years under the Proposed Action. Changes in Dillon Reservoir contents would also occur under the Proposed Action due to slight differences in the amount and timing of Denver Water's substitution payback from Dillon Reservoir. However, these changes in contents would be small and infrequent. Differences in Dillon Reservoir contents would carry forward from year to year, which would result in less water spilled in years when the reservoir fills.

Refer to Table 3-4 for a summary of monthly average changes in flows in the Blue River downstream of Green Mountain

Table 3-4
Blue River below Green Mountain Reservoir
Modeled Differences in Flow Between No Action and Proposed Action Alternatives (cfs)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Avg
Maximum Monthly Flow Decrease[1]													
No Action Flow	307.5	241.8	240.6	241.6	251.1	237.3	N/A	N/A	1,828.1	1,179.4	841.1	395.6	
Proposed Action Flow	306.1	241.1	240.0	240.9	250.4	236.6	N/A	N/A	1,820.0	1,175.4	836.4	394.5	
Flow Change	-1.4	-0.7	0.0	-0.7	-0.7	-0.7	0.0	0.0	-8.1	-3.9	-4.7	-1.2	
Percent Change	-0.5%	-0.3%	0.0%	-0.3%	-0.3%	-0.3%	0.0%	0.0%	-0.4%	-0.3%	-0.6%	-0.3%	
Maximum Monthly Flow Increase[1]													
No Action Flow	241.8	185.2	166.5	162.5	169.4	191.7	276.2	580.8	1,935.7	2,329.6	612.9	229.5	
Proposed Action Flow	243.0	185.5	166.7	162.8	169.7	192.0	276.3	580.9	1,935.7	2,329.6	613.2	229.9	
Flow Change	1.2	0.3	0.3	0.3	0.3	0.3	0.0	0.1	0.0	0.0	0.3	0.4	
Percent Change	0.5%	0.2%	0.2%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	
Dry Year Monthly Average Flow (Average of 1954, 1966, 1977, 2002, 2004)													
No Action Flow	519.4	240.0	218.2	249.9	208.0	236.8	259.8	84.6	253.7	568.5	252.9	189.0	273.4
Proposed Action Flow	519.4	240.0	218.3	249.9	208.0	236.8	259.8	84.6	253.7	568.5	252.4	188.9	273.4
Flow Change	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	-0.5	-0.1	0.0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%	0.0%	0.0%
Average Flow During Substitution Years[2]													
No Action Flow	444.5	217.4	204.7	207.7	198.4	214.2	216.6	82.1	204.4	544.6	348.5	236.6	260.0
Proposed Action Flow	444.5	217.4	204.8	207.8	198.5	214.2	216.6	82.1	204.4	544.6	348.2	236.6	260.0
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	0.0	0.0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Substitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004
N/A: Not applicable.

Reservoir. The reduction in flows downstream of Dillon Reservoir would be translated downstream to the confluence

with the Colorado River. Reductions in flows downstream of Dillon Reservoir would decrease the inflow to Green Mountain Reservoir, and therefore, reduce the amount and possibly timing of spills at Green Mountain Reservoir. Small increases and decreases in flows downstream of Green Mountain Reservoir would also occur due to slight differences in the timing of HUP releases from Green Mountain Reservoir. While the total amount released would be the same under both the No Action and Proposed Action alternatives, the timing of these releases may be offset by a few months. These slight differences are likely a function of the reservoir storage targets and the sequence and priority of operating rules in the CDSS Model and may not occur under actual operations.

As discussed in Section 3.3.1.7, Phase 2 of the Grand County SMP identified environmental flows to support ecological needs in relation to fisheries for the reach below Green Mountain Reservoir. The preferred range for summer environmental flows is 200 to 250 cfs below Green Mountain Reservoir. As indicated in the Phase 2 report, flow records for the USGS gage station 09057500 below Green Mountain Reservoir, show the recommended summer environmental flow range is typically present and often exceeded within this reach. Flow reductions under the Proposed Action in this reach would be infrequent and small and not affect the ability to meet these recommendations.

Based on the magnitude and frequency of flow changes along the Blue River below Dillon and Green Mountain reservoirs, there would be little to no impact on potential future projects such as the Green Mountain Reservoir Pumpback Project or on the BLM's potential Wild and Scenic River designations in the Blue River basin.

In summary, flows in the Blue River downstream of the Continental-Hoosier System and upstream of Dillon Reservoir. would decrease by up to 4.6 cfs or 8.9% in August and increase by up to 4.2 cfs or 21.5% in November. Maximum flow increases and decreases at this location would be similar in the driest years and substitution years. Flows below Dillon Reservoir would decrease by up to 7.8 cfs or 3.5% in May. Flows below Green Mountain Reservoir, would decrease by up to 8.1 cfs or 0.4% in June and increase by up to 1.2 cfs or 0.5% in December. In the driest years and substitution years, monthly average flows would decrease by less than 1.2 cfs below Dillon and Green Mountain Reservoirs.

The changes in flows along the Blue River downstream of the Continental-Hoosier System, Dillon Reservoir and Green Mountain Reservoir under the Proposed Action would be well within the normal range of flows that have historically occurred at these locations, as shown in Figures 3-2, 3-3, and 3-4.

<u>Upper Blue Reservoir</u>

Refer to Table 3-5 for a summary of monthly average changes in contents in Upper Blue Reservoir. In summary, end-of-month contents in Upper Blue Reservoir would increase by up to 250 AF in August, September and October. Under the Proposed Action, Upper Blue Reservoir contents would increase because 250 AF must be reserved in Upper Blue Reservoir

Table 3-5
Upper Blue Reservoir
Modeled Differences in Content Between No Action and Proposed Action Alternatives (AF)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Maximum Monthly Content Decrease[1]												
No Action Content	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	319	2,090
Proposed Action Content	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	318	2,087
Content Change	0	0	0	0	0	0	0	0	0	0	-1	-3
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.3%	-0.1%
Maximum Monthly Content Increase[1]												
No Action Content	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,053	1,269	0	0
Proposed Action Content	250	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2,066	1,281	250	250
Content Change	250	0	0	0	0	0	0	0	13	12	250	250
Percent Change	N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.9%	N/A	N/A
Dry Year Content (Average of 1954, 1966, 1977, 2002, 2004)												
No Action Content	0	0	0	0	0	0	18	432	1,500	1,379	0	0
Proposed Action Content	250	0	0	0	0	0	18	432	1,503	1,381	250	250
Content Change	250	0	0	0	0	0	0	0	3	2	250	250
Percent Change	N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%	N/A	N/A
Average Content During Substitution Years[2]												
No Action Content	0	0	0	0	0	0	7	482	1,636	1,699	449	344
Proposed Action Content	250	0	0	0	0	0	7	482	1,637	1,700	622	497
Content Change	250	0	0	0	0	0	0	0	1	1	173	154
Percent Change	N/A	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	38.5%	N/A

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004
N/A: Not applicable.

for release in November for West Slope users in the Blue River basin. Under the No Action alternative, this water would be released earlier in the year for either substitution payback or delivery through Hoosier Tunnel. The same amount of water would be released from Upper Blue Reservoir under the Proposed Action; however, the timing of the release would change slightly. Since this water likely will be released later in the year under the Proposed Action, storage contents would be higher from August through October.

Dillon Reservoir

Refer to Table 3-6 for a summary of monthly average changes in contents in Dillon Reservoir. In summary, end-of-month contents in Dillon Reservoir would increase by up to 113 AF or 0.1% and decrease by up to 522 AF or 0.3%. In the driest years and substitution years, average end-of-month contents would decrease by

Table 3-6
Dillon Reservoir
Modeled Differences in Content Between No Action and Proposed Action Alternatives (AF)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Maximum Monthly Content Decrease[1]												
No Action Content	134,664	130,949	126,819	124,275	120,406	115,275	112,363	135,890	202,413	235,097	155,891	142,785
Proposed Action Content	134,144	130,429	126,299	123,754	119,913	114,783	111,871	135,400	201,925	234,610	155,369	142,264
Content Change	-520	-520	0	-521	-493	-492	-492	-490	-488	-487	-522	-521
Percent Change	-0.4%	-0.4%	0.0%	-0.4%	-0.4%	-0.4%	-0.4%	-0.4%	-0.2%	-0.2%	-0.3%	-0.4%
Maximum Monthly Content Increase[1]												
No Action Content	102,089	95,649	88,579	83,080	77,805	71,532	71,946	118,491	189,471	205,009	131,006	113,703
Proposed Action Content	102,202	95,762	88,692	83,193	77,918	71,645	72,059	118,603	189,583	205,121	131,119	113,816
Content Change	113	113	113	113	113	113	113	112	112	112	113	113
Percent Change	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%
Dry Year Content (Average of 1954, 1966, 1977, 2002, 2004)												
No Action Content	215,246	210,606	205,097	200,972	196,133	192,422	186,344	192,098	192,939	171,538	150,546	135,011
Proposed Action Content	215,268	210,628	205,119	200,994	196,155	192,444	186,366	192,120	192,958	171,557	150,391	134,856
Content Change	22	22	22	22	22	22	21	22	19	19	-156	-155
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%
Average Content During Substitution Years[2]												
No Action Content	194,852	190,639	185,768	181,561	177,292	173,793	168,403	181,521	193,463	180,732	166,511	156,485
Proposed Action Content	194,803	190,590	185,719	181,512	177,242	173,744	168,354	181,472	193,413	180,682	166,334	156,328
Content Change	-49	-49	-49	-49	-49	-49	-49	-49	-50	-50	-176	-157
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004
N/A: Not applicable.

up to 176 AF or 0.1% and increase by up to 22 AF or less than 0.1%.

Changes in content at Dillon Reservoir would primarily occur due to the release of 250 AF from Upper Blue Reservoir for West Slope users in the Blue River basin under the Proposed Action instead of being released for substitution purposes by Springs Utilities. Since this water would be used to extinction it would not be available for storage in Dillon Reservoir in substitution years. Therefore, Dillon Reservoir contents would decrease by 250 AF in substitution years under the Proposed Action. Changes in Dillon Reservoir contents would also occur under the Proposed Action due to slight differences in the amount and timing of Denver Water's substitution payback from Dillon Reservoir. However, these changes in content would be small and infrequent. Differences in contents under the Proposed Action would carry forward from year to year until Dillon Reservoir fills.

Green Mountain Reservoir

Refer to Table 3-7 for a summary of monthly average changes in contents in Green Mountain Reservoir. In summary, end-of-month contents in Green Mountain Reservoir would increase by up to 414 AF or 0.3% in August and decrease by up to 479 AF or 0.6% in May. In the driest years and substitution years, average end-of-month contents would increase by up to 24 AF or less than 0.1%.

Decreases in contents at Green Mountain Reservoir would be due primarily to reduced inflow when Dillon Reservoir fills. Reduced spills from Dillon Reservoir would decrease the inflow to Green Mountain Reservoir, and therefore, reduce the amount and possibly timing of spills at Green Mountain Reservoir. Increases in contents

Table 3-7
Green Mountain Reservoir
Modeled Differences in Content Between No Action and Proposed Action Alternatives (AF)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Maximum Monthly Content Decrease[1]												
No Action Content	107,962	64,490	64,021	63,523	63,007	63,115	70,506	81,884	146,782	129,697	75,348	73,593
Proposed Action Content	107,759	64,302	63,833	63,335	62,819	62,927	70,317	81,405	146,544	129,456	75,027	73,319
Content Change	-203	-188	0	-188	-188	-188	-189	-479	-238	-241	-321	-274
Percent Change	-0.2%	-0.3%	0.0%	-0.3%	-0.3%	-0.3%	-0.3%	-0.6%	-0.2%	-0.2%	-0.4%	-0.4%
Maximum Monthly Content Increase[1]												
No Action Content	105,573	96,410	87,381	78,322	69,148	N/A	75,031	150,073	107,138	120,612	143,684	131,295
Proposed Action Content	105,926	96,693	87,593	78,463	69,219	N/A	75,032	150,074	107,139	120,625	144,098	131,649
Content Change	353	283	212	141	71	0	1	1	1	13	414	354
Percent Change	0.3%	0.3%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.3%
Dry Year Content (Average of 1954, 1966, 1977, 2002, 2004)												
No Action Content	101,583	95,220	88,989	82,729	76,351	69,926	65,243	80,405	89,872	78,994	80,287	77,814
Proposed Action Content	101,601	95,234	88,999	82,736	76,354	69,926	65,243	80,405	89,872	78,994	80,312	77,835
Content Change	18	14	10	7	3	0	0	0	0	0	24	21
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Average Content During Substitution Years[2]												
No Action Content	97,644	91,916	86,316	80,689	74,947	69,157	66,844	85,955	105,664	95,615	93,186	88,728
Proposed Action Content	97,653	91,923	86,322	80,693	74,948	69,157	66,844	85,955	105,664	95,616	93,195	88,735
Content Change	9	7	5	3	2	0	0	0	0	1	9	8
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004
N/A: Not applicable.

at Green Mountain Reservoir would be due to slight differences in the timing of releases from the HUP pool. While, the operation and use of Green Mountain's HUP pool would not change under the Proposed Action, there may be slight differences in the timing of HUP releases from Green Mountain Reservoir. While the total amount released from Green Mountain Reservoir would be the same under both the No Action and Proposed Action alternatives, the timing of these releases may be offset by a few months. These slight differences are likely a function of the reservoir storage targets and the sequence and priority of operating rules in the CDSS Model and may not occur under actual operations.

Williams Fork River Basin

Williams Fork River

Flow changes in Williams Fork River downstream of Williams Fork Reservoir are shown in Table 3-8. In summary, monthly average flows in Williams Fork River would decrease by a maximum of 8.3 cfs or 11.5% in March and increase by a maximum of 3.4 cfs or 2.5% in June. In the driest years and substitution years, monthly average flows would increase or decrease by less than 0.6 cfs or less than 0.7%. The changes in flows in the Williams Fork River under the Proposed Action would be well within the

Table 3-8
Williams Fork River below Williams Fork Reservoir
Modeled Differences in Flow Between No Action and Proposed Action Alternatives (cfs)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Avg
Maximum Monthly Flow Decrease[1]													
No Action Flow	264.0	N/A	48.6	75.6	59.1	72.1	N/A	N/A	657.0	222.3	310.9	110.2	
Proposed Action Flow	263.1	N/A	48.4	75.6	59.0	63.8	N/A	N/A	656.3	222.3	308.9	109.3	
Flow Change	-0.9	0.0	0.0	0.0	-0.2	-8.3	0.0	0.0	-0.6	0.0	-2.0	-0.9	
Percent Change	-0.3%	0.0%	0.0%	0.0%	-0.3%	-11.5%	0.0%	0.0%	-0.1%	0.0%	-0.6%	-0.9%	
Maximum Monthly Flow Increase[1]													
No Action Flow	93.4	N/A	N/A	87.2	64.4	N/A	N/A	N/A	134.1	273.5	186.2	207.2	
Proposed Action Flow	94.8	N/A	N/A	88.6	64.9	N/A	N/A	N/A	137.4	273.5	187.7	208.8	
Flow Change	1.4	0.0	0.0	1.4	0.5	0.0	0.0	0.0	3.4	0.0	1.5	1.6	
Percent Change	1.6%	0.0%	0.0%	1.6%	0.8%	0.0%	0.0%	0.0%	2.5%	0.0%	0.8%	0.8%	
Dry Year Monthly Average Flow (Average of 1954, 1966, 1977, 2002, 2004)													
No Action Flow	143.0	107.2	94.4	77.7	62.2	87.3	95.1	32.8	55.4	95.0	242.9	107.0	100.0
Proposed Action Flow	143.3	107.2	94.4	77.7	62.2	87.3	95.1	32.8	55.4	95.0	242.6	106.9	100.0
Flow Change	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.3	-0.2	0.0
Percent Change	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.2%	0.0%
Average Flow During Substitution Years[2]													
No Action Flow	169.2	117.0	98.4	85.3	69.3	88.6	87.6	37.4	83.7	84.7	247.7	156.3	110.4
Proposed Action Flow	169.3	117.0	98.4	85.3	69.3	87.9	87.6	37.4	83.7	84.7	247.4	156.4	110.4
Flow Change	0.1	0.0	0.0	0.0	0.0	-0.6	0.0	0.0	0.0	0.0	-0.4	0.1	-0.1
Percent Change	0.1%	0.0%	0.0%	0.0%	0.0%	-0.7%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	-0.1%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004
N/A: Not applicable.

normal range of flows that have historically occurred downstream of Williams Fork Reservoir, as shown in Figure 3-8.

Flow changes in the Williams Fork River would occur under the Proposed Action due to differences in the amount and timing of water released from Williams Fork Reservoir for substitution payback. Under the Proposed Action, substitution releases from Wolford Mountain and Homestake reservoirs would increase, while substitution releases from Williams Fork Reservoir would decrease by a commensurate amount. Changes in substitution releases from Williams Fork Reservoir would only occur in years the last increment of Denver Water's substitution obligation is released from Williams Fork Reservoir. A reduced substitution release under the Proposed Action would result in higher contents in Williams Fork Reservoir. As a result, less water would be stored in subsequent months depending on storage targets at Williams Fork Reservoir as the reservoir refills. Reductions in the amount stored would increase flows below the reservoir in some months under the Proposed Action. Changes in flows in some months would also occur due to differences in the timing of substitution releases from Williams Fork Reservoir. While the total amount released would be the same under both alternatives, the timing of the substitution releases may be offset by a few months. For example, a reduction in flow in one month due to a reduced substitution release would be offset by a corresponding increase in flow in subsequent months due to an increased substitution release. These differences are small and infrequent and likely a function of modeling assumptions such as reservoir storage targets and the sequence and priority of operating rules in the CDSS Model and may not occur under actual operations.

There would be no impact on the ability to meet the bypass requirement at Williams Fork Reservoir under the Proposed Action.

As discussed in Section 3.3.1.7, Phase 2 of the Grand County SMP identified environmental flows to support ecological needs in relation to fisheries for the reach below Williams Fork Reservoir. The preferred range for summer environmental flows is 40 to 140 cfs below Williams Fork Reservoir. As indicated in the Phase 2 report, flow records for the USGS gage station 09038500 below Williams Fork Reservoir show the recommended summer environmental flow range is quite commonly present in this reach. Flow reductions under the Proposed Action would be infrequent and minor and would not affect the ability to meet these flow recommendations particularly since substitution releases from William Fork Reservoir augment flows in this reach during the late summer and fall.

<u>Williams Fork Reservoir</u>

Refer to Table 3-9 for a summary of monthly average changes in contents in Williams Fork Reservoir. In summary, end-of-month contents in Williams Fork Reservoir would increase by up to 564 AF or 2.8% in March and decrease by up to 37 AF or 0.1% in February, March, April and May. In the driest years and substitution years, monthly average contents would increase by up to 85 AF or 0.2%.

Changes in content at Williams Fork Reservoir would primarily occur due to differences in the timing and amount of releases for substitution payback. In substitution years when the last increment of Denver Water's substitution obligation is released from Williams Fork Reservoir, substitution releases from Wolford Mountain Reservoir and possibly

Table 3-9
Williams Fork Reservoir
Modeled Differences in Content Between No Action and Proposed Action Alternatives (AF)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Maximum Monthly Content Decrease[1]												
No Action Content	3,042	1,479	4,288	54,709	53,188	51,415	66,434	92,205	N/A	N/A	89,267	18,573
Proposed Action Content	3,025	1,462	4,279	54,672	53,151	51,378	66,397	92,168	N/A	N/A	89,266	18,571
Content Change	-17	-17	0	-37	-37	-37	-37	-37	0	0	-1	-2
Percent Change	-0.6%	-1.1%	0.0%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Maximum Monthly Content Increase[1]												
No Action Content	19,686	16,423	13,747	11,356	9,228	19,930	16,057	26,229	32,254	32,168	28,783	23,165
Proposed Action Content	20,234	16,971	14,295	11,905	9,777	20,494	16,619	26,788	32,811	32,722	29,335	23,714
Content Change	548	548	548	549	549	564	562	559	557	554	552	549
Percent Change	2.8%	3.3%	4.0%	4.8%	5.9%	2.8%	3.5%	2.1%	1.7%	1.7%	1.9%	2.4%
Dry Year Content (Average of 1954, 1966, 1977, 2002, 2004)												
No Action Content	46,241	43,526	40,926	38,906	37,710	35,670	35,158	39,824	43,156	40,602	27,832	23,010
Proposed Action Content	46,294	43,580	40,979	38,960	37,764	35,723	35,212	39,877	43,209	40,654	27,902	23,091
Content Change	53	53	53	53	54	53	54	53	53	53	70	81
Percent Change	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%	0.3%	0.4%
Average Content During Substitution Years[2]												
No Action Content	47,083	43,568	40,499	37,866	36,303	33,964	33,812	41,302	48,369	47,547	35,033	27,858
Proposed Action Content	47,107	43,592	40,524	37,891	36,328	34,028	33,876	41,366	48,433	47,610	35,118	27,939
Content Change	25	25	25	25	25	64	64	64	63	63	85	80
Percent Change	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.1%	0.1%	0.2%	0.3%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.
N/A: Not applicable.

Homestake Reservoir would increase, while substitution releases from Williams Fork Reservoir would decrease by a commensurate amount. A reduced substitution release under the Proposed Action would result in higher contents in Williams Fork Reservoir until the reservoir refills.

Some increases and decreases in contents would also occur due to slight differences in the timing of substitution releases from Williams Fork Reservoir under the Proposed Action. While the total amount released would be the same under both the No Action and Proposed Action alternatives, the timing of substitution releases may be offset by a few months. These slight differences are likely a function of modeling assumptions such as reservoir storage targets and the sequence and priority of operating rules in the CDSS Model and may not occur under actual operations.

Muddy Creek Basin

Muddy Creek

Flow changes in Muddy Creek downstream of Wolford Mountain Reservoir are shown in Table 3-10. In summary, monthly average flows in Muddy Creek would decrease by a maximum of 5.7 cfs or 4.3% in June and increase by a maximum of 6.1 cfs or 4.4% in October. In the driest years and substitution years, monthly average flows would increase or decrease by less than 0.2 cfs or less than 0.5%. The changes in Muddy Creek flows under the Proposed Action would be well within the range of flows that have historically occurred downstream of Wolford Mountain Reservoir, as shown in Figure 3-10.

Flow changes in Muddy Creek would occur due to differences in the amount and timing of water released for substitution payback from Wolford Mountain Reservoir. In substitution years when the last increment of Denver Water's substitution obligation is

Table 3-10
Muddy Creek below Wolford Mountain Reservoir
Modeled Differences in Flow Between No Action and Proposed Action Alternatives (cfs)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Avg
Maximum Monthly Flow Decrease[1]													
No Action Flow	316.2	N/A	N/A	39.6	12.9	N/A	86.0	66.5	132.9	139.8	78.5	34.9	
Proposed Action Flow	311.7	N/A	N/A	38.2	12.9	N/A	85.9	64.9	127.2	139.7	77.9	33.3	
Flow Change	-4.4	0.0	0.0	-1.4	0.0	0.0	0.0	-1.6	-5.7	0.0	-0.7	-1.6	
Percent Change	-1.4%	0.0%	0.0%	-3.5%	-0.1%	0.0%	0.0%	-2.4%	-4.3%	0.0%	-0.8%	-4.6%	
Maximum Monthly Flow Increase[1]													
No Action Flow	137.2	N/A	N/A	N/A	N/A	130.3	461.0	355.8	319.5	N/A	270.4	33.1	
Proposed Action Flow	143.3	N/A	N/A	N/A	N/A	131.3	461.4	356.1	324.2	N/A	271.2	34.0	
Flow Change	6.1	0.0	0.0	0.0	0.0	1.0	0.4	0.3	4.6	0.0	0.8	0.9	
Percent Change	4.4%	0.0%	0.0%	0.0%	0.0%	0.8%	0.1%	0.1%	1.5%	0.0%	0.3%	2.8%	
Dry Year Monthly Average Flow (Average of 1954, 1966, 1977, 2002, 2004)													
No Action Flow	14.5	22.0	14.2	13.4	10.5	26.5	89.2	177.3	104.3	93.4	224.8	38.9	69.1
Proposed Action Flow	14.5	22.0	14.2	13.4	10.5	26.5	89.2	177.3	104.3	93.4	224.8	39.1	69.1
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%
Average Flow During Substitution Years[2]													
No Action Flow	55.7	23.6	15.6	13.9	11.4	26.9	88.2	156.5	137.8	92.1	194.9	56.2	72.7
Proposed Action Flow	55.7	23.6	15.6	13.9	11.4	27.0	88.2	156.6	137.8	92.1	194.9	56.1	72.7
Flow Change	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.
N/A: Not applicable.

released from Wolford Mountain Reservoir, there would be no change in the total substitution release from Wolford Mountain. In those years, the total amount released from Wolford Mountain Reservoir for substitution payback would be the same; however, the releases would be allocated from different accounts in that reservoir and from Williams Fork Reservoir. Under the No Action alternative, water would be released from Denver Water's Williams Fork Reservoir for Springs Utilities and a larger proportion of Denver Waters' release would be allocated to Wolford Mountain Reservoir, whereas, under the Proposed Action, water would be released from Springs Utilities' Wolford Mountain Reservoir account. An exception to this would be when Springs Utilities account in Wolford Mountain is not sufficient to fully payback their obligation and an additional substitution release would be needed from Homestake Reservoir. Under the Proposed Action, substitution releases from Homestake Reservoir would occur infrequently (once in the 56-year study period). A reduced substitution release from Wolford Mountain Reservoir under the Proposed Action would result in higher contents in Wolford Mountain Reservoir. As a result, less water would be stored in subsequent months depending on storage targets as Wolford Mountain Reservoir refills. Reductions in the amount stored would increase flows in some months under the Proposed Action.

Changes in flows in some months would also occur due to differences in the timing of substitution releases from Wolford Mountain Reservoir. While the total amount released would be the same under both alternatives, the timing of substitution releases may be offset by a few months. These slight differences are likely a function of modeling assumptions such as reservoir storage targets and the sequence and priority of operating rules in the CDSS Model and may not occur under actual operations.

There would be no impact on the ability to meet the bypass requirement at Wolford Mountain Reservoir or the CWCB instream flow requirements below the reservoir under the Proposed Action.

As discussed in Section 3.3.1.7, Phase 2 of the Grand County SMP identified environmental flows to support ecological needs in relation to fisheries for the reach below Wolford Mountain Reservoir. The preferred range for summer environmental flows is 60 to 90 cfs below Wolford Mountain Reservoir. As indicated in the Phase 2 report, flow records for the USGS gage station 09041400 below Wolford Mountain Reservoir show the recommended summer environmental flow range is typically present in this reach. Flow reductions under the Proposed Action would be infrequent and minor and would not affect the ability to meet these recommendations, particularly since substitution releases from Wolford Mountain Reservoir augment flows in this reach during the late summer and fall.

<u>Wolford Mountain Reservoir</u>

Refer to Table 3-11 for a summary of monthly average changes in contents in Wolford Mountain Reservoir. In summary, end-of-month contents in Wolford Mountain Reservoir would increase by a maximum of 280 AF or 1.3% in December, January and February and decrease by a maximum of 343 AF or 1.7% in January and February. In the driest years and substitution years, monthly average contents would increase by up to 6 AF or less than 0.1% and decrease by up to 8 AF or less than 0.1%.

Table 3-11
Wolford Mountain Reservoir
Modeled Differences in Content Between No Action and Proposed Action Alternatives (AF)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Maximum Monthly Content Decrease[1]												
No Action Content	19,790	19,724	19,699	19,684	19,639	19,551	19,386	48,920	50,859	50,445	45,286	38,423
Proposed Action Content	19,448	19,382	19,356	19,341	19,296	19,209	19,045	48,582	50,755	50,342	45,184	38,323
Content Change	-342	-342	0	-343	-343	-342	-341	-338	-104	-103	-102	-100
Percent Change	-1.7%	-1.7%	0.0%	-1.7%	-1.7%	-1.7%	-1.8%	-0.7%	-0.2%	-0.2%	-0.2%	-0.3%
Maximum Monthly Content Increase[1]												
No Action Content	20,914	20,844	20,821	20,812	20,763	20,673	22,136	51,363	45,605	39,507	62,196	46,444
Proposed Action Content	21,193	21,123	21,101	21,092	21,043	20,952	22,414	51,639	45,613	39,516	62,236	46,542
Content Change	279	279	280	280	280	279	278	276	8	9	40	98
Percent Change	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	0.5%	0.0%	0.0%	0.1%	0.2%
Dry Year Content (Average of 1954, 1966, 1977, 2002, 2004)												
No Action Content	54,312	54,236	54,258	54,298	54,253	54,138	53,862	57,469	57,938	55,234	41,894	39,825
Proposed Action Content	54,317	54,241	54,263	54,303	54,258	54,143	53,867	57,474	57,943	55,240	41,897	39,817
Content Change	5	5	5	5	5	5	5	5	5	6	3	-8
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Average Content During Substitution Years[2]												
No Action Content	50,986	50,737	50,685	50,657	50,561	50,183	49,925	58,838	59,909	57,609	46,308	43,364
Proposed Action Content	50,988	50,738	50,686	50,658	50,562	50,180	49,922	58,832	59,904	57,604	46,303	43,363
Content Change	1	1	1	2	1	-3	-3	-6	-5	-5	-5	-1
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.
N/A: Not applicable.

Changes in content at Wolford Mountain Reservoir would primarily occur due to differences in the amount and timing of releases for substitution payback. In substitution years when the last increment of Denver Water's substitution obligation is released from Williams Fork Reservoir, substitution releases from Wolford Mountain Reservoir would increase while substitution releases from Williams Fork Reservoir would decrease by a commensurate amount. An increased substitution release under the Proposed Action would result in lower contents in Wolford Mountain Reservoir until the reservoir refills. In substitution years when the last increment of Denver Water's substitution obligation is released from Wolford Mountain Reservoir, there would often be no change in contents in Wolford Mountain Reservoir. In those years, the total amount released from Wolford Mountain Reservoir for substitution payback would be the same; however, releases would be allocated differently as described previously. If Springs Utilities account in Wolford Mountain Reservoir is not sufficient to fully payback their obligation an additional substitution release would be needed from Homestake Reservoir. In those years, Wolford Mountain Reservoir contents would be higher until the reservoir refills, because some water would be released from Homestake Reservoir under the Proposed Action instead of Wolford Mountain Reservoir.

Some small increases and decreases in contents under the Proposed Action reflect slight differences in the timing of substitution releases from Wolford Mountain Reservoir under the Proposed Action. While the total amount released would be the same under both the No Action and Proposed Action alternatives, the timing of substitution releases may be offset by a few months. These slight differences are likely a function of modeling assumptions such as reservoir storage targets and the sequence and priority of operating rules in the CDSS Model and may not occur under actual operations.

Colorado River Basin

<u>Colorado River</u>

Flow changes in the Colorado River downstream of the confluence with Williams Fork River, at the USGS gage near Kremmling (09058000), and downstream of the confluence with the Eagle River are shown in Tables 3-12, 3-13, and 3-14, respectively.

Flow changes in the Colorado River downstream of the confluence with the Williams Fork River reflect changes in the amount and timing of substitution releases from Williams Fork Reservoir and the amounts stored as the reservoir refills. Model results indicate there would be a slight difference in the magnitude of flow change downstream of Williams Fork Reservoir compared to the Colorado River downstream of the confluence with the Williams Fork River due to differences in the amount diverted by HUP beneficiaries downstream of Williams Fork Reservoir under the Proposed Action. This change may or may not occur depending on the location, amount and timing of HUP demands and their associated consumptive use and return flows.

The Municipal Subdistrict (Subdistrict) of the Northern Colorado Water Conservancy District (NCWCD) expressed concerns that the Proposed Action would result in decreased flows in the Colorado River below the confluence with the Williams Fork River. The Subdistrict indicated that decreased flows in the Colorado River below the Williams Fork River during the spring could affect the Windy Gap Project water rights because those rights cannot legally divert unless certain downstream minimum stream flows in the Colorado River below the Williams Fork River are maintained and downstream senior water rights are satisfied. As discussed above, substitution releases from Williams Fork Reservoir would decrease under the Proposed Action, while substitution releases from Wolford Mountain and Homestake reservoirs would increase. The decrease in substitution releases from Williams Fork Reservoir would occur from August through March of dry years when Windy Gap is not diverting. A reduced substitution release under the Proposed Action would result in higher contents in Williams Fork Reservoir. As a result, less water would be stored in subsequent months as the reservoir refills. Reductions in the amount stored would

Table 3-12
Colorado River below the Confluence with the Williams Fork River
Modeled Differences in Flow Between No Action and Proposed Action Alternatives (cfs)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Avg
Maximum Monthly Flow Decrease[1]													
No Action Flow	345.3	203.0	230.0	166.8	147.1	169.1	288.9	156.2	2,591.7	172.0	232.6	231.7	
Proposed Action Flow	344.4	203.0	229.7	166.8	147.0	162.8	287.9	155.9	2,590.3	171.9	228.5	230.5	
Flow Change	-0.9	0.0	0.0	0.0	0.0	-6.3	-1.0	-0.3	-1.4	-0.1	-4.1	-1.2	
Percent Change	-0.3%	0.0%	0.0%	0.0%	0.0%	-3.7%	-0.3%	-0.2%	-0.1%	-0.1%	-1.7%	-0.5%	
Maximum Monthly Flow Increase[1]													
No Action Flow	158.9	N/A	N/A	211.2	159.6	N/A	300.9	1,350.5	2,434.5	274.7	294.7	299.9	
Proposed Action Flow	160.4	N/A	N/A	212.6	160.1	N/A	301.3	1,350.9	2,438.6	274.7	296.1	301.8	
Flow Change	1.4	0.0	0.0	1.4	0.5	0.0	0.4	0.4	4.1	0.0	1.4	1.9	
Percent Change	0.9%	0.0%	0.0%	0.7%	0.3%	0.0%	0.1%	0.0%	0.2%	0.0%	0.5%	0.6%	
Dry Year Monthly Average Flow (Average of 1954, 1966, 1977, 2002, 2004)													
No Action Flow	226.8	239.9	209.0	183.1	168.4	235.1	228.6	157.6	173.1	276.8	368.3	216.0	223.6
Proposed Action Flow	227.1	239.9	209.0	183.1	168.4	235.1	228.6	157.6	173.1	276.8	368.1	215.8	223.6
Flow Change	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.2	-0.2	0.0
Percent Change	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	-0.1%	0.0%
Average Flow During Substitution Years[2]													
No Action Flow	261.7	255.4	198.6	184.5	173.4	224.5	239.9	177.4	209.7	241.5	375.0	274.7	234.7
Proposed Action Flow	261.9	255.4	198.6	184.5	173.3	224.0	239.8	177.3	209.7	241.5	374.4	274.8	234.6
Flow Change	0.1	0.0	0.0	0.0	0.0	-0.5	-0.1	0.0	0.0	0.0	-0.6	0.1	-0.1
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%	0.0%	0.0%	0.0%	0.0%	-0.2%	0.0%	0.0%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.
N/A: Not applicable.

increase flows along the Colorado River in some months under the Proposed Action and potentially benefit the Windy Gap Project. Model results show there would be no impact on Windy Gap diversions under the Proposed Action.

The ability to meet the CWCB instream flow requirements along the Colorado River below the confluence with the Williams Fork River under the Proposed Action was evaluated. The analysis focused on August and September, which are key low flow months during which there are occasionally flow changes under the Proposed Action due to differences in substitution releases from Williams Fork Reservoir. Springs Utilities diversions from the Upper Blue River do not deplete the Colorado River from the confluence of the Williams Fork downstream to the confluence to the Blue River. Springs Utilities' Continental-Hoosier System diversions deplete the Blue River and Colorado River mainstem from the confluence of the Blue River downstream. In substitution years, water released from Williams Fork Reservoir in August and September for substitution payback augments flows in the Colorado River below the confluence Williams Fork River. Therefore, the only potential impact

Table 3-13
Colorado River near Kremmling at USGS Gage 09058000
Modeled Differences in Flow Between No Action and Proposed Action Alternatives (cfs)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Avg
Maximum Monthly Flow Decrease[1,3]													
No Action Flow	880.9	668.9	546.6	557.5	527.2	411.3	707.5	663.2	5,485.8	1,329.6	921.3	376.0	
Proposed Action Flow	876.8	668.2	545.9	556.8	526.5	405.3	706.6	661.6	5,477.7	1,325.7	915.6	375.0	
Flow Change	-4.1	-0.7	0.0	-0.7	-0.7	-5.9	-0.9	-1.6	-8.1	-3.9	-5.7	-0.9	
Percent Change	-0.5%	-0.1%	0.0%	-0.1%	-0.1%	-1.4%	-0.1%	-0.2%	-0.1%	-0.3%	-0.6%	-0.2%	
Maximum Monthly Flow Increase[1,3]													
No Action Flow	636.4	568.4	452.6	421.3	460.7	400.8	1,334.3	2,802.2	1,402.3	2,676.4	1,437.4	859.7	
Proposed Action Flow	641.0	568.7	452.9	421.6	461.0	401.3	1,335.2	2,802.6	1,406.9	2,676.4	1,438.9	861.2	
Flow Change	4.6	0.3	0.3	0.3	0.3	0.5	0.9	0.4	4.6	0.0	1.5	1.5	
Percent Change	0.7%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.3%	0.0%	0.1%	0.2%	
Dry Year Monthly Average Flow (Average of 1954, 1966, 1977, 2002, 2004)													
No Action Flow	817.5	581.4	501.3	469.1	476.5	578.6	620.9	363.0	435.9	871.4	863.5	484.8	588.6
Proposed Action Flow	817.8	581.5	501.3	469.1	476.5	578.7	620.9	363.0	435.9	871.4	862.9	484.6	588.6
Flow Change	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	-0.6	-0.2	0.0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%
Average Flow During Substitution Years[2]													
No Action Flow	807.8	578.1	485.3	464.4	471.5	559.1	623.9	434.2	514.0	821.0	934.6	599.6	607.8
Proposed Action Flow	808.0	578.1	485.3	464.4	471.5	558.7	623.8	434.2	514.0	821.0	933.8	599.6	607.7
Flow Change	0.1	0.0	0.0	0.0	0.0	-0.4	-0.1	0.0	0.0	0.0	-0.8	0.0	-0.1
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%	0.0%	0.0%	-0.1%	0.0%	0.0%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.
[3]The first year of the study period was not included in the analysis of maximum increases and decreases due to start-up conditions in the model.
N/A: Not applicable.

on CWCB instream flow rights along the Colorado River from the confluence with the

Williams Fork River downstream to the confluence with the Blue River would be a reduction in the amount of water ***added*** to the river due to a change in substitution releases from Williams Fork Reservoir.

CDSS Model results show that average monthly flows in the Colorado River below the confluence with the Williams Fork River would occasionally be less than the instream flow requirement of 135 cfs in August and September under the Proposed Action. However, flows can be less than 135 cfs in August and September in non-substitution years because water is not released from Williams Fork Reservoir for substitution payback purposes. Flows in August and September would not decrease under the Proposed Action in non-substitution years. Model results show the average monthly flow exceeded the instream flow requirement of 135 cfs in all months that flows in the Colorado River below the confluence with the Williams Fork River would decrease under the Proposed Action. Therefore, a reduction in substitution releases from Williams Fork Reservoir

Table 3-14
Colorado River Below the Confluence with the Eagle River
Modeled Differences in Flow Between No Action and Proposed Action Alternatives (cfs)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Avg
Maximum Monthly Flow Decrease[1,3]													
No Action Flow	1,142.9	1,070.3	891.0	882.8	809.6	626.7	1,061.2	2,399.7	10,746.8	3,367.2	1,654.5	554.4	
Proposed Action Flow	1,138.8	1,069.6	890.3	882.1	808.9	620.7	1,060.3	2,398.1	10,738.7	3,363.2	1,649.8	553.4	
Flow Change	-4.1	-0.7	0.0	-0.7	-0.7	-5.9	-0.9	-1.6	-8.1	-4.0	-4.7	-0.9	
Percent Change	-0.4%	-0.1%	0.0%	-0.1%	-0.1%	-0.9%	-0.1%	-0.1%	-0.1%	-0.1%	-0.3%	-0.2%	
Maximum Monthly Flow Increase[1,3]													
No Action Flow	858.8	887.4	728.1	663.0	687.3	632.4	3,008.5	5,970.7	5,764.7	2,928.5	1,330.9	1,404.1	
Proposed Action Flow	863.4	887.7	728.4	663.3	687.6	632.9	3,009.4	5,971.1	5,769.4	2,928.5	1,332.8	1,405.6	
Flow Change	4.6	0.3	0.3	0.3	0.3	0.5	0.9	0.4	4.6	0.0	1.9	1.5	
Percent Change	0.5%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.1%	0.0%	0.1%	0.1%	
Dry Year Monthly Average Flow (Average of 1954, 1966, 1977, 2002, 2004)													
No Action Flow	1,138.6	924.8	775.3	731.0	699.0	856.9	1,097.9	1,453.7	1,309.1	1,170.5	1,063.8	706.9	994.0
Proposed Action Flow	1,138.9	924.8	775.4	731.1	699.1	857.0	1,097.9	1,453.7	1,309.1	1,170.5	1,063.4	706.7	994.0
Flow Change	0.3	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	-0.5	-0.2	0.0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Average Flow During Substitution Years[2]													
No Action Flow	1,114.1	932.0	758.2	707.4	703.6	821.7	1,099.7	1,779.6	1,842.8	1,246.9	1,217.3	887.7	1,092.6
Proposed Action Flow	1,114.2	932.0	758.3	707.4	703.6	821.3	1,099.6	1,779.6	1,842.7	1,246.8	1,217.1	887.6	1,092.5
Flow Change	0.1	0.0	0.0	0.0	0.0	-0.4	-0.1	0.0	0.0	0.0	-0.2	0.0	0.0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.
[3]The first year of the study period was not included in the analysis of maximum increases and decreases due to start-up conditions in the model.
N/A: Not applicable.

under the Proposed Action would have negligible impact on the ability to meet the CWCB instream flow requirements along the Colorado River.

This analysis coincides with a review of flow data for the gage maintained by the Northern Colorado Water Conservancy District (NCWCD), Colorado River below the confluence of the Williams Fork River at Parshall. Since 1992, recorded flows at that gage in August and September were less than 135 cfs for only 4 days in early September 2006. Since 2006 was not a substitution year, Springs Utilities operations had no effect on flows in the Colorado River in that reach.

As discussed in Section 3.3.1.7, Phase 2 of the Grand County SMP identified environmental flows to support ecological needs in relation to fisheries for several stream reaches along the Colorado River. The preferred range for summer environmental flows in the Colorado River is 250 to 450 cfs below the confluence with the Williams Fork River and 600 to 1000 cfs below the confluence with the Blue River. As indicated in the Phase 2 SMP, flow records for gage stations near Parshall and below the KB Ditch, which are operated by NCWCD, and the USGS gage 09058000 Colorado River near Kremmling, show the recommended summer environmental flow ranges are quite commonly present in these reaches. Substitution releases from Williams Fork Reservoir and Wolford Mountain Reservoir contribute to meeting these flow recommendations since they augment naturally occurring flow along the Colorado River in the fall. Flow reductions along the Colorado River under the Proposed Action would be infrequent and minor and would have negligible affect on the ability to meet these flow recommendations particularly since substitution releases augment flows in this reach during the late summer and fall.

Flow changes in the Colorado River near Kremmling reflect changes in the amount and timing of substitution releases from Williams Fork Reservoir and Wolford Mountain Reservoir and the amounts stored as these reservoirs refill. These changes in flows are translated downstream. Slight changes in flow may also occur due to the location, amount and timing of HUP demands and their associated consumptive use and return flows.

Flow changes in the Colorado River downstream of the Eagle River reflect changes in the timing of substitution releases from Williams Fork, Wolford Mountain, and Homestake Reservoirs, reservoir spills, and the additional 250 AF that would be used by West Slope users in the Blue River basin. Slight changes in flow may also occur due to the location, amount and timing of HUP demands and their associated consumptive use and return flows. Downstream of the Eagle River there would be little change in the total flow across the year since the total substitution payback by Springs Utilities and Denver Water would not change at this location. The majority of flow changes downstream of the Eagle River would be due to changes in the timing of reservoir releases and spills.

In summary, average monthly flows in the Colorado River downstream of the confluence with Williams Fork River would decrease up to 6.3 cfs or 3.7% in March and increase by up to 4.1 cfs or 0.2% in June. Monthly average flows in the Colorado River near Kremmling would decrease by up to 8.1 cfs or 0.1% in June and increase by up to 4.6 cfs or 0.7% in October. Monthly average flows in the Colorado River downstream of the Eagle River would decrease by up to 8.1 cfs or 0.1% in June and increase by up to 4.6 cfs or 0.5% in October. In the driest years and substitution years, monthly average flows at all these locations would increase or decrease by less than 0.8 cfs.

The changes in flows under the Proposed Action would be well within the normal range of flows that have historically occurred along the Colorado River at these locations, as shown in Figure 3-12 for the Colorado River near Kremmling. Based on the magnitude and frequency of flow changes along the Colorado River, there would be little to no impact on the BLM’s potential Wild and Scenic Rivers designation along the Colorado River.

Eagle River Basin

Homestake Creek

Flow changes downstream of the Homestake Project on Homestake Creek are shown in Table 3-15. In summary, monthly average flows in Homestake Creek would increase by a maximum of 7.6 cfs or 18.1% in August. In substitution years, average monthly flows would increase by up to 0.6 cfs or 2.3%. There would be no change in flows in the driest years. Flows in Homestake Creek would change under the Proposed Action due to a substitution release from Homestake Reservoir in one year during the 56-year study period. This substitution release would result in a reduced delivery through Homestake Tunnel. The increase in flows under the Proposed Action would be well within the normal range of flows that have historically occurred in Homestake Creek downstream of the Homestake Project, as shown in Figure 3-13.

There would be no impact on the ability to meet the instream flow requirements along Homestake Creek and the Eagle River under the Proposed Action.

Table 3-15
Homestake Creek below Homestake Project at USGS Gage 09064000
Modeled Differences in Flow Between No Action and Proposed Action Alternatives (cfs)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Avg
Maximum Monthly Flow Decrease[1]													
No Action Flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Proposed Action Flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Maximum Monthly Flow Increase[1]													
No Action Flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	82.9	42.1	N/A	
Proposed Action Flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	83.1	49.8	N/A	
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	7.6	0.0	
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	18.1%	0.0%	
Dry Year Monthly Average Flow (Average of 1954, 1966, 1977, 2002, 2004)													
No Action Flow	11.2	5.4	4.2	4.1	3.8	6.7	24.7	69.0	82.9	35.3	20.5	11.3	23.3
Proposed Action Flow	11.2	5.4	4.2	4.1	3.8	6.7	24.7	69.0	82.9	35.3	20.5	11.3	23.3
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Average Flow During Substitution Years[2]													
No Action Flow	10.4	6.6	4.9	4.2	4.0	5.7	19.8	55.6	68.2	49.0	25.7	14.1	22.3
Proposed Action Flow	10.4	6.6	4.9	4.2	4.0	5.7	19.8	55.6	68.2	49.0	26.3	14.1	22.4
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.3%	0.0%	0.2%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.
N/A: Not applicable.

Homestake Reservoir

Refer to Table 3-16 for a summary of monthly average changes in contents in Homestake Reservoir. Changes in contents at Homestake Reservoir under the Proposed Action would be infrequent and minor. End-of-month contents would decrease in seven months during the 56-year study period by up to 469 AF or 18.9% in August. Contents would decrease under the Proposed Action due to a substitution release from Homestake Reservoir in one year during the study period.

Table 3-16
Homestake Reservoir
Modeled Differences in Content Between No Action and Proposed Action Alternatives (AF)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Maximum Monthly Content Decrease[1]												
No Action Content	2,464	2,462	2,471	2,482	2,484	N/A	N/A	N/A	N/A	8,118	4,895	4,814
Proposed Action Content	1,998	1,996	2,004	2,014	2,015	N/A	N/A	N/A	N/A	8,111	4,426	4,347
Content Change	-466	-466	-467	-468	-469	0	0	0	0	-7	-469	-467
Percent Change	-18.9%	-18.9%	0.0%	-18.9%	-18.9%	0.0%	0.0%	0.0%	0.0%	-0.1%	-9.6%	-9.7%
Maximum Monthly Content Increase[1]												
No Action Content	18,967	N/A	14,187	N/A	N/A	N/A	169	5,052	17,401	N/A	29,055	N/A
Proposed Action Content	18,968	N/A	14,188	N/A	N/A	N/A	170	5,053	17,402	N/A	29,056	N/A
Content Change	1	0	1	0	0	0	1	1	1	0	1	0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%
Dry Year Content (Average of 1954, 1966, 1977, 2002, 2004)												
No Action Content	25,768	25,016	25,038	25,063	25,068	20,981	13,410	17,249	19,324	19,137	17,786	16,190
Proposed Action Content	25,768	25,016	25,038	25,063	25,068	20,981	13,410	17,249	19,324	19,137	17,786	16,190
Content Change	0	0	0	0	0	0	0	0	0	0	0	0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Average Content During Substitution Years[2]												
No Action Content	24,860	24,555	24,577	24,602	24,607	19,327	11,170	16,221	21,104	19,592	18,357	17,279
Proposed Action Content	24,824	24,519	24,541	24,566	24,571	19,327	11,170	16,221	21,104	19,592	18,321	17,242
Content Change	-36	-36	-36	-36	-36	0	0	0	0	-1	-37	-37
Percent Change	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.2%	-0.2%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.
N/A: Not applicable.

South Platte River Basin

Middle Fork South Platte River

Flow changes downstream of Montgomery Reservoir on the Middle Fork South Platte River are shown in Table 3-17. Springs Utilities' flow measurements at the outlet of Montgomery Reservoir were used to evaluate changes in streamflows along the Middle Fork South Platte River. Changes in flow reflect a 6% transit loss which would be assessed on deliveries from Montgomery Reservoir to Elevenmile Canyon Reservoir per the 2003 MOA. In summary, average monthly flows in the Middle Fork South Platte River would decrease by 34.1 cfs or 61.6% and increase by 4.3 cfs or 14.6% in August. The decrease in flows would be greater than 7 cfs in only one month during the study period. In the driest years and substitution years, average monthly flows in

Table 3-17
Middle Fork South Platte River below Montgomery Reservoir[3]
Modeled Differences in Flow Between No Action and Proposed Action Alternatives (cfs)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Avg
Maximum Monthly Flow Decrease[1]													
No Action Flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	55.3	N/A	
Proposed Action Flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	21.2	N/A	
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-34.1	0.0	
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-61.6%	0.0%	
Maximum Monthly Flow Increase[1]													
No Action Flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	29.6	N/A	
Proposed Action Flow	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	33.9	N/A	
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14.6%	0.0%	
Dry Year Monthly Average Flow (Average of 1954, 1966, 1977, 2002, 2004)													
No Action Flow	2.9	0.1	0.0	0.0	0.0	0.0	0.7	16.7	33.7	28.7	30.6	6.9	10.0
Proposed Action Flow	2.9	0.1	0.0	0.0	0.0	0.0	0.7	16.7	33.7	28.7	27.5	6.9	9.8
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.0	0.0	-0.3
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-10.0%	0.0%	-2.5%
Average Flow During Substitution Years[2]													
No Action Flow	2.8	0.1	0.0	0.0	0.0	0.0	0.9	19.8	40.1	36.2	26.8	7.9	11.2
Proposed Action Flow	2.8	0.1	0.0	0.0	0.0	0.0	0.9	19.8	40.1	36.2	23.0	7.9	10.9
Flow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.8	0.0	-0.3
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-14.3%	0.0%	-2.8%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.
[3] Middle Fork South Platte River flows below Montgomery Reservoir were assumed to equal the measured outflow to the river. Measured outflows were not available prior to 1990, therefore, monthly flows prior to 1990 were assumed to be the average of flows from 1990 through 2005.
N/A: Not applicable.

August would decrease by 3.8 cfs or 14.3%. The decrease in flows under the Proposed Action would be well within the normal range of flows that have historically occurred in the Middle Fork South Platte River.

Flows in the Middle Fork South Platte River would change under the Proposed Action due to differences in releases from Montgomery Reservoir. Under the Proposed Action, less water would be released from Montgomery Reservoir to payback Denver Water for substitution releases made for Springs Utilities on the West Slope. Under the Proposed Action, Denver Water would release less water from Williams Fork and Wolford Mountain Reservoirs to meet Springs Utilities' substitution obligation, therefore, Springs Utilities' releases from Montgomery Reservoir to payback Denver Water would also decrease. Flows in the Middle Fork South Platte River would change in eight months during the 56-year study period.

The only potential impact on CWCB instream flow rights along the Middle Fork South Platte River below Montgomery Reservoir would be a reduction in the amount of water added to the river below the reservoir. There would be no increase in depletions to the Middle Fork South Platte River under the Proposed Action, however, less water would be released from Montgomery Reservoir to payback Denver Water for substitution releases made for Springs Utilities on the West Slope as described above. A review of Springs Utilities' flow measurements at the outlet of Montgomery Reservoir indicates there would be no impact on the ability to meet the instream flow requirements along the Middle Fork South Platte River below Montgomery Reservoir under the Proposed Action alternative.

<u>Montgomery Reservoir</u>

Refer to Table 3-18 for a summary of monthly average changes in contents in Montgomery Reservoir. In summary, end-of-month contents in Montgomery Reservoir would decrease by a maximum of 271 AF or 24.1% and increase by a maximum of 2,096 AF or 355%. The change in contents would be greater than approximately 400 AF in only one year during the study period. In the driest years and substitution years, average end-of-month contents would decrease by up to 250 AF or 11.1% and increase by up to 218 AF or 6.4%.

Changes in content at Montgomery Reservoir would primarily occur due to differences in the amount of water Springs Utilities would release to payback Denver Water for substitution releases on the West Slope. In substitution years when there is sufficient water in Upper Blue Reservoir to fully payback Springs Utilities' substitution obligation there would be no water released from Montgomery Reservoir for Denver Water under both alternatives. In years, when the contents in Upper Blue Reservoir are not sufficient to fully pack back the substitution obligation, Springs Utilities would release water from Montgomery Reservoir to Elevenmile Canyon Reservoir to payback Denver Water for substitution releases on the West Slope. Under the Proposed Action, Denver Water's substitution releases for Springs Utilities would decrease on average, therefore, Springs Utilities' releases from Montgomery Reservoir to payback Denver Water would also decrease. If less water is released from Montgomery Reservoir to the Middle Fork South Platte River under the Proposed Action, contents would be higher on average from August through March following

Table 3-18
Montgomery Reservoir
Modeled Differences in Content Between No Action and Proposed Action Alternatives (AF)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Maximum Monthly Content Decrease[1]												
No Action Content	3,881	3,534	2,994	2,455	1,876	1,124	N/A	N/A	N/A	N/A	3,568	3,586
Proposed Action Content	3,610	3,263	2,723	2,184	1,604	853	N/A	N/A	N/A	N/A	3,302	3,320
Content Change	-271.1	-271.1	-271	-271.1	-271.1	-271.1	0.0	0.0	0.0	0.0	-266.0	-266.0
Percent Change	-7.0%	-7.7%	0.0%	-11.0%	-14.5%	-24.1%	0.0%	0.0%	0.0%	0.0%	-7.5%	-7.4%
Maximum Monthly Content Increase[1]												
No Action Content	1,144	590	206	206	206	1,119	N/A	N/A	N/A	N/A	2,548	2,190
Proposed Action Content	3,240	2,686	2,113	1,541	1,019	1,525	N/A	N/A	N/A	N/A	4,644	4,286
Content Change	2,096	2,096	1,908	1,335	814	405	0	0	0	0	2,096	2,096
Percent Change	183%	355%	927%	649%	395%	36%	0%	0%	0%	0%	82%	96%
Dry Year Content (Average of 1954, 1966, 1977, 2002, 2004)												
No Action Content	4,145	3,774	3,331	3,056	2,255	1,514	1,004	1,853	3,736	4,154	2,922	2,706
Proposed Action Content	3,895	3,524	3,081	2,806	2,005	1,307	1,004	1,853	3,736	4,154	3,109	2,893
Content Change	-250	-250	-250	-250	-250	-207	0	0	0	0	187	187
Percent Change	-6.0%	-6.6%	-7.5%	-8.2%	-11.1%	-13.6%	0.0%	0.0%	0.0%	0.0%	6.4%	6.9%
Average Content During Substitution Years[2]												
No Action Content	3,822	3,507	3,053	2,642	1,938	1,213	732	1,612	3,822	4,080	3,433	3,399
Proposed Action Content	3,825	3,510	3,042	2,586	1,837	1,056	732	1,612	3,822	4,080	3,651	3,617
Content Change	3	3	-11	-55	-100	-157	0	0	0	0	218	218
Percent Change	0.1%	0.1%	-0.4%	-2.1%	-5.2%	-12.9%	0.0%	0.0%	0.0%	0.0%	6.3%	6.4%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase
means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.
N/A: Not applicable.

substitution years. There would likely be no change in contents from April through July since Montgomery Reservoir is typically drawn down to the dead pool by the end of April due to deliveries through the Blue River Pipeline through the winter months. Increased storage under the Proposed Action would likely result in higher deliveries through the Blue River Pipeline to Springs Utilities North Slope reservoirs through the winter months. For the purposes of this analysis it was assumed there would no change in diversions to Montgomery Reservoir from the Middle Fork South Platte

River, particularly since the reservoir's water right is relatively junior and storage contents at the end of April would be similar under both alternatives.

Montgomery Reservoir contents would also decrease slightly in non-substitution years due to a reduction in Hoosier Tunnel deliveries under the Proposed Action. The release of 250 AF each year from Upper Blue Reservoir for West Slope users in the Blue River basin would decrease the amount of water delivered through the Hoosier Tunnel to Montgomery Reservoir by a commensurate amount. Deliveries through the Blue River Pipeline to Springs Utilities' North Slope reservoirs through the winter months would likely decrease by 250 AF due to this reduction in storage contents. There would likely be no change in contents from April through July since Montgomery Reservoir is typically drawn down to the dead pool by the end of April.

<u>Elevenmile Canyon Reservoir</u>

Refer to Table 3-19 for a summary of monthly average changes in contents in Elevenmile Canyon Reservoir. There would likely be no change in Elevenmile Canyon Reservoir contents under the Proposed Action because the reservoir is operated for long-term drought storage and typically remains full during most years. In substitution years when there is sufficient water in Upper Blue Reservoir to fully payback Springs Utilities' substitution obligation there would be no water released from Montgomery Reservoir to Elevenmile Canyon Reservoir under both alternatives. In years when the contents in Upper Blue Reservoir are not sufficient to fully payback Spring Utilities' substitution obligation, water would be released from Montgomery Reservoir to Elevenmile Canyon Reservoir to payback Denver Water for substitution releases made for Springs Utilities. Under the Proposed Action, more water would be released from Springs Utilities' accounts in Wolford Mountain and Homestake Reservoirs in lieu of Denver Water's substitution releases for Springs Utilities from Wolford Mountain Reservoir and/or Williams Fork Reservoir. As a result, the amount of water released from Montgomery Reservoir would decrease under the Proposed Action in eight months during the 56-year study period. Releases from Montgomery Reservoir would likely be passed through Elevenmile Canyon Reservoir since Elevenmile Canyon Reservoir would typically be full.

3.3.3 Cumulative Impacts

Actions that meet all of the following criteria were considered reasonably foreseeable and were included in the cumulative effects analysis:

- The action would occur within the same geographic area.
- The action would affect the same environmental resources and measurably contribute to the total resource impact.
- There is reasonable certainty as to the likelihood of the action occurring; the action is not speculative.
- There is sufficient information available to define the action and conduct a meaningful analysis.

Table 3-19
Elevenmile Canyon Reservoir
Modeled Differences in Content Between No Action and Proposed Action Alternatives (AF)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Maximum Monthly Content Decrease[1]												
No Action Content	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Proposed Action Content	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Content Change	0	0	0	0	0	0	0	0	0	0	0	0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Maximum Monthly Content Increase[1]												
No Action Content	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Proposed Action Content	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Content Change	0	0	0	0	0	0	0	0	0	0	0	0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dry Year Content (Average of 1954, 1966, 1977, 2002, 2004)												
No Action Content	95,465	95,377	95,281	95,054	94,929	94,804	94,742	94,689	94,819	95,408	95,614	95,062
Proposed Action Content	95,465	95,377	95,281	95,054	94,929	94,804	94,742	94,689	94,819	95,408	95,614	95,062
Content Change	0	0	0	0	0	0	0	0	0	0	0	0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Average Content During Substitution Years[2]												
No Action Content	95,155	94,892	94,512	93,724	93,064	92,443	92,038	91,743	91,827	92,334	92,287	91,627
Proposed Action Content	95,155	94,892	94,512	93,724	93,064	92,443	92,038	91,743	91,827	92,334	92,287	91,627
Content Change	0	0	0	0	0	0	0	0	0	0	0	0
Percent Change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[1] A decrease means that the quantity for the Proposed Action is less than the comparable quantity for the No Action alternative, and an increase means that the quantity in the Proposed Action is greater than the comparable quantity for the No Action alternative.
The maximum monthly flow increase and decrease due to the Proposed Action may occur in different years from month to month.
[2]Subsitution years during the 56-year study period include 1954, 1955, 1961, 1963, 1964, 1966, 1977, 1981, 1992, 1994, 2001, 2002, and 2004.
N/A: Not applicable.

Cumulative Effects for the Proposed Action

Cumulative changes in reservoir contents and streamflows, including those segments of the Blue and Colorado rivers potentially eligible for Wild and Scenic Rivers designation, resulting from the Proposed Action would follow a pattern similar to direct effects.

Within the Study Area for this EA, the reasonably foreseeable projects would primarily affect flows along the Colorado River from the confluence with the Williams Fork River downstream. Growth in Summit County and the exchanges applied for in

Case No. 03CW314 would affect flows in the Blue River basin, however, increased water demands and depletions are expected to occur primarily in areas below Dillon Reservoir. It is possible that flows could be reduced below the Continental-Hoosier System in late summer/early fall if Springs Utilities exercises their pending exchange rights. These additional diversions could potentially overlap with flow reductions associated with differences in substitution payback in August under the Proposed Action. However, typically flows are higher in August in years that substitution releases are made from Upper Blue Reservoir. In addition, flows in the Blue River would generally need to be higher than average for exchange potential to exist. While it is difficult to predict the frequency and magnitude that these exchange rights would be exercised, the cumulative effect of Springs Utilities' pending exchange rights is expected to be negligible to minor given the circumstances that must occur for exchange potential to exist. The Homestake Project to Blue River exchange has only been operated once in the past in late July and August in 1966.

The cumulative effects projects discussed above would likely have negligible effect on Springs Utilities' Continental-Hoosier System diversions under the Blue River Decree and their corresponding substitution obligation since that system is located high in the Blue River basin. It is possible that Springs Utilities' substitution obligation may increase slightly in the future if Xcel Energy's Shoshone Power Plant call comes on sooner and/or extends for a longer period in years that Green Mountain Reservoir does not fill.

The potential hydrologic effects associated with reasonably foreseeable actions focused on dry years since the Proposed Action would cause flow changes primarily during substitution years, which coincide with dry years. There would be negligible cumulative effects from the Proposed Action in average and wet years since flow changes in those years would be infrequent and minor and generally a result of differences in reservoir spills. In dry years, the critical low-flow period along the Colorado River that coincides with potential flow reductions under the Proposed Action is August and September. Therefore, the following analysis focuses on potential flow changes associated with reasonably foreseeable actions in dry years during August and September, which would occur in combination with flow reductions associated with the Proposed Action.

There would be no change in flows along the Colorado River in dry years due to the WGFP and Denver Water's Moffat Collection System Project because the Windy Gap Project and Denver Water already divert the maximum amount physically and legally available under their existing water rights without additional storage in their systems in those years.

The expiration of Denver Water's Contract with Big Lake Ditch would result in less depletion and a corresponding increase in flows on average in the Williams Fork River basin. This increase in flow may be translated downstream to the Colorado River depending on whether Denver Water stores additional water in Williams Fork Reservoir when their water rights are in priority.

Increased water use and wastewater discharges associated with urban growth in Grand and Summit counties would result in changes in the quantity and timing of streamflows along the Colorado River. However, cumulative changes in flows in the fall in dry years would be minor since the majority of additional water diverted for indoor use (80% to 90%) would be returned to the river as wastewater effluent. Additional diversions in the fall would also be limited since municipal water providers already typically divert the maximum amount physically and legally available under their existing water rights in dry years similar to Denver Water and the Windy Gap Project.

The reasonably foreseeable action with the greatest potential to effect flows along the Colorado River in dry years would be a reduction of Xcel Energy's Shoshone Power Plant call. Increased in-priority diversions and reduced reservoir releases for exchange and/or substitution under a call reduction would decrease flows in the Colorado River during the relaxation period. However, the Shoshone call relaxation could be invoked between March 14 and May 20, therefore, there would be no impact on flows in the months of August and September from this action.

Increased contract releases from Wolford Mountain Reservoir would increase flows in Muddy Creek below the reservoir and along the Colorado River mainstem in August and September. Since contract demands would likely be out-of-priority in dry years during the fall, contract releases would be made to cover those depletions. This increase in flow in the fall could offset decreases in flow resulting from the Proposed Action.

Reductions in releases from Williams Fork and Wolford Mountain reservoirs to meet USFWS flow recommendations for the 15-Mile Reach would decrease flows along the Colorado River downstream of the confluence of the Williams Fork during the late summer and early fall. Historical releases for fish flow purposes from 2000 through 2006 were reviewed. Typically releases are on the order of 50 to 75 cfs, however, the maximum amount released from Wolford Mountain Reservoir and Williams Fork Reservoir was 140 cfs and 150 cfs, respectively. Typically these releases are offset in terms of timing however, occasionally releases from both reservoirs are made at the same time. While releases from these reservoirs for the agreed upon flow recommendations in the 15-mile reach (i.e., 10,825 AF) would decrease in the future, it is possible a portion of this water would be released from Lake Granby instead. The ongoing 10,825 Study is evaluating options to release a portion of the 10,825 obligation from Lake Granby. This would reduce potential impacts on flows high in the basin associated with reductions in releases from Williams Fork and Wolford Mountain reservoirs.

During August and September, the Proposed Action would result in average monthly flow reductions of up to 0.2 cfs or 0.1% in dry years and 0.6 cfs or 0.2% in substitution years in the Colorado River below the confluence with the Williams Fork River. The reasonably foreseeable projects that reduce flows in August and September include increased water use due to urban growth in Grand and Summit counties and reductions in releases from Williams Fork and Wolford Mountain reservoirs for fish flow purposes. If these actions reduce average monthly flows in August and September by an additional 150 cfs in dry years below the confluence with the Williams Fork River, the incremental effect of the Proposed Action would still be a flow reduction of less than 0.4% on average at that location. A flow reduction of 150 cfs was selected because that is the maximum amount that has been released from Williams Fork Reservoir for fish flow purposes in relation to the agreed upon flow recommendations in the 15-mile reach (i.e., 10,825 AF). In August and September of dry years, the potential cumulative effects on flows along the Colorado River from the confluence with the Williams Fork River downstream to the confluence with the Blue River would primarily be a reduction in the amount of water ***added*** to the river as compared to the No Action alternative since releases for fish flow purposes and substitution payback augment flows in that reach. The Proposed Action does not cause depletions in this reach of the river.

A similar analysis was conducted for the Colorado River near Kremmling gage. The Proposed Action would result in average monthly flow reductions of up to 0.6 cfs or 0.1% in dry years and 0.8 cfs or 0.1% in substitution years in the Colorado River near Kremmling gage. The reasonably foreseeable projects that reduce flows in August and September include increased water use due to urban growth in Grand and Summit counties and reductions in releases from Williams Fork and Wolford Mountain reservoirs for fish flow purposes. If these actions reduce average monthly flows in August and September by an additional 300 cfs in dry years, the incremental effect of the Proposed Action would still be a flow reduction of less than 0.1%. A flow reduction of 300 cfs was selected because that is approximately the maximum amount that has been released from both Williams Fork and Wolford Mountain reservoirs for fish flow purposes in relation to the agreed upon flow recommendations in the 15-mile reach (i.e., 10,825 AF).

The incremental cumulative hydrologic effect of the Proposed Action would be negligible to minor in comparison to other past actions and the reasonably foreseeable actions described above. In general, the reasonably foreseeable actions would result in additional water use in the future, which would cumulatively reduce streamflows and reservoir contents in the Study Area. While the magnitude of hydrologic changes under the Proposed Action would be similar under cumulative effects, the percentage change in flows and reservoir contents under the Proposed Action may be slightly higher under cumulative effects than described for direct effects.

3.4 Hydroelectric Generation

Six hydroelectric facilities occur within the Study Area and were evaluated in this section (refer to Figure 3-1 for the location of these facilities).

1) Dillon Reservoir Power Plant
2) Roberts Tunnel Power Plant
3) Green Mountain Reservoir Power Plant
4) Shoshone Power Plant
5) Mt. Elbert Power Plant
6) Williams Fork Reservoir Power Plant

For the purposes of this analysis, it is assumed all of the power plants have the same generation efficiencies. In other words, if the same volume of water is passed through one hydroelectric facility instead of another hydroelectric facility due to an exchange or substitution, then the same power is generated.

3.4.1 Affected Environment

Dillon Reservoir Power Plant

Two power plants are associated with the Roberts Tunnel Collection System. The first is the Dillon Reservoir Power Plant, owned and operated by Denver Water, which generates power from Dillon Reservoir releases to the Blue River. The outlet works from the Dillon Reservoir are equipped with a hydroelectric generating facility, with a capacity of about 110 cfs. Power releases from Dillon Reservoir are discharged to the power plant through a penstock (pipe or conduit) branching off of the outlets works tunnel. The Dillon Reservoir Power Plant contains a single turbine with a rated capacity of 1,750 kilowatt (Kw). When possible releases from the Dillon Reservoir to the Blue River are maintained between 50 and 110 cfs, the latter being the flow required for full power generation. There is no direct flow right for the hydroelectric operation (CDWR 2007).

Roberts Tunnel Power Plant

The Roberts Tunnel Power Plant associated with the Roberts Tunnel Collection System is owned and operated by Denver Water. The Roberts Tunnel Power Plant generates power from Dillon Reservoir releases through Roberts Tunnel. Power releases from the Roberts Tunnel are conveyed to the Roberts Tunnel Power Plant through a penstock bifurcating off of the tunnel upstream of the outlet works. The power plant consists of a single turbine connected to a generator with a rated capacity of 5.5 megawatts (MW).

Green Mountain Reservoir Power Plant

The Green Mountain Reservoir Power Plant, owned and operated by Reclamation, is a 26 MW facility located at the base of Green Mountain Reservoir Dam. It is one of six power plants - the only one on the West Slope - in the C-BT Project. Green Mountain Reservoir was constructed for the primary purposes of providing replacement storage for transmountain diversions by the C-BT Project and to preserve existing and future water rights and interests on the West Slope. Power generation is a secondary purpose for Green Mountain Reservoir. Releases from the reservoir are made through the Green Mountain Reservoir Power Plant. The Green Mountain Reservoir Power Plant has a decree for 1,726 cfs (CDWR 2007).

Historically, power interference has been administered on a year–to-year basis. Springs Utilities’ operations on the Blue River impacts Reclamation’s ability to produce hydropower; therefore Springs Utilities is required to replace the power that would have been generated by the water that Springs Utilities diverts under its 1948 water rights. During the months the Blue River System is operated, Springs Utilities provides Reclamation with daily operations data. Reclamation then determines the amount of power interference calculated at a rate of 210 kilowatt-hours per AF of depletion. Since Springs Utilities owns and operates power generation facilities, power interference is typically repaid with power. Springs Utilities coordinates with WAPA to deliver the required amount of replacement power at a time and location determined by WAPA. Springs Utilities may also pay WAPA with cash.

Shoshone Power Plant

The Shoshone Power Plant, owned by Xcel Energy, is a 3 MW facility located on the mainstem of the Colorado River in Glenwood Canyon eight miles upstream of Glenwood Springs. The plant has two identical horizontal turbine-generator units. This facility has water rights to divert 1,408 cfs from the Upper Colorado River.

Water is diverted at the Shoshone Power Plant on a year-round basis, although the plant is often closed during January for maintenance and power production is curtailed in the winter in direct proportion to the decrease in flow in the river. Below 800 cfs, one unit is normally shut down and the full flow is routed through the other unit. Both units are typically operated at full capacity when the flow at Dotsero (eight miles upstream of the power plant) is 1,408 cfs or above. There is no consumptive use associated with the operation of the power plant and all diverted water is returned back to the river at a point located about three miles downstream of the diversion dam. There are no other water rights in the intervening reach of the river (CDWR 2007).

During times when the streamflow at the Dotsero gage is less than 1,408 cfs, the power plant diverts generally all of the river flow, leaving only a small amount of leakage through the diversion dam as the flow in the river throughout the three mile reach. At times when the flow is less than 1,250 or 1,408 cfs, the division engineer strictly enforces the call by the Shoshone Power Plant. The right for 1,250 cfs is senior in comparison with the majority of upstream water rights, so the Shoshone Power Plant is generally the controlling call on the river during the late summer, winter, and early spring. During unusually dry years, the Shoshone call can be enforced throughout the period of late June through mid-April of the following year. During unusually wet years, the call does not go into effect until November or December (CDWR 2007).

Mt. Elbert Power Plant

The Mt. Elbert Power Plant is a 200 MW facility owned and operated by Reclamation near Leadville, Colorado. This facility is a pumped-storage hydroelectric plant, which is a facility with both an upper and lower reservoir for water storage. It operates by releasing water for generation from the upper reservoir to the lower reservoir during periods of high demand and then pumping the water back into the upper reservoir during the evening or other periods of low demand. Pumped-storage plants allow existing off-peak generation to be shifted to peak periods, and thus reduce the need for new generating plants (Renewable Resource Generation Development Areas Task Force 2007).

The Mt. Elbert Power Plant generates hydroelectric power for the Fryingpan-Arkansas Project and supports peak capacity needs of the interconnected power system. The power generated at Mt. Elbert derives from water originally pumped from Twin Lakes Reservoir, which acts as the Mt. Elbert afterbay, and also from supplemental water delivered from Turquoise Reservoir via the Mt. Elbert conduit to the Mt. Elbert forebay. The majority of the power plant structure is below ground on the edge of Twin Lakes Reservoir. Water is stored in the forebay to build up "head" or energy before being dropped down over half a mile in elevation to the hydroelectric Mt. Elbert Plant. Water exiting the Mt. Elbert Power Plant helps to fill Twin Lakes Reservoir.

Williams Fork Reservoir Power Plant

The Williams Fork Reservoir Power Plant is a 3 MW facility on a secondary outlet from the Williams Fork Reservoir and is owned and operated by Denver Water. The primary purpose of Williams Fork Reservoir is to provide replacement water for out-of-priority diversions by Denver Water and to generate power. Power operations generally influence reservoir releases during much of the year. Depending upon the available pressure head in the reservoir and the number of turbines in operation, the flow required for hydroelectric generation ranges from about 100 cfs (1 MW) to 280 cfs (3 MW) (CDWR 2007). Most of the power generated at Williams Fork Reservoir Power Plant is provided to Reclamation as partial payment for power generation interference caused to the Green Mountain Reservoir Power Plant by Denver Water's upstream depletions to the Blue River at Dillon

Reservoir and Roberts Tunnel. The minimum flow for the power plant to function is 105 cfs and the maximum flow is 300 cfs.

3.4.2 Environmental Consequences

3.4.2.1 No Action Alternative

Under the No Action alternative, Springs Utilities would continue to operate according to the Blue River Decree during substitution years. Therefore, hydroelectric power generation would not change as a result of Springs Utilities' substitution operations. Per the Blue River Decree, Springs Utilities would continue to pay Reclamation and WAPA at Green Mountain Reservoir Power Plant on an as-needed basis for lost power generation due to their diversions from the Blue River. As a result, this alternative is expected to have no direct, indirect, or cumulative impacts on hydroelectric power generation.

3.4.2.2 Proposed Action

Under the Proposed Action, a long-term Power Interference Agreement would be formalized with Reclamation and WAPA. Under the agreement, Springs Utilities would compensate Reclamation and WAPA for lost hydropower in substitution years with power generated from their own facilities, at a time and location determined by WAPA. Springs Utilities may pay WAPA in cash or with power.

Model results indicate there would be 13 substitution years during the 56-year study period from 1950 through 2005. In those years, there would be no change in Springs Utilities' *total* substitution obligation between the No Action and Proposed Action alternatives because there would be no difference in the deficit at Green Mountain Reservoir in those years. Springs Utilities would divert the same amount of water under the Proposed Action from the Blue River at their Continental-Hoosier System diversion points. As a result, there would be little to no change in hydropower generation under the Proposed Action. However, even though the Springs Utilities' total substitution obligation would not change under the Proposed Action, the timing and sources of water used for substitution payback would change. Small changes in the timing and amount of releases from Dillon Reservoir, Green Mountain Reservoir, Homestake Reservoir, Wolford Mountain Reservoir, and Williams Fork Reservoir could have a minor impact on hydroelectric power generation.

The biggest difference in the payback of the substitution obligation under the Proposed Action would occur when the substitution obligation is greater than 2,100 AF. The substitution bill is greater than 2,100 AF in approximately seven of the substitution years during the 56-year study period. In those years, contents in the Upper Blue Reservoir would not be sufficient to fully pay back the substitution obligation. Therefore, under the Proposed Action more water would be released from Springs Utilities' accounts in Wolford Mountain and Homestake reservoirs while Denver Water's substitution releases for Springs Utilities from either Wolford Mountain Reservoir or Williams Fork Reservoir would decrease. Changes in hydropower generation at each facility due to changes in the timing and source of water used for substitution payback are discussed below.

Dillon Reservoir Power Plant

Changes in releases from Dillon Reservoir to the Blue River would occur due to small differences in reservoir end-of-month contents when Dillon Reservoir fills and spills. These flow changes would occur in part to the release of 250 AF from Upper Blue Reservoir for West Slope users in the Blue River basin under the Proposed Action. Since this water would be used to extinction it would not be available for storage in Dillon Reservoir, in which case Dillon Reservoir contents would decrease by 250 AF in substitution years under the Proposed Action. Under the No Action alternative, this water would be delivered through the Hoosier Tunnel to Montgomery Reservoir. Differences in Dillon Reservoir contents would carry forward from year to year, which would result in changes in spills in years when the reservoir fills. Since there would be no change in releases from Dillon Reservoir in the 50 cfs to 110 cfs range, there would be no change in hydroelectric power generation at the Dillon Reservoir Power Plant. No impacts are anticipated.

Roberts Tunnel Power Plant

The Roberts Tunnel Power Plant generates power from Dillon Reservoir releases through Roberts Tunnel. Since there would be no difference in the amount of water diverted through Roberts Tunnel under the Proposed Action, there would be no impact on hydropower generation at this facility. Minor changes in inflow to Dillon Reservoir described in Section 3.3.2 would result in changes in storage contents, however, there would be no impact on Roberts Tunnel deliveries since there is always sufficient storage in Dillon Reservoir and water available under the Roberts Tunnel direct flow water right to meet that demand.

Green Mountain Reservoir Power Plant

Springs Utilities would divert the same amount of water under the Proposed Action from the Blue River at their Continental-Hoosier System diversion points. As a result, hydropower generation at the Green Mountain Reservoir Power Plant would not change in substitution years under the Proposed Action. There could be a minor adverse short-term impact on hydropower generation in years that Green Mountain Reservoir fills and spills. There would be a small decrease in spills from Green Mountain Reservoir in some years under the Proposed Action, due primarily to reduced inflow when Dillon Reservoir fills. Reduced spills from Dillon Reservoir would decrease the inflow to Green Mountain Reservoir, and therefore, reduce the amount and possibly timing of spills at Green Mountain Reservoir. This could decrease the amount of water released through the Green Mountain Reservoir Power Plant, however, these changes are expected to be negligible.

Shoshone Power Plant

To evaluate potential changes in hydroelectric power generation at the Shoshone Power Plant, flow changes in the Colorado River near Kremmling were evaluated. Flow changes at this location reflect changes in the amount and timing of substitution releases from Williams Fork Reservoir and Wolford Mountain Reservoir and the amounts stored as these reservoirs refill. These changes in flows are translated downstream. Slight changes in flow may also occur due to the location, amount, and timing of HUP demands and their associated consumptive use and return flows. The maximum increases and decreases in flow would be less than 1% at the Colorado River near Kremmling, therefore, changes in hydropower generation are expected to be minor adverse and short-term.

Mt. Elbert Power Plant

Under the No Action alternative, substitution releases would not be made from Springs Utilities' Homestake Reservoir account. However, under the Proposed Action, substitution releases from Springs Utilities' account in Homestake Reservoir would occur in one year out of the 56-year study period in the amount of 469 AF, as shown in Table 3-1. Due to this substitution release, Springs Utilities' diversions through the Homestake Tunnel would decrease by a comparable amount. This decrease in diversion through the Homestake Tunnel could result in a minor adverse short-term decrease in power generation at the Mt. Elbert Power Plant under the Proposed Action.

Williams Fork Reservoir Power Plant

Changes in releases from Williams Fork Reservoir would occur due to differences in the amount and timing of water released from Williams Fork Reservoir for substitution payback. Under the Proposed Action, substitution releases from Wolford Mountain and Homestake reservoirs would increase, while substitution releases from Williams Fork Reservoir would decrease by a commensurate amount. A reduced substitution release under the Proposed Action would result in higher contents in Williams Fork Reservoir. As a result, less water would be stored in subsequent months depending on storage targets at Williams Fork Reservoir as the reservoir refills. Changes in reservoir releases in some months would also occur due to differences in the timing of substitution releases from Williams Fork Reservoir under the Proposed Action. While the total amount released from Williams Fork Reservoir would essentially be the same under both alternatives, the timing of substitution releases may be offset by a few months. Because there would be little to no change in the total amount released from Williams Fork Reservoir, changes in the total hydroelectric power generation at the Williams Fork Reservoir Power Plant would be negligible. However, there could be minor adverse short-term changes in the timing of hydroelectric power generation in some years.

3.4.3 Cumulative Impacts

The incremental hydrologic effect of the Proposed Action would be negligible to minor in comparison to other past actions and the reasonably foreseeable water-based actions considered in the cumulative effects analysis as described in Section 3.1.3. In general, the reasonably foreseeable actions relevant to this study would result in additional water use in the future, which would reduce streamflows and reservoir contents in the Study Area. While the magnitude of hydrologic changes under the Proposed Action would be similar under cumulative effects, the percentage change in flows and reservoir contents under the Proposed Action may be slightly higher under cumulative effects than described for direct effects. However, hydropower generation operations would be maintained per existing contracts at the facilities described previously. Therefore, there would be no cumulative change to operations at these power plants.

3.5 Water Quality

This section describes the existing water quality in the Study Area per the CDPHE Water Quality Control Commission (WQCC) water quality standards (classifications and designated uses) and qualitatively describes the potential effects of the No Action and Proposed Action alternatives on water quality in streams and reservoirs. Potentially affected river segments and reservoirs in the Study Area are shown in Figure 3-1. It is assumed, for the purposes of this water quality assessment, that any impacts to the existing flow conditions of a water body, may in turn, have the potential to change the existing water quality. This section provides a summary of the water quality standards for each of the affected river basins in the Study Area (river basins are shown on Figure 3-1). Any existing water quality concerns such as Total Maximum Daily Load (TMDL) and/or other use protection designations, area also included in this section.

The TMDL process is designed by the Federal Water Pollution Control Act ("Clean Water Act") to insure that all sources of pollutant loading are accounted for when devising strategies to meet Water Quality Standards. Consistent with the Section 3.3 Hydrology, the water quality assessment was conducted on a watershed/basin basis for those waterbodies identified as potentially affected. In order to be consistent with the structure of water quality standards in Colorado, water quality is evaluated on a broader basin basis for the Upper Colorado River Basin and the South Platte River Basins only; these two basins contain potentially affected stream segments.

Issues raised during scoping that relate to water quality are similar to those identified in Section 3.3 Hydrology. These issues include:

- Effects on Colorado River stream flows below the Windy Gap Project diversion point due to using Williams Fork Reservoir as a source of substitution replacement, and
- Effect of transfers on water temperatures in affected streams

In general, water quality conditions correlate to water quantity and flow conditions and therefore any potentially affected stream segments evaluated in Section 3.3 may impact water quality.

Water Quality Standards and Regulations

The “health” of a water body is measured by whether or not it is maintaining the assigned water quality standards. The Water Quality Standards Program in Colorado is a system based on protection of designated uses, also referred to as classifications. Specific uses (such as aquatic life, agriculture, and recreation) have been established by the WQCC and water quality standards (numeric criteria) have been developed to protect those uses. Different uses and standards may be assigned to different portions or segments of a water body.

In Colorado, water quality standards are set for specific water body segments through the use of statewide adopted Table Value Standards (TVS). TVS are the levels that are protective of the uses under general conditions. Segments may have TVS standards or site-specific standards. Site-specific standards require a great deal more data collection and background information to support their adoption by showing the levels would be protective of the uses of the segment.

In addition to numeric criteria to protect specific uses, WQCC has adopted numeric standards for radionuclides and narrative standards for such parameters as sediment deposition, floating debris, odor, taste, and shore deposits. A summary of the numeric criteria for the Upper Colorado and South Platte River Basins is provided in Appendix C.

Regulation No. 31, the Basic Standards and Methodologies for Surface Water (CDPHE 2008c) defines the use classifications for Recreation, Agriculture, Aquatic Life, and Domestic Water Supply.

3.5.1 Affected Environment

The Study Area encompasses portions of the Upper Colorado River and South Platte River basins. Potentially affected river segments and reservoirs in the Upper Colorado River Basin and South Platte River Basin are discussed in detail in Section 3.3 Hydrology and are presented in Figure 3-1. The existing water quality the Upper Colorado and South Platte River basins are discussed in the following sections.

Upper Colorado River Basin

The potentially affected river segments and reservoirs in the Upper Colorado River Basin are presented in Figures 3-1 and 3-17, and are listed in Table 3-20. Water quality standards for the Upper Colorado River Basin are provided in Regulation No. 33, Upper Colorado River Basin (see Appendix C) (CDPHE 2008d). The water quality appendix provides a summary of the designated uses and criteria for the waterbodies within the Upper Colorado River Basin.

Waterbodies currently not meeting water quality standards are listed on the 303(d) List and are provided on associated TMDL. The WQCC updates the 303(d) List of impaired stream segments every two years. Section 303(d) List Water-Quality Limited Stream Segments Requiring TMDLs is stated in Regulation No. 93 (CDPHE 2008e).

Table 3-20 summarizes the potentially affected stream segments within the Upper Colorado River Basin and are shown on Figure 3-17.

Table 3-20
TMDLs for the Upper Colorado River Basin

Segment/ Waterbody ID	Stream Segment	Portion	Parameters	Priority
COUCEA05a	Eagle River, Belden to Hwy 24 Bridge	All	Cu, Zn*	H
COUCEA05b	Eagle River, Hwy 24 Bridge to Martin Creek	All	Zn*	H
COUCEA05c	Eagle River, Martin Creek to Gore Creek	All	Zn*	H
COUCUC05	Lakes and Reservoirs tributary to the Colorado River from RMNP/ANRA to the Roaring Fork not on National Forest	Wolford Mountain Reservoir	D.O.	L

Source: CDPHE 2008c
Notes:
* - Carryover listings from the 1998 303(d) List; All are high priority

Cd – Cadmium	Mn – Manganese	H - High
Cu – Copper	Pb – Lead	M - Medium
D.O. – Dissolved Oxygen	Trec – Total recoverable	L - Low
Fe – Iron	Zn – Zinc	

Dillon Reservoir

The WQCC has developed a specific regulation which controls both point sources and nonpoint sources of total phosphorus to Dillon Reservoir over the long term. This regulation is based on a state-local partnership in controlling total phosphorus. Regulation No. 71, Dillon Reservoir Control Regulation (CDPHE 2007a). Specific wasteload and load (nonpoint source) allocations have been established for this reservoir. See Regulation No. 71 for specific information regarding the numeric and narrative criteria.

South Platte River Basin

Potentially affected river segments and reservoirs in the South Platte River basin are presented in Figures 3-1. Water quality standards for the South Platte River Basin are stated in Regulation No. 38, Classifications and Numeric Standards for South Platte River Basin (Appendix C) (CDPHE 2008f). There are no affected river segments within the South Platte River Basin that are classified as impaired.

3.5.2 Environmental Consequences

No Action Alternative

As described in Section 3.3.2 Hydrology, the No Action alternative would have no hydrologic impacts. Rather, stream flows and reservoir contents would continually fluctuate as they have historically under the Blue River Decree. Typically, water quality correlates with surface water fluctuations; thus no impacts to water quality are anticipated under the No Action alternative.

Proposed Action

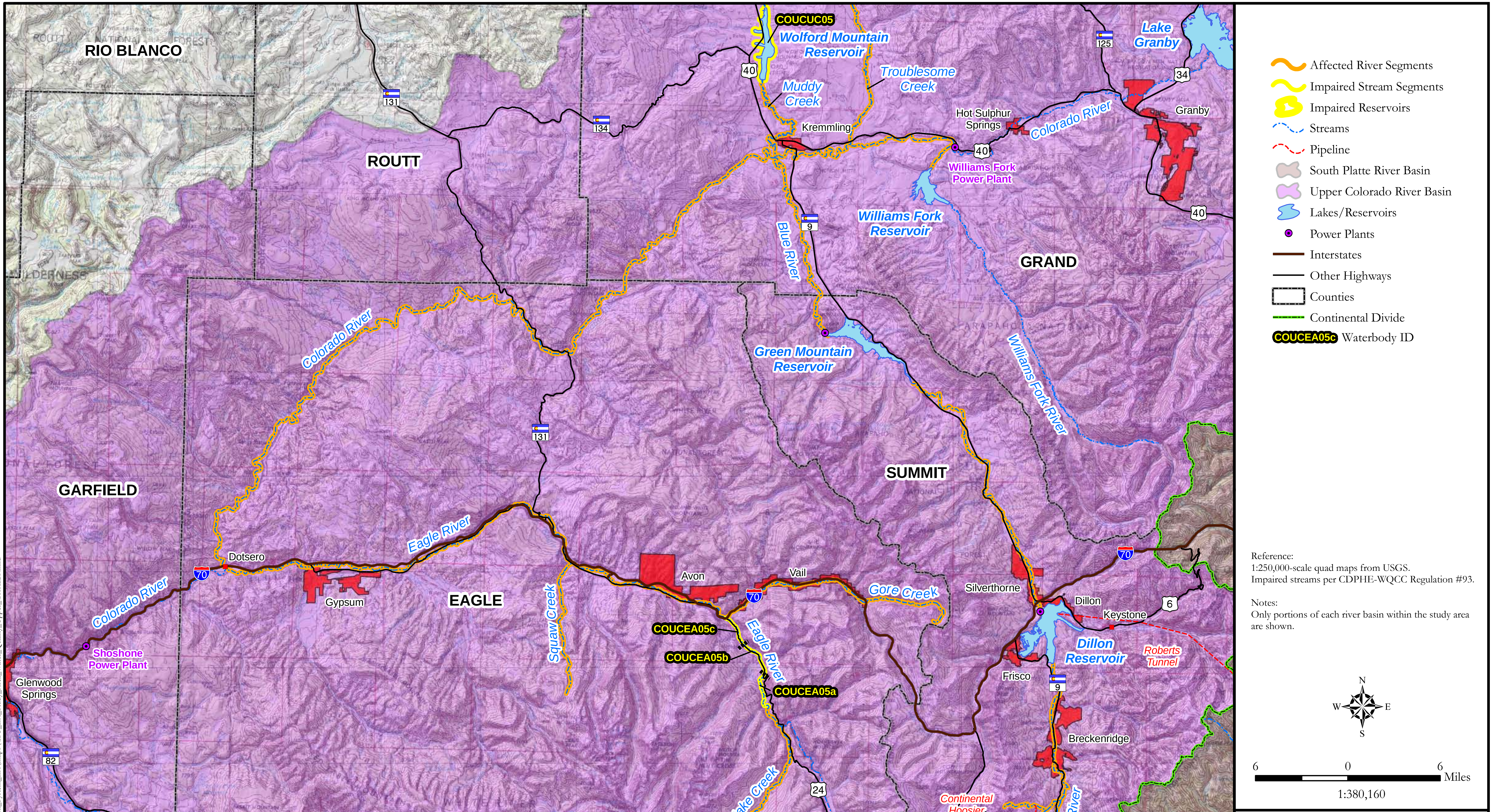
As described in Section 3.3.2 Hydrology, the Proposed Action would create none to minor short-term impacts to surface water resources. Similarly, none to minimal stream flow changes within all segments of the potentially affected rivers segments in the Upper Colorado River and South Platte River basins and fluctuations within all reservoirs in these river basins would occur infrequently during substitution years and are thus not anticipated to degrade water quality in these water bodies within the Study Area. The greatest potential for water quality impacts is for those stream segments listed in the TMDL tables for the Upper Colorado (refer to Table 3-20 and Figure 3-17). It should be noted that the CDPHE WQCC (Regulation No. 93) TMDL list is updated every two years.

Consistent with the conclusions discussed in Section 3.3.1.7, there will be little to no change in flows under the Proposed Action along the Williams Fork River, Muddy Creek, Eagle River, and Colorado River mainstem. Therefore, it is anticipated that there will be negligible water quality and temperature impacts to these river reaches.

The timing and location of the releases from reservoirs (e.g., releasing water from the base of reservoirs where the water is colder) in late summer and early fall could assist in enhancing "environmental" benefits as defined in the Grand County SMP. This management strategy is a type of administrative mitigation measure that can assist with minimizing and/or eliminating any impacts to the existing water quality and temperature in the river reaches included in the Grand County SMP.

3.5.3 Cumulative Impacts

Refer to Section 3.1.3 for a general description of the reasonably foreseeable water-based actions that are considered and to Section 3.3.3 for the cumulative impacts discussion as it relates to hydrology. As a general rule, any changes in the quantity of



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Green Mountain Reservoir Substitution and Power Interference Agreements EA

Figure 3-17
Upper Colorado River Basin Water Quality

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water in a stream or reservoir may have an effect on water quality. The timing of the change in flow, both on a daily basis and seasonal basis, and where the flow is being diverted may affect water quality.

Windy Gap Firming Project

The cumulative effect of the WGFP in reduction of flows in the Colorado River downstream of the Windy Gap diversion may have the potential to impact water quality. The water quality standards and data for the Colorado River Basin are provided in Appendix C.

There are several TMDLs listed for the Upper Colorado River (Table 3-21).

Denver Water Moffat Collection System Project

The additional diversions anticipated to result from this project, primarily from the upper Fraser River and Williams Fork River basins, may affect the water quality of those basins and specifically reduce water quality in the Colorado River, Williams Fork River, and Blue River in average and wet years primarily during runoff.

Other Increased Water Use in Grand and Summit Counties

Any construction-related activities as a result of growth in Grand and Summit counties and within the Study Area river basins have the potential to contribute pollutants to receiving waters. Increased water use and wastewater discharges are also expected to result in changes in the quantity and timing of streamflows and water quality.

Reduction of Xcel Energy's Shoshone Power Plant Call

Reduced flows as a result of any reduction in the call at Shoshone primarily may have an effect on water quality in the Williams Fork River, Muddy Creek, the Blue River, and the Colorado River Mainstem below the Windy Gap diversion and may affect the water quality along the Lower Colorado River below the point of diversion.

Changes in Releases from Williams Fork and Wolford Mountain Reservoirs to Meet USFWS Flow Recommendations for Endangered Fish in the 15-Mile Reach

Water quality standards supporting the uses for these endangered fish exist along this 15-Mile reach of the Colorado River. Any cumulative reduction in flows may affect the water quality standards supporting the designated uses for these species, such as dissolved oxygen, temperature, and increased sediment loads.

Cumulative Effects for the Proposed Action

Any changes in streamflows 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 affects. In general, the reasonably foreseeable actions described above would result in additional water use in the future, which would reduce streamflows and reservoir contents in the Study Area. While the magnitude of hydrologic changes under the Proposed Action would be similar under 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.

3.6 Aquatic Resources and Special Status Species

This section describes the aquatic resources in the Study Area and the potential environmental consequences of the Proposed Action and No Action alternatives. The alternatives could potentially affect aquatic resources through changes in flow regimes, habitat, and water quality. The aquatic resources described in this section include active river channels and fish populations. Fisheries data, specifically abundance of species locally and throughout the Study Area, was selected as a benchmark for determining the environmental consequences associated with changes to flow regimes due to the availability of historic Colorado Division of Wildlife (CDOW) fish survey data (CDOW 2008a) and detailed literature documentation of fish habitat impacts associated with changes to flow regimes. Aquatic resource evaluations can include a multitude of factors (i.e., benthic macroinvertebrates, habitat quality and water quality); however, for the purposes of this study fish species have been utilized as indicators of potential effects. No other data set encompassing the entire Study Area was as consistently useful or available to compare changes in aquatic habitat characteristics between the Proposed Action and the No Action alternatives without more intensive field evaluation. In addition, site specific resource evaluation was conducted as part of this study. A summary of the fish populations for each basin within the Study Area is provided.

This section also provides an assessment of the potential environmental consequences of the Proposed Action and No Action alternatives to aquatic habitat of special status species. In particular, the impact assessment provides an effect determination in relation to Section 7 of the Endangered Species Act (ESA) for the four endangered fish in the 15-mile reach of the Colorado River. The effect determination is included in Section 3.6.2.2 for the special status fish species and is indicated by parentheses [( )].

3.6.1 Affected Environment

The CDPHE WQCD provides a classification system for surface waters, which establishes beneficial use categories (CDPHE 2008). Waters are classified according to the uses for which they are presently suitable or intended to become suitable. Classifications may be established for any state surface waters, except water in ditches and other manmade conveyance structures. Waters assessed within the Study Area are defined as Class l – Cold Water Aquatic Life. These are waters that (1) currently are capable of sustaining a wide variety of cold water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions. Waters shall be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species. In addition, several of the waters within the Study Area are designated Gold Medal Waters by the Colorado Wildlife Commission. Gold Medal Waters are defined as lakes or streams that support a trout standing stock of at least 60 pounds per acre, and contains an average of at least 12 quality trout (any trout 14 inches or longer) per acre (CWC 2008). Potentially affected aquatic resources include active channels within sections of the Blue River, Williams Fork River, Muddy Creek, Colorado River, Homestake Creek, Eagle River, Middle Fork South Platte

River, and South Platte River (refer to Figure 3-1).

A desktop review of available CDOW fisheries survey data was utilized to provide an understanding of fish species distribution throughout the Study Area (CDOW 2008a). Data provided by the CDOW for each basin was collected using one of three methods (1) mark – recapture; (2) multi-pass removal; (3) presence – absence surveys. The CDOW surveys represent data recorded from 70 sample station locations within the Study Area between 1985 and 2007. Information presented in this section has not been field verified for accuracy.

Whirling disease was introduced to Colorado in 1987 and has spread throughout the state. Whirling disease is caused by a parasite that affects fish in the trout and salmon family. By damaging cartilage, whirling disease can kill young fish directly, or cause infected fish to swim in an uncontrolled whirling motion. This can make it impossible for them to escape predators or to effectively seek food, ultimately decimating trout populations before they have an opportunity to mature. Fish less than 13 centimeters (cm) are most at risk to whirling disease. Larger fish are less susceptible to the disease and are not affected, but may be vectors. There are also differences in the susceptibility of different trout species to the parasite, although rainbow trout and cutthroat trout are particularly susceptible. The parasite that causes the disease, *Myxobolus cerebralis*, has two hosts during its life cycle: trout and tubificid worms. All watersheds within the Study Area have tested positive for whirling disease, although particular streams within these watersheds may still be negative. Whirling disease has greatly reduced the population of rainbow trout within the Study Area basins as well as throughout Colorado. Over five hundred miles of five major trout streams (Cache La Poudre, Colorado, Gunnison, South Platte and Rio Grande rivers) are showing partial to complete loss of wild rainbow trout recruitment (CDOW 2008b).

3.6.1.1 Blue River Basin

Portions of the Blue River in the Study Area are classified as Aquatic Life Cold Class 1. The Blue River downstream of Dillon Reservoir to the confluence with the Colorado River is designated Gold Medal Waters by CDOW.

Fish population survey data at 30 separate sampling locations on the Blue River was reviewed for sampling years 1985 – 1997 (CDOW 2008a). Fish species and subspecies collected during these sampling periods are shown in Table 3-21. Dominant trout species upstream of the Green Mountain Reservoir include brook trout, rainbow trout and brown trout. Dominant species downstream of the Green Mountain Reservoir are primarily rainbow trout and brown trout.

The section of the Blue River between Dillon Reservoir and Green Mountain Reservoir is stocked annually by CDOW with small (6 inches or less) rainbow trout. CDOW also annually stocks Dillon and Green Mountain reservoirs with species that may include rainbow trout, Snake River cutthroat trout, and kokanee salmon in any given year. These fish may also move into the section of the Blue River between these two reservoirs.

3.6.1.2 Williams Fork River Basin

The Surface Water classification for the Williams Fork River downstream of Williams Fork Reservoir is Aquatic Life Cold Class 1.

Fish population survey data at 2 separate sampling locations on the Williams Fork River was reviewed for sampling years 1993-2003 (CDOW 2008a). Fish species and subspecies collected during these sampling periods are shown in Table 3-21. Brown trout, followed by rainbow trout, represent the most abundant fish species within the Williams Fork River Basin.

3.6.1.3 Muddy Creek Basin

The Surface Water classification for Muddy Creek downstream of Wolford Mountain Reservoir is Aquatic Life Cold Class 1.

Fish population survey data at 2 separate sampling locations within Muddy Creek was reviewed for sampling years 1993 and 2000 (CDOW 2008a). Fish species and subspecies collected during these sampling periods are shown in Table 3-21.

Rainbow trout represent the most abundant fish species within the Muddy Creek Basin (407 recorded in 2000), followed by brook trout (59 recorded in 2000). Kokanee salmon are also strongly represented in the September 27, 2000 sampling data at Sample Station CR 0397. These individuals probably represent species collected during a spawning run, and do not necessarily represent species living permanently within Muddy Creek.

3.6.1.4 Colorado River Basin

The surface water classification for the Colorado River below the confluence with the Williams Fork River downstream to the confluence with the Eagle River is Aquatic Life Cold Class 1. The reach of the Colorado River between Windy Gap and the confluence with Troublesome Creek is designated Gold Medal Waters by the CDOW. This section of the Colorado River is stocked annually by CDOW with small (6 inches or less) rainbow trout.

Fish population survey data at 4 separate sampling locations along the Colorado River between the confluence with the Williams Fork River and the confluence with the Eagle River was reviewed for sampling years 1993, 2003, and 2004 (CDOW 2008a). Local diversity of fish species within the Colorado River can vary temporally and spatially based on a variety of factors. Fish species and subspecies collected during these sampling periods are shown in Table 3-21. Rainbow trout and brown trout are the most abundant trout species within this reach of the Colorado River.

Special Status Fish Species in the Colorado River Basin

Water depletions to West Slope tributaries of the Colorado River may affect four endangered fish species where they occur downstream in the Colorado River. These species include bonytail chub, Colorado pike minnow, humpback chub, and razorback sucker. Critical habitat for endangered Colorado River fish extends from Rifle, Colorado downstream to Lake Powell.

The decline of these fish species throughout the Colorado Basin is a result of extensive loss, fragmentation, modification of habitat, and barriers to fish movement associated with dam construction and operations. In addition, loss of stream flows due to upstream depletions in the watershed is a major factor that has contributed to the decline of the endangered fish species. Each of these endangered fish species is discussed in more detail below.

<u>Bonytail Chub</u>

Bonytail chubs were historically found throughout the Colorado River drainage.

Wild adult bonytail have been captured in Powell, Mohave, and Havasu lakes, and in rivers within the Upper Colorado River Basin, including the Green River in Colorado and Utah and in the Colorado River, west of Grand Junction near the Colorado-Utah border. Since 1977, only 11 wild adults have been reported from the upper basin. Currently, no self-sustaining populations of bonytail chub exist in the wild (USFWS 2002a). CDOW has been stocking some bonytail chub in the river near Grand Junction.

Colorado Pikeminnow

Currently, Colorado pikeminnow occur primarily in the Green River below the confluence with the Yampa River, the lower Duchesne River in Utah, the Yampa River below the town of Craig in Colorado, the White River from Taylor Draw Dam near the town of Rangely downstream to the confluence with the Green River, the Gunnison River in Colorado, and the Colorado River from Palisade, Colorado, downstream to Lake Powell (USFWS 2002b).

Humpback Chub

Historically, humpback chubs occurred in Colorado, Green, Yampa, White and Little Colorado Rivers. Currently humpback chub populations are found in canyon portions of the Colorado River near the Colorado-Utah border at Westwater Canyon in Utah and Black Rocks in Colorado. Smaller populations inhabit the Yampa and Green rivers in Dinosaur National Monument in Colorado, Desolation and Gray canyons on the Green River in Utah, Cataract Canyon on the Colorado River in Utah and the Colorado River and Little Colorado River in the Grand Canyon in Arizona.

Razorback Sucker

In the upper Colorado River Basin, reproducing razorback suckers are currently only found in the upper Green River in Utah and in an off-channel pond of the Colorado River near Grand Junction. Razorback suckers also occur in the lower Yampa River in Colorado and Lake Powell at the mouths of the Dirty Devil, San Juan and Colorado rivers. Approximately 500 wild razorback suckers are thought to occur in the upper Colorado River basin. Most of these individuals are adults likely more than 25 years old, and are reproducing, but few young are surviving. Razorback suckers are being stocked in the Green, Colorado, Gunnison and San Juan rivers to develop and augment adult populations (CDOW 2006b).

3.6.1.5 Eagle River Basin

The surface water classification for Homestake Creek and the Eagle River below the confluence with the Homestake Creek downstream to the confluence with the Colorado River is Aquatic Life Cold Class 1.

Fish population survey data at 15 separate sampling locations within the Eagle River Basin was reviewed for sampling years 1991-2005 (CDOW 2008a). Fish species and subspecies collected during these sampling are shown in Table 3-21. Species diversity and abundance can vary greatly based on timing and location of sampling efforts. Brown trout, followed by rainbow trout and brook trout are the most abundant trout species within the Eagle River Basin. Colorado River cutthroat trout, though not the most abundant species, also appear regularly throughout sampling efforts.

3.6.1.6 South Platte River Basin

The surface water classification for the Middle Fork South Platte River and South Platte River downstream to Elevenmile Canyon Reservoir is Aquatic Life Cold Class 1 by CDPHE. The Middle Fork South Platte River downstream from the Highway 9 Bridge is designated Gold Medal Waters by the CDOW.

Fish population survey data at nine sampling locations within the South Platte River was reviewed for sampling years 1993–2005 (CDOW 2008a). Fish species and subspecies collected during these sampling periods are shown in Table 3-21. Brown trout are the most abundant species in the South Platte River Basin, followed by rainbow trout. Brook trout do not constitute a significant population (4 individuals in 1995).

Table 3-21
Fish Species Identified within Study Area Stream Reaches

Fish Species	Blue River Basin	Williams Fork River Basin	Muddy Creek Basin	Colorado River Basin	Eagle River Basin	South Platte River Basin
Brook Trout	✓		✓		✓	✓
Brown Trout	✓	✓	✓	✓	✓	✓
Rainbow Trout	✓	✓	✓	✓	✓	✓
Colorado River Rainbow Trout	✓					
Colorado River Cutthroat Trout					✓	
Kamloop Form Rainbow Trout	✓					
Emerald Lake Rainbow Trout	✓					
Rainbow Trout x Natural Hybrid	✓		✓		✓	
Steelhead Form Rainbow Trout	✓					
Snake River Cutthroat Trout	✓					✓
Kokanee (Sockeye) Salmon	✓		✓			
Cutthroat Trout	✓					
Cutthroat Trout S.U.*					✓	
Bluehead Sucker	✓			✓	✓	
Flannelmouth Sucker	✓			✓	✓	
Longnose Sucker	✓	✓		✓	✓	✓
White Sucker	✓	✓	✓	✓		✓
Creek Chub	✓		✓			
Mottled Sculpin	✓	✓	✓		✓	
Speckled Dace	✓	✓	✓	✓		
Northern Pike		✓				✓
Longnose Dace		✓		✓		✓
Chub S.U.*			✓			
Dace S.U.*			✓			
Paiute Sculpin			✓			
Sucker S.U.*			✓			
Red Shiner				✓		
Sand Shiner				✓		

Table 3-21
Fish Species Identified within Study Area Stream Reaches

Fish Species	Blue River Basin	Williams Fork River Basin	Muddy Creek Basin	Colorado River Basin	Eagle River Basin	South Platte River Basin
Roundtail Chub				✓		
Channel Catfish				✓		
Common Carp				✓		
Fathead Minnow				✓	✓	
Yellow Bullhead				✓		
Mountain Whitefish					✓	
Trout S.U*					✓	

S.U.* = Species unidentified
✓ = Species identified in CDOW samples within basin
= Species identified as a dominant species within basin

3.6.2 Environmental Consequences

The CDOW has collected routine fish population census data for each Study Area basin. Trout were selected as a reference species because of the availability of survey data throughout each Study Area basin and potential sensitivity to flow change. Within all river Study Area basins, 34 species or subspecies of fish have been documented by the CDOW. Three species, brown trout, rainbow trout and brook trout, represent over 50% of the total number of fish counted in CDOW surveys. When different trout species occur in the same high gradient river systems, they tend to occupy the suitable trout habitat in a longitudinally stratified manner from headwater areas downstream. Typically, brook or cutthroat trout tend to occupy the colder, swifter, less fertile headwater region; rainbow trout the mid-region of the river system with intermediate habitat conditions; and brown trout the deeper, lower velocity, warmer, more fertile downstream region. Although trout species can utilize different habitat during critical periods of the year, all trout require food, shelter, breeding, migratory and over-wintering habitat that could potentially be affected by flow changes.

Brown trout are the only species of fish documented at all CDOW sample stations and within all river Study Area basins. In addition, the areas potentially affected by changes in flow are primarily characterized by lower velocity, warmer downstream habitat, which is optimal habitat for brown trout, and mid-region intermediate habitat, which is optimal habitat for rainbow trout. Consistent with these habitats, brown trout represent approximately 33% of all the fish observed in the survey, followed by rainbow trout (12%). No other species accounts for more than 10% of the fish surveyed. Based on the abundance of brown and rainbow trout utilizing relatively similar habitat types, brown trout habitat requirements, as outlined by Raleigh et al., (1986) in *Habitat Suitability Index Models and Instream Flow Suitability Curves: Brown Trout*, were assessed to evaluate the effects of changes in flow between the No Action alternative and the Proposed Action.

Optimal brown trout riverine habitat is characterized by clear, cool to cold water; a relatively silt-free rocky substrate in riffle-run areas; a 50% to 70% pool to 30% to 50% riffle –run combination with areas of slow deep water; well-vegetated, stable stream banks; abundant instream cover; and relatively stable annual water flow and temperature regimes. Fundamental habitat requirements potentially affected by changes in flow are described on a life stage basis: embryo, fry, juvenile and adult.

The embryo stage includes egg incubation and fry development up to emergence from gravel. Redds are shallow depressions in the gravel substrate of a stream channel, in which spawning fish deposit eggs and sperm. When the process is complete, the female covers the redd with gravel to protect the embryos until fry emerge from the gravel. Brown trout construct well-defined redds. Waters (1976) set the optimal water depth for brown trout redd construction at 0.80 feet to 1.5 feet, with a suitable range of 0.40 feet to 2.9 feet. A range of water velocity between 1.75 feet per second (ft/s) and 2.25 ft/s is believed to be optimal, with 0.498 ft/s to 2.9 ft/s considered suitable.

A critical period for brown trout is the time between egg deposition in late summer and fall and fry emergence the following spring. Although flows must be adequate to meet the needs of the developing embryos and yolk sac fry in the gravel, abnormally low or high flows can be destructive. Generally low flow periods are most critical to adult trout. Prolonged periods of shallow water can increase temperatures and reduce the amount of dissolved oxygen, negatively affecting trout throughout all portions of their life stages.

The fry stage extends from emergence from the redd until the end of the first year of life. Dispersal of fry takes place immediately after emergence. Fry are often found in shallow, smooth bottomed stream reaches where older trout are absent. Brown trout fry are often found along the margins of rivers, in sections with water depths between 0.66 feet and 0.98 feet (Lindroth 1955; Raleigh 1986).

The juvenile stage is the second year of life. Juvenile brown trout occur at shallower depths and lower velocities than adults. Both fry and juvenile brown trout prefer velocities of less than 0.492 ft/s (Wesche 1980). As growth progresses, depths greater than 0.492 feet are preferred (Wesche 1980).

The adult stage begins when the individual reaches sexual maturity after its second year. Water depths greater than 0.492 feet and a focal point velocity of less than 0.492 ft/s are recommended for optimal adult brown trout resting and feeding habitat (Raleigh et al. 1986; Wesche 1980). During the winter, brown trout exhibit strong hiding or cover behavior. Adult brown trout tend to move into deep, low-velocity water (Bjornn 1971).

Changes in flow were evaluated to determine changes in channel characteristics potentially affecting aquatic resources within each Study Area basin. Three flow parameters were selected for evaluation: (1) depth (feet); (2) wetted perimeter (feet); and (3) velocity (ft/s).

The effects of large changes in flow parameters could significantly affect the feeding, breeding, sheltering, migratory and overwintering habitats associated with trout life histories. For instance:

- a dramatic increase in water depth could upset predator-prey interactions occurring within trout microhabitat such as pool-riffle-run areas;

- a dramatic increase in flow velocity could disrupt preferred sheltering habitat for juvenile and adult trout;
- a dramatic decrease in water depth could expose optimal spawning habitat, exposing shallow gravel areas and leaving mature fish with no potential redds;
- a dramatic decrease in flow velocity could decrease dissolved oxygen content and increase temperatures; and
- a dramatic decrease in wetted area could reduce the usable habitat available for overwintering habitat, subjecting all species to additional predator-prey related stress.

The following critical guideline thresholds were established to determine if a change in flow would effect trout and therefore the aquatic resource.

- Depths utilized by trout generally range from 0.2 feet to 5.5 feet. A water depth of greater than 0.5 feet is recommended for optimal adult brown trout resting and feeding habitat. Depths below 0.2 feet are considered critical and unusable to brown trout. Flow changes which result in water depths less than 0.4 feet are considered a potential effect. Flow change fluctuations of greater than 0.5 feet for a monthly average are also considered a potential effect. Flow changes which do not result in water depths less than 0.4 feet or fluctuations greater than 0.5 feet are considered negligible and are not expected to have discernable effects on aquatic resources.
- Wetted perimeter is the perimeter of the cross sectional area of a channel or river that is "wet". In theory, if the wetted perimeter of a river decreases, less water is available and additional substrate is exposed. Conversely, if wetted perimeter increases, more water is available in the river to aquatic resources. In regards to trout habitat, significant decreases in wetted perimeter could expose adult, embryo and young trout resulting in a potential effect. For the purpose of this EA, a conservative estimate of a 5 feet decrease or increase in wetted perimeter is considered a potential effect. Flow changes resulting in less than a 5 feet change in wetted perimeter are considered negligible and are not expected to have a discernable effect on aquatic resources.
- Velocity preferences of adult brown trout range from 0 to 0.7 ft/s for resting and 0.5 to 1.5 ft/s for feeding. A velocity of 0.5 ft/s is recommended for optimal adult brown trout resting and feeding habitat. For the purpose of this analysis, velocity below 0.5 ft/s is considered a potential effect. Monthly average changes in velocity greater than 0.5 ft/s are also considered a potential effect. Flow changes that do not result in velocities below 0.5 ft/s and fluctuations of more than 0.5 ft/s are considered negligible and not expected to have discernable effects on aquatic resources.

Differences in flow between the No Action and Proposed Action alternatives described in Section 3.2.2 Hydrology were utilized as the basis for determining potential effects to aquatic resources along affected river segments, which are described in the following sections. The hydrology comparison tables (Tables 3.1 through 3.19) were reviewed to determine the maximum *percentage* decrease and increase in average monthly flow in any month at each location. The corresponding maximum changes in flow were evaluated to determine changes in flow parameters (water depth, wetted perimeter and velocity). Channel characteristics, including average channel width, slope and cross-section shape, at key locations in the Study Area were used to calculate water depth, wetted perimeter and velocity for a given flow rate. Modeled flow parameters were then compared to the critical guideline thresholds, which were established for water depth, wetted perimeter and velocity.

Differences in reservoir contents between the No Action and Proposed Action alternatives described in Section 3.3.2 Hydrology were utilized as the basis for determining potential effects to aquatic resources in reservoirs. The Proposed Action and No Action alternatives storage contents and water levels within the reservoirs encompassed in the Study Area are very similar. Average monthly changes in content in the driest years and all substitution years are less than 1% at all reservoirs except Montgomery Reservoir. At Montgomery Reservoir, dry year average monthly contents decrease by up to 13.6% in March, as shown in Table 3-18. However, Montgomery Reservoir functions as a regulating reservoir for deliveries from the Continental-Hoosier System. The reservoir is filled each summer and then is typically drawn down to less than 1,000 AF by the end of April. Given that Montgomery Reservoir is operated as a regulating facility, it is intended to have fluctuating contents and water levels. The fluctuations in contents and levels that would occur at Montgomery Reservoir under the Proposed Action would be well within the normal range of fluctuations that have historically occurred.

Based on the magnitude and frequency of changes in reservoir contents and water levels that would occur under the Proposed Action, there would be no measurable, discernable effects on aquatic resources in the affected reservoirs.

3.6.2.1 No Action Alternative

Under the No Action alternative, Springs Utilities would continue to operate according to the Blue River Decree during substitution years. Therefore, river flows and reservoir contents would continue to fluctuate as they have historically as a result of Springs Utilities substitution operations. The No Action alternative is expected to have no direct, indirect or cumulative impacts on aquatic resources or on threatened and endangered fish species (no effect).

3.6.2.2 Proposed Action

Blue River Basin

Refer to the flow changes expected along the Blue River as described in Section 3.3.2 Hydrology. The maximum changes in flow shown in Tables 3-2 through 3-4 were used to estimate changes in water depth, wetted perimeter and velocity.

Refer to Tables 3-22 and 3-23 for the changes in water depth, wetted perimeter, and velocity expected for the No Action and Proposed Action along the Blue River. In summary, expected changes in flows along the Blue River downstream of the Continental-Hoosier System, Dillon Reservoir and the Green Mountain Reservoir under the Proposed Action would result in minimal change in flow parameters (less than: 0.04 feet change in water depth, 0.2 feet change in wetted perimeter and 0.2 ft/s change in velocity) within the aquatic environment. Flow changes of this magnitude under the Proposed Action would have no discernable effect on aquatic resources. In addition, critical threshold guidelines established for this EA as described in Section 3.6.2 would not be exceeded.

Williams Fork River Basin

Refer to the flow changes expected along the William Fork River as described in the Section 3.3.2 Hydrology. The maximum changes in flow shown in Table 3-8 were used to estimate changes in water depth, wetted perimeter and velocity.

Refer to Tables 3-22 and 3-23 for the changes in water depth, wetted perimeter, and velocity expected for the No Action and Proposed Action alternatives along the Williams Fork River. In summary, expected changes in flows along the Williams Fork River downstream of Williams Fork Reservoir would result in minimal change in flow parameters (less than: 0.03 feet change in water depth, 0.1 feet change in wetted perimeter and 0.2 ft/s change in velocity) within the aquatic environment. Flow changes of this magnitude under the Proposed Action would have no discernable effect on aquatic resources. In addition, critical threshold guidelines established for this analysis would not be exceeded.

Muddy Creek Basin

Refer to the flow changes expected along Muddy Creek as described in Section 3.3 Hydrology. The maximum changes in flow shown in Table 3-10 were used to estimate changes in water depth, wetted perimeter and velocity.

Refer to Tables 3-22 and 3-23 for the changes in water depth, wetted perimeter, and velocity expected for the No Action and Proposed Action alternatives along Muddy Creek. In summary, expected changes in flows along Muddy Creek downstream of Wolford Mountain Reservoir would result in minimal change in flow parameters (less than: 0.03 feet reduction in water depth, 0.1 feet reduction in wetted perimeter and no measurable change in velocity) within the aquatic environment. Flow changes of this magnitude under the Proposed Action would have no discernable effect on aquatic resources. In addition, critical threshold guidelines established for this analysis would not be exceeded.

Colorado River Basin

Refer to the flow changes expected along the Colorado River as described in Section 3.3.2 Hydrology. The maximum changes in flow shown in Tables 3-12, 3-13, and 3-14 were used to estimate changes in water depth, wetted perimeter and velocity.

Refer to Tables 3-22 and 3-23 for the changes in water depth, wetted perimeter, and velocity expected for the No Action and Proposed Action alternatives along the Colorado River. In summary, expected changes in flows along the Colorado River would result in minimal change in flow parameters (less than: 0.02 feet reduction in water depth, 0.1 feet reduction in wetted perimeter, and 0.1 ft/s reduction in velocity) within the aquatic environment. Flow changes of this magnitude under the Proposed Action would have no discernable effect on aquatic resources. In addition, critical threshold guidelines established for this analysis would not be exceeded.

<u>Special Status Fish Species in the Colorado River Basin</u>

Consultation with USFWS is required under Section 7 of the ESA prior to authorization of any federal action that may adversely modify critical habitat, which includes alteration of flow volume or timing (i.e., depletion). Flow depletions adversely affect the listed species by reducing peak spring and base flows that limit access to and the extent of off-channel waters such as backwaters, eddies, and oxbows, which are necessary as rearing areas for young fish. To evaluate potential depletions to the Colorado River under the Proposed Action, flows in the Colorado River downstream of the confluence with the Eagle River were evaluated.

Downstream of the Eagle River there would be no change in the average annual flow in the Colorado River under the Proposed Action since diversions at Springs Utilities' Continental-Hoosier System and the total substitution payback by Springs Utilities and Denver Water would not change. However, there would be infrequent, minor changes in the timing of flows due primarily to changes in the timing of substitution releases from Williams Fork, Wolford Mountain, and Homestake reservoirs, reservoir spills, and the additional 250 AF that would be used by West Slope users in the Blue River basin.

Monthly average flows in the Colorado River downstream of the confluence with the Eagle River would decrease by a maximum of 8.1 cfs or 0.1% in June and increase by a maximum of 4.6 cfs or 0.5% in October, as shown in Table 3-14. These changes in flow would be translated downstream along the Colorado River, but changes would be smaller relative to the total stream, which is growing. These changes in flow would not alter the water depth, wetted perimeter, or velocity by any measurable amount within the aquatic environment. In addition, critical threshold guidelines established for this analysis would not be exceeded. Flow changes of this magnitude under the Proposed Action would have no adverse effect on the endangered fish species along the Colorado River (no effect).

Eagle River Basin

Refer to the flow changes expected along Homestake Creek as described in Section 3.3.2 Hydrology. The maximum changes in flow shown in Table 3-15 were used to estimate changes in water depth, wetted perimeter and velocity.

Refer to Tables 3-22 and 3-23 for the changes in water depth, wetted perimeter, and velocity expected for the No Action and Proposed Action alternatives along Homestake Creek. In summary, expected changes in flow along Homestake Creek downstream of the Homestake Project would result in minimal change in flow parameters (less than: 0.09 feet increase in water depth, 0.5 feet increase in wetted perimeter and 0.2 ft/s increase in velocity) within the aquatic environment. Flow changes of this magnitude under the Proposed Action would have no discernable effect on aquatic resources. In addition, critical threshold guidelines established for this analysis would not be exceeded.

South Platte River Basin

Refer to the flow changes expected along the Middle Fork South Platte River as described in Section 3.3.2 Hydrology. The maximum changes in flow shown in Table 3-17 were used to estimate changes in water depth, wetted perimeter and velocity.

Refer to Tables 3-22 and 3-23 for the changes in water depth, wetted perimeter, and velocity expected for the No Action and Proposed Action alternatives along the Middle Fork South Platte River. In summary, the maximum decrease in flow would result in a reduction in water depth of 0.37 feet, a reduction in wetted perimeter of 2.0 feet and a reduction in velocity of 0.8 ft/s. The maximum

Table 3-22
Summary of Maximum Average Monthly Flow Decreases and Associated Changes in Water Depth, Wetted Perimeter, and Velocity

Location Description	Channel Parameters		Max Avg Monthly Flow Decrease			No Action Flow Parameters				Proposed Action Flow Parameters				Change in Flow Parameters		
	Average Bottom Width	Average Slope	Month	Change in Flow	% Change in Flow	Flow	Depth	Wetted Perimeter	Velocity	Flow	Depth	Wetted Perimeter	Velocity	Change in Depth	Change in Wetted Perimeter	Change in Velocity
	(ft)	(%)			(%)	(cfs)	(ft)	(ft)	(ft/s)	(cfs)	(ft)	(ft)	(ft/s)	(ft)	(ft)	(ft/s)
Blue River below the Continental-Hoosier System	27	1.93%	August	-4.6	-8.9%	51.0	0.58	30.1	3.1	46.5	0.55	30.0	3.0	-0.03	-0.10	-0.10
Blue River below Dillon Reservoir	83	0.82%	June	-4.1	-3.4%	121.1	0.64	86.5	2.2	117.0	0.63	86.4	2.2	-0.01	-0.10	0.00
Blue River below Green Mountain Reservoir	105	1.05%	August	-4.7	-0.6%	841.1	1.66	114.0	4.6	836.4	1.66	114.0	4.6	0.00	0.00	0.00
Williams Fork River below Williams Fork Reservoir	47	2.14%	March	-8.3	-11.5%	72.1	0.5	49.7	3.0	63.8	0.47	49.5	2.8	-0.03	-0.20	-0.20
Muddy Creek below Wolford Mountain Reservoir	67	0.41%	June	-5.7	-4.3%	132.9	0.96	72.1	2.0	127.2	0.93	72.0	2.0	-0.03	-0.10	0.00
Colorado River below the Confluence with the Williams Fork River	108	0.35%	March	-6.3	-3.7%	169.1	0.87	112.7	1.8	162.8	0.85	112.6	1.7	-0.02	-0.10	-0.10
Colorado River near Kremmling	317	0.59%	March	-5.9	-1.4%	411.3	0.67	320.6	1.9	405.3	0.66	320.6	1.9	-0.01	0.00	0.00
Colorado River below the confluence with the Eagle River	194	0.10%	March	-5.9	-0.9%	626.7	1.96	204.5	1.6	620.7	1.94	204.5	1.6	-0.02	0.00	0.00
Homestake Creek below Homestake Project	17	0.83%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Middle Fork South Platte River below Montgomery Reservoir	21	1.03%	August	-34.1	-61.6%	55.3	0.85	25.6	2.8	21.2	0.48	23.6	2.0	-0.37	-2.00	-0.80

Table 3-23
Summary of Maximum Average Monthly Flow Increases and Associated Changes in Water Depth, Wetted Perimeter, and Velocity

Location Description	Channel Parameters		Max Avg Monthly Flow Increase			No Action Flow Parameters				Proposed Action Flow Parameters				Change in Flow Parameters		
	Average Bottom Width	Average Slope	Month	Change in Flow	% Change in Flow	Flow	Depth	Wetted Perimeter	Velocity	Flow	Depth	Wetted Perimeter	Velocity	Change in Depth	Change in Wetted Perimeter	Change in Velocity
	(ft)	(%)			(%)	(cfs)	(ft)	(ft)	(ft/s)	(cfs)	(ft)	(ft)	(ft/s)	(ft)	(ft)	(ft/s)
Blue River below the Continental-Hoosier System	27	1.93%	November	4.2	21.8%	19.3	0.33	28.8	2.1	23.5	0.37	29.0	2.3	0.04	0.20	0.20
Blue River below Dillon Reservoir	83	0.82%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Blue River below Green Mountain Reservoir	105	1.05%	October	1.2	0.5%	241.8	0.79	109.3	2.9	243.0	0.79	109.3	2.9	0.00	0.00	0.00
Williams Fork River below Williams Fork Reservoir	47	2.14%	June	3.4	2.5%	134.1	0.72	50.9	3.8	137.4	0.73	51.0	3.8	0.01	0.10	0.00
Muddy Creek below Wolford Mountain Reservoir	67	0.41%	October	6.1	4.4%	137.2	0.97	72.2	2.0	143.3	1.00	72.4	2.1	0.03	0.20	0.10
Colorado River below the Confluence with the Williams Fork River	108	0.35%	October	1.4	0.9%	158.9	0.84	112.5	1.7	160.4	0.84	112.5	1.7	0.00	0.00	0.00
Colorado River near Kremmling	317	0.59%	October	4.6	0.7%	636.4	0.87	321.7	2.3	641.0	0.87	321.7	2.3	0.00	0.00	0.00
Colorado River below the confluence with the Eagle River	194	0.10%	October	4.6	0.5%	858.8	2.36	206.7	1.8	863.4	2.36	206.7	1.8	0.00	0.00	0.00
Homestake Creek below Homestake Project	17	0.83%	August	7.6	18.1%	42.1	0.87	21.7	2.5	49.8	0.96	22.2	2.7	0.09	0.50	0.20
Middle Fork South Platte River below Montgomery Reservoir	21	1.03%	August	4.3	14.6%	29.6	0.59	24.2	2.2	33.9	0.64	24.4	2.4	0.05	0.20	0.20

increase in flow would result in an increase in water depth of 0.05 feet, an increase in wetted perimeter of 0.2 feet and an increase of velocity of 0.2 ft/s (Table 3-23).

In summary, the changes in flow along the Middle Fork of the South Platte River downstream of Montgomery Reservoir would result in minimal change in flow parameters (less than: 0.37 feet change in water depth, 2.0 feet change in wetted perimeter and 0.2 ft/s change in velocity) within the aquatic environment. Flow changes of this magnitude under the Proposed Action would have no discernable effect on aquatic resources. In addition, critical threshold guidelines established for this analysis would not be exceeded.

3.6.3 Cumulative Impacts

Cumulative impacts of reasonably foreseeable water-based actions are summarized in Section 3.3.3. Reasonably foreseeable projects would likely result in cumulative changes in flow that could have a potential effect on aquatic resources.

In general, reasonably foreseeable actions would result in additional water use in the future, which would reduce streamflows and reservoir contents and levels in the Study Area. While the magnitude of hydrologic changes caused by the Proposed Action would be similar under cumulative effects, the percentage change in flows and reservoir contents under the Proposed Action may be slightly higher under cumulative effects than described for direct effects. This could result in a slightly greater effect on aquatic resources in the Study Area. The analysis of potential flow changes in dry years due to reasonably foreseeable actions described in Section 3.3.3 showed that the incremental cumulative hydrologic effect of the Proposed Action would be negligible to minor in combination with other past actions and the reasonably foreseeable actions described in Section 3.1.3. Because the Proposed Action would have no discernable effect on aquatic resources under direct effects it is likely that the incremental effect of the Proposed Action on aquatic resources under cumulative effects would be negligible to minor in combination with the reasonably foreseeable actions..

3.7 Wetland and Riparian Resources and Special Status Species

This section describes the existing wetland and riparian resources in the Study Area and the effects of the Proposed Action and No Action alternatives on these resources. An evaluation of special status species associated with wetland and riparian areas within the Study Area is also provided in this section. The effect determination is included in Section 3.7.2.2 for the special status species and is indicated by parentheses [( )].

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. The Study Area basins associated with this EA provide suitable conditions for wetland and riparian resources that could potentially be affected by the Proposed Action.

Wetlands

Wetlands are valuable biological resources that perform many functions including groundwater recharge, flood flow attenuation, erosion control, and water quality improvement. They also provide habitat for many plants and animals.

Wetlands have three general diagnostic characteristics; hydrophytic vegetation, hydric soils, and wetland hydrology.

Riparian Areas

Riparian areas generally serve as transitional zones between active river channels and uplands. They are vegetated corridors that border creeks, rivers, or other bodies of water.

Because of their proximity to water, topographic relief, and high degree of vegetative cover, these areas provide a unique and important habitat for many plant and animal species. From a watershed perspective, riparian areas occupy only a small percentage of the land; however, they represent an extremely important component of the overall landscape by performing many of the same functions as wetlands such as trapping sediment and pollutants, absorbing excess nutrients from runoff, attenuating flood flow, moderating water temperature, and providing habitat for wildlife.

Riparian habitats are often viewed as an element of wetlands as a result of their hydrologic similarities; however, they differ in that riparian areas are generally linear, more terrestrial, and are often dependent on the varying flow regimes of rivers (Naiman and Latterell 2005). Riparian areas are not typically classified as wetland because they often do not meet the general diagnostic characteristics established by the USACE and U.S. Environmental Protection Agency (EPA).

Wetland and Riparian Resource Assessment

A qualitative assessment of wetland and riparian resources was used to describe the affected environment within the Study Area, which included documentation of existing wetland/riparian resources and the general magnitude of these habitat types within the Study Area. The wetland information included in this assessment was derived from 44 National Wetland Inventory (NWI) Maps produced by the USFWS (USFWS 1983; USFWA 1984). Review of the CDOW Natural Diversity Information Source (NDIS) digital riparian vegetation mapping was also conducted to further identify wetland and riparian resources within the Study Area.

NWI Maps were developed by the USFWS as topical overlays to the USGS Quadrangle (Quad) Maps. The data represents the extent, approximate location, and type of wetlands and deepwater habitats; however it is in no way intended as a formal wetland delineation or federal jurisdictional determination.

The methodology used to assess the wetland and riparian resources in the Study Area included a visual review of NWI maps to determine the type of wetlands and river habitats located within each Study Area basin. The percent cover of wetland and river type was then visually estimated and compiled for each length of potentially affected river segment. The data collected from the NWI maps was compiled to determine a relative coverage estimate for the length of the river basin within the Study Area (Table 3-24). The following sections provide a description of the wetland types present (as defined by the Cowardin et al. wetland classification system) within the Study Area basins.

Riverine

Riverine Systems are all wetlands and deepwater habitats contained within a channel except those wetlands which (1) are dominated by trees, shrubs, persistent emergents, emergent mosses or lichens and (2) which have habitats with ocean derived salinities in excess of 0.5 parts per thousand (ppt) (Cowardin 1979).

Within the Riverine classification, stream systems can be further categorized as Upper Perennial (R3) and Lower Perennial (R2).

Palustrine

Palustrine Systems are all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens and all such tidal wetlands where ocean derived salinities are below 0.5 ppt. This category also includes wetlands lacking such hydric vegetation but with all of the following characteristics: (1) area less than 20 acres, (2) lacking an active wave formed or bedrock boundary, (3) water depth in the deepest part of the basin is less than 6.6 feet at low water and (4) ocean derived salinities less than 0.5 ppt (Cowardin 1979).

Within the Palustrine classification, wetlands can be further categorized into Emergent (PEM), Scrub-Shrub (PSS), Forested (PFO), and Aquatic Bed (AB) Subsystems.

Additional qualifiers exist for both Riverine and Palustrine Systems with regard to substrate type (Class and Subclass). However, the level of detail required for this assessment did not necessitate the utilization of these additional qualifiers.

Review of the CDOW riparian vegetation mapping was also conducted to further qualitatively identify riparian resources within each Study Area basin. This review documented the type and relative coverage of riparian resources depicted by the CDOW riparian vegetation mapping within the Study Area basins. The CDOW riparian mapping was incomplete for some basins and not available in other basins. Mapping was not available for review in the Muddy Creek Basin.

3.7.1 Affected Environment

Potentially affected wetland and riparian resources include areas immediately adjacent to or within sections of the Blue River, Williams Fork River, Muddy Creek, Colorado River, Homestake Creek, Eagle River, Middle Fork South Platte River, and South Platte River. The data provided in this section is based on visual relative estimates of the type of habitat and is intended to provide an understanding of magnitude and composition of wetland and riparian resources within the Study Area basins (Table 3-24). The information presented in this section has not been investigated on the ground for accuracy.

Table 3-24
Dominant Riparian and Wetland Classifications in the Study Area

	Cowardin Classification System							**Colorado Division of Wildlife**
	Riverine		**Palustrine**					
	Upper Perennial (R2)	***Lower Perennial (R3)***	***Emergent (PEM)***	***Scrub-Shrub (PSS)***	***Forested (PFO)***	***Aquatic Bed (PAB)***	***Total Wetland Cover***	***Dominant Vegetation Classification***
Blue River Basin	N/A	74%	17%	9%	<1%	N/A	100%	riparian herbaceous, riparian shrub
Muddy Creek Basin	N/A	77%	15%	7%	1%	N/A	100%	N/A
Colorado River Basin	N/A	75%	10%	10%	≈ 2.5%	≈ 2.5%	100%	riparian herbaceous, riparian shrub
South Platte River Basin	20%	40%	30%	10%	<1%	N/A	100%	riparian herbaceous
Eagle River Basin	N/A	70%	15%	10%	≈2.5%	≈2.5%	100%	riparian deciduous, riparian herbaceous
Williams Fork River Basin	N/A	75%	≈ 12.5%	≈12.5%	N/A	N/A	100%	riparian evergreen, riparian shrub

Blue River Basin

Approximately 63 miles of the Blue River was assessed. The river type through the length of the basin is classified as R3, with an approximate average cover of 74%. The dominant wetland type is PEM, with an approximate average cover of 17%, followed by PSS wetland with an approximate average cover of 9%. Areas of PFO wetland were noted along the river; however cover was negligible at approximately 1%. Wetlands adjacent to the Blue River were minimal throughout the Study Area. The total average cover for wetlands adjacent to the Blue River is approximately 27% (Table 3-24).

CDOW riparian vegetation mapping is incomplete within the Blue River Basin. Based on a review of available CDOW riparian vegetation mapping for the affected river reach, the dominant vegetation types along the river consist of riparian herbaceous – both general and sedges/rushes/mesic grasses and riparian shrub – willow.

Williams Fork River Basin

Approximately 2.1 miles of the Williams Fork River was assessed. NWI Maps were not available for the potentially affected reach below Williams Fork Reservoir; therefore percent cover estimates of wetlands along this reach were not completed. Because of relatively similar geographic characteristics, wetland and riparian resources are assumed to be similar to that of the Blue River and the Muddy Creek Basins. For the purpose of this assessment, the river type through the length of the system is assumed classified as R3, with an approximate average cover of 75%.

The remaining dominant wetland type is assumed a mix of PSS, PEM, and PFO with an approximate average cover of 25% (Table 3-24). Based on a review of available CDOW riparian vegetation mapping for the affected river reach, the dominant vegetation types along the river consist of riparian evergreen and riparian shrub – willow.

Muddy Creek Basin

Approximately 10.5 miles of Muddy Creek was assessed. The river type through this reach is classified as R3, with an approximate average cover of 77%. The dominant wetland cover type is PEM, with an approximate average cover of 15%, followed by PSS wetland with an approximate average cover of 7%. Areas of PFO wetland were noted along the river; however cover was negligible at approximately 1% (Table 3-24). Wetlands adjacent to the Muddy Creek were minimal throughout the Study Area. The total average cover for wetlands adjacent to the Muddy Creek is approximately 23%. CDOW riparian vegetation mapping was not available for review within the Muddy Creek Basin.

Colorado River Basin

Approximately 84.5 miles of the Colorado River was assessed. The dominant river type through the system is R3, with an approximate average cover of 75%. The dominant wetland cover types are PEM with an approximate average cover of 10% and PSS with an approximate average cover of 10%. Areas of PFO and PAB wetland were noted along the river; however cover was negligible at approximately 5% (Table 3-24). The majority of the Study Area basin had minimal wetland complexes located adjacent to the river. The total average cover for wetlands adjacent to the Colorado River is approximately 25%.

Based on review of available data CDOW riparian vegetation mapping for this affected river reach, the dominant vegetation types along the river consist of riparian herbaceous – both general and sedges/rushes/mesic grasses and riparian shrub – willow. Long sections of the river were noted where no riparian vegetation was mapped. These areas appear to be sections where the river has steep banks and is deeply incised.

Eagle River Basin

Approximately 63.8 total miles of river was assessed, including 13.45 miles of Homestake Creek and 50.3 miles of Eagle River.

The entire length of affected river is categorized as R3, with an approximate average cover of 70%. Wetland habitat through this reach of the Eagle River is dominated by PSS (average cover of 15%), followed by PEM (average cover of 10%). Areas of PFO and PAB wetland were noted along the river; however cover was minimal at less than 5% (Table 3-24). Large sections of the Eagle River were observed to be highly channelized, resulting in minimal wetland complex development adjacent to the river channel.

CDOW riparian vegetation mapping is incomplete within the Eagle River Basin. Based on review of available data for the affected river reach, the dominant vegetation types consists of riparian deciduous cottonwood trees and riparian herbaceous consisting of sedges, rushes and mesic grasses.

South Platte River Basin

The area assessed in the Upper South Platte River basin includes approximately 52.4 miles of river. The upper reach of the river is characterized as R3 (with an average cover of 40%) and the lower reach is characterized as R2 (with an average cover of 20%). Wetland habitat was dominated by PEM wetlands, with an average of approximately 30% cover. PSS cover along the river was approximately 10%; areas of PFO and PAB wetland were noted along the river, however cover was negligible (Table 3-26). The river is characterized by a meandering pattern, resulting in the existence of large wetland complexes adjacent to the channel along the length of the reach assessed.

Based on review of available CDOW riparian vegetation mapping for this river reach, the dominant vegetation type in the basin is riparian herbaceous – both general and sedges/rushes/mesic grasses. The river is highly meandering and the majority of the section assessed had mapped riparian vegetation along the banks.

Special Status Species Associated with Wetland and Riparian Areas

Special status species include federal and state listed threatened, endangered, and candidate species. Federally-listed species are protected under the ESA and Bald and Golden Eagle Protection Act while state listed species are protected under Colorado State law. Bald eagle (*Haliaeetus leucocephalus),* boreal toad (*Bufo boreas boreas),* and river otter (*Lontra Canadensis)* have been documented to occur, or have the potential to occur within the Study Area.

Bald eagles mainly subsist on fish, waterfowl, and carrion but are also opportunistic feeders and often rely on rabbits and ground squirrels (Griffin et al. 1982). In Colorado, nest trees are located in various forest types from old-growth ponderosa pine to linear groups of riparian woodland. Nests and roosts are usually located in tall trees near water in areas free of human activity and development. Roost sites are trees that provide diurnal and/or nocturnal perches for less than 15 wintering bald eagles and includes a ¼-mile buffer zone (NDIS 2005). An active bald eagle nest is located just west of the western end of the Colorado River segment, west of the town of Parshall. This segment of the Colorado River is used by bald eagles during winter foraging and the western end of the segment is a foraging area in summer (NDIS 2005). Two inactive nests and several bald eagle roost sites are located along the Blue River. Inactive nests are defined as nests in which neither courtship, breeding, or brooding activity has been observed at any time during the last 5 years (NDIS 2005).

River otters inhabit high-quality, perennial rivers that support abundant fish or crustaceans within many habitats ranging from semi-desert shrublands to montane and subalpine forests. Other habitat features that may be important include the presence of ice-free reaches of stream in winter, water depth, stream width, and suitable access to shoreline (Fitzgerald et al. 1994). An approximately 0.5-mile reach of the Colorado River, two 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 2006). River otters have also been documented in the Blue River between the Town of Silverthorne and Green Mountain Reservoir (McKinney 2001; Taylor Young 2000). CDOW has identified only a small area of river otter range several miles north of the town of Silverthorne (NDIS 2006).

Historic records indicate boreal toads were present along the Williams Fork River (CDOW 2005). Areas of potential habitat include shallow, abandoned, or active beaver ponds and other areas of still, shallow water. The Colorado Natural Heritage Program (CNHP) monitors and surveys boreal toads in Colorado; non-breeding boreal toads were surveyed in Williams Fork River in 2005 (CNHP 2005). Boreal toads have also been recorded from the Blue River watershed (Keinath and McGee 2005), however, the habitat conditions along the river in the Study Area are only marginally suitable to support the species.

3.7.2 Environmental Consequences

Over 75% of the potentially affected river Study Area basins are classified as R3. This river type is typically lined with cobbles or gravel and has very little floodplain development due to rapidly moving water (Cowardin 1979). Wetland or riparian areas along these river types are typically narrow and less developed if at all present. However, water typically moves through these systems throughout the year. One basin section, the Middle Fork of the South Platte River in its lower reaches, was characterized as R2. This type of river system typically has flowing water throughout the year and a substrate that consists mainly of sand and mud. The gradient is lower than the R3 system, which allows for a relatively more developed floodplain. Thus, wetland or riparian areas along this type of river are typically larger and more complex.

The correlation between in-channel river flows and adjacent wetland/riparian habitat is very site specific and not easily determined for an entire river basin without more intensive field evaluation. Wetlands and riparian areas may be directly connected to flows of a river system, with sustaining hydrology provided by in-channel flows. Other wetland and riparian areas may be directly connected to inflows from other sources draining towards the river and not directly connected to in-channel flows. As a general theoretic rule, the less water available within a river system, the less water will be available for wetland and riparian resources. As in-channel flows increase and water depths become higher more water is available to adjacent wetland and riparian resources. As in-channel flows decrease depths become lower and less water is available to adjacent wetland and riparian resources. In addition, as in-channel flows decrease, groundwater hydrologic gradient can increase, creating additional drainage of adjacent wetland and riparian resources.

Differences in flow between the No Action and Proposed Action alternatives described in Section 3.3 were utilized as the basis for determining potential effects to wetland and riparian resources. The hydrology comparison tables (Tables 3.2 through 3.19) were reviewed to determine the maximum percentage increase and decrease in average monthly flow in any month at each location. The corresponding maximum changes in flow were evaluated to determine changes in flow parameters (water depth and wetted perimeter). Changes in flow parameters were calculated using average channel width, slope and cross-section shape at each location.

Two flow parameters were selected as they related to this resource, including depth (feet) and wetted perimeter (feet). These flow parameters were selected as part of this analysis as indicators of potential effects to wetland and riparian resources immediately adjacent to the river channels. Large changes in these flow parameters under the Proposed Action could be considered an effect to the resources. Modeled flow parameters were compared to critical guideline thresholds, which were established for water depth and wetted perimeter.

The following critical guideline thresholds were established to determine if changes in flow could potentially affect wetland and riparian resources:

- Depth: Wetlands and riparian resources are typically adapted to tolerate seasonal relatively short duration increases and decreases in stream flows (i.e., flooding and drying). However, for the purposes of this study, flow changes which result in a monthly average fluctuation in water depth of more than 0.5 feet are considered a potential effect. Flow changes that result in water depth fluctuations of less than 0.5 feet are considered negligible and expected to have no discernable effect on the resource.
- Wetted Perimeter: Wetted Perimeter is the perimeter of the cross sectional area of a channel or river that is "wet". In theory, if the wetted perimeter of a river decreases, less water is available to the adjacent wetland and riparian resources. Conversely, if wetted perimeter increases, more water is available in the river to the adjacent wetland and riparian resources. For the purpose of this study a conservative estimate of a 5 feet decrease or increase in the wetted perimeter is considered a potential effect. Flow changes resulting in a change in wetted perimeter less than 5 feet are considered negligible and expected to have no discernable effect on the resource.

3.7.2.1 No Action Alternative

Under the No Action alternative, Springs Utilities would continue to operate according to the Blue River Decree during substitution years. Therefore, river flows and reservoir contents would continue to fluctuate as they have historically as a result of Springs Utilities' substitution operations. This alternative is expected to have no direct, indirect or cumulative impacts on streamflows or reservoirs. Therefore, the No Action alternative is expected to have no direct, indirect or cumulative impacts on wetland or riparian resources within the Study Area. Likewise, there are no anticipated impacts (no effect) to special status species associated with wetland and riparian areas under the No Action alternative.

3.7.2.2 Proposed Action

Blue River Basin

Refer to Section 3.6.2.2 for a discussion of maximum flow increases and decreases and the associated changes in water depth and wetted perimeter along the Blue River downstream of the Continental-Hoosier System, Dillon Reservoir and the Green Mountain Reservoir. Flow changes of this magnitude and frequency would have no effect on the adjacent wetland and riparian resources. In addition, the critical threshold guidelines established for this study would not be exceeded.

Williams Fork River Basin

Flow changes along the Williams Fork River would likely occur under the Proposed Action as described in the Section 3.3.2 Hydrology.

Refer to Section 3.6.2.2 for a discussion of maximum flow increases and decreases and the associated changes in water depth and wetted perimeter along the Williams Fork River. Flow changes of this magnitude and frequency would have no effect on the adjacent wetland and riparian resources. In addition, the critical threshold guidelines established for this study would not be exceeded.

Muddy Creek Basin

Flow changes along Muddy Creek would likely occur under the Proposed Action as described in the Section 3.3.2 Hydrology.

Refer to Section 3.6.2.2 for a discussion of maximum flow increases and decreases and the associated changes in water depth and wetted perimeter along Muddy Creek. Flow changes of this magnitude and frequency would have no effect on the adjacent wetland and riparian resources. In addition, the critical threshold guidelines established for this study would not be exceeded.

Colorado River Basin

Flow changes along the Colorado River would likely occur under the Proposed Action as described in the Section 3.3.2 Hydrology.

Refer to Section 3.6.2.2 for a discussion of maximum flow increases and decreases and the associated changes in water depth and wetted perimeter along the Colorado River. Flow changes of this magnitude and frequency are expected to have no effect on the adjacent wetland and riparian resources. In addition, the critical threshold guidelines established for this study would not be exceeded.

Eagle River Basin

Flow changes along Homestake Creek and the Eagle River would likely occur under the Proposed Action as described in the Section 3.3.2 Hydrology.

Refer to Section 3.6.2.2 for a discussion of maximum flow increases and decreases and the associated changes in water depth and wetted perimeter along Homestake Creek. Flow changes of this magnitude and frequency would have no effect on the adjacent wetland and riparian resources. In addition, the critical threshold guidelines established for this analysis would not be exceeded.

South Platte River Basin

Flow changes along the Middle Fork South Platte River and South Platte River would likely occur under the Proposed Action as described in the Section 3.3.2 Hydrology.

Refer to Section 3.6.2.2 for a discussion of maximum flow increases and decreases and the associated changes in water depth and wetted perimeter along the Middle Fork South Platte River. While changes in flow along the Middle Fork of the South Platte River downstream of Montgomery Reservoir indicate some of the largest flow parameter changes calculated as part of the assessment, the changes still indicate relative insignificant effect on wetland and riparian resources. Flow changes of this magnitude as part of the Proposed Action would have no effect on the adjacent wetland and riparian resource. In addition, critical threshold guidelines established for this analysis would not be exceeded.

Special Status Species Associated with Wetland and Riparian Areas

No ground disturbing activities associated with the Proposed Action would occur in the Study Area that would directly impact special status species' habitat. Thus, potential impacts to special status species were assessed in relation to the changes in hydrology described in Section 3.3. Habitat for bald eagles, river otters and boreal toads occur along the Colorado and Blue rivers. As previously described, flow changes associated with the Proposed Action would have no impact (no effect) on the adjacent riparian/wetland habitats that sustain these special status species in the Study Area.

3.7.3 Cumulative Impacts

Cumulative impacts of reasonably foreseeable water-based actions are summarized in Section 3.3.3. These projects would likely result in changes in flow that could have a potential effect on wetland and riparian resources.

In general, reasonably foreseeable actions would result in additional water use in the future, which would reduce streamflows and reservoir contents in the Study Area. While the magnitude of hydrologic changes caused by the Proposed Action would be similar under cumulative effects, the percentage change in flows and reservoir contents under the Proposed Action may be slightly higher under cumulative effects than described for direct effects. This could result in a slightly greater effect on wetland and riparian resources in the Study Area. The analysis of potential flow reductions in dry years due to reasonably foreseeable actions described in Section 3.3.3 showed that the incremental cumulative hydrologic effect of the Proposed Action would be negligible to minor in combination with other past actions and the reasonably foreseeable actions described in Section 3.1.3. Because the Proposed Action would have no effect on wetland and riparian resources under direct effects it is likely that the incremental effect of the Proposed Action on wetland and riparian resources under cumulative effects would be negligible to minor in combination with the reasonably foreseeable actions previously described.

3.8 Recreation

This section provides an overview of existing recreational resources within the Study Area and evaluates the potential effects of the No Action and Proposed Action alternatives.

During scoping for this project, the following comments were recorded that were considered for this recreational analysis (URS 2008):

- Effect of implementing the 2003 MOAs on stream flow variations including, effect on recreational uses, in particular the Blue River (kayaking and fishing)
- Effects of changes in streamflow and reservoir contents on fish habitat and subsequently fishing opportunities
- The effect of streamflow changes on stream reaches deemed eligible for BLM Wild and Scenic River designation

3.8.1 Affected Environment

Numerous recreational opportunities exist in the potentially affected reaches of streams and reservoirs within the Study Area. The primary recreational opportunities in the streams include fishing, rafting, and kayaking. Fishing can occur on all public sections of the streams and with landowner permission, on many of the private land parcels. One of the higher use areas for fishing along the Blue River is the 10 miles of public access from the Dillon Reservoir Dam to Green Mountain Reservoir. The Breckenridge Kayak Park is located on the Blue River within the Study Area. Indirect recreational uses also come from streams within the Study Area including snowmaking for ski areas in Breckenridge and Vail and irrigation for golf courses.

Several reservoirs are located within the Study Area. The recreational opportunities within each reservoir and on the surrounding property of each reservoir are described below.

Dillon Reservoir provides boating, canoeing, kayaking, sailboarding, fishing, and wildlife viewing within the reservoir. Other recreational opportunities on the property include camping, hiking, and biking in the summer; and cross-country skiing and ice fishing in the winter. Green Mountain Reservoir is used for boating and fishing. Recreational activities in the area include hiking, biking, off-highway vehicle (OHV) riding, snowmobiling, wildlife viewing, and camping. Several rental cabins are located at the south end of the reservoir.

Wolford Mountain Reservoir is used for boating, canoeing, kayaking, fishing, and water sports such as jet skiing. Recreational activities in the area include camping, picnicking, hiking, biking, and volleyball. Recreational opportunities in and around Williams Fork Reservoir include fishing, ice fishing, boating, sailboarding, canoeing, kayaking, camping, picnicking, wildlife viewing, and big game hunting.

Elevenmile Canyon Reservoir is contained within Eleven Mile State Park. Recreational activities within this park include biking; wildlife viewing; boating, including winter ice boating; canoeing; kayaking; sailboarding; camping, including backcountry camping and winter camping; cross-country skiing; educational programs; fishing, including ice fishing; big game, small game, and water fowl hunting; ice skating; OHV riding; and picnicking.

Upper Blue Reservoir and Montgomery Reservoir are used for fishing. Hiking trails exist in the areas surrounding these reservoirs. Homestake Reservoir is used for boating and fishing. Recreational opportunities around the reservoir include hiking and biking.

Gold Medal waters are the highest quality cold water habitats and have the capability to produce many quality size (14 inches or longer) trout (Colorado Wildlife Commission 2008). Several waters within the Study Area are designated Gold Medal waters:

- Below the Dillon Reservoir dam (Denver Water no date).
- The Middle Fork South Platte River from the confluence of the Middle Fork and South Fork downstream to Spinney Mountain Reservoir (CDOW 2008).
- Spinney Mountain Reservoir (CDOW 2008).
- The South Platte River at the outlet of Spinney Mountain Reservoir downstream to the inlet of Elevenmile Reservoir (CDOW 2008).
- The Colorado River between Windy Gap and the confluence with Troublesome Creek (CDOW 2008). This section is partially within the project Study Area.

As described in Section 3.3.1.7, Grand County is currently developing a SMP for the County. Some of stream reaches evaluated in the SMP overlap portions of the Colorado and Blue rivers that were evaluated in the EA. Appendix D of the Phase 2 SMP defines water users flow recommendations for maintaining recreational activities including kayaking, rafting and angling in these reaches (Grand County 2008). The table below summarizes minimal and optimal flows for recreational activities in the Colorado River from the confluence with the Williams Fork River downstream and Blue River downstream of Green Mountain Reservoir as defined in Phase 2 of the SMP.

Colorado River		
Recreational Activity	**Range of Optimum Flows (cfs)**	**Range of Minimum Flows (cfs)**
Kayaking	600 - 1,400	500 - 700
Rafting	800 - 1,300	700 - 800
Angling	200 - 1,000	60 - 450
Blue River		
Recreational Activity	**Range of Optimum Flows (cfs)**	**Range of Minimum Flows (cfs)**
Kayaking	600 - 1,000	400
Rafting	700 - 1,400	550
Angling	200 - 1,200	100

An independent review of the SMP recreational flow recommendations has not been conducted, and the recommendations are currently being evaluated by basin stakeholders as to their validity and applicability, however, they were recognized in the impact analysis.

Wild and Scenic Rivers Designation

As described in Section 3.3.1.4, the BLM is in the process of identifying eligible river segments in Colorado for Wild and Scenic River designations. Three segments of the Blue River have been preliminarily classified as recreational and wild for purpose of being deemed eligible for Wild and Scenic River status. The BLM also has an established fishing access and boat take-out at the downstream end of this segment. ORVs for these segments that may make them eligible for designation include high quality fishing and floatboating, wildlife habitat, and high biodiversity.

3.8.2 Environmental Consequences

3.8.2.1 No Action Alternative

Under the No Action alternative, Springs Utilities would operate according to the Blue River Decree during substitution years. River flows and reservoir contents would fluctuate as they have in the past. Therefore, no changes in stream flow or reservoir contents are expected, and there would be no direct, indirect, or cumulative impacts on recreational resources.

3.8.2.2 Proposed Action

The potential for impacts to recreation are related to changes in stream flow or reservoir content that could impact the quality of recreational activities, especially fishing, rafting/kayaking, and boating. The Proposed Action would change how Springs Utilities pays back their substitution obligation based on the 2003 MOAs. To put the potential for impact into context, it is important to consider that for the historical period evaluated by the hydrologic model, there were 13 substitution years during the 56-year study period. Additionally, changes in how Springs Utilities pays back their substitution obligation would only occur when the substitution obligation is greater than about 2,100 AF or the contents in Upper Blue Reservoir, which would occur in 7 of the 13 substitution years during the hydrologic modeling study period. This trend indicates that potential changes in stream flow caused by the Proposed Action would occur infrequently. The total substitution obligation would not change, and there would be very minimal change in the total amount of water flowing down rivers in the Study Area, but the timing and sources of substitution releases would change.

Based on the results of the hydrologic modeling presented in Section 3.3 Hydrology, the Blue River below the Continental-Hoosier System, and the Middle Fork South Platte River would experience the greatest change in average monthly flow during substitution years (4.5 % decrease in flow in August, and a 24.8% increase in flow in November). Average monthly flows in August would decrease from 56.6 cfs to 54.1 cfs. The minimum change in flow is not enough of a change to have any noticeable impact to water-based recreation activities. The increase in flow during November occurs when there is little on-water recreation use. The Breckenridge Ski Area is usually involved in snowmaking operations in November – the increase of water in the river would not have an adverse impact on their operations. On the Middle Fork South Platte River, the average monthly flow during substitution years would decrease by 14.3% in August, changing flow from 26.8 cfs to 23 cfs. The primary recreational activity on this river reach is fishing. The estimated change in flow would not have an impact on fish, or the quality of fishing opportunities.

All of the other river segments potentially affected by flow changes would experience substantially less changes than those described above for the Blue River and the Middle Fork South Platte River, and would not experience noticeable effects to water-based recreation. The aquatic ecosystem analysis, presented in Section 3.6 Aquatic Resources and Special Status Species, predicts no impact to fish habitat or populations, and therefore the quality or quantity of fish available to anglers would not be impacted.

Montgomery Reservoir and the Upper Blue Reservoir would be the only reservoirs that could experience a noticeable change in average content during substitution years (a 5.2% and a 12.9% decrease in average content during the months of February and March, respectively). This level of change during winter months at these high mountain reservoirs would not impact recreation. During the months of August and September, there would be an average increase in contents of 6.3 % and 6.4 %, respectively. This small increase in contents would not have a noticeable effect on fish or fishing opportunities. In the month of August, the contents of the Upper Blue Reservoir could increase by an average of 38.5%. Except for June and July, which would experience an increase in content of less than 1%, August is the only month where a noticeable change in content is predicted. The additional water content of the reservoir should slightly improve conditions for fish and fishing.

The river segments in the Study Area that have been deemed eligible by BLM for Wild and Scenic Rivers designation would not experience noticeable changes in stream flow; the important values associated with those river segments should not be affected by the Proposed Action.

To summarize, because of the infrequent occurrence of substitution-related changes in stream flow, and the generally modest changes predicted to occur during those infrequent events, recreation is anticipated to experience adverse negligible short-term impacts.

As discussed in Section 3.8.1, Phase 2 of the Grand County SMP identified recreational flows recommendations to support activities such as kayaking, rafting, and angling. Flow reductions under the Proposed Action in the Blue and Colorado rivers would be infrequent and negligible (see Section 3.3.2.2) and would have no noticeable effects to the minimum and optimum flows for recreational activities in the Study Area.

3.8.3 Cumulative Impacts

Several reasonably foreseeable water projects, described in Section 3.1.3, could affect streams and reservoirs in the project Study Area. The Proposed Action would have a negligible to minor incremental hydrological effect, and therefore would have a corresponding minor cumulative effect on recreation resources.

3.9 Socioeconomics

This section provides a brief overview of existing socioeconomic conditions and evaluates potential socioeconomic effects of the No Action and Proposed Action alternatives.

None of the issues, questions or comments received during public scoping identified socioeconomic concerns associated with the Proposed Action. One scoping commenter did identify potential effects on recreational uses (e.g., fishing and kayaking) on the Blue River as an issue to be examined; recreational impacts on the Blue River are described in Section 3.8.

This socioeconomic evaluation focuses on Summit County. Three of the signatories to the 2003 MOA that describes the Proposed Action are Summit County entities: Summit County; Vail Summit Resorts, Inc., and; the Town of Breckenridge. The county encompasses the Blue River Basin from the headwaters of the Blue River near Hoosier Pass, and from the headwaters of Ten Mile Creek near Fremont Pass, to the boundary with Grand County below Green Mountain Reservoir. Several of the water storage facilities that would be affected by the Proposed Action are located in Summit County, including Upper Blue Reservoir, Dillon Reservoir, and Green Mountain Reservoir.

3.9.1 Affected Environment

Summit County was home to nearly 28,000 permanent residents in 2006. Fifty-eight percent of the county's residents lived in unincorporated areas, with approximately 36% of permanent residents living in Silverthorne, Breckenridge, and Frisco, the three largest municipalities in the county (SDO 2008a). Throughout most of the past four decades, the county has been one of the fastest growing areas in Colorado. From 1970 through 2005, Summit County's population increased by an average of 6.5% per year (Headwaters Economics 2007). In general, Summit County has a relatively young, fairly affluent and predominantly non-minority population (Census 2000b).

Summit County is home to four major ski resorts – Breckenridge, Keystone, Copper Mountain and Arapahoe Basin. Due in part to proximity to these resorts, as well as relatively easy access to the Denver Metropolitan Area via Interstate 70, Summit County also has a large population of part-time residents and second home owners. With a large number of second homes, a substantial hotel bed base and many day use visitors, the effective peak population in Summit County on weekends and holidays can be several times the number of permanent residents.

The attractiveness of Summit County real estate has some negative consequences for county residents. In general, housing affordability in Summit County has declined between 1990 and 2000 where the median family income is not enough to buy the median value home (Headwaters Economics 2007a; Headwaters Economics 2007b).

While Summit County was founded during Colorado's mining boom in the 1800s, tourism, broadly defined, is now the primary source of employment in the county. The four Summit County ski resorts received over 4.2 million skier visits during the 2006-2007 season and accounted for just over one-third of all skier visits in Colorado (CSCUSA 2008). Fishing is another example of tourism in Summit County. Preliminary estimates developed for the CDOW indicate that fishing activity generated $37 million in Summit County economic output in 2007 (BBC 2008).

There were 23,850 jobs in Summit County in 2006 (SDO 2008b). The high number of jobs relative to the size of the population reflects both the prevalence of multiple job holding that is common in Colorado resort communities and extensive in-commuting by workers that live in nearby counties. The Colorado State Demography Office estimates that almost two-thirds of Summit County's economic base is tied to tourism, generally in the accommodations and food services industry (Headwaters Economics 2007a; SDO 2008c). Consistent with the emerging, broader definition of "tourism" that includes second home-related activity, 22% of Summit County jobs are in construction and real estate (Headwaters Economics 2007a).

3.9.2 Environmental Consequences

3.9.2.1 No Action Alternative

Under the No Action alternative, Springs Utilities would continue to operate according to the Blue River Decree during substitution years. River flows and reservoir contents would continue to fluctuate as they have historically as a result of Springs Utilities substitution operations. The No Action alternative is expected to have no direct, indirect or cumulative impacts on streamflows or reservoirs and would have no effect on available water supplies in Summit County. Consequently, there would be no socioeconomic effects as a result of the No Action alternative.

3.9.2.2 Proposed Action

Under the Proposed Action, there would be minimal changes to the flow in the Blue River and to the contents and levels of Summit County reservoirs (e.g., Upper Blue, Dillon and Green Mountain). However, these changes are expected to have little or no noticeable impact on recreation opportunities. Fish populations are not expected to be affected. Consequently, the economic benefits to Summit County from river and lake-related recreation activity are not anticipated to be affected by the Proposed Action.

Under the Proposed Action, Springs Utilities would make 250 AF of water available from Upper Blue Reservoir each year to a West Slope Account for use by the River District's marketing program and its contractees in exchange for a like amount of water stored by the River District in Wolford Mountain Reservoir. The River District, in turn, intends to enter into contracts with the Summit County entities. It is anticipated that Summit County would contract for 100 AF of this new supply, Vail Summit Resorts would contract for 100 AF and the Town of Breckenridge would contract for 50 AF.

Exactly how this new water supply would be used has not been specified or documented. However, Summit County is generally in need of additional water supplies to meet anticipated growth in demands. The Statewide Water Supply Initiative (SWSI) identified a gap between identified supplies for Summit County and anticipated demands by 2030 of 1,900 AF. This gap reflects a number of anticipated water needs, including a projected need for 505 AF for development in unincorporated portions of the county (SWSI 2004). Snowmaking demands are projected to grow from 1,500 AF in 2000 to 3,700 AF by 2030 (SWSI 2004).

Precisely quantifying the economic value of the 250 AF of new supply available to Summit County entities under the Proposed Action is not possible. A minimum estimate of the economic value can be estimated, however, based on the prices charged under the River District's marketing program. Under the current marketing policy for contracts issued after July 2006, the River District charges $1,301.25 per AF for Blue River supplies (River District 2008). Under these terms, the Summit County entities would pay a total of approximately $325,000 per year to contract for the 250 AF made available under the Proposed Action. The willingness of the Summit County entities to enter into contracts for this water at the specified price indicates that the benefits from this new supply would likely be greater than the contract price.

3.9.3 Cumulative Impacts

Several reasonably foreseeable actions were identified for cumulative impact assessment in Section 3.1.3. Among these actions, the most relevant in terms of socioeconomic effects are:

- Other increased water use in Grand and Summit counties, and
- Increases in Wolford Mountain Reservoir Contract Demands.

Ongoing urban growth in Summit County will continue to increase the demand for water for municipal, domestic and commercial purposes. Given the limited supply available to the area, the value of the 250 AF made available to the Summit County entities would likely continue to increase in the future.

Increases in Wolford Mountain Reservoir Contract Demands would add to the value of the water that the River District stores in that reservoir on behalf of Springs Utilities in exchange for the supply that Springs Utilities makes available to the River District (and the Summit County entities) from Upper Blue Reservoir. This activity would somewhat reduce the net economic benefit of the new supply provided to the Summit County entities because the "cost" of that supply to the River District would increase. However, the amount of water that the River District will hold for Springs Utilities in Wolford Mountain is capped at 1,750 AF (MOA, May 15, 2003). This cap would limit the offsetting cost of the water to the River District.

3.10 Summary of Impacts

Detailed discussions of the impact analyses for affected resources in the Study Area are presented in Sections 3.3 through 3.9. Table 3-25 presents a summary of impacts to resources evaluated as a result of the Proposed Action and provides a comparison of the potential effects for each resource. In general, the Proposed Action would either result in no impacts, or minor short-term adverse impacts to the affected environment.

Under the No Action alternative, for all resources, Springs Utilities would continue to operate according to the Blue River Decree during substitution years. River flows and reservoir contents would continue to fluctuate as they have historically as a result of Springs Utilities substitution operations. The No Action alternative is expected to have no direct, indirect, or cumulative impacts on streamflows or reservoirs and would have no effect on available water supplies in Summit County. Consequently, there would be no effects to resources evaluated as a result of the No Action alternative.

Table 3-25
Summary of Impacts from the Proposed Action

Affected Resources	Proposed Action
Hydrology	
Blue River	Average monthly flows in the Blue River downstream of the Continental-Hoosier System and upstream of Dillon Reservoir would decrease by up to 4.6 cfs or 8.9% in August and increase by up to 4.2 cfs or 21.5% in November. Flows below Dillon Reservoir would decrease by up to 7.8 cfs or 3.5% in May. Flows below Green Mountain Reservoir, would decrease by up to 8.1 cfs or 0.4% in June and increase by up to 1.2 cfs or 0.5% in October.
Williams Fork River	Monthly average flows in the Williams Fork River would decrease by a maximum of 8.3 cfs or 11.5% in March and increase by a maximum of 3.4 cfs or 2.5% in June.
Muddy Creek	Average monthly flows would decrease by a maximum of 5.7 cfs or 4.3% in June and increase by a maximum of 6.1 cfs or 4.4% in October.
Colorado River	Average monthly flows in the Colorado River downstream of the confluence with the Williams Fork River would decrease up to 6.3 cfs or 3.7% in March and increase by up to 4.1 cfs or 0.2% in June. Average monthly flows in the Colorado River near Kremmling would decrease by up to 8.1 cfs or 0.1% in June and increase by up to 4.6 cfs or 0.7% in October. Average monthly flows in the Colorado River downstream of the Eagle River would decrease by up to 8.1 cfs or 0.1% in June and increase by up to 4.6 cfs or 0.5% in October.
Eagle River	Average monthly flows in Homestake Creek would increase by a maximum of 7.6 cfs or 18.1% in August. In substitution years, average monthly flows would increase by up to 0.6 cfs or 2.3%.
South Platte River	Average monthly flows in the Middle Fork South Platte River would decrease by 34.1 cfs or 61.6% and increase by 4.3 cfs or 14.6% in August.
Upper Blue Reservoir	End-of-month contents in Upper Blue Reservoir would increase by up to 250 AF in August, September and October.
Dillon Reservoir	End-of-month contents in Dillon Reservoir would increase by up to 113 AF or 0.1% in all months and decrease by up to 522 AF or 0.3% in August.
Green Mountain Reservoir	End-of-month contents in Green Mountain Reservoir would increase by up to 414 AF or 0.3% in August and decrease by up to 479 AF or 0.6% in May.
Williams Fork Reservoir	End-of-month contents in Williams Fork Reservoir would increase by up to 564 AF or 2.8% in March and decrease by up to 37 AF or 0.1% in January through May.
Wolford Mountain Reservoir	End-of-month contents in Wolford Mountain Reservoir would increase by a maximum of 280 AF or 1.3% in December, January and February and decrease by a maximum of 343 AF or 1.7% in January and February.
Homestake Reservoir	End-of-month contents in Homestake Reservoir would decrease in seven months during the 56-year study period by up to 469 AF or 18.9% in August.
Montgomery Reservoir	End-of-month contents in Montgomery Reservoir would decrease by a maximum of 271 AF or 24.1% from October through March and increase by a maximum of 2,096 AF or 355% from August through November.
Elevenmile Canyon Reservoir	There would likely be no change in Elevenmile Canyon Reservoir contents.

Table 3-25
Summary of Impacts from the Proposed Action

Affected Resources	Proposed Action
Hydroelectric Generation	
Hydroelectric generation at power plants	• Flow changes would result in none to negligible changes in hydroelectric power generation at the following facilities: Dillon Reservoir Power Plant, Roberts Tunnel Power Plant, and Green Mountain Reservoir Power Plant. • Flow changes in the Colorado River near Kremmling could result in minor adverse short-term impacts to hydropower generation at the Shoshone Power Plant. • Changes in the diversions through Homestake Tunnel could result in minor adverse short-term impacts to hydropower generation at the Mt. Elbert Power Plant. • Changes in the timing of substitution releases from the Williams Fork Reservoir may result in minor adverse short-term impacts to hydropower generation at the Williams Fork Reservoir Power Plant.
Water Quality	
River basins: Upper Colorado River and South Platte River	Flow changes would have negligible effect on water quality in the Upper Colorado River Basin or the South Platte River Basin.
Aquatic Resources and Special Status Species	
River basins: Blue River, Williams Fork River, Muddy Creek, Colorado River, Eagle River, and South Platte River	Flow changes would have negligible effect on aquatic resources.
Special status fish species in the Colorado River Basin	Flow changes in the Colorado River downstream of the confluence with the Eagle River would have no adverse effect on the endangered fish species along the Colorado River (no effect).
Wetlands and Riparian Resources and Special Status Species	
River basins: Blue River, Williams Fork River, Muddy Creek, Colorado River, Eagle River, and South Platte River	Flow changes would have negligable effect on wetlands and riparian resources.
Special status species associated with wetland and riparian areas	Flow changes would have no impact (no effect) on the adjacent riparian/wetland habitats that sustain special status species in the Study Area.
Recreation	
Recreational activities, including: fishing, rafting, kayaking, and boating	Because of the infrequent occurrence of substitution-related changes in stream flow, and the generally modest changes predicted to occur during those infrequent events, impacts to recreation are anticipated to be negligible.

Table 3-25
Summary of Impacts from the Proposed Action

Affected Resources	Proposed Action
Socioeconomics	
Economic benefits related to recreational opportunities and economic value of available water supply	Minimal flow changes would have no discernable effect on recreation opportunities, such as fishing. Consequently, the economic benefits to Summit County from river and lake-related recreation activity are not anticipated to be affected. The new water supply (250 AF of water from Upper Blue Reservoir each year to a West Slope Account for use by the River District's marketing program and its contractees) in Summit County would satisfy a portion of the needed supply to meet anticipated growth in demands. The benefits from this new supply would likely be greater than the contract price.

4.0 Consultation and Coordination

4.1 Scoping Process

Reclamation used several methods to inform the public and interested agencies of the proposed project and to solicit their input, including: scoping announcements, agency scoping interviews, and a public scoping meeting.

Public notices were published on February 20 and 27, 2008 in *The Summit Daily News*. A postcard, "Notice of Public Open House," was mailed to all individuals on Reclamation's project mailing list, totaling over 50 people.

Reclamation issued a press release on February 29, 2008. The press release was electronically mailed to approximately 130 people on Reclamation's project-specific mailing list. The press release announced the scoping meeting and provided an overview of the project, the dates of the scoping comment period, and a contact for more information.

A scoping newsletter was provided at the Public Scoping Meeting (described below) and to agencies as part of the agency scoping interview process. The newsletter described the project purpose and need, proposed alternatives, and the NEPA process.

Agency scoping was conducted through individual stakeholder telephone interviews. These interviews were conducted in March and April 2008 and included representatives from four federal agencies, three state agencies, five municipal and regional agencies, and one county agency. A summary of the agency scoping process is described in the *Scoping Summary Report* (URS 2008).

A public scoping meeting was held by Reclamation on March 6, 2008 at the Silverthorne Library in Silverthorne, Colorado. A total of eight attendees signed-in. The scoping newsletter, described above, was provided at the meeting. The meeting was an open house format with eight display boards.

The public comment period extended 30 days between March 6 and April 4, 2008. Two written comments were submitted by the CDPHE and the Municipal Subdistrict regarding the project and may be found in the *Scoping Summary Report* (URS 2008).

As a result of this scoping process Reclamation received written or oral feedback on the project. The comments are summarized below, and have been considered in the development of the EA.

- Effect of implementing the 2003 MOAs on stream flow variations including:
    - Fluctuations related to timing and amount of flow
    - Effect on aquatic biological resources in the Colorado River and Blue River
    - Effect on recreational uses, in particular the Blue River (kayaking and fishing)
- Effects on Colorado River stream flows below the Windy Gap Project diversion point from utilizing water from the Williams Fork Reservoir as a substitute supply.
- Effects of water transfers on water temperature and subsequently fish.
- What is Reclamation's power right and how is it administered?

- How does the Historic Users Pool (HUP) operate and would the HUP be affected by stream flow variations as a result of implementing the 2003 MOAs?
- Would the Green Mountain Reservoir Pumpback project (also known as the Blue River Pumpback) considered by Denver Water be affected by implementation of the 2003 MOAs?
- The effect of Springs Utilities' re-use and conservation programs on the water substitution agreement.
  - Is Springs Utilities maximizing their efforts to reuse transbasin water to extinction under their existing conservation program?
- The effect of BLM's Wild and Scenic River designations on stream reaches within the study area of this project.
- Will additional water be diverted from the West Slope to the East Slope as part of the project?

4.2 Comments on the Draft EA

A Draft EA was prepared and made available for comment during a 2-week comment period between September 30 through October 14, 2008. An electronic copy of the Draft EA, as well as other project-related information, is available at Reclamation's website at: http://www.usbr.gov/gp/nepa/quarterly.cfm. A hardcopy of the Draft EA was available for public review at the following repositories:

Summit County Library North Branch
651 Center Circle
Silverthorne, CO 80498

Summit County Library South Branch
504 Airport Road
Breckenridge, CO 80424

A postcard notification of the availability of the EA was distributed to the project mailing list, attendees at the scoping meeting, and agencies.

Comments on the Draft EA were received by: Colorado Department of Public Health and the Environment, Water Quality Control Division; Bureau of Land Management; Trout Unlimited; Petros and White, LLC on behalf of the Board of Commissioners, Summit County, Colorado, and; White and Jankowski, L.L.P. on behalf of the Board of County Commissioners, Grand County, Colorado. A summary of the comments contained in these letters as well as responses can be found in Appendix D.

4.3 Preparers

URS Corporation (URS), a third-party contractor, prepared the Green Mountain Reservoir Substitution Agreement and Power Interference Agreement EA working under the direction of and in cooperation with the lead agency for the project, Reclamation. The following subcontractors assisted Reclamation and URS with the preparation of the EA: Ecological Resource Consultants, Inc. (ERC) assisted conducted hydrologic analysis and modeling, surface water resources, aquatic resources, and special status species associated with aquatic resources; BBC Research & Consulting conducted socioeconomic analysis, and; Seamless Composition, LLC assisted with the public involvement process for the project. Table 4-1 provides the names of the individuals who were principally involved with preparing the EA.

Table 4-1
List of Preparers

Name	Title	Contribution
Bureau of Reclamation		
Carlie Ronca	Project Manager	Project management for environmental compliance and document production
Kara Lamb	Public Involvement Specialist	Public and agency involvement and notification
Ron Thomasson	Hydraulic Engineer	Water scheduling consideration, hydrologic analysis, and document review
URS Corporation		
Paula Daukas	Project Manager (Nov 2007 – May 2008)	Project management for environmental compliance and document production
Andrea Parker	Project Manager (May 2008 - present) Assistant Project Manager (Nov 2007 – May 2008)	Project management, environmental compliance, and document production
Rachel Badger	Environmental Planner	Technical report writing and document production
Angie Fowler	Water Resources Engineer	Water quality
Sarah Jensen	Environmental Planner	Recreation
David Jones	Senior Environmental Planner	Recreation
John Sikora, P.E.	Senior Water Resources Engineer	Water resources, hydroelectric generation
Ecological Resource Consultants, Inc.		
David Blauch	Ecologist	Floodplains, aquatic resources, wetland and riparian resources
Heather Thompson, P.E.	Water Resource Engineer	Surface water, hydrology and modeling
Troy Thompson, P.E.	Water Resource Engineer	Floodplains, aquatic resources, wetland and riparian resources
BBC Research & Consulting		
Doug Jeavons	Economist	Social and economic analysis
Seamless Composition, LLC		
Lisa Pine	Public Involvement Specialist	Public and agency involvement and notification

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______. Garo, Colorado.

______. Hartsell, Colorado.

______. Sulphur Mountain, Colorado.

______. Guffee, Colorado.

______. Battle Mountain, Colorado.

______. Breckenridge, Colorado.

______. Corral Peaks, Colorado.

______. Gunsight Pass, Colorado.

______. Mount of the Holy Cross, Colorado.

______. Vail Pass, Colorado.

______. Frisco, Colorado.

______. Dillon, Colorado.

______. Willow Lakes, Colorado.

______. Squaw Creek, Colorado.

______. Mount Powell, Colorado.

______. King Creek, Colorado.

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Glossary

Acre-foot – A uniform volume of water that will cover one acre (43,560 square feet) to a depth of one foot (often averaged to 326,000 gallons).

Appropriation – The diversion of water and the placing of it to a beneficial use, also may refer to the amount of water a user has the legal right to withdraw from a water source.

Call – Demand for administration of water rights.

Consumptive use – Water use that permanently withdraws water from its source; water that is no longer available because it has evaporated, been transpired by plants, incorporated into products or crops, consumed by people or livestock, or otherwise removed from the immediate water environment.

Denver Water's Platte and Colorado Simulation Model (PACSM) – PACSM is a water allocation and accounting model that was developed by Denver Water to model the operations of raw water supply systems belonging to Denver Water and others within portions of the Colorado and Platte River basins. The water supply system is represented as a system of linked nodes. The diversion structures, reservoirs, water rights, operations, instream flow requirements, demands and stream gages included in the PACSM model are very similar to the CDSS Model for the Colorado River Basin.

Diversion – An alteration in the natural course of a stream for the purpose of water supply, usually causing some of the water to leave the natural channel. In Colorado Springs this includes taking water through a ditch, tunnel, pipe or other conduit.

Drought – A water supply shortage that is caused by natural conditions such as an extended period of below-normal precipitation.

Historic User's Pool (HUP) – The HUP in Green Mountain Reservoir is 66,000 acre-feet. When the administration of water under the priority system would result in curtailment in whole or in part of a water right for irrigation or domestic uses within western Colorado, which was perfected by use on or before October 15, 1977, releases are made from the HUP pool to the extent necessary to permit diversions to the full amount of said decrees.

Hydroelectric Power – Electric current produced from water power.

Hydroelectric Power Plant – A building in which turbines are operated, to drive generators, by the energy of natural or artificial waterfalls.

Priority (in & out) – The right to divert or store water, based on the Doctrine of Prior Appropriation. In Colorado this is regulated by the Division of Water Resources, and is based on the date of the water right, i.e., "First in time, first in right."

Pumped-Storage Hydroelectric Plant – A plant that usually generates electric energy during peak-load periods by using water previously pumped into an elevated storage reservoir during off-peak periods when excess generating capacity is available to do so. When additional generating capacity is needed, the water can be released from the reservoir through a conduit to turbine generators located in a power plant at a lower level.

Reusable Water – Water with the legal characteristic of being able to be used, reused, and subsequently used to extinction. Sources typically are transbasin water, nontributary (e.g. Denver Basin) groundwater, and agricultural consumptive use water.

Riparian Areas – Those plant communities adjacent to and affected by surface or groundwater of perennial or ephemeral water bodies such as rivers, streams, lakes, ponds, playas, or drainage ways. These areas have distinctly different vegetation than adjacent areas or have species similar to surrounding areas that exhibit a more vigorous or robust growth form. (CDOW 2006a).

State of Colorado's Colorado Decision Support System Model (CDSS Model) – The CDSS Model is a surface water allocation model of the Upper Colorado River Basin. The model covers the entire Colorado River drainage, except the Gunnison River, from the headwaters to the Colorado-Utah state line. The water supply system is represented as a system of nodes, which correspond with features such as diversion structures, reservoirs, instream flow requirements, demands, or stream gages.

Transmountain diversion – A water project that diverts water from one river basin to another. For Colorado Springs, this typically is a project to divert water from the Colorado River Basin to the Arkansas River Basin.

Transmountain water (Transbasin water) – Water produced by a transmountain diversion (e.g. water diverted from the western slope of the continental divide for use on the eastern slope). See also Reusable Water.

Water right – A property right created by the diversion of water and the placing of it to a beneficial use (appropriation). Water rights become officially recognized and administrable when documented in a decree of the State water court (adjudicated).

Wetlands – As defined by the USACE and EPA, wetlands are: those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. (EPA 2006; USACE 2007)