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City of Aurora
Proposed Excess Capacity Contracts

Water Quality Technical Report

Fryingpan-Arkansas Project

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

September 2006

Water Quality Technical Report

City of Aurora
Proposed Excess Capacity Contracts

Fryingpan-Arkansas Project

prepared by

ERO Resources Corporation
Denver, Colorado

In Association With
MWH Consultants, Inc.
Hydrosphere Resources, Inc.
BBC Research & Consulting
Chadwick Ecological Consultants, Inc.

Preface

This technical report was prepared to provide the hydrology information necessary to assess the effects of proposed contracts between Reclamation and Aurora for the use of excess capacity in the Fryingpan-Arkansas Project. As such, it has been prepared to fulfill reporting requirements of the Water Resources Studies Task of Professional Services Agreement No. 02PO783 (dated November 26, 2003) between the City of Aurora and MWH Americas, Inc.

Contents

List of Tables

List of Figures

List of Abbreviations

Abbrev -iation	Definition	Abbrev-iation	Definition
ac	acute (1-day)	N/A	not available
Ag	silver	NEPA	National Environmental Policy Act
Al	aluminum	NH_3	unionized ammonia
As	arsenic	Ni	nickel
Aurora	City of Aurora	NO_2	nitrite
B	boron	NO_3	nitrate
Ba	barium	NRCS	Natural Resources Conservation Service
Be	beryllium	OW	outstanding waters
Cd	cadmium	P	phosphorus
CDPHE	Colorado Department of Public Health and Environment	Pb	lead
CDPS	Colorado Discharge Permit System	PSOP	Arkansas Basin Preferred Storage Options Plan
cfs	cubic feet per second	Q	discharge
ch	chronic (30-day)	Reclamation	Bureau of Reclamation
Cl	chloride	RICD	recreational in channel diversion
Cl_2	residual chlorine	ROY	Restoration of yield
cm	centimeter	S	Sulfide as undissociated H_2S (hydrogen sulfide)
CN	free cyanide	SECWCD	Southeastern Colorado Water Conservancy District
CO	Colorado	Sb	antimony
CrIII	trivalent chromium	SC	Specific Conductance
CrVI	hexavalent chromium	SDS	Southern Delivery System
Cu	copper	sp	spawning
CWCB	Colorado Water Conservation Board	TDS	total dissolved solids
dis	dissolved	Tl	thallium
EA	Environmental Assessment	TMDL	total maximum daily load
EPA	United States Environmental Protection Agency	Tr	trout
Fe	iron	Trec	total recoverable
FMP	Flow management plan	TSI	trophic state index
Fry-Ark	Fryingpan-Arkansas	TVS	table value standard
Hg	mercury	U	uranium
IHA	Indicators of Hydrologic Alteration	UAVFMP	Upper Arkansas Voluntary Flow Management Program
kg	kilogram	UP	Use-protected
L	liter	USGS	United States Geological Survey
LMDT	Leadville Mine Drainage Tunnel	WQCC	Colorado Water Quality Control Commission
m	meters	WQCD	Water Quality Control Division (of CDPHE)
MCL	maximum contaminant level	WQS	water quality standards
MDL	method detection limit	WS	Actual water supply use
mgd	million gallons per day	WWTF	wastewater treatment facility
mg/kg	milligrams per kilogram	Zn	zinc
mg/L	milligrams per liter	µg	microgram
ml	milliliters	µg/L	Microgram per liter
Mn	manganese	µS	microsiemens
N	nitrogen		

1. Introduction

The Bureau of Reclamation (Reclamation) is considering a request from the City of Aurora (Aurora), Colorado, for a long-term excess capacity contract and a long-term exchange contract. The purpose of the proposed contract(s) is to establish a long-term agreement that allows Aurora to more efficiently manage and use its decreed Arkansas River water rights and leased Arkansas River water. Aurora's water rights and leased water from the Arkansas River provide about 25 percent to 40 percent of its water supply (depending on hydrologic conditions in a particular year) and are needed to meet the City's existing and future municipal and industrial water demands. Use of excess capacity in the Fryingpan-Arkansas (Fry-Ark) Project would eliminate the need for construction of a new reservoir and other physical facilities to facilitate the movement of this water from the Arkansas Basin to the South Platte Basin where it can be used by Aurora.

The Fry-Ark Project is a Reclamation project that delivers water from the West Slope of Colorado to the upper Arkansas River Basin near Leadville. Turquoise Reservoir and Twin Lakes Reservoir are Reclamation facilities in the upper Arkansas River Basin that store Fry-Ark Project water before it is delivered to downstream users. From Turquoise Reservoir and Twin Lakes Reservoir, Fry-Ark Project water is delivered via the Arkansas River to Pueblo Reservoir where this water is further distributed to Fry-Ark Project users.

Reclamation must decide whether to enter into these long-term (40-year) contracts with Aurora. Because this decision involves a federal action, the proposal is subject to compliance with the National Environmental Policy Act (NEPA) of 1969, amendments, and other regulatory laws. Reclamation is preparing an Environmental Assessment (EA) to analyze and disclose the potential effects associated with the Proposed Action, as well as the No Action Alternative if Reclamation denies the request for storage and exchange. To assist in the preparation of the EA, Reclamation has requested that the third-party consultant team prepare technical reports for resources of concern. The technical reports provide information on the affected environment and the environmental consequences of the Proposed Action and No Action Alternative. Information from the technical reports will be used in preparation of the EA.

1.1. Water Quality Technical Report

The Water Quality Technical Report is being prepared to provide the water quality information necessary to assess the effects of proposed contracts between Reclamation and Aurora for the use of excess capacity in the Fry-Ark Project. The technical report covers study methods and descriptions of the existing water quality (the affected environment) and the direct and cumulative effects of the Proposed Action and No Action Alternative. This document also summarizes water quality modeling results for the project alternatives. The methodology and criteria for water quality modeling are described in the Excess Capacity Contract Environmental Assessment Water Quality Model Documentation (MWH, 2006), which is provided under separate cover.

1.2. Relationship To Other Resource Studies

Output from the water resources analysis (MWH, 2005) was used in the analysis of effects on water quality. Aquatic habitat studies require water quality data. Studies of socioeconomics require analysis of impacts of water quality on agriculture.

1.3. Description of Alternatives

Aurora currently owns Arkansas River Basin water rights, and has relied on temporary (one-year) "if-and-when" storage and exchange contracts with Reclamation to store and exchange Arkansas River

Basin water diverted into Pueblo Reservoir. An "if-and-when" exchange contract permits an entity to exchange non-Fry-Ark Project water stored in one reservoir for Fry-Ark Project water stored in another reservoir "if-and-when" Reclamation determines conditions are appropriate for an exchange.

The Proposed Action is to enter into a long-term contract with Aurora to allow the use of excess capacity in the Fry-Ark Project for storage of Aurora's non-Fry-Ark Project water and exchange of Aurora's water with Fry-Ark Project water. Under the No Action Alternative, Reclamation would no longer contract with Aurora for the storage and exchange of Aurora's water rights, and Aurora would develop other means of storage in the Arkansas River Basin. The No Action Alternative and Proposed Action are described in more detail below.

1.3.1. Proposed Action

Under the Proposed Action, Reclamation would execute a long-term (40-year) storage contract with Aurora for the use of up to 10,000 acre-feet of available excess capacity in Pueblo Reservoir. The storage space could be filled and emptied multiple times each year to accommodate water exchanges to Twin Lakes Reservoir, Turquoise Reservoir, and the Otero Pump Station. Additionally, Aurora has requested that Reclamation enter into a separate contract that would allow annual contract exchanges of up to 10,000 acre-feet of Aurora's water rights stored in Pueblo Reservoir for Fry-Ark Project water stored in Twin Lakes Reservoir and Turquoise Reservoir. Contract exchanges could take place multiple times in one year, as long as the total amount exchanged in one year does not exceed 10,000 acre-feet. The Proposed Action does not require construction of new facilities.

1.3.2. No Action Alternative

Under the No Action Alternative, Reclamation would not enter into an excess capacity storage contract with Aurora. Additionally, Reclamation would not enter into a contract with Aurora for exchanges of up to 10,000 acre-feet of Aurora's Arkansas River water for Fry-Ark Project water in Twin Lakes Reservoir or Turquoise Reservoir. In the absence of these contracts with Reclamation, Aurora would look to other ways to use its decreed Arkansas River water rights. Aurora would pursue both short-term and long-term actions to store and exchange existing Arkansas River water rights. In the short-term, this would include filings with Colorado Water Court to modify existing decrees to allow additional alternate points of diversion for use of those water rights to upstream locations. In the long-term, new infrastructure, primarily gravel pit conversion to reservoir storage, would need to be constructed.

To provide for the long-term use of its water rights and to develop their full available yield, Aurora would develop 10,000 acre-feet of water storage within a future gravel pit. Aurora currently has an option on the purchase of an active gravel mining site that could provide water storage following gravel excavation. Gravel mining is not part of the No Action Alternative. The site is located adjacent to the Arkansas River about 6 miles downstream of the City of Pueblo. Depending on final site development, it is anticipated that about 500 acres of land would be needed to provide sufficient storage for 10,000 acre-feet of water.

Water would be diverted to the site via the existing Excelsior Ditch located about 2 miles upstream of the site. The Excelsior Ditch headgate on the Arkansas River is expected to have adequate capacity, but some improvements to the ditch may be necessary to convey Aurora's Arkansas River water rights. Water from this gravel pit storage would be returned to the Arkansas River using a new outlet structure and pumping facilities as necessary. Development of the gravel pit site, including mining operations and the associated improvements that would be needed to make this site suitable for water storage, is expected to take about 10 years.

1.4. Study Area

The study area stream segments include Lake Fork below Turquoise Reservoir, Lake Creek below Twin Lakes Reservoir, and the Arkansas River from the Lake Fork confluence to Timpas Creek, between Rocky Ford and La Junta. The study area reservoirs include Turquoise Reservoir, Twin Lakes Reservoir, Pueblo Reservoir, Lake Meredith, Lake Henry, and Holbrook Reservoir. In addition, new gravel pit storage under the No Action Alternative would be located adjacent to the Arkansas River east of the City of Pueblo. These streams and reservoirs are collectively referred to as the study area and are shown in shown in **Figure 1-1**.

The total capacity of Twin Lakes is approximately 140,000 acre-feet (MWH, 2005). Aurora's share of storage space in Twin Lakes is 2,700 acre-feet. The effects of Aurora's actions on Twin Lakes Reservoir were not considered for the EA for two reasons: there are daily fluctuations in the top two feet of the reservoir due to power operations conducted by Reclamation as part of the Fry-Ark Project, and Aurora only owns 5 percent of the storage capacity in Twin Lakes Reservoir. As a result, Reclamation has determined that, "Aurora's actions will have minimal effects on storage contents and reservoir pool elevations when compared with historical fluctuations" (MWH, 2005). Because the source water and pool elevations of Twin Lakes will not be modified by Aurora's actions, changes in water quality due to Aurora's actions are not expected.

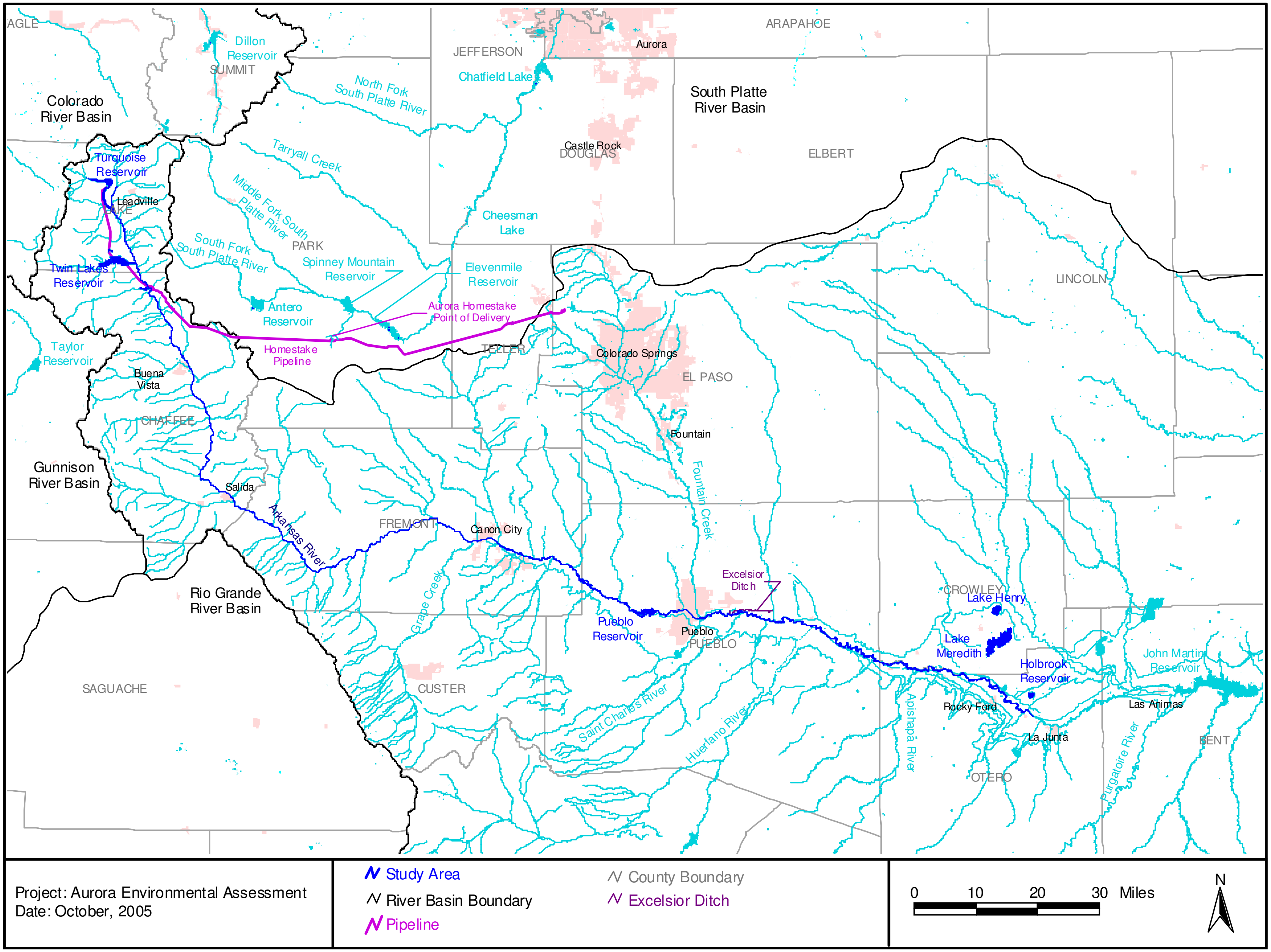


Figure 1-1. Study Area

2. Water Quality Background

This section provides an overview of the Colorado water quality regulatory system and discusses water quality parameters of interest in the study area.

2.1. Colorado Water Quality Regulatory System

The Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division (WQCD) is Colorado's lead agency for protecting the quality of the state's waters and the safety of drinking water systems. The WQCD implements federal and state laws including the Clean Water Act and the Colorado Water Quality Control Act. The Colorado Water Quality Control Commission (WQCC) is the administrative agency that develops state water quality policies.

2.1.1. Use Classifications

The WQCC's Regulation Number 32 (Classifications and Numeric Standards for Arkansas River Basin) (CDPHE, 2004b) defines the classifications and numeric water quality standards (WQS) for the Arkansas River Basin. Waters are classified according to the uses for which they are presently suitable or intended to become suitable. One or more use classifications (CDPHE, 2005b) are assigned to segments in the study area including:

- Recreation – Class 1a – Existing Primary Contact: Suitable for recreational activities in or on the water when the ingestion of small quantities of water is likely to occur such as swimming, and boating. Class 1a waters are those in which primary contact uses have been documented or are presumed to be present.
- Recreation – Class 2 – Secondary Contact: Surface waters not suitable for primary contact recreation uses, but are suitable for recreational uses such as wading, fishing, and other streamside or lakeside recreation.
- Agriculture: Suitable for irrigation of crops usually grown in Colorado and which are not hazardous as drinking water for livestock.
- Aquatic Life – Class 1 – Cold Water: Waters that either currently are capable of sustaining a wide variety of cold water biota including sensitive species, or could sustain such biota if water quality conditions are corrected.
- Aquatic Life – Class 1 – Warm Water: Waters that currently are capable of sustaining a wide variety of warm water biota including sensitive species, or could sustain such biota but for correctable water quality conditions.
- Aquatic Life – Class 2 – Warm Water: Waters that are not capable of sustaining a wide variety of cold or warm water biota, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.
- Domestic Water Supply: Waters that are suitable for potable water supplies. After receiving standard treatment these waters will meet Colorado drinking water regulations (CDPHE, 2005b).

2.1.2. Antidegradation

Colorado's antidegradation provisions aim to maintain the quality of the state's waters, even if the waters are currently better than necessary to protect the stated use classifications (CFWE, 2003). Waters are either designated "outstanding waters" or "use-protected waters" or are not given a designation and are refereed to as "reviewable". The antidegradation designations are described below in order of water quality protection:

- Outstanding Waters: The highest level of water quality protection applies to these waters because they represent an outstanding state or national resource. Outstanding waters are to be maintained and protected at their existing quality (CDPHE, 2005b). None of the waters in the study area are designated "outstanding."
- Reviewable: Waters that are not designated outstanding or use-protected are "maintained and protected at their existing quality unless it is determined that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located" (CDPHE, 2005b).
- Use-protected Waters: Waters that the WQCC has determined do not warrant the protection provided by the outstanding waters designation or the antidegradation review process.

An antidegradation review process must be conducted for regulated activities conducted in waters that are either designated outstanding waters or reviewable. Regulated activities are defined as "any activities which require a discharge permit or water quality certification under federal or state law, or which are subject to state control regulations unless the [Water Quality Control] Commission has specified in the control regulation that the antidegradation review process is not applicable." (CDPHE, 2005b). State control regulations have not been adopted for any of the waterbodies within the study area. Regulated actions are typically those requiring a Colorado Discharge Permit System (CDPS) permit or Section 401 certifications of 404 permits. Although some of the segments in the study area are reviewable, Aurora's Proposed Action is not expected to be a regulated activity under the Antidegradation Rule. Therefore, this process is not discussed further.

Table 2-1 summarizes the use classifications and antidegradation designations for segments within the study area.

Table 2-1. Summary of Use Classifications for Segments Within the Study Area

Segment	Segment Description	Antidegred. Designation	Classifications
UA2c	Mainstem of the **Arkansas River** from a point immediately above the confluence with the Lake Fork to a point immediately above the confluence with Lake Creek	Reviewable	• Aq Life Cold 1 • Recreation 1a • Agriculture
UA3	Mainstem of the **Arkansas River** from a point immediately above the confluence with the Lake Creek to the inlet to Pueblo Reservoir	Reviewable	• Aq Life Cold 1 • Recreation 1a • Water Supply • Agriculture
UA5	All tributaries to the Arkansas River, including wetlands, lakes and reservoirs, from the source to immediately below the confluence with Browns Creeks, except for specific listings in segments 6 through 12. [includes **Turquoise Reservoir** and **Lake Fork** downstream to Arkansas River]	Reviewable	• Aq Life Cold 1 • Recreation 1a • Water Supply • Agriculture
UA10	Mainstem of **Lake Creek**, including all tributaries, wetlands, lakes and reservoirs, from the source to the confluence with the Arkansas River, except for the specific listing in segment 11.	Reviewable	• Aq Life Cold 1 • Recreation 1a • Water Supply • Agriculture
MA1	**Pueblo Reservoir**	Reviewable	• Aq Life Cold 1 • Recreation 1a • Water Supply • Agriculture
MA2	Mainstem of the **Arkansas River** from the outlet of Pueblo Reservoir to a point immediately above the confluence with Wildhorse/Dry Creek Arroyo	Reviewable	• Aq Life Cold 1 • Recreation 1a • Water Supply • Agriculture
MA3	Mainstem of the **Arkansas River** from a point immediately above the confluence with Wildhorse/Dry Creek Arroyo to a point immediately above the confluence with Fountain Creek, Valco Ponds and Fountain Lake	Reviewable	• Aq Life Warm 1 • Recreation 1a • Water Supply • Agriculture
LA1a	Mainstem of the **Arkansas River** from a point immediately above the confluence with Fountain Creek to immediately above the Colorado Canal headgate near Avondale	Use Protected	• Aq Life Warm 2 • Recreation 1a • Water Supply • Agriculture
LA1b	Mainstem of the **Arkansas River** from the Colorado Canal headgate to the inlet to John Martin Reservoir	Use Protected	• Aq Life Warm 2 • Recreation 1a • Water Supply • Agriculture
LA10	Two Buttes Reservoir, Two Buttes Pond, Hasty Lake, **Holbrook Reservoir**, Burchfield Lake, Nee-Skah (Queens) Reservoir, Adobe Creek Reservoir, Neeso Pah Reservoir, Nee Noshe Reservoir; Nee Gronda Reservoir.	Reviewable	• Aq Life Warm 1 • Recreation 1a • Water Supply • Agriculture
LA12	**Lake Henry, Lake Meredith**	Reviewable	• Aq Life Warm 1 • Recreation 1a • Agriculture

Note: portions of the segments in the study area are shown in **bold**.
Source: CDPHE, 2004b

2.1.3. Water Quality Standards

Narrative and numeric WQS are assigned to water bodies to protect classified uses (CDPHE, 2005b). Numeric standards can either apply on a statewide basis or to specific waters. General WQS, known as Table Value Standards (TVS), are assigned for the Arkansas River Basin in Regulation Number 32

(CDPHE, 2004b). Site specific standards are assigned to segments and may or may not be equal to the TVS.

An acute standard is the level not to be exceeded by the concentration in a single sample or calculated as the average of all samples in a one-day period. A chronic standard is the level not to be exceeded by the concentration for either a single representative sample or calculated as an average of all samples collected during a 30-day period (CDPHE, 2005b). These standards are implemented with a selected duration and frequency of occurrence.

The WQS for segments in the study area are summarized in Appendix A. Historical water quality data from the study area are compared with WQS in Section 4.

2.1.4. Water Quality Limited Segments and TMDLs

The Federal Clean Water Act requires that states submit to the U.S. Environmental Protection Agency (EPA) a list of those waters for which technology based effluent limitations and other required controls are not stringent enough to attain WQS. Colorado's most recent list of water quality limited segments, known as the 303(d) list (after Section 303(d) of the Clean Water Act), was published in 2006. Colorado adds and removes waters from the 303(d) list based on published listing methodology (CDPHE, 2005c). **Figure 2-1** shows the water quality limited segments in the study area.

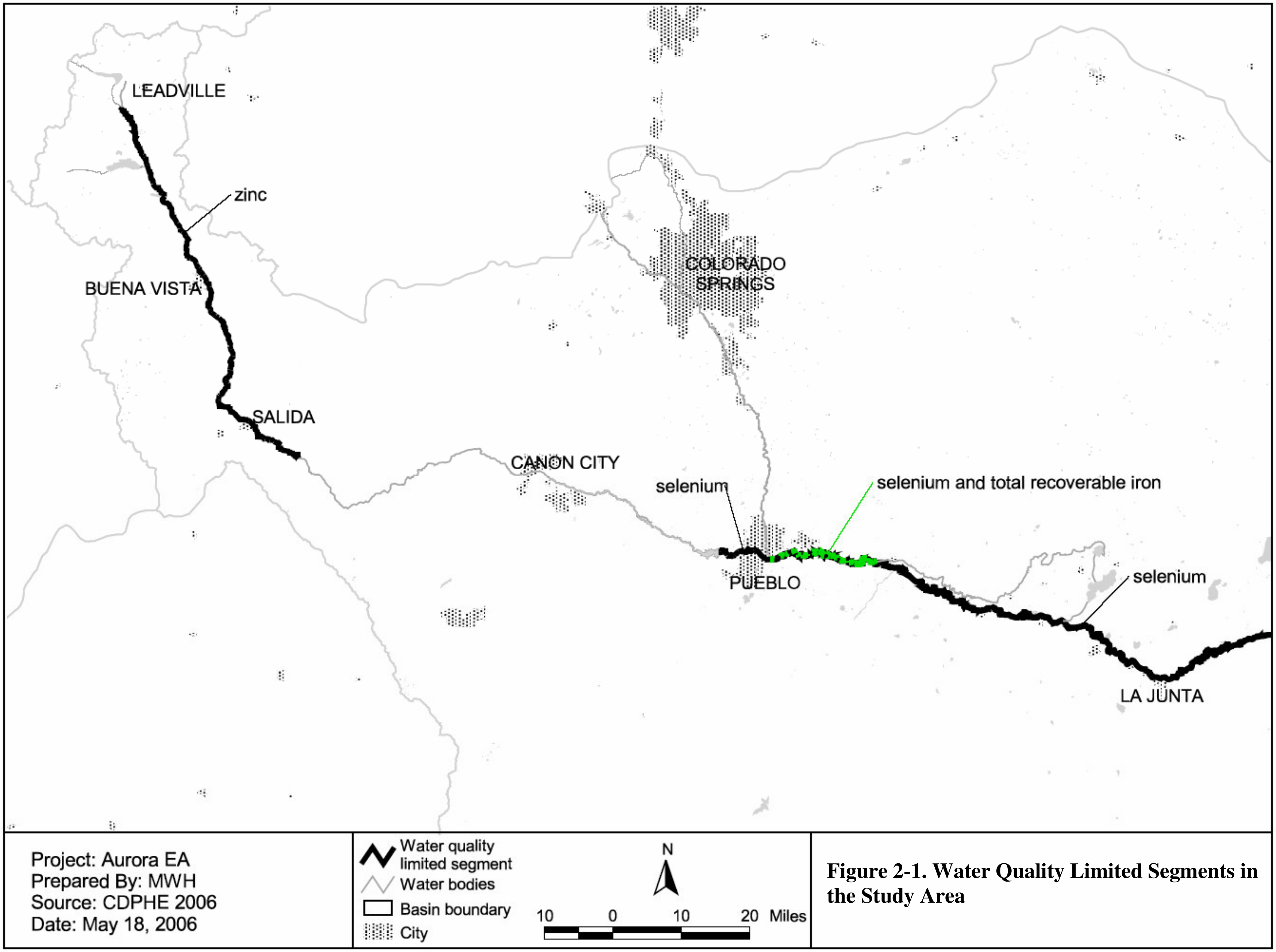


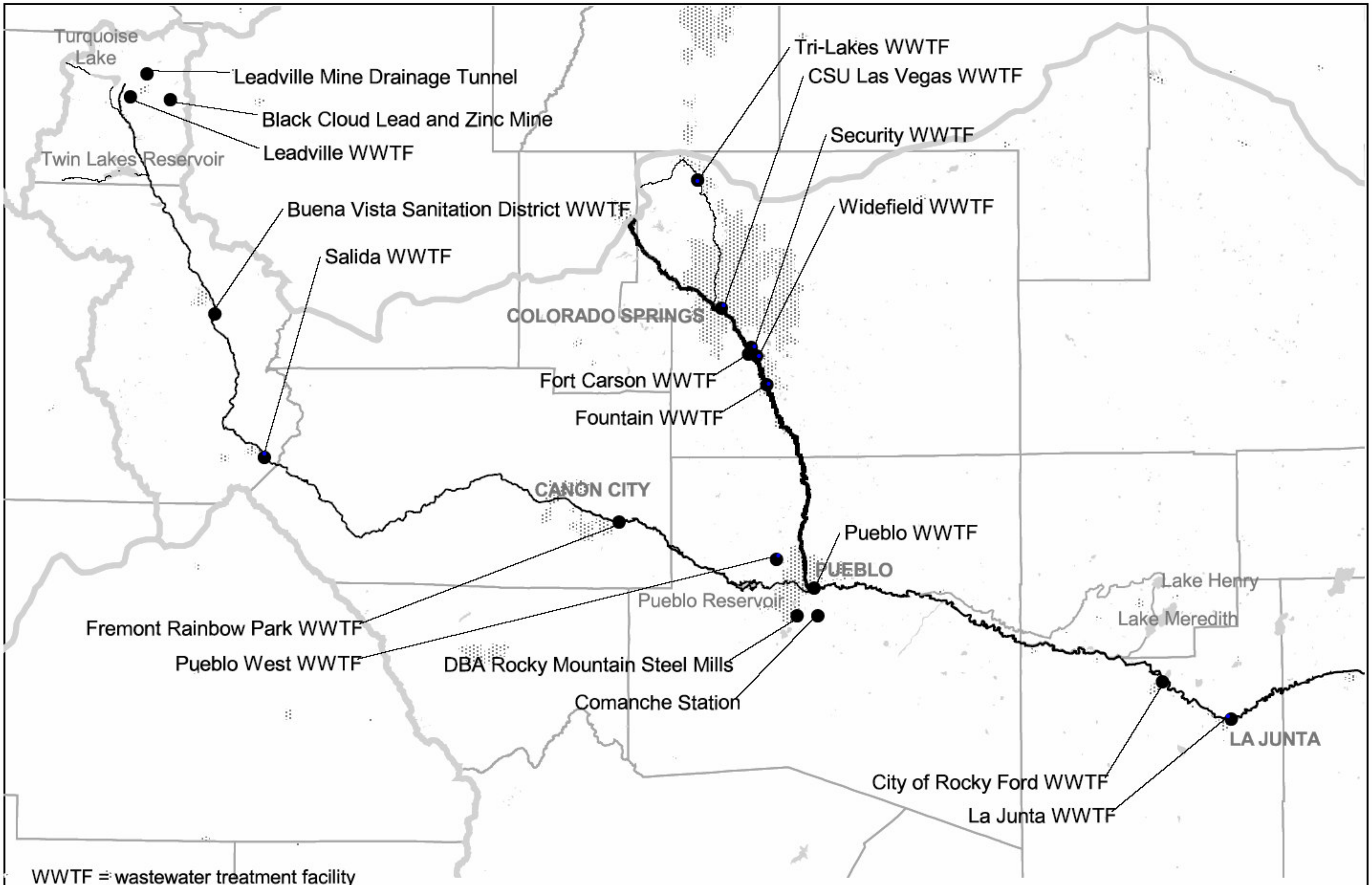
Figure 2-1. Water Quality Limited Segments in the Study Area

The 303(d) list represents those segments requiring Total Maximum Daily Load (TMDL) development. The purpose of the TMDL process is to reduce pollutant loading to levels that will meet WQS and allocate available loading among various pollutant sources.

2.1.5. Permitted Discharges

The WQCD regulates the discharge of pollutants into the state's surface and ground waters. Discharge permits, known as CDPS permits, are issued to comply with WQS and control regulations so that discharges protect the classified uses of water bodies (CDPHE, 2004b). **Figure 2-2** shows the locations of major dischargers in the Arkansas Basin upstream of John Martin Reservoir. The major dischargers are summarized in **Table 2-2**. EPA classifies major dischargers as those dischargers with at least 1.0 million gallons per day (mgd) of flow. There are many other regulated smaller dischargers in the study area.

Effluent limitations are the concentration and/or mass of a pollutant that a CDPS permit allows in a discharge. Effluent limitations for major dischargers in the study area are summarized in Appendix B. Effluent limitations are typically based on the expected dilution capacity of the stream. CDPS permits are renewed every 5 years. Effluent limitations are calculated at the time of permit renewal based on chronic and acute low flows from the previous 10 years of flow data (CDPHE, 2005b). Chronic and acute low flows are likely to change over the 5-year permit renewal cycle due to several factors. Effluent limitations are adjusted based on the new low flows so that WQS in the receiving water are not violated. Dischargers are not entitled to historical levels of streamflow, even if changes in low flow require modifications to treatment processes (City of Thornton V Bijou Irrigation, 926 P2d 1 (Colo 1996)).



Project: Aurora EA
Prepared By: MWH
Source: EPA 2004
Date: October 25, 2005

Major dischargers (Flow > 1 MGD)
Water bodies
Divisions
Cities

N

10 0 10 20 Miles

Figure 2-2. Location Map of Major Permitted Dischargers in Arkansas River Basin

Table 2-2. Summary of Major Permitted Dischargers in Arkansas Basin

Permit #	Facility	Flow (mgd)
CO0026735	Colorado Springs Utilities Las Vegas Street WWTF	75*
CO0000621	DBA Rocky Mountain Steel Mills	57
CO0026646	Pueblo WWTF	19
CO0039748	Fremont Rainbow Park WWTF	8
CO0020435	Tri-Lakes WWTF	3
CO0021067	Widefield WWTF	3
CO0045748	Buena Vista Sanitation District WWTF	2
CO0024457	Cherokee Metropolitan District WWTF	2
CO0021261	La Junta WWTF	2
CO0040789	Pueblo West WWTF	2
CO0040339	Salida WWTF	2
CO0024392	Security WWTF	2
CO0000591	Black Cloud Mine	1
CO0023850	City of Rocky Ford WWTF	1
CO0020532	Fountain WWTF	1
CO0021164	Leadville Sanitation District WWTF	1
CO0000612	Comanche Station	N/A
CO0021181	Fort Carson WWTF	N/A
CO0021717	Leadville Drainage Tunnel	N/A

*for March through February permitted flow = 65 mgd
WWTF = wastewater treatment facility; N/A = not available (no flow listed on discharge permit)
Source: EPA, 2005b

2.2. Water Quality Parameters of Interest for the EA

Water quality parameters of interest are either those where there is a known impairment in the study area or those that were raised as a concern in the public scoping process. Parameters causing impairments in the study area, according to the 2006 303(d) list include:

- Metals in the upper Arkansas River;
- Total recoverable iron in the lower Arkansas River; and
- Selenium in the middle and lower Arkansas River (CDPHE, 2006).

Parameters not known to cause impairment in the study area, but raised as a concern in the scoping process, include:

- Nutrients;
- General reservoir water quality;
- Arsenic;
- Mercury;
- Salinity;
- Sulfate; and
- Boron (ERO, 2004).

Dissolved oxygen and pH are also discussed in **Section 4** to further describe existing water quality conditions.

Suspended sediment is a concern in the Arkansas River below the Fountain Creek confluence. Because the source of sediment in Fountain Creek is primarily channel erosion, sediment issues are discussed in the geomorphology section of the Water Resources Technical Report (MWH, 2005).

3. Data Sources and Review

Several organizations have historically investigated and continue to monitor water quality in the study area. Sources of data used in this report, water quality modeling efforts reviewed, and the methods for analyzing the data are discussed below.

3.1. Data Sources

The following efforts were undertaken to obtain water quality information to characterize the affected environment and to gather data for use in the water quality model.

3.1.1. Water Quality Studies Reviewed

Several published studies were reviewed for water quality information in the study area. Information from the studies is referenced throughout this report. A complete list of references is included in Section 7. However, in many cases, more recent data is available than those published in the reports. In those cases, the more recent data is used in conjunction with the published reports to characterize existing conditions.

3.1.2. Data Collection

For most parameters, raw data was collected and analyzed. Efforts were taken to use the most current data whenever possible. All data analysis in the report references the data source and timeframe. The sources of data used are described below.

3.1.2.1. Data Sheets from CDPHE

Data sheets containing data collected by CDPHE for uses such as the 2004 303(d) listing analysis and the triennial review process of Regulation 32 were used to characterize existing conditions where available (Konowal, 2005). The data sheets contain data as recent as 2002. The data was collected by CDPHE as well as other organizations, and should meet CDPHE's requirements for quality (CDPHE, 1993).

The CDPHE data sheets are only available for some of the segments in the study area. The segments and sample locations where data is summarized in CDPHE data sheets are displayed in **Table 3-1**.

Table 3-1. CDPHE Data Sheet Sampling Locations

Segment	Collecting Organization	Locations	Date Range
Upper Arkansas between Lake Fork and Lake Creek (UA2c)	Resurrection Mining Company	AR-4 located on the Arkansas River 0.5 miles downstream of the confluence with Lake Fork, AR-5 located on the Arkansas River 0.25 miles downstream of Highway 24 bridge, AR-6 located at Kobe, approximately 3-4 miles upstream of the confluence with Lake Creek	5/95 to 9/01
	CDPHE WQCD	7182 - Arkansas River below Leadville	1/98 to 5/01
Upper Arkansas between Lake Creek and Pueblo Reservoir (UA3)	CDPHE WQCD	7140 - Arkansas River at Salida, 7145 - Arkansas River below Johnson Village, 7157 - Arkansas River above Buena Vista, 7280 - Arkansas River at Portland (at Highway 120)	1/98 to 9/01
	CDOW	AR7 - Arkansas River at Granite, AR8 - Arkansas River at Buena Vista	5/95 to 9/01
Middle Arkansas between Wildhorse Creek and Fountain Creek (MA3)	USGS	7099970 - Arkansas River at Moffat Street in Pueblo	10/97 to 4/01
	CDPHE WQCD	7297 - Arkansas River below Wildhorse Creek	3/98 to 3/00
Lower Arkansas River from Fountain Creek to Colorado Canal (LA1a)	CDPHE WQCD	7299 - Arkansas River above Avondale at Sixmile Road	3/98 to 6/00
	USGS	7109500 - Arkansas River near Avondale	7/98 to 4/01
Lower Arkansas River from Colorado Canal to John Martin Reservoir (LA1b)*	CDPHE WQCD	7515 - Arkansas River above the Huerfano River at highway 209 near Boone, 7520 - Arkansas River near Nepesta at Highway 50, 7530 - Arkansas River in La Junta at Highway 109, 7533 - Arkansas River in Manzanola at Highway 207, 7535 - Arkansas River above the Purgatoire River in Las Animas at Highway 50	1/98 to 8/01
	USGS	7117000 - Arkansas River near Nepesta 7119700 - Arkansas River at Catlin Dam 7123000 - Arkansas River at La Junta 7124000 - Arkansas River at Las Animas	7/98 to 9/02

Sources: CDPHE, 2002e; CDPHE, 2005e
* EA study area only extends to Timpas Creek

The data summarized in the CDPHE data sheets are for the most part those listed in the antidegradation rule (CDPHE, 2005e). However, the data sheets do not include certain parameters of concern in the study area such as salinity and certain nutrients. Where data were not available from CDPHE's data sheets, other data sources were used.

3.1.2.2. United States Geological Survey (USGS)

Streamflow, temperature, and specific conductance are recorded by the USGS at several stream gages. Additional water quality data is also gathered through periodic sampling. Water quality and/or streamflow data from the following gages were downloaded from the USGS NWISweb database (USGS, 2005b) and was used to prepare Section 4 of this report and the water quality model (MWH, 2006):

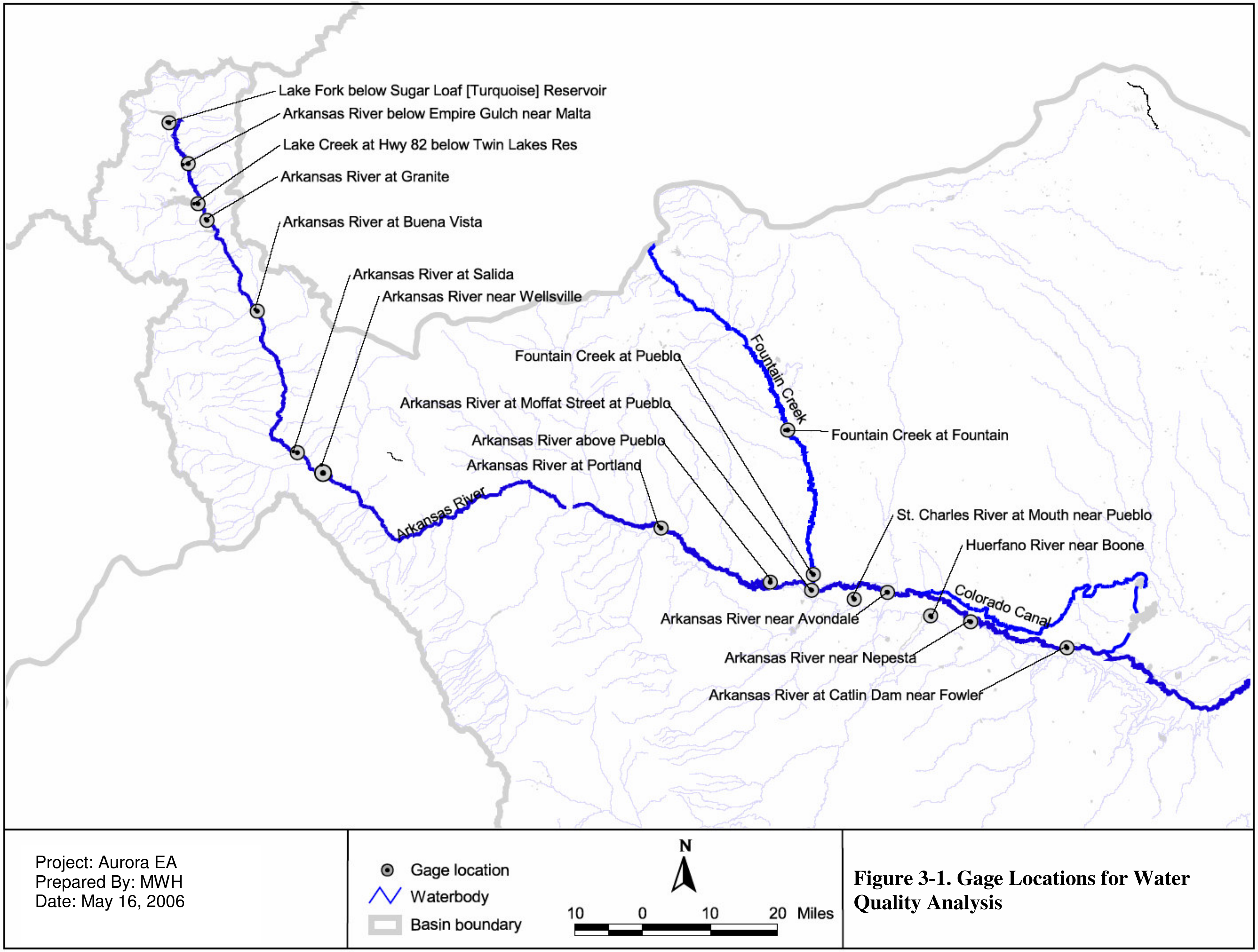
- Lake Fork below Sugar Loaf [Turquoise] Reservoir, CO (07082500) (Lake Fork)
- Lake Creek at State Hwy 82 below Twin Lakes Reservoir, CO (390444106174900) (Lake Creek)
- Arkansas River below Empire Gulch near Malta (07083710) (Malta)
- Arkansas River at Granite, CO (07086000) (Granite)
- Arkansas River at Buena Vista, CO (07087200) (Buena Vista)
- Arkansas River at Salida (07091500) (Salida)

- Arkansas River near Wellsville (07093700) (Wellsville)
- Arkansas River at Portland, CO (07097000) (Portland)
- Arkansas River above Pueblo (07099400) (Above Pueblo)
- Arkansas River at Moffat Street at Pueblo (07099970) (Moffat Street)
- Fountain Creek at Pueblo (07106500) (Fountain Creek)
- Arkansas River near Avondale (07109500) (Avondale)
- Arkansas River near Nepesta (07117000) (Nepesta)
- Arkansas River at Catlin Dam near Fowler (07119700) (Catlin Dam)

Of the above gages, the following are operated and maintained by the Colorado Division of Water Resources State Engineers Office for continuous streamflow measurement: Lake Fork, Granite, Salida, Wellsville, Portland, Above Pueblo, Nepesta, and Catlin Dam. The following additional gages were used only to evaluate selenium loading from tributaries to the Arkansas River (USGS, 2005b):

- St. Charles River at Mouth near Pueblo (07109000)
- Huerfano River near Boone (07116500)
- Fountain Creek at Fountain (07106500)

Figure 3-1 depicts the locations of stream gages listed above.



Project: Aurora EA
Prepared By: MWH
Date: May 16, 2006

Figure 3-1. Gage Locations for Water Quality Analysis

USGS also has collected extensive data for Pueblo Reservoir. These data were used to characterize ambient water quality in Pueblo Reservoir (USGS, 2005b).

Although USGS has daily salinity data for long periods of record for several gages, only the most recent data is published on the NWISweb website. Therefore, daily salinity records for several stream gages were requested directly from USGS (Walker, 2004).

Data collected by USGS in Lake Fork was used to characterize ambient conditions for metals in Lake Fork. The data was collected by USGS in Lake Fork in 2001 but are not available on the NWISweb website (USGS, 2005).

USGS data were used for the Effects Analysis section in several ways:

- Streamflow and salinity data used to develop the salinity model;
- Selenium data used in the selenium model;
- Nutrient and streamflow data used in the nutrients effects analysis; and
- Metals and streamflow data used in metals effects analysis.

3.1.2.3. STORET

STORET (short for storage and retrieval) is an EPA repository for several types of data including surface water quality (EPA, 2005). All of the data downloaded from STORET and used to describe existing conditions was sampled and uploaded to STORET by CDPHE. CDPHE sampling locations often correspond with stream gage locations. Therefore, CDPHE station locations are referred to according to the stream gage locations listed above. STORET contained data for parameters missing in other data sets such as mercury and arsenic. STORET data was also used for the description of existing conditions for Turquoise Reservoir.

STORET data was used for nutrient effects analysis at the Avondale gage. It was also used to develop the selenium model.

3.1.2.4. Colorado Springs Utilities Data for Lakes Henry and Meredith

Colorado Springs Utilities water quality data collected between 1994 and 2004 was used to characterize the water quality of Lakes Henry and Meredith (Colorado Springs Utilities, 2005).

3.1.2.5. Colorado Mountain College – Natural Resource Management Institute

Colorado Mountain College's (CMC) Natural Resource Management Institute collected water quality samples in Lake Fork between 2001 and 2004 (CMC, 2005). The data will be published in a report the summer of 2006. The raw data was summarized for this report to characterize ambient quality in Lake Fork.

3.1.3. Supplemental Data Collection

No new water quality sampling or analysis was conducted for this study.

3.2. Water Quality Modeling Efforts Reviewed

Several organizations have conducted water quality modeling of the Arkansas River. However, none of these models were used to model the impacts of Aurora's alternatives for the EA for reasons stated below. A new model for salinity and selenium was created for the EA to encompass the study area.

3.2.1. Colorado State University – Surface-Groundwater Model of Salinity Impacts to Crop Yields

Dr. Timothy Gates is developing a surface-ground water model to predict impacts of salinity and waterlogging on crop yields in the lower Arkansas Basin (Gates et al., 2002). Dr. Gates' study area is in the La Junta/Rocky Ford area. The model is only completed and calibrated for a small fraction of the study period, April 1999 to October 2001. Work is in progress to extend the calibration period, but the extended period is not available for use in preparing the EA. The minimal surface water salinity effects are likely to result in minimal ground water and crop yield effects. Therefore, no ground water modeling will be used for Aurora's EA effects analysis.

3.2.2. Colorado State University – MODSIM Water Quality Model

Dr. John Labadie is in the process of creating a water quality component for MODSIM which will link water quality calculations to MODSIM groundwater models. The water quality component was not available for use in preparing the EA.

3.2.3. USGS Water Quality Modeling

USGS has completed several water quality modeling efforts in the Arkansas River Basin.

3.2.3.1. Interactive-Accounting Model to Simulate Dissolved Solids, Streamflow, and Water-Supply Operations in the Arkansas River Basin

The USGS developed an accounting model to simulate hypothetical changes in hydrologic conditions or water supply operations in the Arkansas River Basin (USGS, 1989). The streamflow portion of the model was calibrated using streamflow data from 1940 to 1985. USGS modeled water quality in the Arkansas River using regression equations developed earlier by USGS (USGS, 1987) that relate streamflow to specific conductance at main-stem streamflow-gaging stations. However, the regressions used may no longer represent conditions in the study area due to changes in river operation.

3.2.3.2. Simulated Effects of Water Exchanges on Streamflow and Specific-Conductance in the Arkansas River Upstream from Avondale, Colorado

The USGS evaluated the effects of potential Arkansas River water exchanges on a study area between Twin Lakes Reservoir and Avondale (USGS, 1999). The model simulated future exchange conditions on a daily basis using streamflow and specific conductance data from water-years 1986 to 1993. The potential effects of exchanges on specific-conductance were simulated at four stations using regression equations between streamflow and specific conductance. It was not possible to develop an acceptable regression equation for the Above Pueblo gage. This model was not adopted for the EA because the data set is short and not necessarily representative of current conditions. However, much of the modeling approach was adapted for the EA water quality analysis.

3.2.4. SECWCD Water Quality Modeling

The Full Exchange Impact (hydrologic) Model was developed for Southeastern Colorado Water Conservancy District (SECWCD) to assist in the analysis, development, and evaluation of various flow management programs for the Arkansas River through the City of Pueblo. In 2003, Water & Waste Engineering, Inc. used the hydrologic model results and to create a water quality model for litigation and negotiation purposes to evaluate changes in total dissolved solids (TDS) caused by proposed Aurora diversions from the Arkansas River (Water & Waste, 2003). The Water & Waste Engineering, Inc. model provided only monthly estimates for changes in TDS and does not include the entire EA study area.

3.2.5. Modeling for Preferred Storage Options Plan

Water quality impacts associated with several of the Arkansas River Basin storage alternatives identified during development of the Arkansas Basin Preferred Storage Options Plan (PSOP) were evaluated with a model (Montgomery Watson, 2000). The model was not used for the EA because the evaluation was generally qualitative, indicating the direction and order of magnitude of possible water quality changes.

3.3. Data Analysis

The data analysis methods used for Sections 4, 5, and 6 (Affected Environment, Effects Analysis, and Cumulative Effects Analysis) are described below.

3.3.1. Affected Environment

Raw data was analyzed and summarized differently, depending on the parameter being investigated. Data for parameters with WQS were analyzed according to the methods listed in CDPHE's Section 303(d) Listing Methodology for the 2006 Cycle (CDPHE, 2005c). That document outlines how data is typically compared to WQS by CDPHE to determine impairment. The basic methods applied in this study are summarized below:

- Attainment of chronic chemical standards is based upon the 85th percentile of the ranked data, unless otherwise listed below;
- Total recoverable metals are evaluated against the 50th percentile (median) of ranked data;
- Dissolved oxygen standards are compared to the 15th percentile of ranked data;
- pH standards, which represent an acceptable range, are compared to the 15th and 85th percentile of ranked data;
- For all calculations, values less than method detection limits (MDLs) are set equal to zero;
- Hardness is used to calculate many of the metals WQS. Hardness was calculated as the mean of available data. Although, when enough data is available, CDPHE may use a regression analysis to determine hardness, CDPHE frequently bases their analysis on the mean hardness (Konowal, 2005); and
- The maximum historical concentration is compared to the acute WQS. If the maximum concentration is below the acute standard, the segment attains the standard. If the maximum concentration exceeds the acute standard, the segment may not attain the standard, but additional tests are required. Acute WQS can be exceeded once every three years (CDPHE, 2005c). Also, some acute WQS are calculated using equations dependent on paired data, such as hardness. Exceedences of acute metals WQS must be based on the TVS calculated individually for paired data points. Therefore, a maximum concentration that exceeds a TVS calculated using average hardness data might not necessarily indicate that a segment does not attain the acute WQS.

Salinity is not regulated by CDPHE in the study area. Monthly mean salinity data is presented to describe existing conditions. Reservoir trophic state is not regulated by CDPHE in the study area, but can be estimated by parameters such as nutrient concentration, chlorophyll *a* concentration, and transparency. Carlson's Trophic State Index (TSI) was used to describe the trophic state of reservoirs in the study area (Carlson, 1977).

3.3.2. Effects Analysis and Cumulative Effects Analysis

Different data analysis approaches were used for the various water quality parameters in Sections 5 and 6 (Effects Analysis and Cumulative Effects Analysis) as described below.

3.3.2.1. Salinity

A water quality model was developed for salinity in the form of specific conductance. The Aurora Excess Capacity Contract Environmental Assessment Water Quality Model Documentation (MWH, 2006) describes the data analysis used for the salinity model, but a short description is provided below.

The salinity model simulated specific conductance at the Above Pueblo, Avondale, and Catlin Dam gages. The salinity model used output from the Quarter-Monthly Model for flows at several gage locations. The model used a stratified reservoir model for Pueblo Reservoir to predict salinity at the Above Pueblo gage. Mass balance using historical relationships for ungaged loads was used to predict salinity at the Avondale gage. A historical relationship between salinity at the Avondale gage and the Catlin Dam gage was used to predict salinity at the Catlin Dam gage. The model process is summarized in **Figure 3-2**.

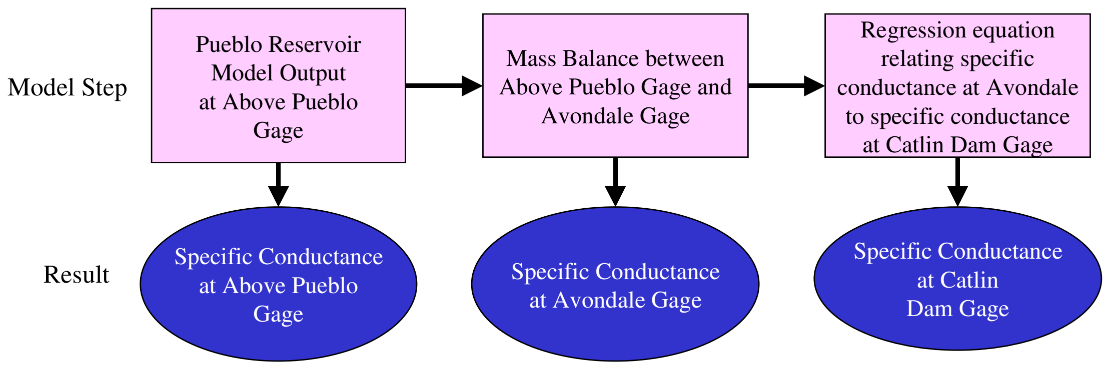


Figure 3-2. Specific Conductance Model Steps and Results

A mass balance was performed on Lake Henry and Lake Meredith to determine salinity effects due to changes in inflow salinity and evapoconcentration. The mass balance assumes:

- Lake Henry and Lake Meredith are one unit in accordance with the Quarter-Monthly Model.
- Inflow salinity to Lake Henry and Lake Meredith is equal to simulated salinity at the Avondale gage.
- Monthly mean evaporation is equal to 70 percent of the pan evaporation rate from Pueblo Reservoir.

A mass balance is performed to determine if reservoir releases from Lake Henry and Lake Meredith affect specific conductance downstream of the Catlin Dam gage.

The salinity model has several limitations. It is based on the historical relationship between flow and specific conductance at several stream gages. Therefore, the model assumes that the historical relationships hold true under the direct effects and cumulative effects conditions. The salinity model is used only to compare between alternatives, it is not intended to predict future water quality in the Arkansas River.

Although there is no WQS for salinity in the Arkansas River, the 85th percentile of quarter-monthly simulated specific conductance was used as the descriptive statistic, according to CDPHE's method of characterizing of ambient water quality in comparison to chronic WQS (CDPHE, 2003). The 85th percentile of quarter-monthly simulated specific conductance for Existing Conditions, Proposed Action, and the No Action Alternative was compared to determine if the alternatives cause a change in specific conductance.

There are two thresholds the 85th percentile of specific conductance was compared against because there is not one industry standard threshold that is typically applied to surface water in the study area. The thresholds are:

- Drinking water secondary MCL for TDS. TDS is converted to specific conductance using site-specific regressions at each gage as well as for Lake Henry and Lake Meredith. When converted to specific conductance in the study area, the secondary MCL ranges from 740 to 772 microsiemens per centimeter (µS/cm).
- The threshold between moderate and high agricultural salinity hazard of 750 µS/cm.

3.3.2.2. Sulfate

Sulfate was raised as a constituent of concern in the lower Arkansas River. Sulfate concentrations are directly related to specific conductance in the lower Arkansas River. **Figure 3-3** depicts the relationship between specific conductance and sulfate at the Catlin Dam gage.

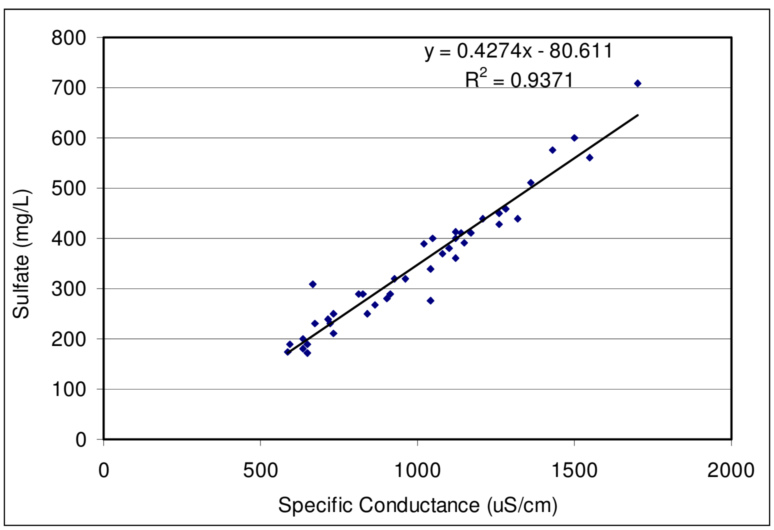


Figure 3-3. Relationship of Specific Conductance and Sulfate at Catlin Dam Gage

Source: USGS, 2005b. 1990 to 2002

The salinity effects analysis and the regression equation shown above can be used to determine effects of the Proposed Action and No Action Alternative on sulfate concentrations. However, current sulfate concentrations at the Catlin Dam gage are far below the WQS (see Section 4.4.5), such that unless specific conductance is shown to increase drastically, sulfate concentrations will not exceed WQS. Therefore, effects on sulfate concentrations are not evaluated.

3.3.2.3. Selenium

Dissolved selenium concentrations for Existing Conditions, Proposed Action, and the No Action Alternative were simulated using a simple quantitative analysis that builds on the results of the salinity model. The Aurora Excess Capacity Contract Environmental Assessment Water Quality Model Documentation (MWH, 2006) describes the data analysis used to develop the selenium model. The selenium analysis used historical relationships between salinity and selenium to simulate dissolved selenium concentration at the three salinity model output locations: Above Pueblo gage, Avondale gage, and Catlin Dam gage.

There are several limitations to the selenium effects analysis. The mechanics of selenium are poorly understood in general and in the Arkansas River basin. In addition, the dataset on which to develop empirical relationships is limited. Therefore, the predicted selenium concentrations have a great deal of uncertainty. The predicted selenium concentrations are only used to compare differences between alternatives, rather than predict actual future selenium concentrations.

Effects and cumulative effects for selenium were evaluated by comparing simulated concentrations of dissolved selenium to instream WQS. The 85th percentile of modeled quarter-monthly concentrations for Existing Conditions, the Proposed Action, and No Action Alternative were compared to each other and to the chronic WQS. Quarter-monthly exceedences of the acute WQS were counted and the number of exceedences was compared for Existing Conditions, the Proposed Action, and No Action Alternative.

A qualitative analysis of dissolved selenium effects in Lake Henry and Lake Meredith was conducted based on the results of the salinity mass balance for the lakes.

3.3.2.4. Percentage of Flow in the Lower Arkansas River from Fountain Creek

The percentage of flow in the lower Arkansas River from Fountain Creek contributing to lower Arkansas River flows was calculated from Quarter-Monthly Model output. The percentage was calculated as Fountain Creek flows at the confluence divided by flows in the Arkansas River reach from Fountain Creek to the St. Charles River.

Effects and cumulative effects were evaluated by comparing the percentages for the No Action Alternative, Proposed Action, and Existing Conditions on an annual mean basis.

3.3.2.5. Metals

Historical metals impairments are documented in the upper Arkansas River (CDPHE, 2004). However, concentrations of many metals have decreased in recent years due to remediation efforts to the point that several impairments that were once documented on the 303(d) list are no longer considered impairments (CDPHE, 2006). Dissolved zinc is the only metal on the 2006 303(d) list in the upper Arkansas River in the study area. For this reason, elevated metals concentrations are not as great of a concern as they once were in the upper Arkansas River.

The Proposed Action and No Action Alternative are not expected to change sources of metals contamination in the upper Arkansas River. The known sources of metal contamination in the upper Arkansas River are runoff and drainage through historically mined areas in the upper basin (USGS, 1998). For both direct and cumulative effects, the loading to surface water from these sources are equal for the Proposed Action and No Action Alternative.

Flows from the Granite gage will be summarized for Existing Conditions, the Proposed Action, and No Action Alternative to determine potential metals effects.

Total recoverable iron was a new addition to the 2006 303(d) list between Fountain Creek and the Colorado Canal. As discussed in Section 4.5.5.3, the source of the total recoverable iron in the reach of the Arkansas River is most likely Fountain Creek and other erosional tributaries that contribute iron bound to sediments at particularly high concentrations during storm events (USGS, 2002). The Aurora EA alternatives would not affect Fountain Creek and the other tributaries that are the most likely sources of iron to the Arkansas River. Therefore, the Aurora EA alternatives would not affect total recoverable iron in the Arkansas River.

3.3.2.6. Boron, Arsenic, and Mercury

Boron, arsenic, and mercury were raised as constituents of concern through the EA public comment process, although ambient data show no indication of impairment. The available data for these constituents is summarized in Section 4. Surface water concentrations of both arsenic and boron in the study area are well below WQS. Mercury concentrations in Pueblo Reservoir are well below CDPHE's action level indicating they are safe for human consumption. Because concentrations in the study area are below applicable standards and the EA alternatives do not affect any boron, arsenic, or mercury sources, the EA alternatives will have no effect on these constituents.

3.3.2.7. Nutrients

Nutrient loading into the middle and lower Arkansas River contributes to algae growth in reservoirs. Potential nutrient sources include wastewater treatment plant discharges, agricultural return flows, urban runoff, and other non-point sources (USGS, 1998). These sources are equal in the Proposed Action and No Action Alternative. Under cumulative effects there may be additional nutrient loading because in 2045 there is more wastewater effluent discharged to surface waters. However, the additional discharges are equal for the Proposed Action and No Action Alternative. The nutrients effects analysis focused on the differences in streamflow at critical locations for in the study area because, although sources may be the same, concentrations can be affected by streamflow.

To evaluate the effect of streamflow on nutrient concentrations, simulated flows were compared for direct effect and cumulative effects at the Portland gage and the Avondale gage. The Portland gage is located just upstream of Pueblo Reservoir. The Avondale gage is located just upstream of the Colorado Canal headgate (serving Lake Henry and Lake Meredith) and upstream of the Holbrook Canal headgate (serving Holbrook Reservoir).

3.3.2.8. Reservoirs

Water quality analysis for reservoirs, other than the salinity analysis in Pueblo Reservoir, Lake Henry, and Lake Meredith, and the nutrient loading analysis, was based on analysis of changes to reservoir depth, residence time, and source water. Residence time and depth can affect stratification patterns and removal of potentially harmful pollutants from reservoirs. Depth, residence time, and source water are calculated using the results of the Quarter-Monthly Model.

Reservoir depth was calculated using storage results from the Quarter-Monthly Model and the depth-capacity curves of the reservoirs. Large reductions in depth of those reservoirs that strongly stratify (Turquoise Reservoir and Pueblo Reservoir) to a point where wind and wave action could overcome stratification would affect summer water quality.

There is not an industry-accepted threshold for effects due to changes in stratified reservoir depth. The Osgood Index (Osgood, 1988), which estimates the probability of complete mixing in summer, was analyzed as a potential quantitative method to determine effects due to changes in depth, but was not found to be applicable to Pueblo Reservoir. When the Osgood Index was calculated using historical data, the Osgood Index suggested that the reservoir was mixed, even during periods of stratification. This problem may be due to the different geometry of Pueblo Reservoir compared to lakes in Minnesota where the Osgood Index was developed. Therefore, effects due to depth changes in Turquoise Reservoir and Pueblo Reservoir were evaluated qualitatively.

Lake Henry, Lake Meredith, and Holbrook Reservoir are all less than 20 feet deep at full capacity and do not strongly stratify (USGS, 1993). In addition, these reservoirs have historically had wide variations in storage and depth under normal operating conditions. Therefore, large changes in depth were not evaluated for impacts to stratification. However, changes in depth of these reservoirs under each alternative are presented for informational purposes.

Shorter residence times in a reservoir can be beneficial to water quality. Residence times in stratified reservoirs with bottom outlets such as Pueblo Reservoir and Turquoise Reservoir can be particularly important for flushing contaminants from the hypolimnion that may have been released from bottom sediments during suboxic periods (dissolved oxygen concentrations less than 3 mg/L) conditions (USGS, 1994). In Pueblo Reservoir, shorter residence times of hypolimneitc water combined with underflow in the late summer help to move inflows with higher concentrations through the hypolimnion without mixing with the rest of the reservoir water (USGS, 1994). Shorter residence times can also reduce the effects of evapoconcentration, in which water evaporates and increases the concentration of water quality constituents in the remaining water.

Residence time was calculated as the annual average storage in a reservoir divided by the annual average outflow using Quarter-Monthly Model results. For all of the reservoirs, the calculated residence time is theoretical. During periods of stratification, actual residence time can vary greatly from theoretical residence time because certain portions of the reservoir may be isolated from the volumes flowing into and out of the reservoir. Residence time in Lake Henry and Lake Meredith was calculated together due to their combination in the Quarter-Monthly Model. Residence time was only calculated on an annual basis due to large fluctuations in residence time that occur on a monthly or quarter-monthly basis.

Pueblo Reservoir is fairly resistant to changes in stratification and mixing patterns. USGS determined that, "unless Arkansas River or Pueblo Reservoir water-operations practices change substantially, the annual stratification and mixing patterns observed in 1985 through 1989 can be expected to continue in the future if water levels, inflows, and outflows remain within the range observed during 1985 through 1989" (USGS, 1994). It is likely that Turquoise Reservoir, the other stratified reservoir in the study area, is similarly resistant to changes in stratification and mixing patterns.

Due to the large fluctuation in residence times under current operating conditions large changes would be required to upset the historical stratification and mixing patterns of Pueblo and Turquoise Reservoir. There is not an industry-accepted threshold for effects due to changes in residence time. Therefore, a qualitative analysis of effects due to changes in residence time was used.

Potential differences in source water in reservoirs between Existing Conditions, Proposed Action, and the No Action Alternative were investigated because different source waters can have different water quality characteristics. A change in the mix of source waters could result in a change in the water quality of the combined water in the reservoir.

The percentage of water in Turquoise Reservoir from the Western Slope of Colorado was evaluated for each alternative. The percentage of water in Turquoise Reservoir from the Western Slope was calculated as the flows from the Busk-Ivanhoe, Bousted, and Homestake Tunnels divided by those Western Slope inflows plus native inflows. Water quality from the upper watershed of the Western Slope and the Arkansas River Basin are expected to be of similar and high quality.

Changes to source water in reservoirs in the lower basin reservoirs were evaluated indirectly by the calculation of the percentage of water in the lower Arkansas River derived from Fountain Creek, which was discussed above.

3.3.2.9. Low Flows

The goal of the low flow effects analysis was to determine if the Proposed Action and No Action Alternative would affect the requirements for wastewater treatment for CDPS dischargers due to changes in low flows. DFLOW (EPA, 1986) is an analytical method approved by the State of Colorado to define low flow conditions in receiving waters for determination of allowable effluent limits for permitted wastewater dischargers. Using DFLOW with Quarter-Monthly Model simulated flows was evaluated as a potential method to determine the effects of the Proposed Action and No Action Alternative on Arkansas River chronic low flows.

Unfortunately, low flows calculated using DFLOW for simulated Proposed Action and No Action Alternative conditions cannot be compared to low flows in existing CDPS permits. Proposed Action and No Action Alternative hydrology was simulated using 2004 operational conditions and demands. Permit low flows are based on historical river flows, which are a result of changing demand levels, changing water management strategies, changing discharges, and changes in diversions and exchanges.

In addition, Existing Conditions hydrology developed for the EA cannot be used as a baseline for low flow effects analysis, as it is for the effects analysis of water quality constituents such as salinity and selenium. Decreases or increases in Proposed Action and No Action Alternative chronic low flows compared to Existing Conditions would not necessarily indicate an effect to CDPS dischargers because current CDPS permits are based on historical flows that resulted from varying demands and river operations. Future permit low flows will be calculated based on the previous ten years of historic hydrologic record at the time of permit renewal. Permits are renewed on a five-year interval. The ten-year period varies from facility to facility, as does the permit renewal cycle. The Existing Conditions hydrology developed for the EA cannot simulate the future hydrology that will be the basis for future CDPS permits.

Finally, if low flows were to decrease or increase as a consequence of changed hydrologic conditions, one of which may be the implementation of the Proposed Action, it would not necessarily result in required changes to treatment processes to meet WQS. If a treatment plant currently produces effluent quality that is better than what is required by the current permit, a change in low flows may not result in added cost for wastewater treatment.

Due to the difficulty in using simulated flows to determine effects on existing wastewater treatment plant discharge permits, a realistic quantitative analysis of effects due to changes in low flow could not be performed.

Nevertheless, Aurora operates exchanges in accordance with several legally binding flow programs and decreed minimum flows in the study area to protect minimum streamflows at key points in the study area. Some of these agreements were negotiated to protect CDPS dischargers. A complete listing of the flow programs and minimum flows is included in the Water Resources Technical Report (MWH, 2005). The following is a summary of some of the significant flow agreements that Aurora will continue to participate in as it proceeds forward:

- Upper Arkansas Voluntary Flow Management Program (UAVFMP): This program is designed to provide water for fisheries and recreation, and varying recommended flows for the program are defined at the Wellsville gage (Walcher, 2003). The highest priority is the maintenance of a minimum year-round flow of at least 250 cfs. Between mid November through April, winter incubation flows should be maintained between 250 and 400, depending on spawning flows. Subject to water and storage availability. Reclamation augments these flows during the July 1 to August 15 period at 700 cfs through releases from the Fry-Ark Project. Aurora has agreed to not diminish Reclamation's ability to meet the goals of the UAVFMP through its operations (SECWCD, 2003).

- City of Pueblo Flow Management Program and recreational in channel diversion (RICD) Application: Pueblo's RICD application resulted in two IGAs in 2004 (February IGA, 2004, May IGA, 2004), which stipulate that exchanges will be reduced or curtailed as necessary to attain a minimum average daily flow of 100 cfs at the Above Pueblo gage and 85 cfs at the combined flow location located above the confluence with Fountain Creek. During the period of March 16 through November 14, exchanges will be reduced or curtailed to maintain specified recreational flows at the Above Pueblo gage.

- Rocky Ford exchange decrees: The exchange decrees for Rocky Ford water (87-CW-63 and 99-CW-170) provide for minimum flows in the upper Arkansas River. Aurora's exchanges may not operate such that the native flow at the Fremont County WWTF (Portland gage) is less than 190 cfs, or the native flow at the Salida WWTF (Wellsville gage) is less than 240 cfs, except in July and August when the flow restriction is 260 cfs. Colorado Water Conservation Board (CWCB) minimum streamflow requirements of 15 cfs in Lake Fork Creek below Turquoise Reservoir and Lake Creek below Twin Lakes Reservoir would be maintained. Furthermore, Aurora has entered into a stipulation with the Arkansas River Outfitters Association that further limits the rate at which Aurora may operate its Rocky Ford exchanges. Aurora's maximum exchange rates vary with flow at the Wellsville gage. No exchanges can be made if flow is less than 250 cfs.

If low flows do change in the future due to any cause, both Colorado and federal law state that entities are not entitled to dilution:

- 40 Code of Federal Regulations (CFR) §131.10 states that waste assimilation cannot be a designated use;

- The finding of the case City of Thornton v Bijou Irrigation, 926 P2d 1 (Colo. 1996) was that water rights are not to be impaired to meet water quality objectives and a CDPS-permitted discharger has no entitlement to dilution flow;

- Colorado Revised Statutes (CRS) §25-8-104 states that water quality regulations cannot impair water rights and the WQCC cannot seek instream flows for any purpose.

4. Affected Environment

The affected environment describes existing conditions in the study area. The discussion is organized according to the following parameters or parameter groups:

- Dissolved oxygen;
- pH;
- Nutrients;
- Salinity;
- Metals;
- Selenium;
- Arsenic; and
- Boron.

Each parameter is discussed according to the following reaches from upstream to downstream. The reaches are divided into segments in accordance with CDPHE's Regulation 32 (2004b):

- Lake Fork and Lake Creek, between Twin Lakes and Turquoise Reservoir and the Arkansas River, respectively;
- Upper Arkansas River, between Lake Fork and Pueblo Reservoir. Includes CDPHE upper Arkansas Basin segments UA2c (Arkansas River from Lake Fork to Lake Creek) and UA3 (Arkansas River form Lake Creek to Pueblo Reservoir);
- Middle Arkansas River, between Pueblo Reservoir and Fountain Creek. Includes CDPHE middle Arkansas Basin segments MA2 (Arkansas River from Pueblo Reservoir to Wildhorse Creek) and MA3 (Arkansas River from Wildhorse Creek to Fountain Creek); and
- Lower Arkansas River, between Pueblo Reservoir and Timpas Creek. Includes CDPHE lower Arkansas Basin segments LA1a (Arkansas River from Fountain Creek to Colorado Canal) and LA1b (Arkansas River from Colorado Canal to John Martin Reservoir – although the study area concludes at Timpas Creek).

Reservoir water quality is discussed after the discussion of individual stream water quality parameters. The following reservoirs are discussed from upstream to downstream:

- Turquoise Reservoir;
- Pueblo Reservoir;
- Lake Henry and Lake Meredith; and
- Holbrook Reservoir.

The reservoir discussion includes the same parameters as above, with additional discussion of trophic state and temperature stratification.

4.1. Dissolved Oxygen

Dissolved oxygen is necessary to support aquatic life. WQS for dissolved oxygen represent the minimum level required. The 15^{th} percentile of available data defines ambient level of dissolved oxygen as compared to WQS. WQS for dissolved oxygen are met for all stream segments in the study area.

4.1.1. Dissolved Oxygen – Lake Fork and Lake Creek

Dissolved oxygen levels in Lake Fork and Lake Creek are summarized in **Table 4-1**. The 15th percentile is equal to or exceeds the WQS.

Table 4-1. Summary of Dissolved Oxygen in Lake Fork and Lake Creek

Location	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS (mg/L)	# Samples (date range)
Lake Fork	8.2	9	9.3	6.0 / 7.0 (sp)	12 (1990 to 1993)
Lake Creek	7.7	9	9.8		26 (1990 to 1993)

(sp) = spawning, mg/L = milligrams per liter
Source: USGS, 2005b. Lake Fork and Lake Creek gages

4.1.2. Dissolved Oxygen – Upper Arkansas River

Table 4-2 summarizes dissolved oxygen data in the upper Arkansas River. The 15th percentile is equal to or exceeds the WQS.

Table 4-2. Summary of Dissolved Oxygen in the Upper Arkansas River

Segment	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS (mg/L)	# Samples (date range)
UA2c. Lake Fork to Lake Creek	6.0	7.1	8.6	6.0 / 7.0 (sp)	273 (1997 to 2001)
UA3. Lake Creek to Pueblo Reservoir	6.4	7.6	9.4		166 (1994 to 2002)

(sp) = spawning
Source: CDPHE, 2005e

4.1.3. Dissolved Oxygen – Middle Arkansas River

Table 4-3 summarizes dissolved oxygen data in the middle Arkansas River. The 15th percentile is equal to or exceeds the WQS.

Table 4-3. Summary of Dissolved Oxygen in the Middle Arkansas River

Segment	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS (mg/L)	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek*	8.2	9.7	11.3	6.0 / 7.0 (sp)	36 (1992 to 2002)
MA3. Wildhorse Creek to Fountain Creek	8.6	10.3	11.8	5.0	34 (1997 to 2001)

(sp) = spawning
Sources: *MA2 – USGS, 2005b. Above Pueblo Gage (no CDPHE data sheet available for this segment). MA3 - CDPHE, 2005e

4.1.4. Dissolved Oxygen – Lower Arkansas River

Table 4-4 summarizes dissolved oxygen data in the lower Arkansas River. The 15th percentile is equal to or exceeds the WQS.

Table 4-4. Summary of Dissolved Oxygen in the Lower Arkansas River

Segment	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS (mg/L)	# Samples (date range)
LA1a. Fountain Creek to Colorado Canal	6.5	8.1	10.0	5.0	1,728 (2000 to 2005)
LA1b. Colorado Canal to John Martin Reservoir	6.8	8.5	10.9	5.0	73 (1998 to 2002)

Source: CDPHE, 2005e, LA1b and USGS, 2005b, LA1a

4.2. pH

pH must be within a certain range to be protective of aquatic life. The minimum pH WQS in all study area segments is 6.5 and is compared to the 15th percentile of ambient data. The maximum pH WQS in all study area segments is 9 and is compared to the 85th percentile of ambient water quality data. WQS for pH are attained for all stream segments within the study area.

4.2.1. pH – Lake Fork and Lake Creek

Table 4-5 summarizes pH data in Lake Fork and Lake Creek. The data is within the range of WQS.

Table 4-5. Summary of pH in Lake Fork and Lake Creek

Segment	15th Percentile	Median	85th Percentile	# Samples (date range)
Lake Fork	7.0	7.2	7.3	13 (1990 to 1993)
Lake Creek	7.4	7.6	7.8	27 (1990 to 1993)

Source: USGS, 2005b. Lake Fork and Lake Creek gages.

4.2.2. pH – Upper Arkansas River

Table 4-6 summarizes pH data for the upper Arkansas River. The 15th and 85th percentiles are within the WQS range.

Table 4-6. Summary of pH in the Upper Arkansas River

Segment	15th Percentile	Median	85th Percentile	# Samples (date range)
UA2c. Lake Fork to Lake Creek	7.4	7.8	8.2	288 (1997 to 2001)
UA3. Lake Creek to Pueblo Reservoir	7.1	7.7	8.1	174 (1994 to 2002)

Source: CDPHE, 2005e

4.2.3. pH – Middle Arkansas River

Table 4-7 summarizes pH data for the middle Arkansas River. The 15th and 85th percentiles are within the WQS range and do not violate the WQS.

Table 4-7. Summary of pH in the Middle Arkansas River

Segment	15th Percentile	Median	85th Percentile	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek*	8.1	8.3	8.4	34 (1992 to 2002)
MA3. Wildhorse Creek to Fountain Creek	8.2	8.4	8.6	36 (1997 to 2001)

Sources: *MA2 – USGS, 2005b. Above Pueblo gage. MA3 – CDPHE, 2005e

4.2.4. pH – Lower Arkansas River

Table 4-8 and summarizes pH data for the lower Arkansas River. The 15th and 85th percentiles are within the WQS range and do not violate the WQS.

Table 4-8. Summary of pH in the Lower Arkansas River

Segment	15th Percentile	Median	85th Percentile	# Samples (date range)
LA1a. Fountain Creek to Colorado Canal	8.0	8.2	8.3	20 (1998 to 2002)
LA1b. Colorado Canal to John Martin Reservoir	7.9	8.2	8.4	85 (1998 to 2002)

Source: CDPHE, 2005e

4.3. Nutrients

Nitrogen and phosphorus are the major nutrients evaluated for water quality purposes. High nutrient concentrations can lead to algae growth and accelerate the process of eutrophication in reservoirs. High nutrient levels can also be a concern for drinking water supply. Nutrients can enter rivers through municipal WWTFs and non-point sources such as agricultural return flows, urban runoff, animal waste, and septic systems. Nutrient levels are generally higher in the lower Arkansas River than the upper Arkansas River. This can be attributed to increased watershed development in the downstream direction.

Nitrate, nitrite, and unionized ammonia are regulated parameters in surface waters in the study area. Unionized ammonia is regulated rather than total ammonia because it is much more toxic to many organisms than the ionized form (Wetzel, 2001). Phosphorus is an important nutrient for algae growth in reservoirs, but there is no surface WQS for phosphorus in the study area. Therefore, phosphorus is not analyzed in the stream segments, but is summarized in the reservoirs discussion, Sections 4.9 through 4.13.

Nitrite and nitrate are not frequently monitored in the study area. CDPHE did not analyze nitrate or nitrite in their 2004 or 2006 303(d) processes. Nitrate plus nitrite as N is more frequently analyzed in the study area and is summarized in this report where possible, rather than discussing each parameter individually.

4.3.1. Nutrients – Lake Fork and Lake Creek

Table 4-9 summarizes unionized ammonia data in Lake Fork and Lake Creek. Unionized ammonia is calcuated as a function of pH, temperature, and total ammonia. Although, in most cases, total ammonia in the stream was measured in concentrations greater than the MDL, calculated unionized ammonia is a small fraction of the measured ammonia and therefore is reported as less than 0.01 mg/L. Comparison of the 85th percentile with the chronic WQS indicates that the standard is not violated. The acute standard varies with temperature and pH and is evaluated individually for each water quality sample. Comparison of individual measurements in Lake Fork and Lake Creek with the acute WQS resulted in no exceedences.

Table 4-9. Summary of Unionized Ammonia as N in Lake Fork and Lake Creek

Segment	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	Chronic WQS (mg/L)	# Samples (date range)
Lake Fork	<0.01	<0.01	<0.01	0.02	11 (1990 to 1993)
Lake Creek	<0.01	<0.01	<0.01	0.02	23 (1990 to 1993)

Source: USGS, 2005b

Table 4-10 and **Figure 4-1** summarize total nitrate plus nitrite data for Lake Fork and Lake Creek. Concentrations of total nitrite plus nitrate are compared to the nitrate WQS because concentrations of nitrite are typically a small component of the sum (USGS, 2001). Because the total of nitrite plus nitrate as N is less than the nitrate standard of 10 mg/L, the standard is not violated.

Table 4-10. Summary of Total Nitrite plus Nitrate as N in Lake Fork and Lake Creek

Location	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS* (mg/L)	# Samples (date range)
Lake Fork	0.024	0.038	0.052	10	11 (1990 to 1993)
Lake Creek	0.008	0.016	0.029	10	23 (1990 to 1993)

* WQS only includes Nitrate as N. Note that the nitrate standard is protective of drinking water uses and concentrations much less than the standard can cause undesirable biological activity in surface water.
Source: Source: USGS, 2005b

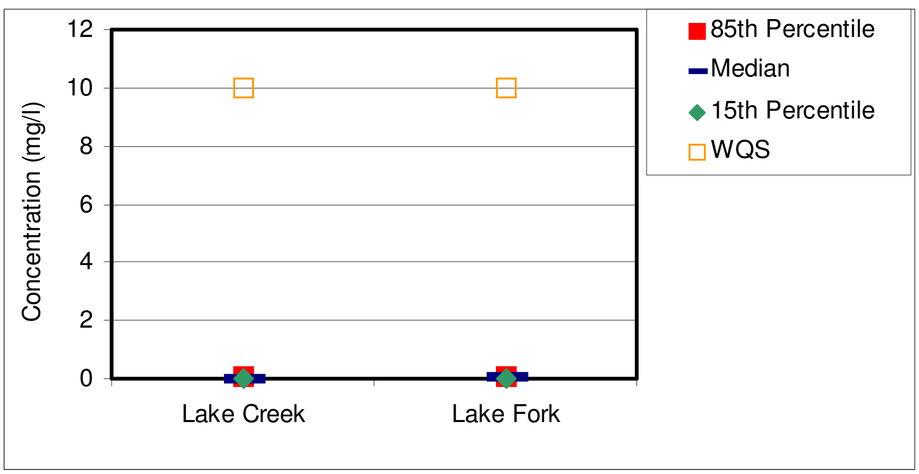


Figure 4-1. Summary of Total Nitrite plus Nitrate as N in Lake Fork and Lake Creek
Source: USGS, 2005b

4.3.2. Nutrients - Upper Arkansas River

Nutrient levels tend to be low in the upper Arkansas River. Total ammonia data is compared to the chronic ammonia WQS in **Table 4-11**. Concentrations in most samples collected were below the MDL and are reported as 0. The chronic WQS for ammonia only includes unionized ammonia. The chronic standard for both upper Arkansas River segments is 0.02 mg/L as N. The 85th percentile of total ammonia data for both segments is equal to or less than the chronic unionized ammonia WQS. Unionized ammonia typically is only a small fraction of total ammonia. Therefore, both segments meet the chronic ammonia WQS. The acute ammonia standard is a function of temperature and pH.

CDPHE found no exceedences to the acute ammonia standard in segments UA2c and UA3 in their data sheets (CDPHE, 2005e).

Table 4-11. Summary of Total Ammonia as N in the Upper Arkansas River

Segment	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	Chronic WQS (unionized) (mg/L)	# Samples (date range)
UA2c. Lake Fork to Lake Creek	0	0	0.02	0.02	23 (1997 to 2001)
UA3. Lake Creek to Pueblo Reservoir	0	0	0	0.02	176 (1994 to 2002)

Source: CDPHE, 2005e

The available data for nitrate plus nitrate in STORET is summarized in **Table 4-12** and **Figure 4-2**. Because the total of nitrite plus nitrate as N is less than the nitrate standard of 10 mg/L, the standard is not violated.

Table 4-12. Summary of Total Nitrite plus Nitrate as N in Upper Arkansas River

Location	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS* (mg/L)	# Samples (date range)
Arkansas River near Malta (segment UA2c)	0	0.08	0.26	None	40 (1998 to 2002)
Arkansas River at Salida (segment UA3)	0	0.09	0.17	10	54 (1998 to 2002)

* WQS only includes Nitrate as N. Note that the nitrate standard is protective of drinking water uses and concentrations much less than the standard can cause undesirable biological activity in surface water.
Source: EPA, 2005

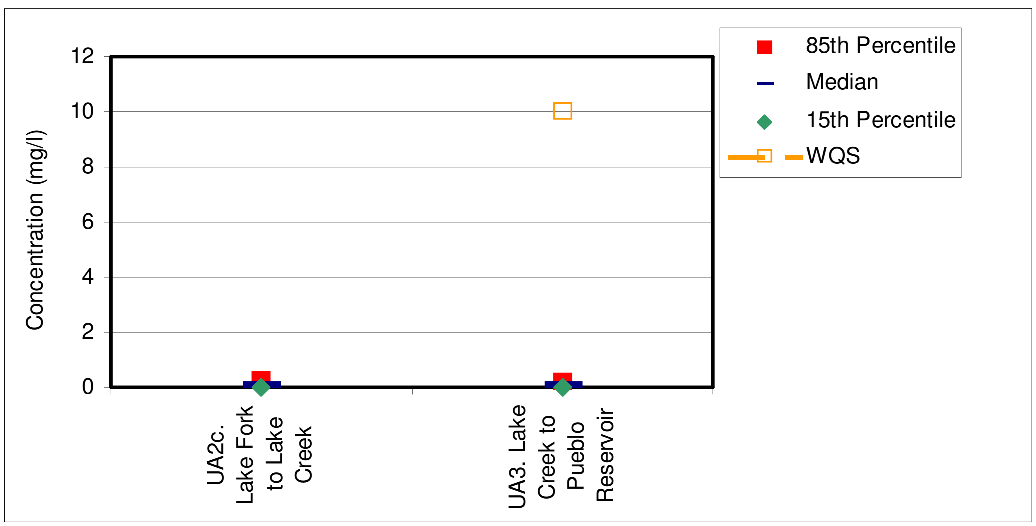


Figure 4-2. Summary of Total Nitrite plus Nitrate as N in Upper Arkansas River

* WQS only includes Nitrate as N
Source: EPA, 2005

4.3.3. Nutrients - Middle Arkansas River

Table 4-13 summarizes unionized ammonia data in the middle Arkansas River. At the Above Pueblo gage. In segment MA3, only one sample of of unionized ammonia was collected (CDPHE, 2005e).

The calculated concentration of unionized ammonia of the one sample rounded to zero. Therefore, the chronic ammonia WQS in the middle Arkansas River is met.

Table 4-13. Summary of Unionized Ammonia as N in the Middle Arkansas River

Segment	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS (mg/L)	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek	<0.01	<0.01	<0.01	0.02	6 (all 1992)
MA3. Wildhorse Creek to Fountain Creek	N/A	<0.01	N/A	0.06	1 (1998)

Sources: MA2 – USGS, 2005b. Above Pueblo Gage. MA3 - CDPHE, 2005e

The acute standard varies with temperature and pH. CDPHE found that the acute WQS for the data point in segment MA3 was 0.14 mg/L, therefore, the acute WQS is met in segment MA3 (CDPHE, 2005e). Comparison of individual at the Above Pueblo gage with the acute WQS resulted in no exceedences (USGS, 2005b).

Data for nitrate plus nitrate is summarized in **Table 4-14** and **Figure 4-3**. Because the total of nitrite plus nitrate as N is less than the nitrate standard of 10 mg/L, the standard is not violated.

Table 4-14. Summary of Total Nitrite plus Nitrate as N in Middle Arkansas River

Location	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS* (mg/L)	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek – Above Pueblo Gage	0	0	0.11	10	3 (all 1998)
MA3. Wildhorse Creek to Fountain Creek – Moffat Street gage	0.48	0.70	2.10	10	3 (all 1998)

* WQS only includes Nitrate as N. Note that the nitrate standard is protective of drinking water uses and concentrations much less than the standard can cause undesirable biological activity in surface water.
Source: EPA, 2005

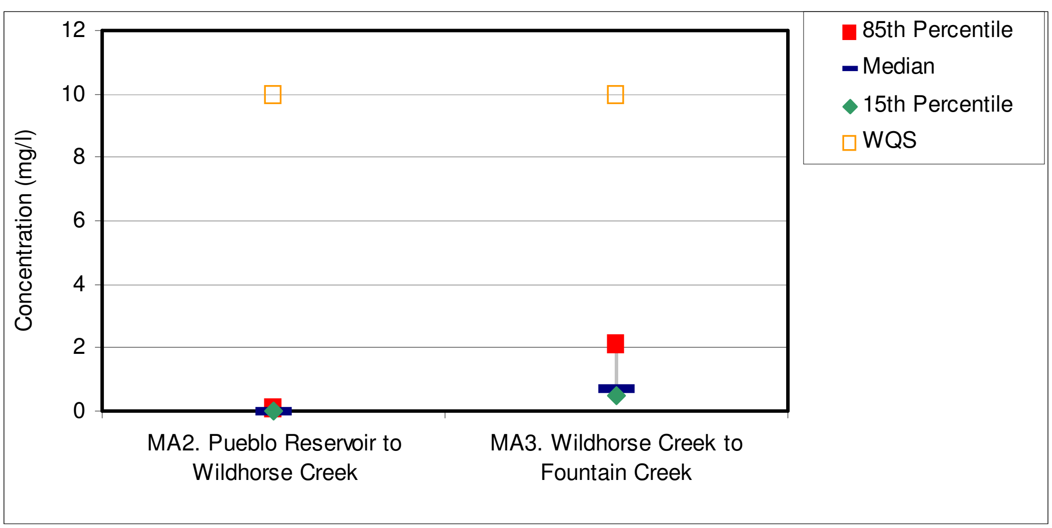


Figure 4-3. Summary of Total Nitrite plus Nitrate as N in Middle Arkansas River
WQS only includes Nitrate as N
Source: EPA, 2005

4.3.4. Nutrients - Lower Arkansas River

Table 4-15 summarizes unionized ammonia data for the lower Arkansas River. Concentrtions of many of the samples collected were below the MDL and are reported as 0. The remaining samples had concentrations above the MDL, but conversion to unionized ammonia resulted in concentrations less than 0.01. Comparison of the 85th percentile with the WQS indicates that the chronic WQS is met. The acute standard varies with temperature and pH. CDPHE found no exceedences to the acute ammonia standard in segment LA1a. There was 1 exceedence out of 34 measurements in segment LA1b (CDPHE, 2005e). According to the 303(d) listing methodology, "in general, data indicates non-attainment of an acute standard if the standard is exceeded more frequently than once in three years" (CDPHE, 2005c). Because there was only one exceedence of the acute standard in four years the acute standard is still attained.

Table 4-15. Summary of Unionized Ammonia as N in the Lower Arkansas River

Segment	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS (mg/L)	# Samples (date range)
LA1a. Fountain Creek to Colorado Canal	0	<0.01	<0.01	0.1	5 (1998 to 2002)
LA1b. Colorado Canal to John Martin Reservoir	0	0	<0.01	0.1	34 (1998 to 2002)

Source: CDPHE, 2005e

Data for nitrite plus nitrate is summarized in **Table 4-16** and **Figure 4-4**. Because the total of nitrite plus nitrate as N is less than the nitrate standard of 10 mg/L, the standard is not violated.

Table 4-16. Summary of Total Nitrite plus Nitrate as N in the Lower Arkansas River

Location	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS*	# Samples (date range)
Arkansas River near Avondale (segment LA1a)	0.67	1.10	2.26	10	12 (1998 to 2000)
Arkansas River near Nepesta (segment LA1b)	0.80	1.80	3.54	10	63 (1992 to 1998)

* WQS only includes Nitrate as N. Note that the nitrate standard is protective of drinking water uses and concentrations much less than the standard can cause undesirable biological activity in surface water.
Source: EPA, 2005

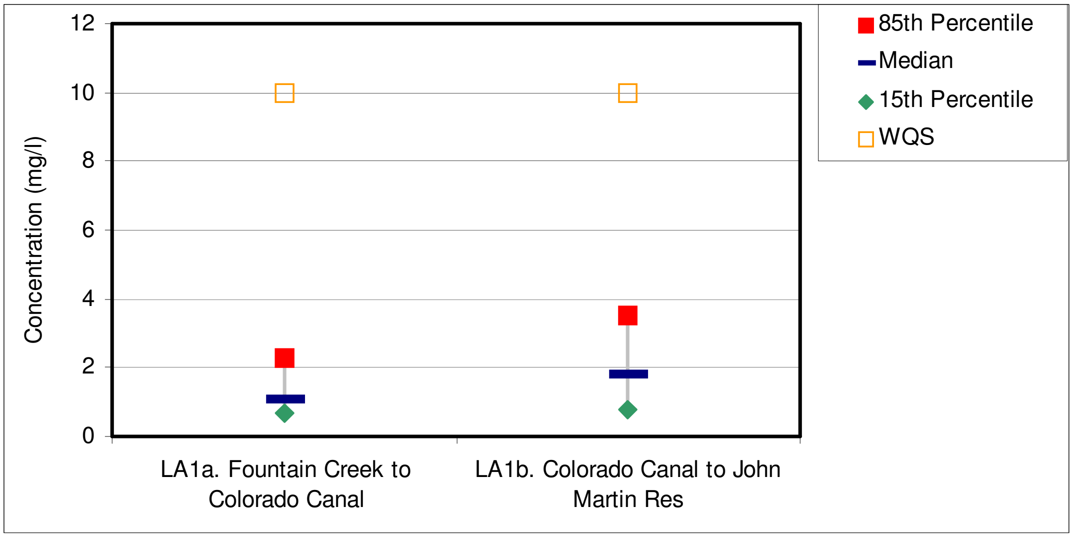


Figure 4-4. Summary of Total Nitrite plus Nitrate as N in Lower Arkansas River

* WQS only includes Nitrate as N
Source: EPA, 2005

4.4. Salinity

Salinity, the amount of salt dissolved in water, is a major concern in the lower Arkansas River Basin due to its potentially negative effects on crop yields and the cost of drinking water treatment. Measurements of specific conductance and TDS are both reflective of salinity levels. The most common measure of salinity is specific conductance, which is measured continuously at many locations in the basin. Specific conductance is a measure of the ability of water to conduct electrical current and its value is related to the type and concentration of ions in solution. Typically the concentration of TDS (in milligrams per liter) is about 65 percent of the specific conductance (in µS/cm), but varies from about 50 percent to 80 percent in the study area depending on the location and concentration.

There is no WQS for salinity in the Arkansas River Basin. However, high salinity can affect the taste of drinking water and can also cause gastrointestinal problems. EPA has set a secondary MCL for drinking water of 500 mg/L dissolved solids (depending on locale, is equal to between 740 and 772 µS/cm specific conductance in the lower Arkansas River). Secondary MCLs are non-enforceable guidelines for contaminant levels at the tap. If salinity in municipal source waters is too high, advanced treatment systems such as reverse osmosis may be required to satisfy consumers.

High salinity can be an issue for irrigators because salts can accumulate in the crop root zone and diminish crop yields. If excessive quantities of soluble salts accumulate in the root zone, plants have difficulty extracting water from the salty soil solution. This reduced water uptake by the plant can result in slow or reduced growth and may also cause symptoms similar in appearance to those shown in periods of drought (Ayers, 1976). The effects of salinity on crop productivity can be reduced through irrigation practices such as applying more water or growing crops that are more tolerant to saline water.

Salinity tolerance levels, or thresholds, represent the upper limit of salinity in irrigation water for which crop yield is not reduced. Salinity tolerance thresholds and tolerance ratings for various crops grown in the study area are given in **Table 4-17**. The tolerance thresholds are expressed as specific conductance and range from 1,000 µS/cm for cantaloupe to 8,000 µS/cm for barley. Crop yields decrease as soil salinity concentrations increase above the thresholds (Maas & Grattan, 1999). The salt tolerance rating can be used to categorize crops in general terms.

Table 4-17. Crop Salinity Tolerances Expressed in Specific Conductance

Crop	Threshold Specific Conductance (µS/cm)
Alfalfa	2,000
Barley	8,000
Bean (common)	1,000
Corn	1,700
Muskmelon (cantaloupe)	1,000
Onion (bulb)	1,200
Sorghum	6,800
Wheat	6,000

Source: Maas & Grattan, 1999
Note: this data serves only as a guideline to relative tolerances among crops. Absolute tolerances vary depending upon climate, soil conditions, and agricultural practices.

The U.S. Salinity Laboratory has developed a salinity hazard classification system for irrigation water based on general crop tolerances (shown in **Table 4-18**). Comparison with **Table 4-17** shows that in areas where irrigation water has a "high" salinity hazard classification, irrigators may choose to grow more salt tolerant crops, use irrigation practices that reduce the effects of salinity, or accept a potential decrease in the productivity of sensitive crops. In cases where irrigation water has a "very high" salinity hazard classification, there are still crops (e.g., barley, sorghum, and wheat) that can be produced without a reduction in crop yield.

Table 4-18. Salinity Hazard Classifications for Irrigated Crops

Class	Salinity Hazard	Specific Conductance
C1	Low	< 250 µS/cm
C2	Moderate	250-750 µS/cm
C3	High	750-2,250 µS/cm
C4	Very High	>2,250 µS/cm

Source: Richards, 1954

Data analysis shows that salinity is inversely related to discharge in the Arkansas River indicating that high flows dilute salinity. **Figure 4-5** shows mean monthly flows at gages from Portland to Catlin Dam. Specific conductance is higher during low flows in the winter. Specific conductance also generally increases in the downstream direction in the Arkansas River. The two processes responsible for the high salinity are salt pickup and salt concentration (CSUCES, 1977). Salt pickup is the major contributor to increasing salinity. It results from water flowing over and through saline and sedimentary materials and from erosion of saline soil (CSUCES, 1977). Salt concentration occurs when water evaporates from surfaces and plants. Some of the salinity increase in the lower Arkansas River Basin is natural, but some is caused by irrigation and activities that cause erosion (CSUCES, 1977).

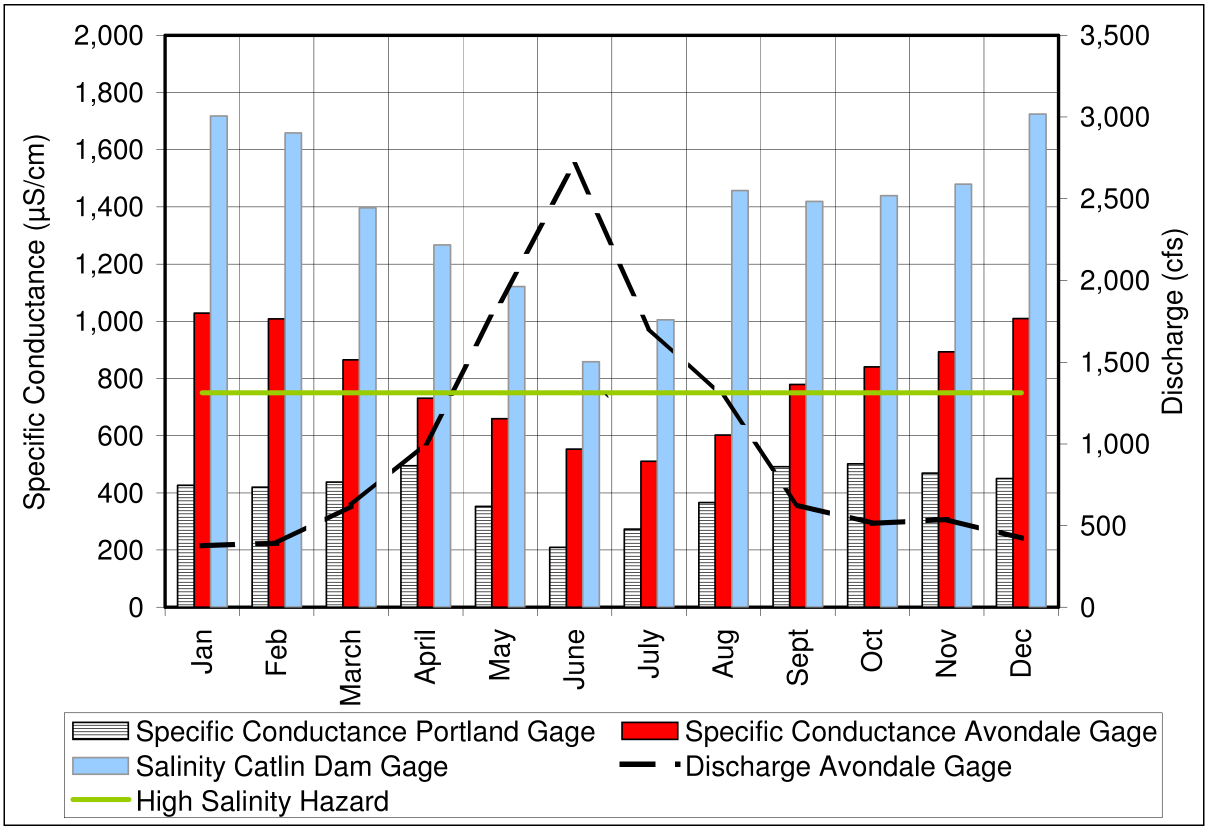


Figure 4-5. Mean Monthly Specific Conductance and Discharge at Arkansas River Gage Locations

Source: USGS, 2005b. Data summarized for water years 1994 to 2002 except Portland, which begins in 1995

4.4.1. Salinity – Lake Fork and Lake Creek

Salinity is low in the Lake Fork and Lake Creek. Median specific conductance is 55 µS/cm in Lake Creek and 27 µS/cm in Lake Fork (USGS, 2005b, data from 1990 to 1993).

4.4.2. Salinity - Upper Arkansas River

Salinity is very low in the upper Arkansas River. At the Granite gage, downstream of Lake Creek, specific conductance is relatively constant throughout the year but decreases during high flows in the summer. **Figure 4-6** depicts the monthly average discharge and specific conductance at the Granite gage. The average specific conductance is less than 200 µS/cm for the entire year, well below levels that would affect agriculture or water treatment.

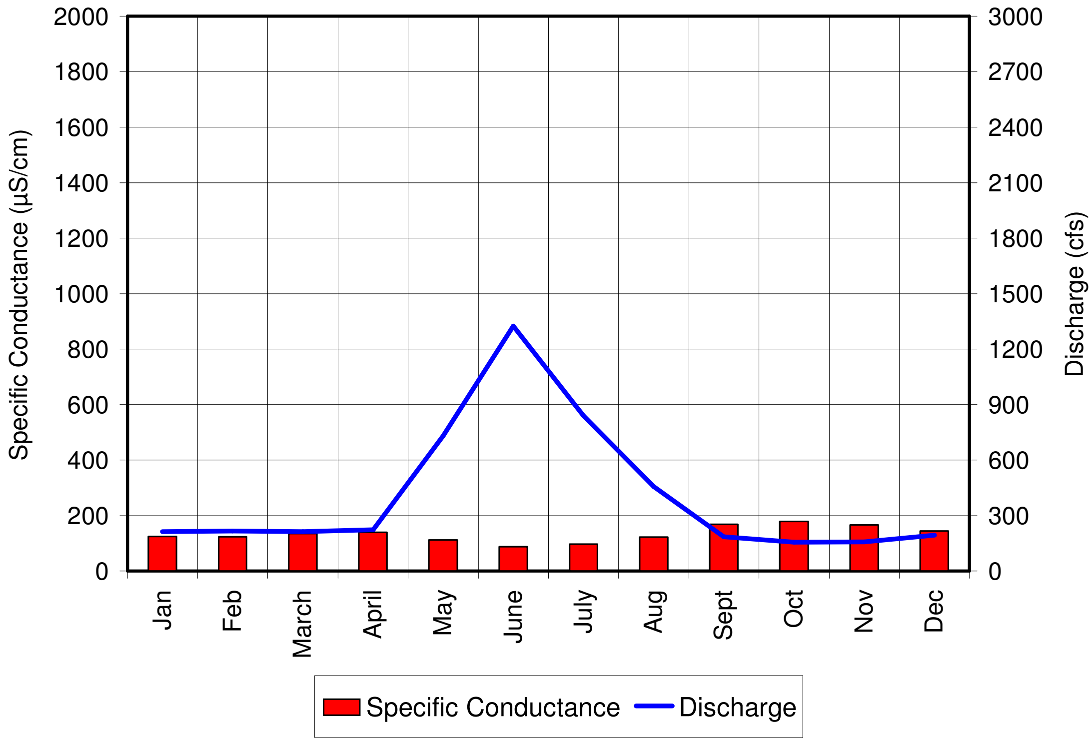


Figure 4-6. Monthly Average Specific Conductance and Discharge at Granite Gage
Source: USGS, 2005b, water years 1994 to 2002

Salinity levels increase in the vicinity of Pueblo Reservoir, but are still below crop high salinity tolerance levels. A comparison of discharge and specific conductance at the Portland gage is shown in **Figure 4-7**. The average peak discharge at the Portland gage occurs in June with a flow of approximately 2,400 cubic feet per second (cfs) corresponding with a minimum salinity of about 200 µS/cm. Specific conductance ranges from about 200 to about 500 µS/cm throughout the year, within the range of moderate salinity hazard.

Salinity in the upper Arkansas River does not exceed the secondary MCL of 500 mg/L (approximately 660 µS/cm) any month of the year.

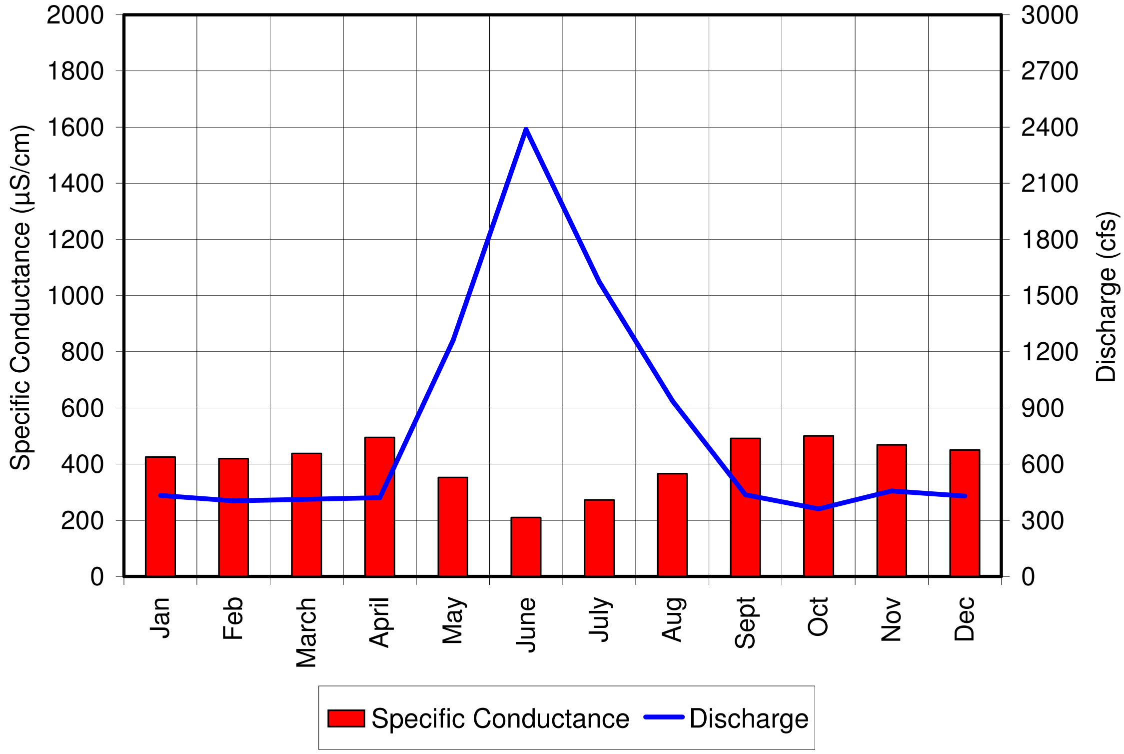


Figure 4-7. Monthly Average Specific Conductance and Discharge at Portland Gage

Source: USGS 2005b, water years 1995 to 2002

4.4.3. Salinity - Middle Arkansas River

Figure 4-8 shows the inverse relationship between streamflow and salinity at the Moffat Street gage. Peak discharge and minimum salinity generally occur in July. Specific conductance ranges from about 400 to about 1,000 µS/cm. Specific conductance does not exceed the high salinity crop hazard of 750 µS/cm during the irrigation season. Salinity exceeds the secondary MCL of 500 mg/L on average from September through March.

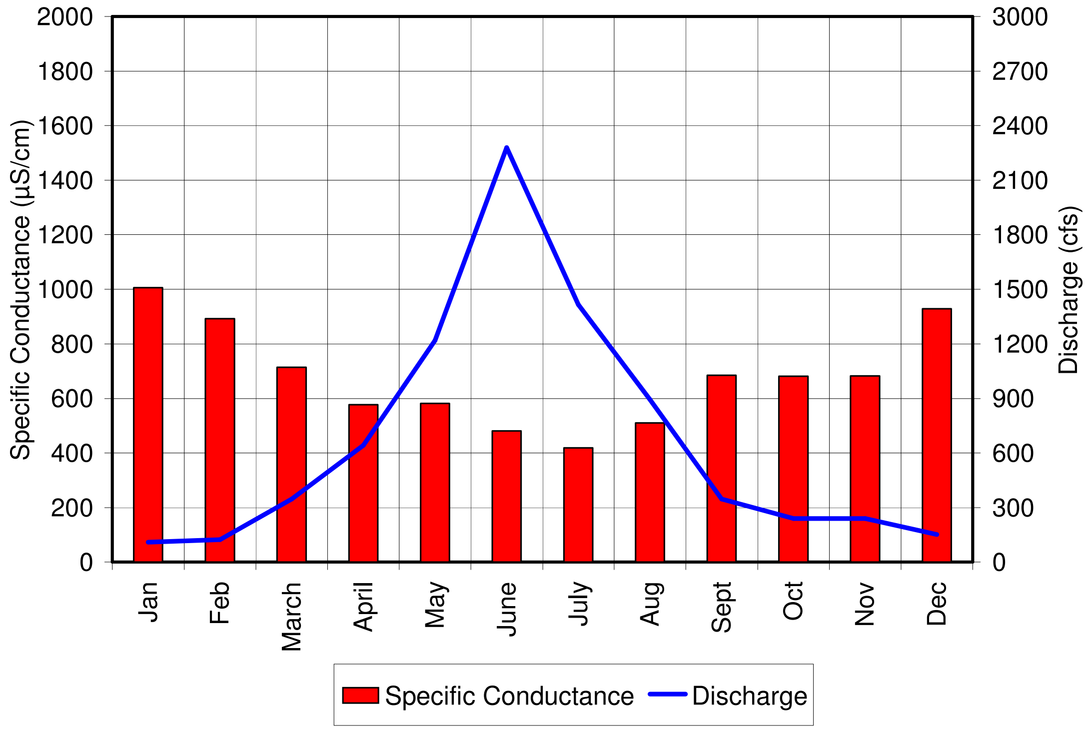


Figure 4-8. Monthly Average Specific Conductance and Discharge at Moffat Street Gage
Source: USGS, 2005b, water years 1994 to 2002

4.4.4. Salinity - Lower Arkansas River

The specific conductance of the lower Arkansas River tends to increase from Fountain Creek to Timpas Creek.

Figure 4-9 depicts monthly mean specific conductance and discharge at the Avondale gage. The peak flow and minimum specific conductance occur in June. Specific conductance ranges from about 500 to about 1,000 µS/cm. Between September and March, salinity exceeds the high hazard threshold of 750 µS/cm, but is below the high salinity hazard for most of the irrigation season. Salinity exceeds the secondary MCL of 500 mg/L on average from September through May.

Figure 4-10 depicts monthly mean specific conductance and discharge at the Catlin Dam gage. The peak flow and minimum specific conductance also occur in June. Specific conductance ranges from about 700 to about 1,400 µS/cm. From August through May, salinity exceeds the high hazard classification of 750 µS/cm. Salinity exceeds the secondary MCL of 500 mg/L on average every month of the year.

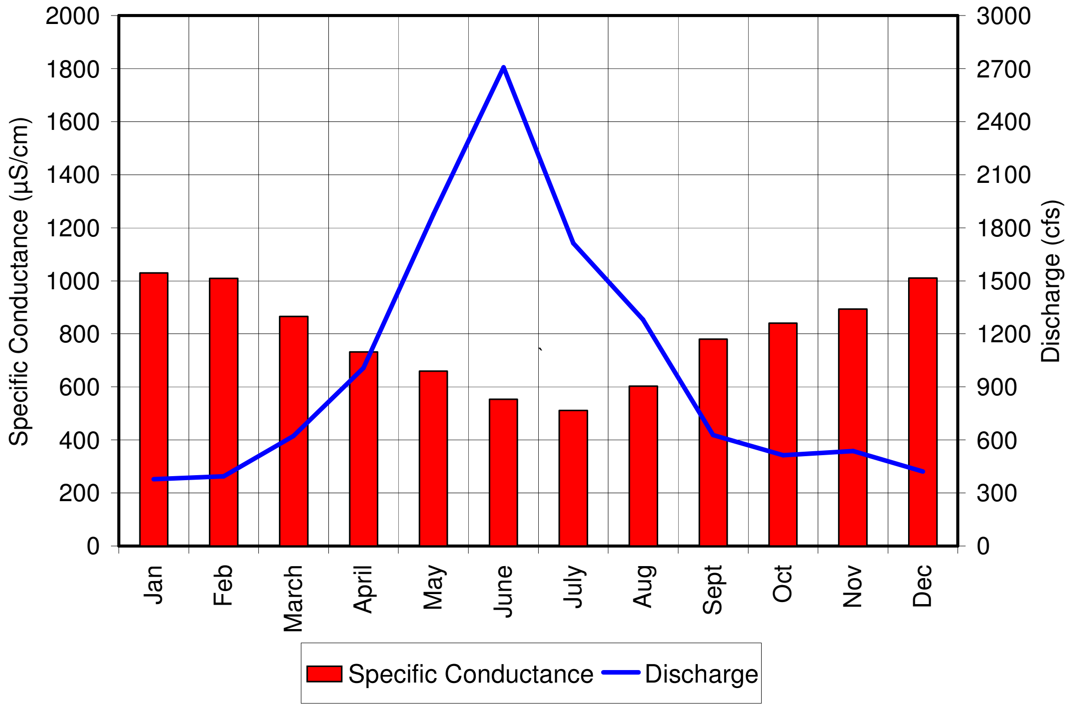


Figure 4-9. Monthly Average Specific Conductance and Discharge at Avondale Gage
Source: USGS, 2005b, water years 1994 to 2002

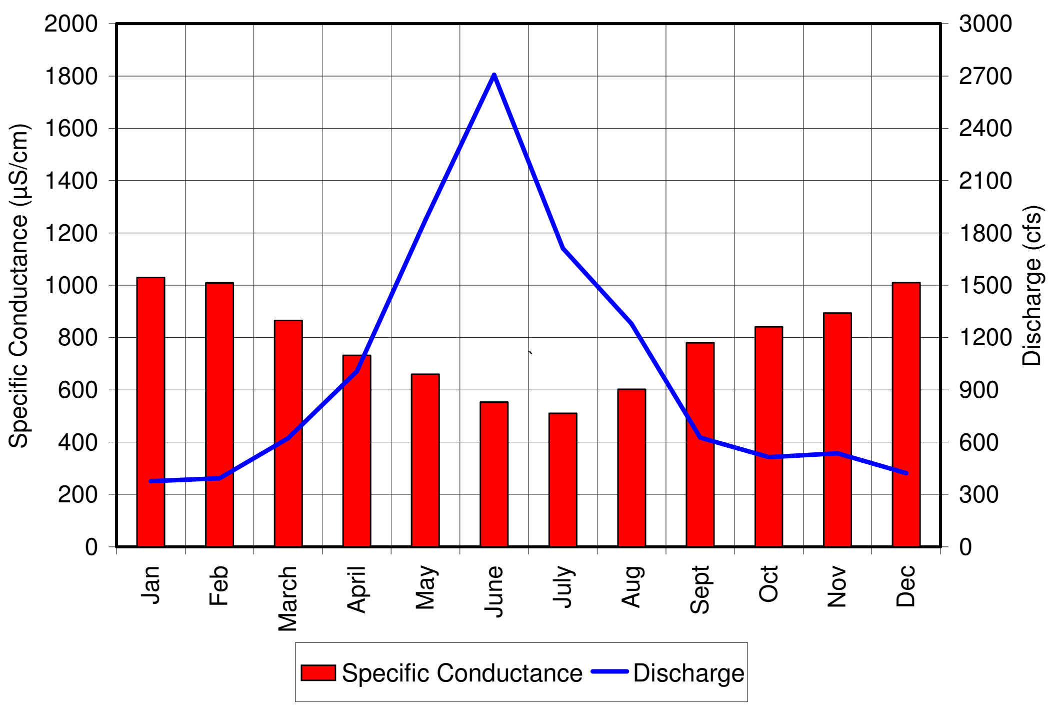


Figure 4-10. Monthly Average Specific Conductance and Discharge at Catlin Dam Gage
Source: USGS, 2005b, water years 1994 to 2002

4.4.5. Sulfate

Concentrations of sulfate increase in the downstream direction in the study area (USGS, 1998). **Table 4-19** summarizes sulfate data from the Catlin Dam gage, located near the downstream end of the study area. The 85th percentile is less than the chronic WQS.

Table 4-19. Summary of Sulfate Data at Catlin Dam Gage

15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS (mg/L)	# Samples (date range)
209	320	450	1,078	40 (1990 to 2002)

Source: USGS, 2005b

Sulfate levels in the lower Arkansas River have been attributed to the Pierre Shale geologic formation located near Pueblo and in the Arkansas River valley (CDPHE, 2005b).

4.5. Metals

Water quality of the upper Arkansas River has been impacted by metals for many years. Runoff and seepage from abandoned mines and mine tailings near the Arkansas River headwaters contribute substantial quantities of metals to the Arkansas River. Historical mining activity in the vicinity of Leadville has affected upper Arkansas River water quality through the introduction of high concentrations of metals. Water flowing through abandoned mines and tailing piles has contributed high concentrations of cadmium, copper, lead, zinc, iron, and manganese to the river.

The Yak Tunnel and Leadville Mine Drainage Tunnel (LMDT) water treatment plants began operation in March 1992. Both treatment plants reduced concentrations of some metals in the upper Arkansas River (USGS, 1998). Therefore, all metals data, except in Lake Fork and Lake Creek, which are not affected by the mine drainage treatment plants, is analyzed for periods after March 1992. The LMDT enters the Arkansas River via the East Fork and the Yak Tunnel via California Gulch. The system of tunnels, reservoirs, and tributaries is shown in **Figure 4-11**.

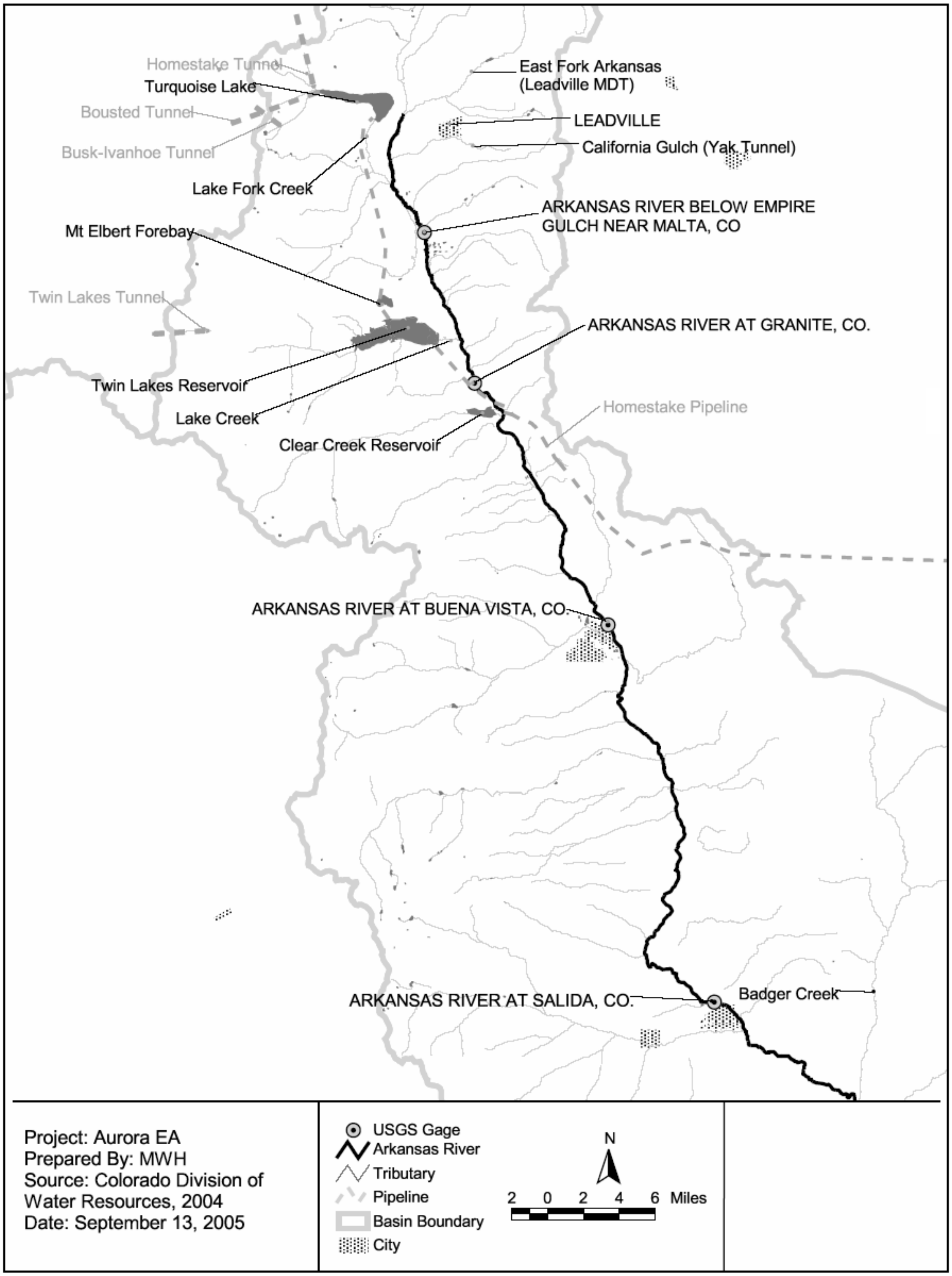


Figure 4-11. Important Tributaries and Mine Drainage Treatment Plants for Metals

The WQS for most metals are based on toxicity to aquatic life. Many of the WQS are dependent on hardness. Higher hardness reduces impacts to aquatic life and the TVS are adjusted accordingly. Hardness generally increases in the downstream direction in the Arkansas River. In addition, hardness generally decreases as flow increases in the Arkansas River, due to dilution (USGS, 1998). A tributary may dilute metals concentrations, but could also reduce hardness, so changes in flow are not directly related to exceedences of WQS.

In this section, data for the following metals is analyzed by reach and compared to WQS:

- Cadmium;
- Copper;
- Iron;
- Lead;
- Manganese; and
- Zinc.

This list of metals is the same list analyzed by CDPHE in the study area for their 2004 and 2006 303(d) processes. Selenium and arsenic are discussed separately in Sections 4.6 and 4.7. Mercury is discussed below because there is not enough data to be analyzed reach by reach.

4.5.1. Mercury

Mercury was mentioned as a concern in the EA scoping process. Mercury from mine waste is a common source of contamination in the western United States. Mercury can be hazardous to fish and aquatic life and has been shown to bioaccumulate. The bioaccumulation can be harmful to humans consuming fish from contaminated waters (Reclamation, 1998).

There is little data available to characterize mercury levels in the study area in comparison to WQS. The recent data in the STORET database was analyzed with detection limits an order of magnitude greater than the chronic WQS of 0.01 µg/L, so the results are not a good indication of compliance with WQS.

The best indicator of mercury levels in the study area may be recent tests of mercury levels in fish in Pueblo Reservoir. CDPHE investigated the concentrations of mercury in fish in Pueblo Reservoir in 2004. All samples analyzed by CDPHE had mercury levels below the MDL of 0.3 milligrams per kilogram (mg/kg). Concentrations in samples analyzed by EPA, with lower MDLs, ranged from less than 0.016 mg/kg to 0.1 mg/kg. All sample concentrations were well below CDPHE's action level for mercury of 0.5 mg/kg. These findings indicate that mercury levels are low enough that they are not affecting the suitability of fish in Pueblo Reservoir for human consumption (CDPHE, 2005).

Therefore, due to a lack of instream data collected using sensitive methods and no indication of impairment in the study area, mercury is not discussed further in this report.

4.5.2. Metals – Lake Fork and Lake Creek

The largest data set available for Lake Creek includes measurements taken by USGS between 1990 and 1993. This data set is used to characterize ambient quality in Lake Creek.

Measurements taken by Colorado Mountain College (CMC) and USGS between 2001 and 2004 are used to characterize ambient quality in Lake Fork. The data indicate that ambient water quality in

Lake Fork may exceed WQS for several metals. Lake Fork and Lake Creek data were not analyzed in the CDPHE data sheets (CDPHE, 2005e) and there was no recent data available in STORET.

The data from 2001 in Lake Fork was part of a study to determine mass loading of major and trace elements, including metals, in Lake Fork (USGS, 2005). One to three samples were collected at 23 sampling locations on Lake Fork between Turquoise Lake and the Arkansas River during September of 2001. The results can be used to show how metals concentrations vary along the stream during low flow conditions (Walton-Day, 2005).

Figure 4-12 depicts the mass load of different constituents and streamflow attributed to Turquoise Reservoir or reaches 1 through 5 of Lake Fork. The mass load of a constituent, such as copper or manganese, either originates in Turquoise Reservoir or is gained in a particular reach where sources such as groundwater, tributaries, or mine drainage enter Lake Fork. Comparison of streamflow in a particular reach with a particular constituent load indicates where loading of a particular constituent is disproportional to the amount of streamflow gained in the reach (USGS, 2005). A reach with low flow compared to mass load is likely to have a concentrated source of that constituent, such as mine drainage. A reach with high flow compared to mass load dilutes concentrations of that constituent. Figure 4-12 shows that the loads of the following metals were low relative to the flow from Turquoise Lake:

- Aluminum;
- Copper;
- Iron;
- Manganese;
- Lead; and
- Zinc.

This indicates that during low flow conditions, water from Turquoise Lake dilutes concentrations of the metals listed above. Copper loading from Turquoise Lake is in proportion to streamflow, indicating that flows from Turquoise Lake have little effect on copper concentrations in Lake Fork during low flow conditions.

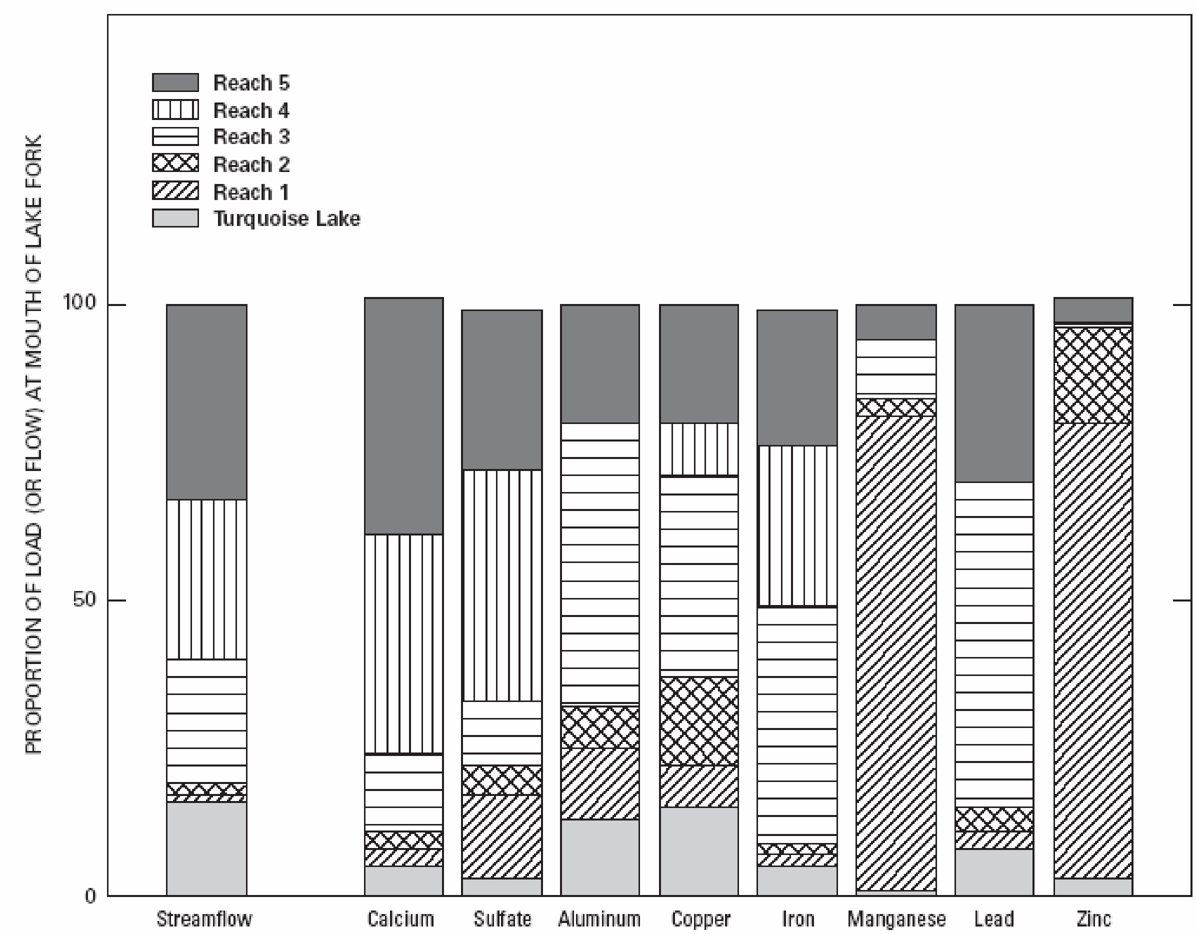


Figure 4-12. Streamflow and Metals Loads in Lake Fork Contributed by Turquoise Lake and Lake Fork Reaches.

Source: USGS, 2005

Reach descriptions: 1 – Sugarloaf Dam to irrigation diversion structure, approximately 800 meters (m) downstream, 2 – downstream to Colorado Gulch, 2,310 m downstream of dam, 3 – includes Rock Creek portion of flow contributed by Leadville National Fish Hatchery effluent, downstream 4,655 m below dam, 4 – extends downstream to just above Halfmoon Creek, 9,115 m downstream of dam, 5 – extends downstream to just above the Arkansas River, 9,515 m downstream of dam.

4.5.2.1. Cadmium

Table 4-20 summarizes dissolved cadmium data for Lake Fork and Lake Creek. **Table 4-21** summarizes the dissolved cadmium WQS for Lake Fork and Lake Creek. **Figure 4-13** displays dissolved cadmium concentrations and the WQS. The chronic WQS is not exceeded by the 85th percentile in either segment. The maximum value measured is compared with the acute WQS because one measured exceedence of the WQS could indicate a violation of the acute standard. Although, as discussed in Section 3.3.1, additional tests using paired hardness data and evaluating the frequency of exceedence are required to determine an actual acute WQS exceedence. The maximum historical dissolved cadmium concentration in Lake Fork exceeds the acute WQS.

Table 4-20. Summary of Dissolved Cadmium Concentrations – Lake Fork and Lake Creek

Location	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max Value (µg/L)	# Samples (date range)
Lake Fork	0	0	0.2	8.9	103 (2001 to 2004)
Lake Creek	0	0	0.1	0.6	19 (1990 to 1993)

Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

Table 4-21. Estimated Dissolved Cadmium WQS – Lake Fork and Lake Creek

Location	Hardness as $CaCO_3$* (mg/L)	WQS Acute Trout (µg/L)	WQS Chronic (µg/L)
Lake Fork	13	0.40	0.49
Lake Creek	23	0.75	0.75

*Mean hardness for Lake Creek calculated from Ca^{++} and Mg^{++} concentration in Lake Creek, 1991 (USGS, 2005b). Mean hardness for Lake Fork in USGS, 2005.

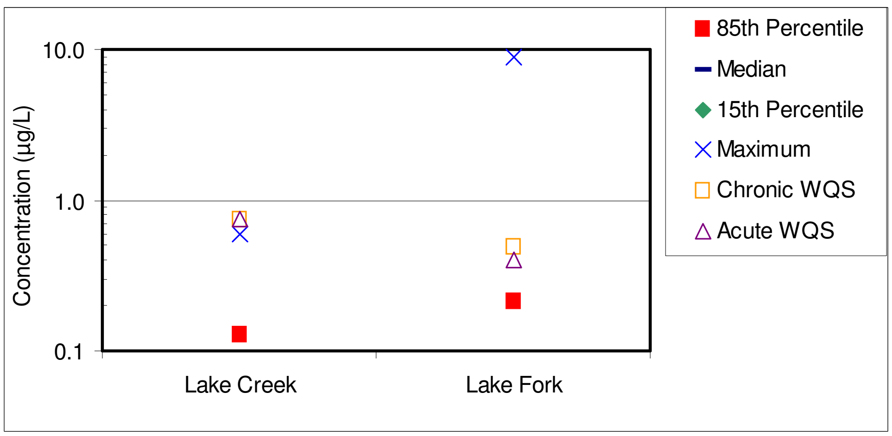


Figure 4-13. Dissolved Cadmium Concentrations and WQS – Lake Fork and Lake Creek

Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

4.5.2.2. Copper

Table 4-22 and **Figure 4-14** summarize dissolved copper data for Lake Creek and Lake Fork. **Table 4-23** summarizes the dissolved copper WQS for Lake Fork and Lake Creek The 85th percentile of copper in Lake Creek exceeds the chronic WQS. The maximum measured dissolved copper concentration in Lake Fork exceeds the acute WQS. However, USGS (2005) found that when individual samples are compared to the acute WQS using coordinating hardness for the sample, the acute standard is not exceeded. Hardness information is not available for each individual sample in the CMC (2005) data.

Table 4-22. Summary of Copper Concentrations - Lake Fork and Lake Creek

Location	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
Lake Fork*	0	0.9	1.4	85.0	103 (2001 to 2004)
Lake Creek (dissolved Cu)	2.0	2.0	3.0	3.0	19 (1990 to 1993)

Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.
*USGS, 2005 data is total copper due to contamination problems in the dissolved copper samples. However, the majority of samples are from CMC, 2005, which is dissolved copper. The maximum measured copper concentration of 85 µg/L is dissolved copper.

Table 4-23. Summary of Dissolved Copper WQS - Lake Fork and Lake Creek

Location	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
Lake Fork	13	2.0	1.6
Lake Creek	23	3.4	2.6

*Mean hardness for Lake Creek calculated from Ca^{++} and Mg^{++} concentration in Lake Creek, 1991 (USGS, 2005b). Mean hardness for Lake Fork in USGS, 2005.

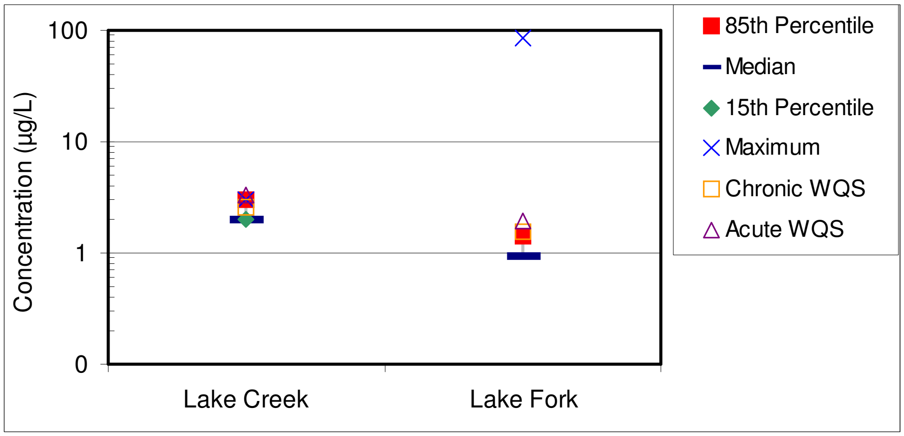


Figure 4-14. Copper Concentrations and WQS - Lake Fork and Lake Creek

Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

4.5.2.3. Iron

Table 4-24 and **Figure 4-15** summarize dissolved iron data for Lake Fork and Lake Creek. **Table 4-25** and **Figure 4-16** summarize total recoverable iron data. Iron WQS are summarized in **Table 4-26**. There are no acute WQS for iron in Lake Fork and Lake Creek. Iron WQS are not based on hardness. The dissolved iron WQS in segments with a water supply classification that have an actual water supply use is the least restrictive of 300 µg/L or existing water quality as of January 1, 2000. The 85^{th} percentile of historical data does not exceed the chronic WQS for dissolved iron for either segment. The chronic WQS for total recoverable iron is compared to the median of historical concentrations rather than the 85^{th} percentile. The median of historical data does not exceed the chronic WQS for total recoverable iron for either segment.

Table 4-24. Summary of Dissolved Iron Concentrations - Lake Fork and Lake Creek

Location	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	# Samples (date range)
Lake Fork	62	89	212	103 (2001 to 2004)
Lake Creek	8.7	15.0	19.6	19 (1990 to 1993)

Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

Table 4-25. Summary of Total Recoverable Iron Concentrations - Lake Fork and Lake Creek

Location	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	# Samples (date range)
Lake Fork	119	154	487	103 (2001 to 2004)
Lake Creek	57	100	179	19 (1990 to 1993)

Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

Table 4-26. Summary of Iron WQS - Lake Fork and Lake Creek

Chronic WQS Dissolved (µg/L)	Chronic WQS Total Recoverable (µg/L)
Water Supply - Least restrictive of: a) 300 µg/L or b) existing quality as of 1/1/00	1,000

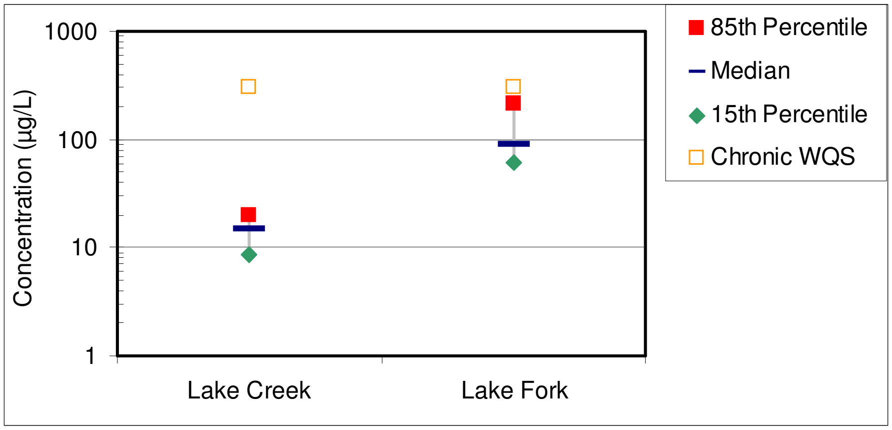


Figure 4-15. Dissolved Iron Concentrations and WQS - Lake Fork and Lake Creek

Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

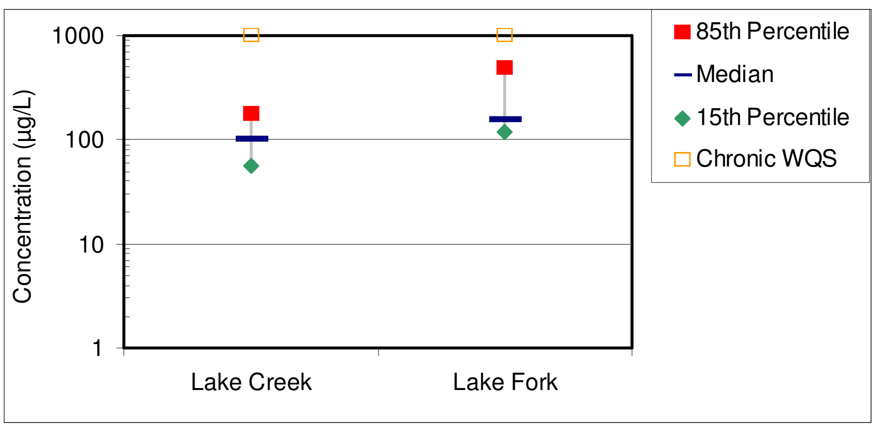


Figure 4-16. Total Recoverable Iron Concentrations and WQS - Lake Fork and Lake Creek

Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

4.5.2.4. Lead

Table 4-27 and **Figure 4-17** summarize the dissolved lead data for Lake Fork and Lake Creek. **Table 4-28** summarizes the lead WQS for Lake Fork and Lake Creek. The 85th percentiles of historical data do not exceed the chronic WQS is either segment. The maximum historical dissolved lead concentration in Lake Fork exceeds the acute WQS.

Table 4-27. Summary of Dissolved Lead Concentrations - Lake Fork and Lake Creek

Location	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
Lake Fork	0	0	0.2	115.1	103 (2001 to 2004)
Lake Creek	0	0	0.1	1.1	19 (1990 to 1993)

Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

Table 4-28. Summary of Dissolved Lead WQS - Lake Fork and Lake Creek

Location	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
Lake Fork	13	6.6	0.3
Lake Creek	23	12.6	0.5

*Mean hardness for Lake Creek calculated from Ca^{++} and Mg^{++} concentration in Lake Creek, 1991 (USGS, 2005b). Mean hardness for Lake Fork in USGS, 2005.

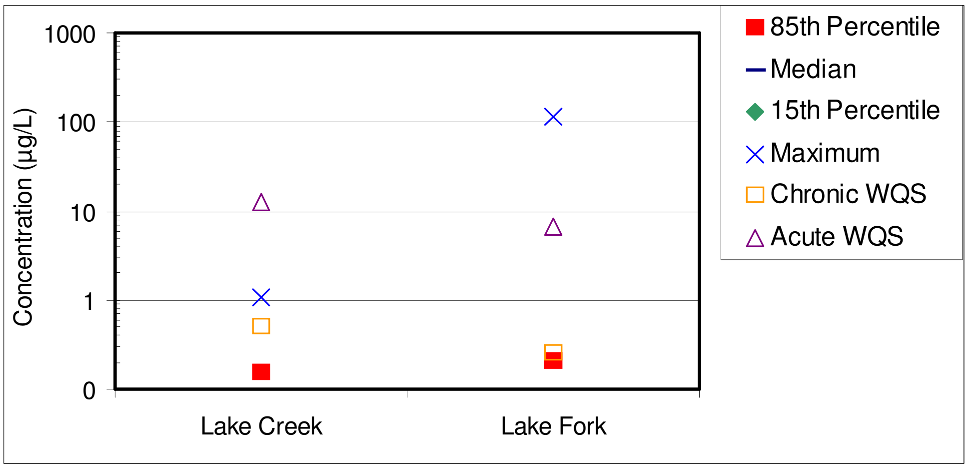


Figure 4-17. Dissolved Lead Concentrations and WQS - Lake Fork and Lake Creek
Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

4.5.2.5. Manganese

Table 4-29 and **Figure 4-18** summarize dissolved manganese data for Lake Fork and Lake Creek. **Table 4-30** summarizes the WQS for Lake Fork and Lake Creek. The 85th percentile of dissolved manganese in Lake Fork exceeds the chronic WQS condition of 50 µg/L, but may not exceed existing quality as of January 1, 2000. The maximum historical concentration in Lake Fork exceeds the acute WQS.

Table 4-29. Summary of Dissolved Manganese Concentrations - Lake Fork and Lake Creek

Location	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
Lake Fork	0	150	694	1,999	103 (2001 to 2004)
Lake Creek	1.7	3.0	7.3	10.0	19 (1990 to 1993)

Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

Table 4-30. Summary of Dissolved Manganese WQS - Lake Fork and Lake Creek

Location	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
Lake Fork	13	1,513	Water Supply - Least restrictive of: a) 50 µg/L or b) existing quality as of 1/1/00
Lake Creek	23	1,830	

*Mean hardness for Lake Creek calculated from Ca^{++} and Mg^{++} concentration in Lake Creek, 1991 (USGS, 2005b). Mean hardness for Lake Fork in USGS, 2005.

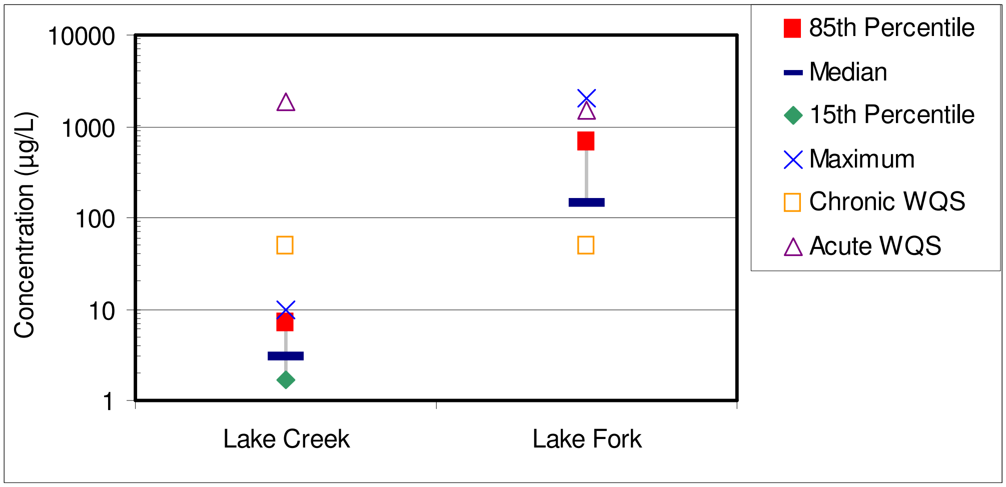


Figure 4-18. Dissolved Manganese Concentrations and WQS - Lake Fork and Lake Creek
Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

4.5.2.6. Zinc

Table 4-31 and **Figure 4-19** summarize dissolved zinc concentrations in Lake Fork and Lake Creek. **Table 4-32** summarizes zinc WQS in Lake Fork and Lake Creek. The 85th percentile of historical data in Lake Fork exceeds the chronic WQS. The maximum historical dissolved zinc concentration exceeds the acute WQS in Lake Fork.

Table 4-31. Summary of Dissolved Zinc Concentrations - Lake Fork and Lake Creek

Location	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
Lake Fork	0	39	122	729	103 (2001 to 2004)
Lake Creek	0	0	6.3	8.0	19 (1990 to 1993)

Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

Table 4-32. Summary of Dissolved Zinc WQS - Lake Fork and Lake Creek

Location	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
Lake Fork	13	21	78§
Lake Creek	23	34	34

*Mean hardness for Lake Creek calculated from Ca^{++} and Mg^{++} concentration in Lake Creek, 1991 (USGS, 2005b). Mean hardness for Lake Fork in USGS, 2005.
§ Temporary modification until 12/31/07

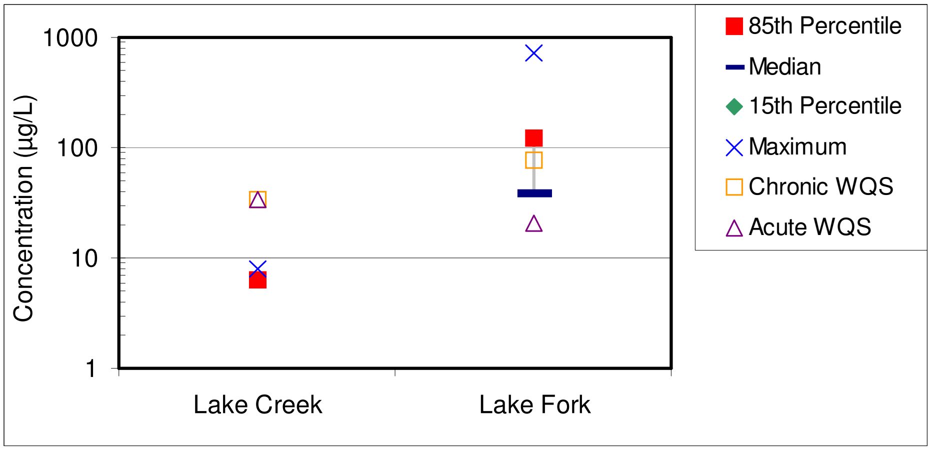


Figure 4-19. Dissolved Zinc Concentrations and WQS - Lake Fork and Lake Creek
Source: Lake Creek, USGS, 2005b. Lake Fork, USGS, 2005 and CMC, 2005.

4.5.3. Metals - Upper Arkansas River

Metals concentrations in the upper Arkansas River are discussed below.

4.5.3.1. Cadmium

Table 4-33 and **Figure 4-20** summarize dissolved cadmium data in the upper Arkansas River. **Table 4-34** summarizes the dissolved cadmium WQS for the upper Arkansas River. The chronic WQS is not exceeded by they 85th percentile for either segment. The maximum historical cadmium concentrations exceed the acute WQS in both segments.

Table 4-33. Summary of Dissolved Cadmium Concentrations - the Upper Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
UA2c. Lake Fork to Lake Creek	0.2	0.3	0.8	2.7	316 (1997 to 2001)
UA3. Lake Creek to Pueblo Reservoir	0	0.2	0.4	5.0	144 (1994 to 2002)

Source: CDPHE, 2005e

Table 4-34. Summary of Dissolved Cadmium WQS - Upper Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute Trout (µg/L)	WQS Chronic (µg/L)
UA2c. Lake Fork to Lake Creek	71	2.55	1.74
UA3. Lake Creek to Pueblo Reservoir	64	2.28	1.61

*Mean hardness from CDPHE, 2005e

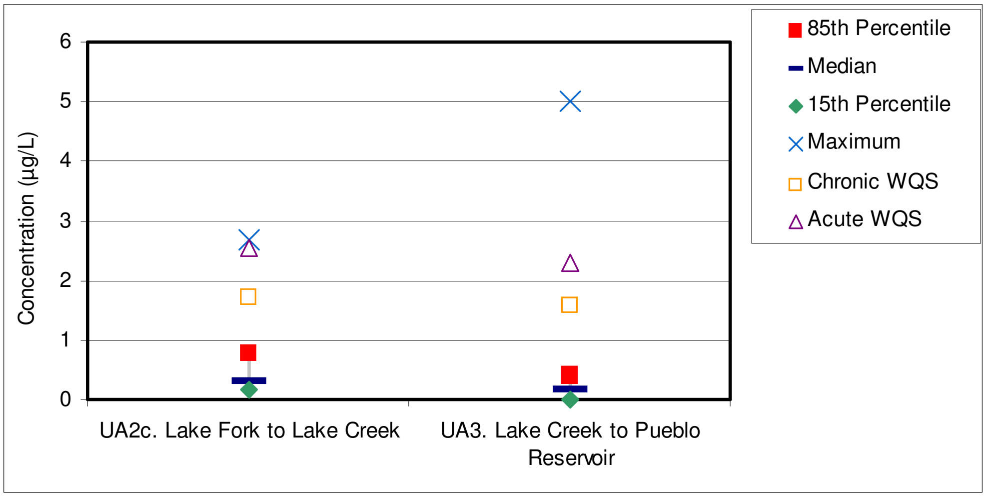


Figure 4-20. Dissolved Cadmium Concentrations and WQS - Upper Arkansas River
Source: CDPHE, 2005e

4.5.3.2. Copper

Table 4-35 and **Figure 4-21** summarize dissolved copper data for the upper Arkansas River. **Table 4-36** summarizes the copper WQS for the upper Arkansas River. The maximum historical copper concentrations exceed the acute WQS in each segment. The chronic WQS is not exceeded by the 85th percentile for either segment.

Table 4-35. Summary of Dissolved Copper Concentrations - Upper Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
UA2c. Lake Fork to Lake Creek	0	1.3	4.2	12.7	320 (1997 to 2001)
UA3. Lake Creek to Pueblo Reservoir	0	1.9	3.6	10.0	176 (1994 to 2002)

Source: CDPHE, 2005e

Table 4-36. Summary of Dissolved Copper WQS - Upper Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
UA2c. Lake Fork to Lake Creek	71	9.74	6.69
UA3. Lake Creek to Pueblo Reservoir	64	8.83	6.12

*Mean hardness from CDPHE, 2005e

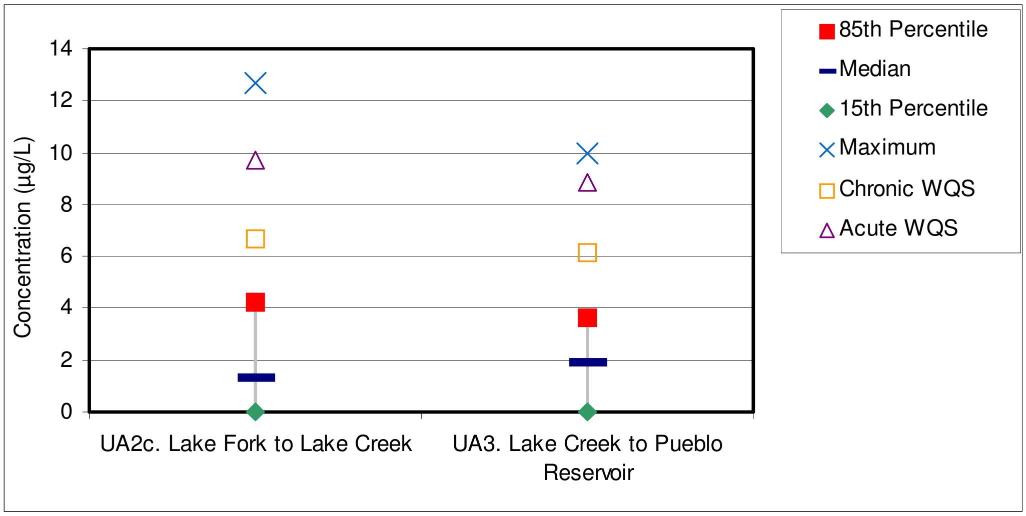


Figure 4-21. Dissolved Copper Concentrations and WQS - Upper Arkansas River
Source: CDPHE, 2005e

4.5.3.3. Iron

Table 4-37 and **Figure 4-22** summarize dissolved iron data for the upper Arkansas River. **Table 4-38** and **Figure 4-23** summarize total recoverable iron data. Iron WQS are summarized in **Table 4-39**. Iron WQS are not based on hardness and there are no acute WQS in the upper Arkansas River. The chronic WQS for total recoverable iron is compared to the median of historical concentrations rather than the 85th percentile. Historical iron data do not exceed WQS.

Table 4-37. Summary of Dissolved Iron Concentrations - Upper Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	# Samples (date range)
UA2c. Lake Fork to Lake Creek	87	106	142	310 (1997 to 2001)
UA3. Lake Creek to Pueblo Reservoir	25	50	89	172 (1994 to 2002)

Source: CDPHE, 2005e

Table 4-38. Summary of Total Recoverable Iron Concentrations - Upper Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	# Samples (date range)
UA2c. Lake Fork to Lake Creek	260	349	844	269 (1997 to 2001)
UA3. Lake Creek to Pueblo Reservoir	76	183	642	168 (1994 to 2002)

Source: CDPHE, 2005e

Table 4-39. Summary of Iron WQS - Upper Arkansas River

Segment	Chronic WQS Dissolved (µg/L)	Chronic WQS Total Recoverable (µg/L)
UA2c. Lake Fork to Lake Creek	None	1,000
UA3. Lake Creek to Pueblo Reservoir	Water Supply - Least restrictive of: a) 300 µg/L or b) existing quality as of 1/1/00	1,000

Source: CDPHE, 2004b

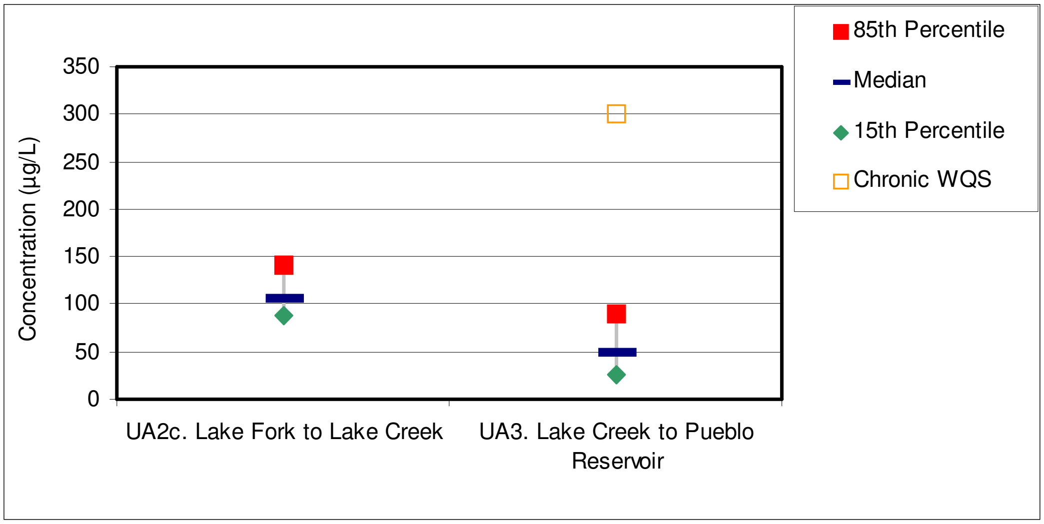


Figure 4-22. Dissolved Iron Concentrations and WQS - Upper Arkansas River
Source: CDPHE, 2005e

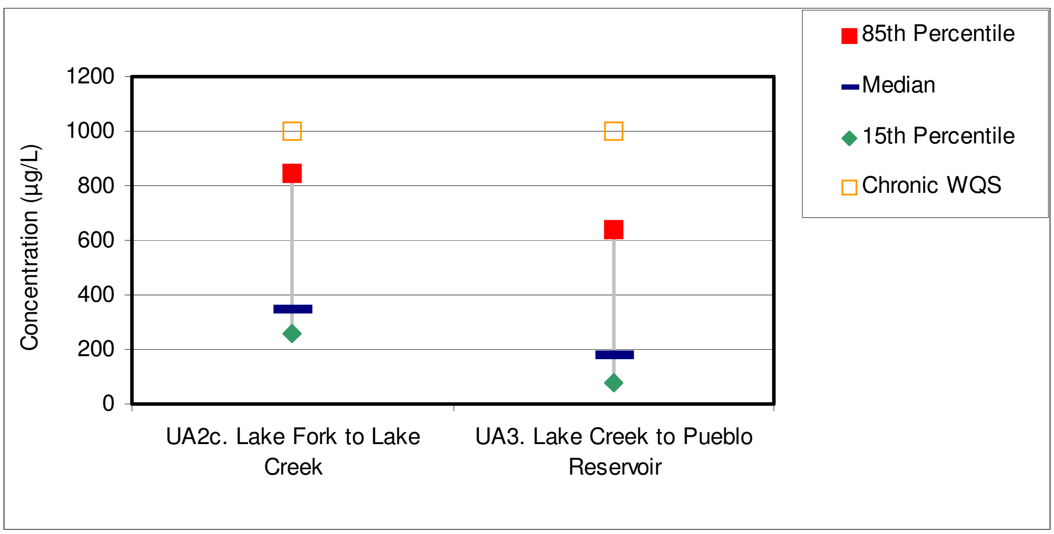


Figure 4-23. Total Recoverable Iron Concentrations and WQS - Upper Arkansas River
Source: CDPHE, 2005e

4.5.3.4. Lead

Table 4-40 summarizes the dissolved lead data for the upper Arkansas River. Most of the measurements were below the MDL. **Table 4-41** summarizes the lead WQS for the upper Arkansas River. Most of the historical lead data was below the MDL and do not indicate exceedences of the WQS.

Table 4-40. Summary of Dissolved Lead Concentrations - Upper Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
UA2c. Lake Fork to Lake Creek	0	0	0	17.1	319 (1997 to 2001)
UA3. Lake Creek to Pueblo Reservoir	0	0	0	13.8	202 (1994 to 2002)

Source: CDPHE, 2005e

Table 4-41. Summary of Dissolved Lead WQS - Upper Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
UA2c. Lake Fork to Lake Creek	71	44.4	1.7
UA3. Lake Creek to Pueblo Reservoir	64	39.6	1.8

*Mean hardness calculated from CDPHE, 2005e

4.5.3.5. Manganese

Table 4-42 and **Figure 4-24** summarize dissolved manganese data for the upper Arkansas River. **Table 4-43** summarizes the WQS in the upper Arkansas River. The 85^{th} percentile measured in segment UA3 exceeds one aspect of the chronic water supply WQS of 50 µg/L, but may not exceed the other aspect of "existing quality as of January 1, 2000" (see Table 4-43). The value of "existing quality" is not known.

Table 4-42. Summary of Dissolved Manganese Concentrations - Upper Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
UA2c. Lake Fork to Lake Creek	49	76	149	881	322 (1997 to 2001)
UA3. Lake Creek to Pueblo Reservoir	14	27	65	311	168 (1994 to 2002)

Source: CDPHE, 2005e

Table 4-43. Summary of Dissolved Manganese WQS - Upper Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
UA2c. Lake Fork to Lake Creek	71	2,664	1,472
UA3. Lake Creek to Pueblo Reservoir	64	2,573	Water Supply - Least restrictive of: a) 50 µg/L or b) existing quality as of 1/1/00

*Mean hardness from CDPHE, 2005e

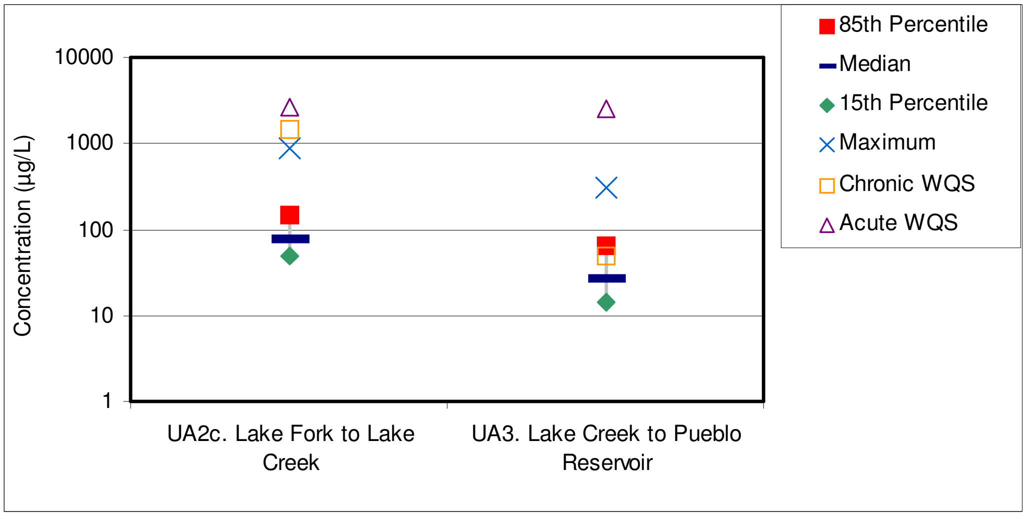


Figure 4-24. Dissolved Manganese Concentrations and WQS - Upper Arkansas River
Source: CDPHE, 2005e

4.5.3.6. Zinc

Table 4-44 and Figure 4-25 summarize dissolved zinc concentrations in the upper Arkansas River. Table 4-45 summarizes zinc WQS in the upper Arkansas River. The 85th percentile of historical data does not exceed the temporary chronic WQS for zinc. The maximum measurement in segment UA3 exceeds the acute WQS indicating that the segment may not attain acute WQS.

Table 4-44. Summary of Dissolved Zinc Concentrations - Upper Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
UA2c. Lake Fork to Lake Creek	60	100	200	569	320 (1997 to 2001)
UA3. Lake Creek to Pueblo Reservoir	23	48	99	520	195 (1994 to 2002)

Source: CDPHE, 2005e

Table 4-45. Summary of Dissolved Lead WQS - Upper Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
UA2c. Lake Fork to Lake Creek	71	None§	250§
UA3. Lake Creek to Pueblo Reservoir	64	80.3	101§

§ Temporary modification until 12/31/07
*Mean hardness from CDPHE, 2005e

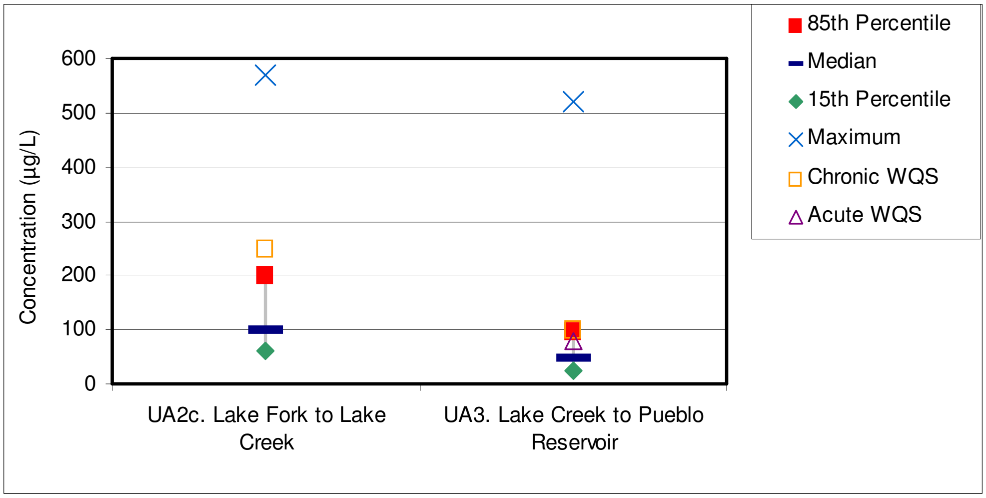


Figure 4-25. Dissolved Zinc Concentrations and WQS - Upper Arkansas River
Source: CDPHE, 2005e

4.5.4. Metals - Middle Arkansas River

Metals concentrations in the middle Arkansas River are discussed below.

4.5.4.1. Cadmium

Table 4-46 and **Figure 4-26** summarize dissolved cadmium data in the middle Arkansas River. **Table 4-47** summarizes the dissolved cadmium WQS for the middle Arkansas River. Most of the data collected were below the MDL. The 85th percentile of historical data does not exceed the chronic WQS. The maximum historical dissolved cadmium concentration does not exceed the acute WQS.

Table 4-46. Summary of Dissolved Cadmium Concentrations - Middle Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek	0	0	0.3	0.3	8 (1992 to 2002)
MA3. Wildhorse Creek to Fountain Creek	0	0	0	0	4 (1997 to 2001)

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e.

Table 4-47. Summary of Dissolved Cadmium WQS - Middle Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
MA2. Pueblo Reservoir to Wildhorse Creek	204.5	8.04 (trout TVS)	1.61
MA3. Wildhorse Creek to Fountain Creek	204.5	9.26	1.61

*Mean hardness in MA3 from CDPHE, 2005e. Assumed hardness in MA2 equal to hardness in MA3.

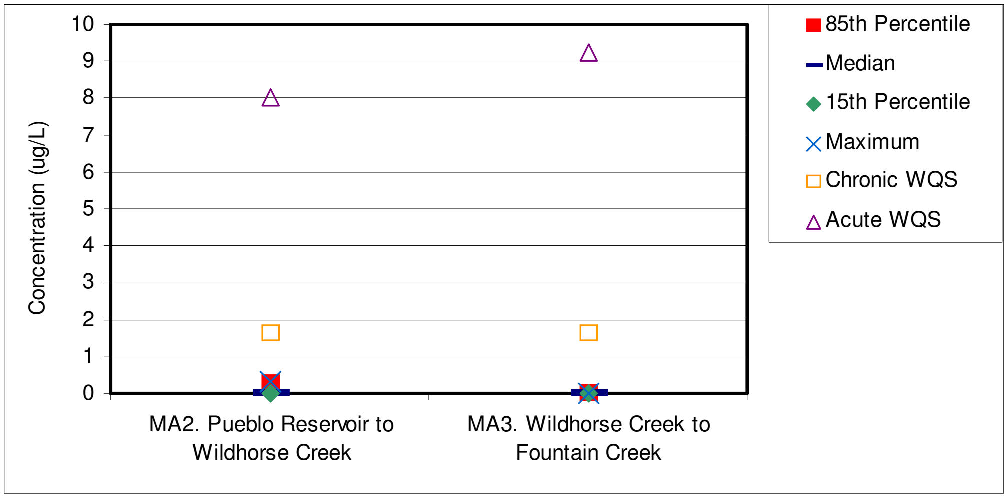


Figure 4-26. Dissolved Cadmium Concentrations and WQS - Middle Arkansas River

Sources: *MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e

4.5.4.2. Copper

Table 4-48 and **Figure 4-27** summarize dissolved copper data for the middle Arkansas River. **Table 4-49** summarizes the copper WQS for the middle Arkansas River. Historical copper data do not exceed WQS.

Table 4-48. Summary of Dissolved Copper Concentrations - Middle Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek	0.2	1.0	2.8	3.0	8 (1992 to 2002)
MA3. Wildhorse Creek to Fountain Creek	0.5	2.0	3.4	3.8	4 (1997 to 2001)

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e.

Table 4-49. Summary of Dissolved Copper WQS - Middle Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
MA2. Pueblo Reservoir to Wildhorse Creek	204.5	26.4	16.5
MA3. Wildhorse Creek to Fountain Creek	204.5	26.4	16.5

*Mean hardness in MA3 from CDPHE, 2005e. Assumed hardness in MA2 equal to hardness in MA3.

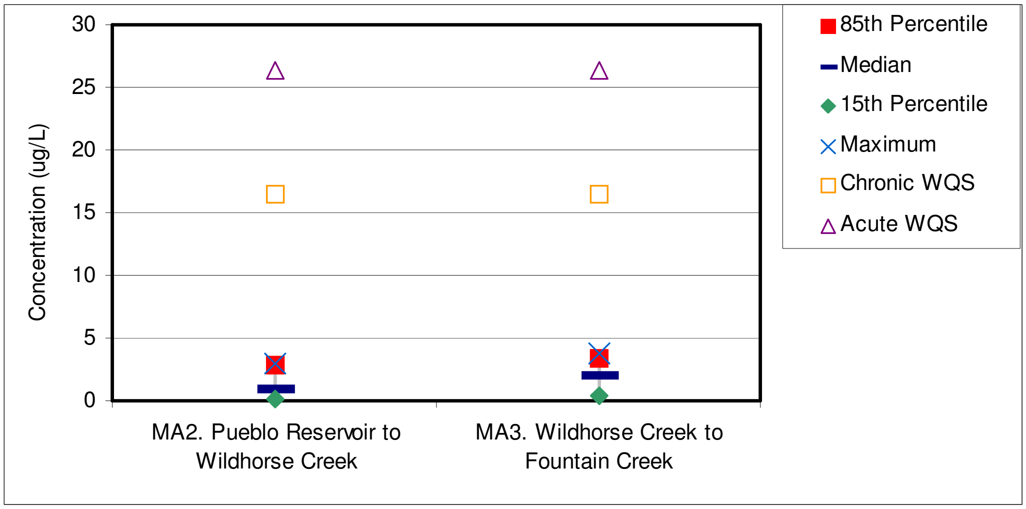


Figure 4-27. Dissolved Copper Concentrations and WQS - Middle Arkansas River

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e

4.5.4.3. Iron

Table 4-50 summarizes dissolved iron data for the middle Arkansas River. **Table 4-51** summarizes total recoverable iron data. Iron WQS are summarized in **Table 4-52**. **Figure 4-28** summarizes the dissolved iron water quality and WQS. **Figure 4-29** summarizes the total recoverable iron concentrations and WQS. The chronic WQS for total recoverable iron is compared to the median of historical concentrations rather than the 85th percentile. The historical iron data do not exceed WQS.

Table 4-50. Summary of Dissolved Iron Concentrations - Middle Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek	0	0	6.6	18 (1992 to 2002)
MA3. Wildhorse Creek to Fountain Creek	0	10.0	60.0	12 (1997 to 2001)

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e.

Table 4-51. Summary of Total Recoverable Iron Concentrations - Middle Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek	64	180	332	16 (1992 to 2002)
MA3. Wildhorse Creek to Fountain Creek	50	100	215	11 (1997 to 2001)

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e.

Table 4-52. Summary of Iron WQS - Middle Arkansas River

Segment	Chronic WQS Dissolved (µg/L)	Chronic WQS Total Recoverable (µg/L)
MA2. Pueblo Reservoir to Wildhorse Creek	Water Supply - Least restrictive of: a) 300 µg/L or b) existing quality as of 1/1/00	1,000
MA3. Wildhorse Creek to Fountain Creek		1,000

Source: CDPHE, 2004B

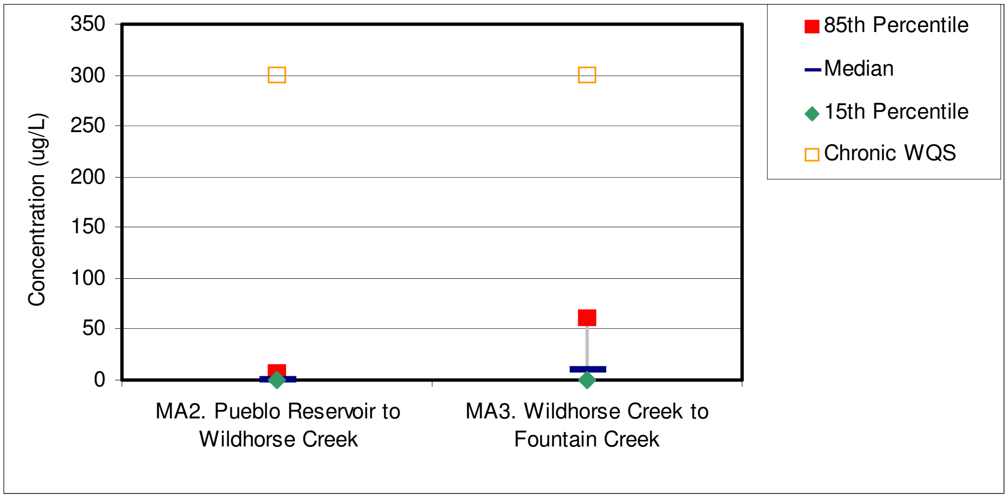


Figure 4-28. Dissolved Iron Concentrations and WQS - Middle Arkansas River

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e.

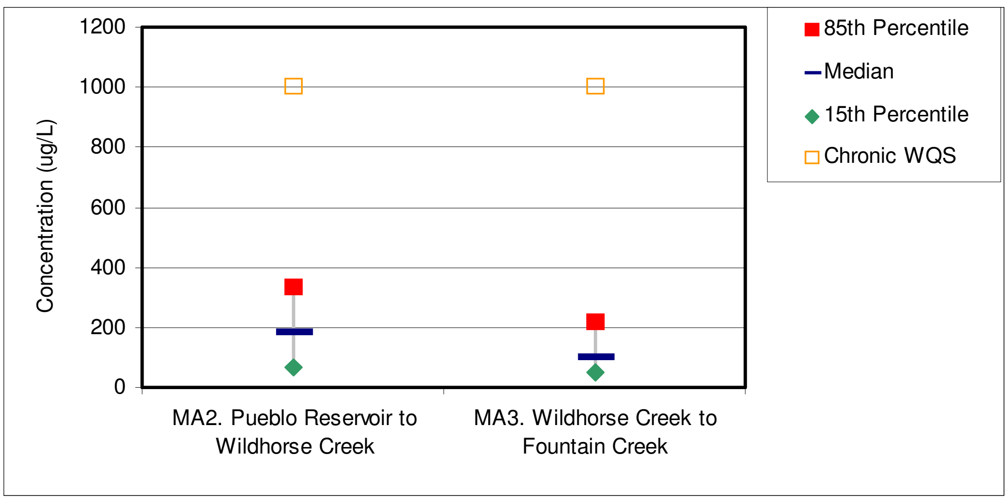


Figure 4-29. Total Recoverable Iron Concentrations and WQS - Middle Arkansas River

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e

4.5.4.4. Lead

Table 4-53 and **Figure 4-30** summarize dissolved lead data for the middle Arkansas River. **Table 4-54** summarizes lead WQS for the middle Arkansas River. In segment MA2, most of the samples were less than the MDL. The historical lead data do not exceed WQS.

Table 4-53. Summary of Dissolved Lead Concentrations - Middle Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek	0	0	1.2	1.5	8 (1992 to 2002)
MA3. Wildhorse Creek to Fountain Creek	0.1	0.2	0.3	0.3	4 (1997 to 2001)

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e.

Table 4-54. Summary of Dissolved Lead WQS - Middle Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
MA2. Pueblo Reservoir to Wildhorse Creek	204.5	139.4	5.4
MA3. Wildhorse Creek to Fountain Creek	204.5	139.4	5.4

*Mean hardness in MA3 from CDPHE, 2005e. Assumed hardness in MA2 equal to hardness in MA3.

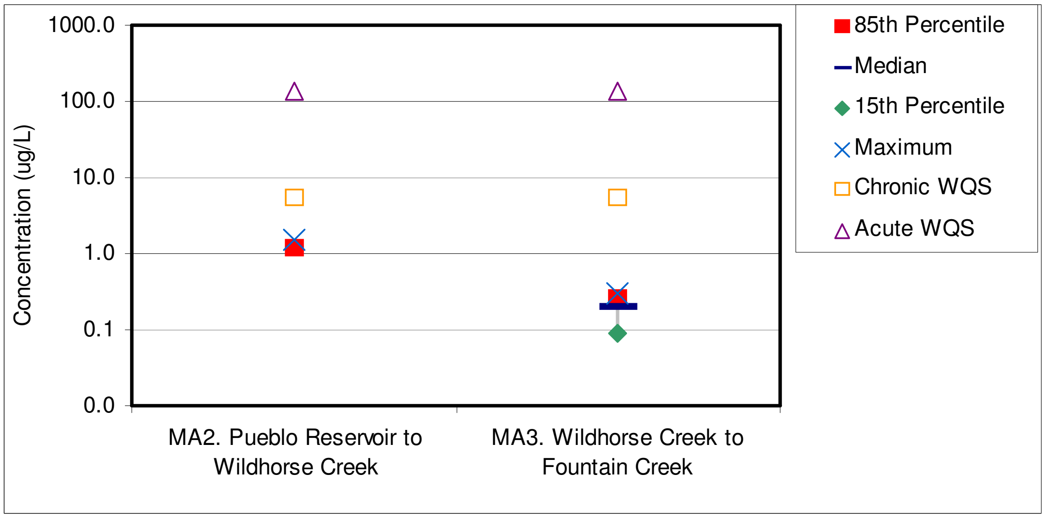


Figure 4-30. Dissolved Lead Concentration and WQS - Middle Arkansas River

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e.
Note: Acute WQS is greater than graph scale

4.5.4.5. Manganese

Table 4-55 and **Figure 4-31** summarize dissolved manganese data for the middle Arkansas River. **Table 4-56** summarizes the WQS for the middle Arkansas River. The 85th percentile for segment MA2 exceeds one aspect of the chronic water supply WQS of 50 µg/L, but may not exceed the other aspect of "existing quality as of January 1, 2000" (see Table 4-56). The value of "existing quality" is not known.

Table 4-55. Summary of Dissolved Manganese Concentrations - Middle Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek	0	4.0	52.1	162.0	25 (1992 to 2002)
MA3. Wildhorse Creek to Fountain Creek	4.0	6.2	14.0	28.0	19 (1997 to 2001)

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e.

Table 4-56. Summary of Dissolved Manganese WQS - Middle Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
MA2. Pueblo Reservoir to Wildhorse Creek	204.5	3,789	Water Supply - Least restrictive of: a) 50 µg/L or b) existing quality as of 1/1/00
MA3. Wildhorse Creek to Fountain Creek	204.5	3,789	

*Mean hardness in MA3 from CDPHE, 2005e. Assumed hardness in MA2 equal to hardness in MA3.

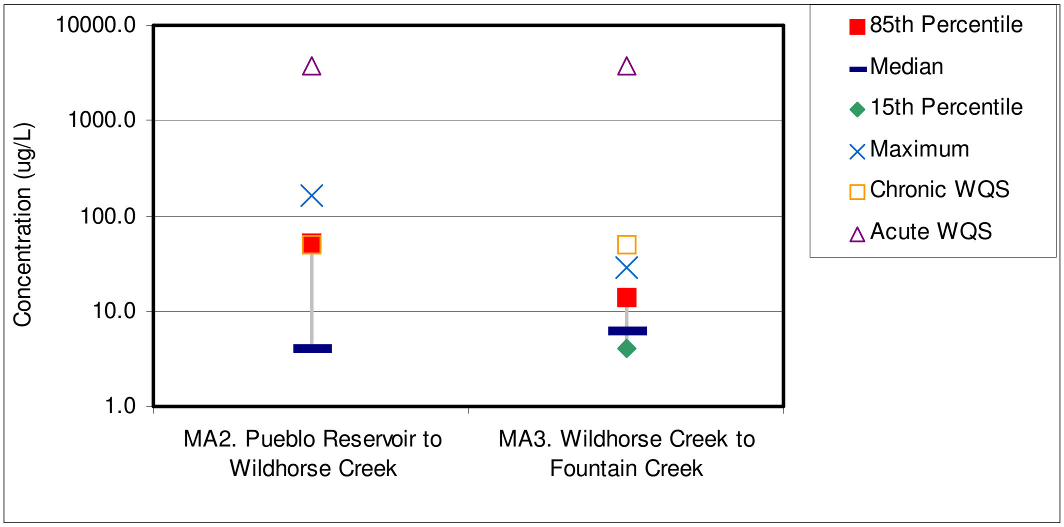


Figure 4-31. Dissolved Manganese Concentrations and WQS - Middle Arkansas River

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e.

4.5.4.6. Zinc

Table 4-57 and **Figure 4-32** summarize dissolved zinc concentrations for the middle Arkansas River. **Table 4-58** summarizes zinc WQS for the middle Arkansas River. The historical zinc data do not exceed WQS.

Table 4-57. Summary of Dissolved Zinc Concentrations - Middle Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek	0	0	3.8	4.0	8 (1992 to 2002)
MA3. Wildhorse Creek to Fountain Creek	1.7	5.1	10.0	13.0	4 (1997 to 2001)

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e.

Table 4-58. Summary of Dissolved Lead WQS - Middle Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
MA2. Pueblo Reservoir to Wildhorse Creek	204.5	215	217
MA3. Wildhorse Creek to Fountain Creek	204.5	215	217

*Mean hardness in MA3 from CDPHE, 2005e. Assumed hardness in MA2 equal to hardness in MA3.

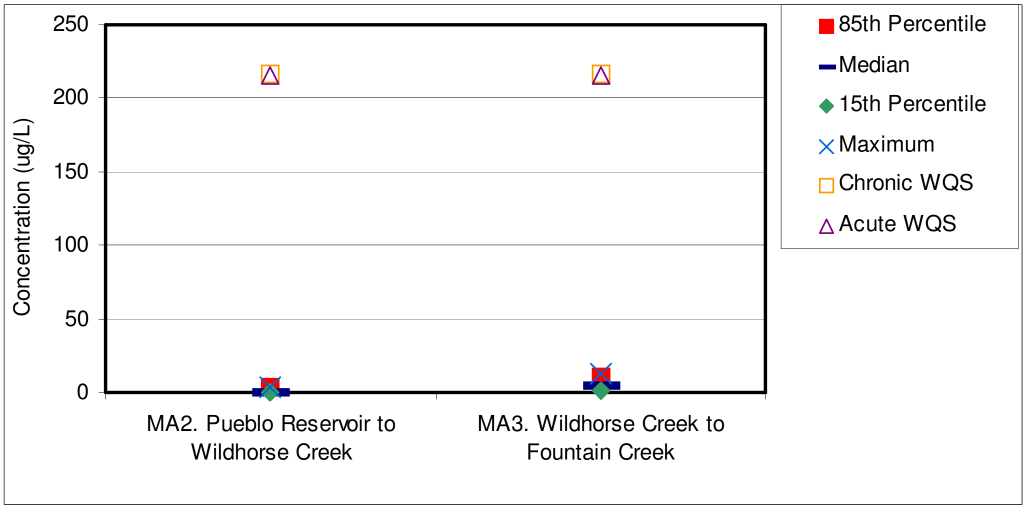


Figure 4-32. Dissolved Zinc Concentrations and WQS - Middle Arkansas River
Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e.

4.5.5. Metals - Lower Arkansas River

Metals concentrations in the lower Arkansas River are discussed below.

4.5.5.1. Cadmium

Table 4-59 summarizes dissolved cadmium data for the lower Arkansas River. **Table 4-60** summarizes dissolved cadmium WQS for the lower Arkansas River. Most of the data were below the MDL and the historical cadmium data exceed WQS.

Table 4-59. Summary of Dissolved Cadmium Concentrations - Lower Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
LA1a. Fountain Creek to Colorado Canal	0	0	0	0	9 (1998 to 2002)
LA1b. Colorado Canal to John Martin Reservoir	0	0	0	0.5	55 (1998 to 2002)

Source: CDPHE, 2005e. Note: MDLs are not published with STORET data.

Table 4-60. Summary of Dissolved Cadmium WQS - Lower Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
LA1a. Fountain Creek to Colorado Canal	315.3	14.8	5.2
LA1b. Colorado Canal to John Martin Reservoir	400	19.1	6.2

*Mean hardness from CDPHE, 2005e. 400 is the maximum hardness used in TVS calculations.

4.5.5.2. Copper

Table 4-61 summarizes dissolved copper data for the lower Arkansas River. **Table 4-62** summarizes the copper WQS for the lower Arkansas River. Most of the data were below the MDL and the historical copper data do not exceed WQS.

Table 4-61. Summary of Dissolved Copper Concentrations - Lower Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
LA1a. Fountain Creek to Colorado Canal	0	0	0	3.1	8 (1998 to 2002)
LA1b. Colorado Canal to John Martin Reservoir	0	0	0	13.0	55 (1998 to 2002)

Source: CDPHE, 2005e. Note: MDLs are not published with STORET data

Table 4-62. Summary of Dissolved Copper WQS - Lower Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
LA1a. Fountain Creek to Colorado Canal	315.3	39.6	23.9
LA1b. Colorado Canal to John Martin Reservoir	400	49.6	29.3

*Mean hardness from CDPHE, 2005e. 400 is the maximum hardness used in TVS calculations.

4.5.5.3. Iron

Table 4-63 and **Figure 4-33** summarize dissolved iron data for the lower Arkansas River. **Table 4-64** and **Figure 4-34** summarize total recoverable iron data. Iron WQS are summarized in **Table 4-65**. There are no acute WQS for iron in the lower Arkansas River. The chronic WQS for total recoverable iron is compared to the median of historical concentrations rather than the 85th percentile. The median total recoverable iron concentrations for both segments are equal to the WQS. The 85th percentile of dissolved iron does not exceed the chronic WQS.

Table 4-63. Summary of Dissolved Iron Concentrations - Lower Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	# Samples (date range)
LA1a. Fountain Creek to Colorado Canal	0	13.5	60.0	16 (1998 to 2002)
LA1b. Colorado Canal to John Martin Reservoir	0	14.0	60.0	57 (1998 to 2002)

Source: CDPHE, 2005e

Table 4-64. Summary of Total Recoverable Iron Concentrations - Lower Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	# Samples (date range)
LA1a. Fountain Creek to Colorado Canal	828	1,600	3,615	16 (1998 to 2002)
LA1b. Colorado Canal to John Martin Reservoir	498	2,000	12,300	66 (1998 to 2002)

Source: CDPHE, 2005e

Table 4-65. Summary of Iron WQS - Lower Arkansas River

Segment	Chronic WQS Dissolved (µg/L)	Chronic WQS Total Recoverable (µg/L)
LA1a. Fountain Creek to Colorado Canal	Water Supply - Least restrictive of: a) 300 µg/L or b) existing quality as of 1/1/00	1,600
LA1b. Colorado Canal to John Martin Reservoir		2,000

Source: CDPHE, 2004B

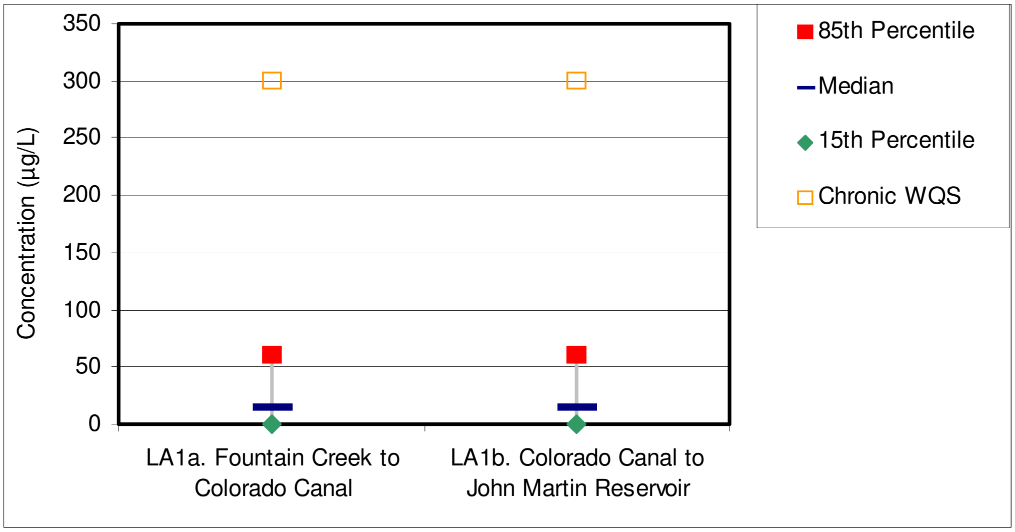


Figure 4-33. Dissolved Iron Concentrations and WQS - Lower Arkansas River
Source: CDPHE, 2005e

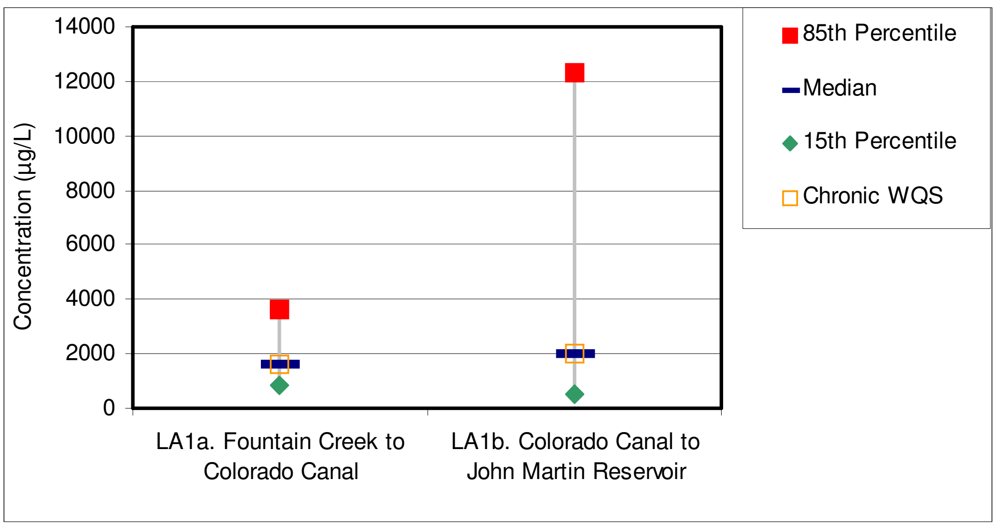


Figure 4-34. Total Recoverable Iron Concentrations and WQS - Lower Arkansas River
Source: CDPHE, 2005e
Note: (compare total recoverable iron WQS to median concentration)

The source of total recoverable iron in the lower Arkansas River is likely Fountain Creek and other erosional tributaries, which contribute sediment and associated particulate iron to the lower Arkansas River. Fountain Creek is not on the 303(d) list for total recoverable iron because the WQS in Fountain Creek are higher than the Arkansas River. Concentrations of total recoverable iron in Fountain Creek and other tributaries are much higher during stormflows than during non-storm flows (USGS, 2002). Much of the iron is likely bound to particulates washed into Fountain Creek from the watershed in storm runoff and some is likely resuspended in the stream channel due to higher flows during storms.

4.5.5.4. Lead

Table 4-66 summarizes the dissolved lead data for the lower Arkansas River. **Table 4-67** summarizes the lead WQS for the lower Arkansas River. Most of the measurements are below the MDL. Historical lead data do not exceed the WQS.

Table 4-66. Summary of Dissolved Lead Concentrations - Lower Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
LA1a. Fountain Creek to Colorado Canal	0	0	0	0.1	8 (1998 to 2002)
LA1b. Colorado Canal to John Martin Reservoir	0	0	0	13.0	54 (1998 to 2002)

Source: CDPHE, 2005e. Note: MDLs are not published with STORET data

Table 4-67. Summary of Dissolved Lead WQS - Lower Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
LA1a. Fountain Creek to Colorado Canal	315.3	220	8.6
LA1b. Colorado Canal to John Martin Reservoir	400	281	10.9

*Mean hardness from CDPHE, 2005e. 400 is the maximum hardness used in TVS calculations.

4.5.5.5. Manganese

Table 4-68 and **Figure 4-35** summarize dissolved manganese data for the lower Arkansas River. **Table 4-69** summarizes WQS for the lower Arkansas River. Historical manganese data do not exceed WQS.

Table 4-68. Summary of Dissolved Manganese Concentrations - Lower Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
LA1a. Fountain Creek to Colorado Canal	4.0	7.4	11.7	15	23 (1998 to 2002)
LA1b. Colorado Canal to John Martin Reservoir	0.0	7.5	33.0	194	100 (1998 to 2002)

Source: CDPHE, 2005e

Table 4-69. Summary of Dissolved Manganese WQS - Lower Arkansas River

Segment	Hardness as $CaCO_3$* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
LA1a. Fountain Creek to Colorado Canal	315.3	4377	Water Supply - Least restrictive of: a) 50 µg/L or b) existing quality as of 1/1/00
LA1b. Colorado Canal to John Martin Reservoir	400	4738	

*Mean hardness from CDPHE, 2005e. 400 is the maximum hardness used in TVS calculations.

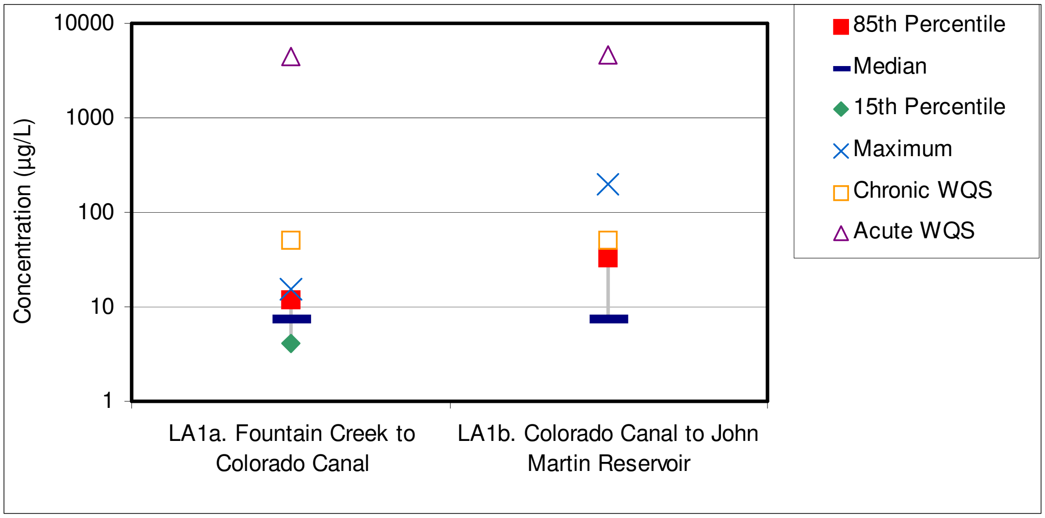


Figure 4-35. Dissolved Manganese Concentrations and WQS - Lower Arkansas River
Source: CDPHE, 2005e

4.5.5.6. Zinc

Table 4-70 and **Figure 4-36** summarize dissolved zinc concentrations for the lower Arkansas River. **Table 4-71** summarizes zinc WQS for the lower Arkansas River. Historical zinc data do not exceed WQS.

Table 4-70. Summary of Dissolved Zinc Concentrations - Lower Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
LA1a. Fountain Creek to Colorado Canal	10.5	39.5	92.1	100	8 (1998 to 2002)
LA1b. Colorado Canal to John Martin Reservoir	0	11.0	35.9	120	55 (1998 to 2002)

Source: CDPHE, 2005e

Table 4-71. Summary of Dissolved Zinc WQS - Lower Arkansas River

Segment	Hardness as CaCO3* (mg/L)	WQS Acute (µg/L)	WQS Chronic (µg/L)
LA1a. Fountain Creek to Colorado Canal	315.3	310	312.6
LA1b. Colorado Canal to John Martin Reservoir	400	379	382.4

*Mean hardness from CDPHE, 2005e. 400 is the maximum hardness used in TVS calculations.

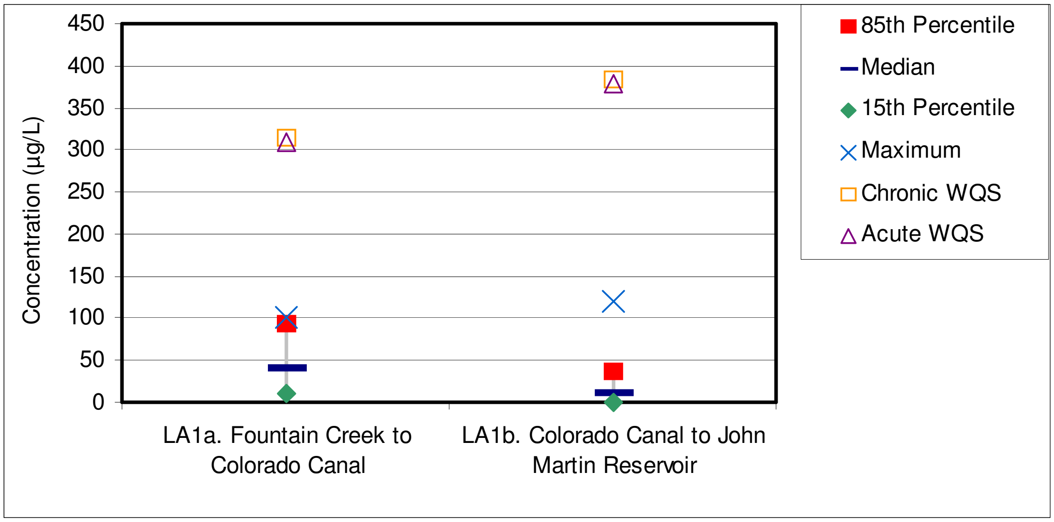


Figure 4-36. Dissolved Zinc Concentrations and WQS - Lower Arkansas River
Source: CDPHE, 2005e

4.6. Selenium

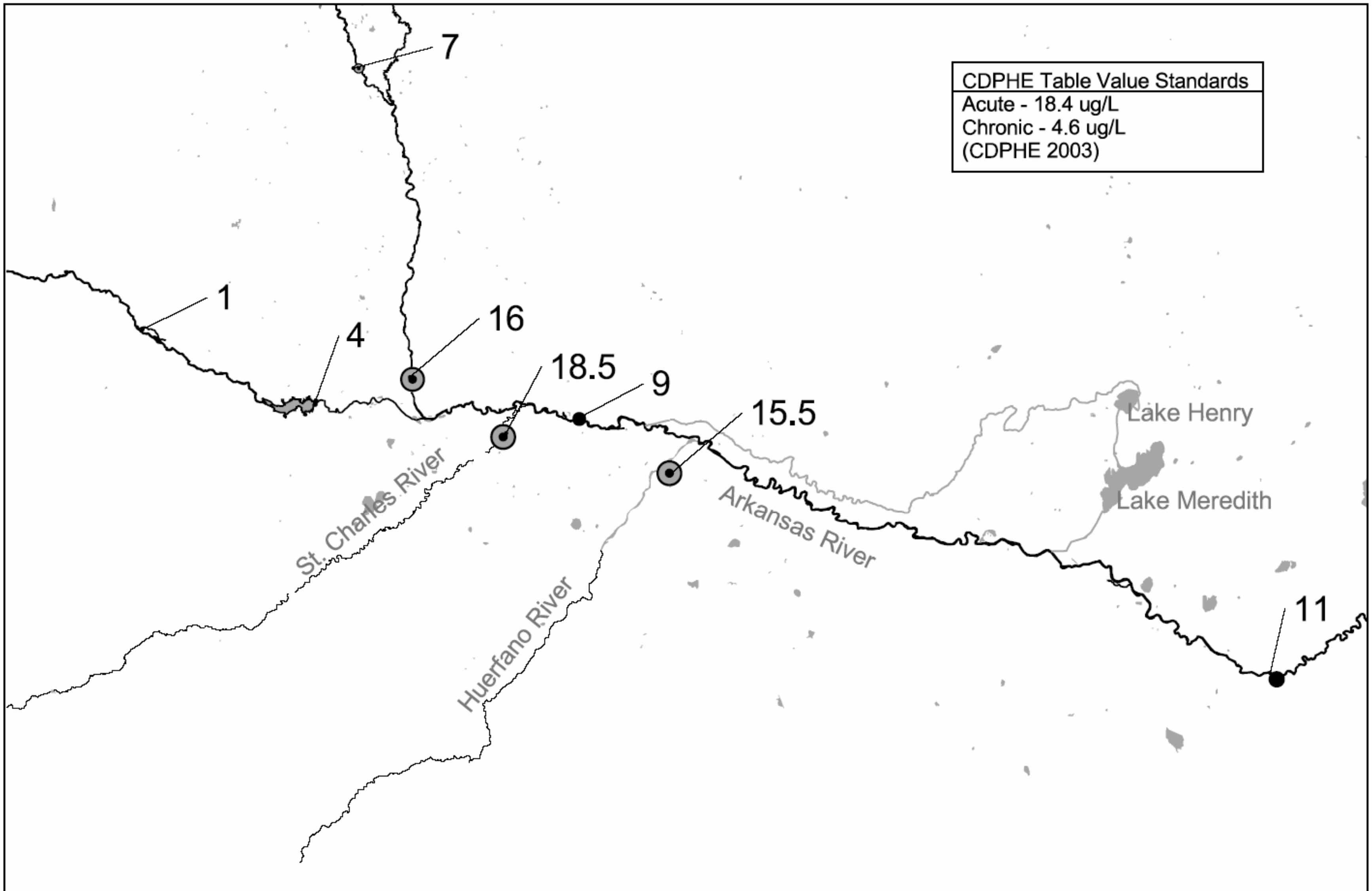
Selenium is a naturally occurring semi-metallic trace element that is essential for animals in small doses but is toxic at high concentrations (Reclamation, 1998). Selenium is widely distributed in marine sedimentary rocks in the western United States. The concentration of selenium in waterbodies can be greatly increased by return flow through selenium containing formations. Anthropogenic sources of selenium in the environment include coal fly ash, mining of uranium, bentonite and coal, and oil refinery wastewater.

Selenium is more toxic to vertebrate animals than to plants and invertebrates (Reclamation, 1998). Egg laying vertebrates such as birds and fish are more sensitive than placental vertebrates. The effects of selenium at relatively low concentrations can cause death and reproductive failure through bioaccumulation in the food web. Normal background concentrations of total selenium in freshwater have been estimated between 0.1 and 0.4 µg/L (Reclamation, 1998). Field cases of selenium poisoning in fish and birds have been documented for waters averaging as little as 10 µg/L (Reclamation, 1998). The window between which dietary exposure is beneficial and harmful is relatively small. Nutritionally optimum concentrations for animals are reported between 0.1 and 0.3 mg Se/kg. The threshold for toxicity to some organisms is only 2 to 5 mg Se/kg (Reclamation, 1998).

CDPHE's TVS for acute and chronic dissolved selenium are 18.4 and 4.6 µg/L, respectively. However, temporary modifications for selenium have been set in certain segments in the Arkansas River Basin due to uncertainty. Segments with temporary modifications based on uncertainty are not subject to TMDL development and permit limits are not based on the underlying standard until the uncertainty is resolved. The WQS for the study area are summarized in Appendix A and are presented in the subsections below including temporary selenium standards.

The medians of dissolved selenium measurements taken at several stream gages in the Arkansas River Basin from 1980 to 2002 are presented in **Table 4-72** and **Figure 4-37**. Fountain Creek, Huerfano River, and St. Charles River all have median selenium concentrations approaching the acute TVS. Measurements taken in the upper Arkansas River are generally less than the detection limit of 1 µg/L (USGS, 2005b).

Shale formations either exposed to the surface or weathered into soil are generally thought to be the source of selenium. Selenium dissolves out of rock and soil into groundwater, and is then transported to the surface water. There are hotspots in the Arkansas River Basin area where dissolved selenium has been measured at concentrations one or two orders of magnitude higher than WQS. Research is ongoing to determine selenium source areas.



Project: Aurora EA
Prepared By: MWH
Source: USGS Gage Data
Date: September 21, 2005

● Arkansas River Median Selenium
◉ Tributary Median Selenium
Water bodies
Basin Boundary

N

5 0 5 10 Miles

Figure 4-37. Spatial Distribution of Median Dissolved Selenium (µg/L) Measurements at stream gages 1980 to 2002

Table 4-72. Median Selenium Measurements at Stream Gages 1980 to 2002

Stream Gage Description	Number of Measurements	Median Dissolved Selenium (µg/L)
Arkansas River at Portland, CO	90	1
Arkansas River Above Pueblo, CO	39	4
Fountain Creek Near Fountain, CO	32	7
Fountain Creek at Pueblo, CO	93	16
St. Charles River at Mouth, Near Pueblo, CO	14	18.5
Arkansas River near Avondale, CO	28	9
Huerfano River near Boone, CO	14	15.5
Arkansas River at La Junta, CO	18	11

Source: USGS, 2005b

4.6.1. Selenium – Lake Fork and Lake Creek

There is no selenium data available for Lake Fork and Lake Creek. However, selenium concentrations are expected to be low, similar to other reaches in the upper Arkansas River Basin.

4.6.2. Selenium - Upper Arkansas River

Table 4-73 summarizes dissolved selenium concentrations for the upper Arkansas River. **Table 4-74** summarizes dissolved selenium WQS for the upper Arkansas River. The 85th percentiles of historical data do not exceed chronic WQS. The maximum measured selenium concentrations do not exceed the acute WQS.

Table 4-73. Summary of Dissolved Selenium Concentrations - Upper Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
UA2c. Lake Fork to Lake Creek	0	0	0	2.9	313 (1997 to 2001)
UA3. Lake Creek to Pueblo Reservoir	0	0	0	2.1	56 (1994 to 2002)

Source: CDPHE, 2005b

Table 4-74. Summary of Dissolved Selenium WQS - Upper Arkansas River

Segment	WQS Acute (µg/L)	WQS Chronic (µg/L)
UA2c. Lake Fork to Lake Creek	18.4	4.6
UA3. Lake Creek to Pueblo Reservoir	18.4	4.6

Source: CDPHE, 2004b

4.6.3. Selenium - Middle Arkansas River

Table 4-75 and **Figure 4-38** summarize dissolved selenium concentrations in the middle Arkansas River. **Table 4-76** summarizes dissolved selenium WQS in the middle Arkansas River. The 85th percentile of historical data from the Above Pueblo gage exceeds the temporary chronic WQS of 6.0 µg/L for segment MA2. The 85th percentile of historical data in segment MA3 does not exceed the chronic WQS. The maximum value recorded in segment MA3 exceeds the acute WQS of 18.4 µg/L. As discussed in Section 3.3.1, if such exceedences occur more frequently than once every three years the acute WQS is not attained.

Table 4-75. Summary of Dissolved Selenium Concentrations - Middle Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
MA2. Pueblo Reservoir to Wildhorse Creek	3.0	5.0	6.5	7.0	17 (1992 to 2002)
MA3. Wildhorse Creek to Fountain Creek	5.1	7.4	11.4	36.0	40 (1997 to 2001)

Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e

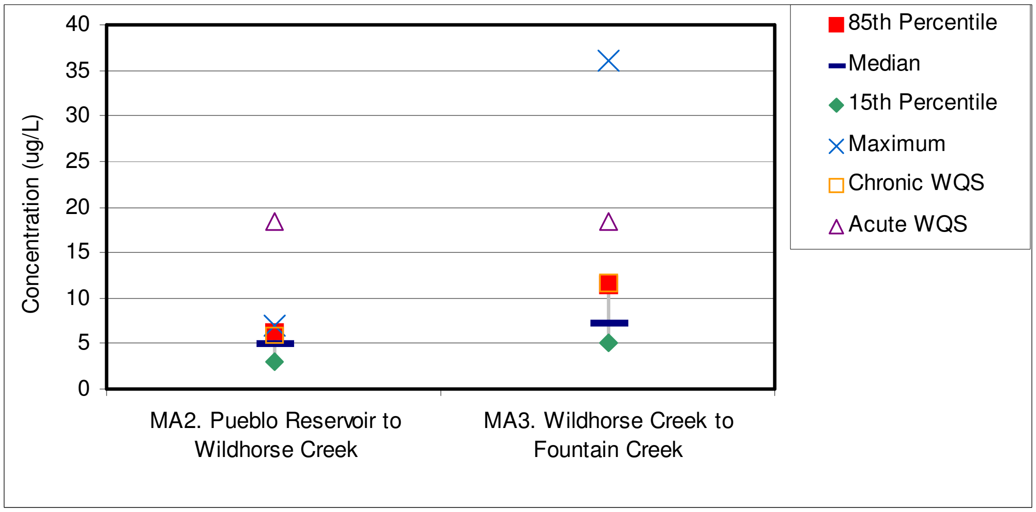


Figure 4-38. Dissolved Selenium Concentrations and WQS - Middle Arkansas River
Sources: MA2 – USGS, 2005b, Above Pueblo Gage. MA3 - CDPHE, 2005e

Table 4-76. Summary of Dissolved Selenium WQS - Middle Arkansas River

Segment	WQS Acute (µg/L)	WQS Chronic (µg/L)
MA2. Pueblo Reservoir to Wildhorse Creek	18.4	6.0§
MA3. Wildhorse Creek to Fountain Creek	18.4	11.7§

Source: CDPHE, 2004b
§ Temporary modification until 12/31/07

4.6.4. Selenium - Lower Arkansas River

Table 4-77 and **Figure 4-39** summarize dissolved selenium concentrations for the lower Arkansas River. **Table 4-78** summarizes dissolved selenium WQS for the lower Arkansas River. The historical data for segment LA1b exceeds the acute WQS.

Table 4-77. Summary of Dissolved Selenium Concentrations - Lower Arkansas River

Segment	15th Percentile (µg/L)	Median (µg/L)	85th Percentile (µg/L)	Max (µg/L)	# Samples (date range)
LA1a. Fountain Creek to Colorado Canal	6.5	11.0	14.5	17.0	25 (1998 to 2002)
LA1b. Colorado Canal to John Martin Reservoir	7.7	11.3	15.2	36.0	96 (1998 to 2002)

Source: CDPHE, 2005e

Table 4-78. Summary of Dissolved Selenium WQS - Lower Arkansas River

Segment	WQS Acute (µg/L)	WQS Chronic (µg/L)
LA1a. Fountain Creek to Colorado Canal	Existing Quality[(1)]	Existing Quality[(1)]
LA1b. Colorado Canal to John Martin Reservoir	18.4	16.0[(2)]

(1) Temporary modification until 7/1/08
(2) Temporary modification until 12/31/07
Source: CDPHE, 2004b

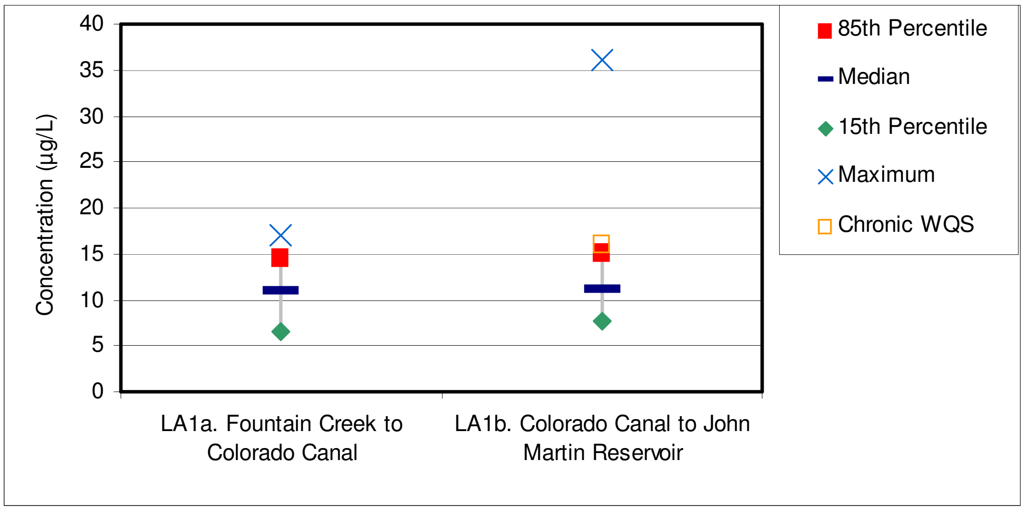


Figure 4-39. Dissolved Selenium Concentrations and WQS - Lower Arkansas River
Source: CDPHE, 2005e

4.7. Arsenic

Arsenic is a metalloid, an element with properties between those of a metal and nonmetal. Water can become contaminated by arsenic from mine tailings and agricultural applications. Arsenic in drinking water is carcinogenic and the most restrictive WQS are those protective of drinking water supply. The WQS for arsenic in most of the study area is 50 µg/L total recoverable arsenic, acute, protective of drinking water supply. Aquatic life and agricultural WQS are higher. Segment UA2c, Arkansas River between Lake Fork and Lake Creek, has a WQS of 100 µg/L total recoverable arsenic, chronic, protective of agricultural uses.

Arsenic was raised as a concern in the EA scoping process, but is not an impairment in the study area (CDPHE, 2004). According to the American Water Works Association, “as with other toxic inorganic contaminants, arsenic is almost exclusively a groundwater problem” (AWWA, 1990). Arsenic was not analyzed by CDPHE for the 2004 or 2006 303(d) listing processes. Data from STORET, collected by CDPHE, was mostly in the dissolved form, which is not comparable to WQS. Therefore, available data from stream gages was used to depict existing conditions. Arsenic levels are well below the applicable WQS in the study area.

4.7.1. Arsenic – Lake Fork and Lake Creek

There is no arsenic data available for Lake Fork and Lake Creek.

4.7.2. Arsenic – Upper Arkansas River

Table 4-79 summarizes total arsenic data and WQS for locations in the upper Arkansas River. There was no data available in segment UA2c, Arkansas River from Lake Fork to Lake Creek. The maximum value measured in the upper Arkansas River is less than the WQS.

Table 4-79. Total Arsenic Data in Upper Arkansas River (µg/L)

Sample Location	15th Percentile	Median	85th Percentile	Max	WQS	# Samples (date range)
Granite Gage (UA3)	0	0	0	0	50 (ac)	2 (2002)
Portland Gage (UA3)	0	0	1	1	50 (ac)	7 (1990 to 2002)

Source: USGS, 2005b

4.7.3. Arsenic – Middle Arkansas River

There is no arsenic data measured since 1990 available for the middle Arkansas River.

4.7.4. Arsenic – Lower Arkansas River

Table 4-80 summarizes total arsenic data for locations in the lower Arkansas River The maximum value measured in the lower Arkansas River is less than the WQS.

Table 4-80. Total Arsenic Data in Lower Arkansas River (µg/L)

Sample Location	15th Percentile	Median	85th Percentile	Max	WQS	# Samples (date range)
Avondale Gage (LA1a)	1.8	2	3.3	4	50 (ac)	6 (1990 to 2002)
Catlin Dam Gage (LA1b)	3	3.5	4	4	50 (ac)	6 (1990 to 2002)

Source: USGS, 2005b

4.8. Boron

Boron is not an impairment in the study area (CDPHE, 2004). Boron is a metalloid element whose toxicity effects are generally more pronounced in plants than in animals (Reclamation, 1998).

Boron is regulated by CDPHE with a WQS of 0.75 mg/L throughout the study area, but it was not evaluated in the study area for the 2004 or 2006 303(d) process. Boron concentrations are not frequently measured in the study area. Data in STORET from the Nepesta gage, near the downstream end of the study area is summarized in **Table 4-81**. The 85th percentile of the data is well below the WQS.

Table 4-81. Summary of Dissolved Boron Data at the Nepesta Gage (mg/L)

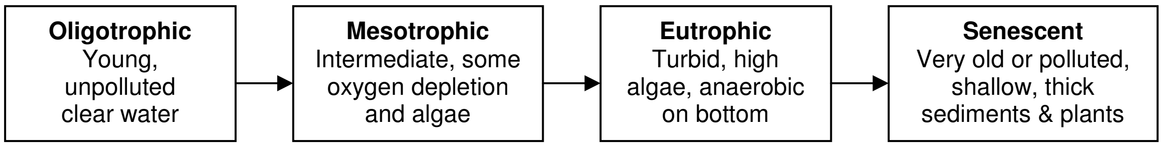
15th Percentile	Median	85th Percentile	WQS	# Samples (date range)
0.057	0.11	0.15	0.75	21 (1993 to 1998)

Source: EPA, 2005

4.9. General Reservoir Water Quality

Reservoir water quality is determined by the water quality of the inflows, by a number of physical characteristics of the reservoir such as depth, temperature, and circulation patterns, and by the presence and activities of aquatic species and other organisms. Reservoir water quality is greatly affected by nutrient levels in reservoir inflows as well as temperature. High temperatures and high nutrient levels lead to algae growth and reduced dissolved oxygen, which can inhibit the beneficial uses of a reservoir.

Eutrophication is a natural process in which nutrients in a lake or reservoir gradually increase over time. The natural process of eutrophication can be accelerated by pollution associated with human activity. The eutrophication process is shown below.



For study area reservoirs, Carlson's TSI was used to characterize the trophic state. Carlson's TSI is based on phytoplankton biomass as estimated by either chlorophyll *a*, Secchi disk depth, or total phosphorus concentration. Most reservoirs have a TSI between 0 and 100, with higher TSI indicating more eutrophic. An increase in the TSI of 10 represents a doubling of algal biomass in a waterbody (Carlson, 1977). The upper limit of oligotrophy is at a TSI of about 41 and the lower limit of eutrophy is at a TSI of about 51 (Carlson, 1979).

Temperature in reservoirs varies seasonally and can vary by depth. Reservoirs in the temperate zone, such as those in the study area, generally thermally stratify in the summer if they are deep enough to overcome wind and wave action (Wetzel, 2001). The deepest stratified layer is referred to as the hypolimnion. The temperature of the hypolimnion is generally fairly constant during periods of stratification (Wetzel, 2001). The top layer, the epilimnion, has generally a uniform temperature and the water circulates due to wind and wave action. The middle layer, the metalimnion, is characterized by a temperature gradient, connecting the hypolimnion and epilmnion .

4.10. Turquoise Reservoir

Native flows into Turquoise Reservoir are released to Lake Fork. Transmountain water entering Turquoise Reservoir flows through the Mt. Elbert conduit to the Mt. Elbert Forebay, upstream of Twin Lakes. Water is released from the forebay through the power plant to Twin Lakes to generate power during the peak hours of demand. During off-peak periods, power from the grid is used to pump water back from Twin Lakes to the forebay (USGS, 1993). From Twin Lakes water is released either to the Homestake Pipeline or to Lake Creek. The orientation of the reservoirs and outlets is shown in Figure 4-11.

The use classifications for Turquoise Reservoir are summarized in Table 2-1. Turquoise Reservoir has a total storage capacity of about 129,000 acre-feet. The Elevation-Area-Capacity curve and historic water storage in Turquoise Reservoir are presented in the Water Resources Technical Report (MWH, 2005). Very little water quality data is available for Turquoise Reservoir, other than some metals results from CDPHE in 2003. The water quality of nearby Twin Lakes Reservoir has been studied in more detail and some conclusions can be drawn about Turquoise water quality from Twin Lakes water quality. The two reservoirs are likely to have similar water quality due to their similar climate, size, and source water.

4.10.1. Dissolved Oxygen

Dissolved oxygen data is not available for Turquoise Reservoir. Dissolved oxygen conditions are likely to be similar to conditions in Twin Lakes Reservoir, which meet WQS (Montano and Mueller, 2002).

4.10.2. pH

There is no pH data for Turquoise Reservoir. The pH in Lake Fork met the WQS range of 6.5 to 9.0 (see Section 4.2.1), indicating that pH in Turquoise Reservoir is likely within the WQS range.

4.10.3. Temperature

There is no temperature data available for Turquoise Reservoir. However, due to their similar climate and size, temperature profiles are expected to be similar to Upper Twin Lake, which stratifies in the summer (see **Figure**). The temperature is shown to clearly decrease with depth. The temperature WQS for Class 1 cold water aquatic life is 20 °C. The historical data for Twin Lakes do not exceed the WQS.

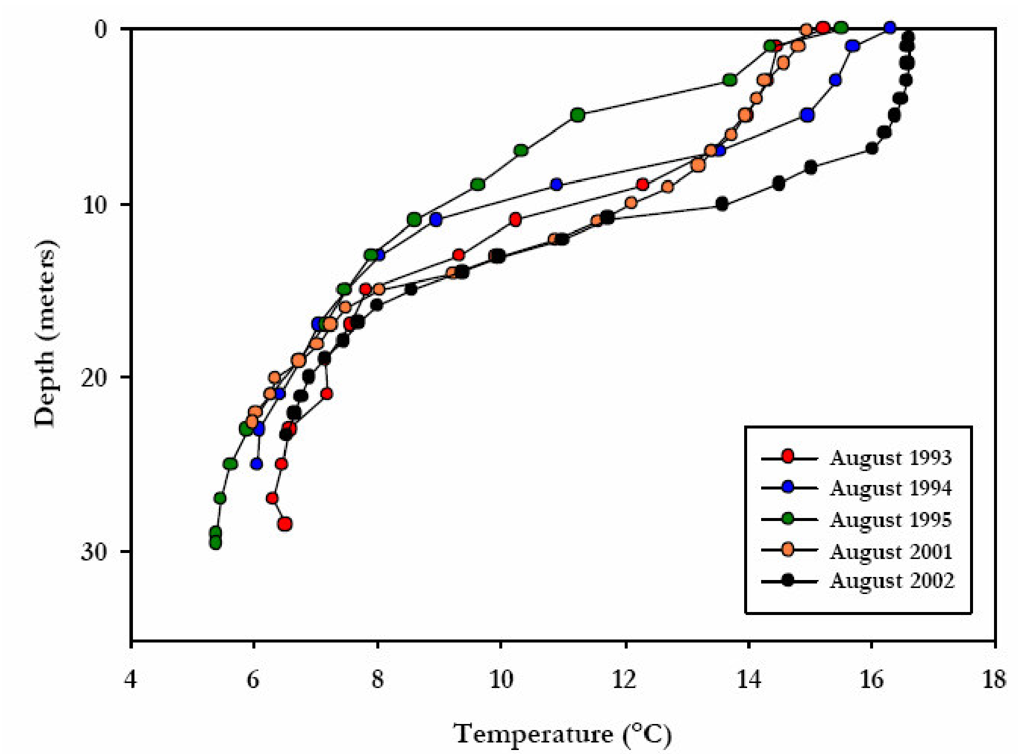


Figure . Upper Twin Lake Temperature Profiles – Month of August
Source: Montano and Mueller, 2002

4.10.4. Salinity

No salinity data is available for Turquoise Reservoir. However, salinity in Lake Creek downstream of Turquoise Reservoir is low, as discussed in Section 4.4.1, indicating that salinity in Turquoise Reservoir is also low.

4.10.5. Metals

Dissolved lead, copper, cadmium, silver, manganese, mercury, and zinc were all measured three times in Turquoise Reservoir by CDPHE in 1993. All of the data resulted in non-detects, except for one manganese sample, which measured 10 µg/L (EPA, 2005). This would meet the water supply manganese WQS of 50 µg/L for manganese and the less stringent TVS.

4.10.6. Selenium

Three dissolved selenium measurements from Turquoise Reservoir in 1993 were all below the MDL (EPA, 2005). Selenium data is not available for Lake Fork. However, most of the selenium measurements for the upper Arkansas River were less than the MDL with no exceedences of the WQS.

4.10.7. Arsenic

There is no arsenic data for Turquoise Reservoir. However, arsenic levels are expected to be much lower than WQS, similar to data collected in the upper Arkansas River.

4.10.8. Nutrients and Trophic State

No nutrient or trophic state data is available in Turquoise Reservoir. Ammonia and nitrate plus nitrite samples from Lake Fork, downstream of Turquoise Reservoir, were much less than the WQS, as discussed in Section 4.3.1, indicating that nutrient concentrations are also low in Turquoise Reservoir. With no major nutrient loading sources, it is likely that Turquoise Reservoir is oligotrophic.

4.11. Pueblo Reservoir

Pueblo Reservoir is located upstream of the City of Pueblo and the confluence of Fountain Creek with the Arkansas River. It provides water storage for irrigation, municipal and industrial uses, and flood control.

Pueblo Reservoir is a temperate climate reservoir that experiences summer stratification and fall turnover. The primary outlet of the reservoir to the Arkansas River is located near the reservoir bottom. Hydraulic residence times vary from a few weeks to several months. Shorter residence times occur in the summer when the reservoir is stratified and underflow from the Arkansas River short-circuits some of the reservoir storage (USGS, 1994).

Storage in Pueblo Reservoir generally follows an annual pattern of filling during the winter and drawing down toward the end of summer as municipal and agricultural demands are filled. The recent drought resulted in reservoir storage reductions beginning in 2000.

Stratification, underflow, and withdrawals from the hypolimnion in summer affect concentrations of dissolved solids, nutrients, and metals in the reservoir and downstream (USGS, 1994). Summer stratification and underflow prevent mixing, which minimizes nutrient loading but prevents dilution of reservoir water by river flows (USGS, 1994).

Figure 4-40 depicts the water quality sampling transects in Pueblo Reservoir. Pueblo Reservoir water quality is characterized according to data from three representative stations: 3B, 5C, and 7B. According to USGS (1994), "data collected from sites 3B, 5C, and 7B adequately describe the spatial variations of the physical, chemical, and biological characteristics within the reservoir". Each of the three stations is located in the middle of the appropriate transect shown in Figure 4-40.

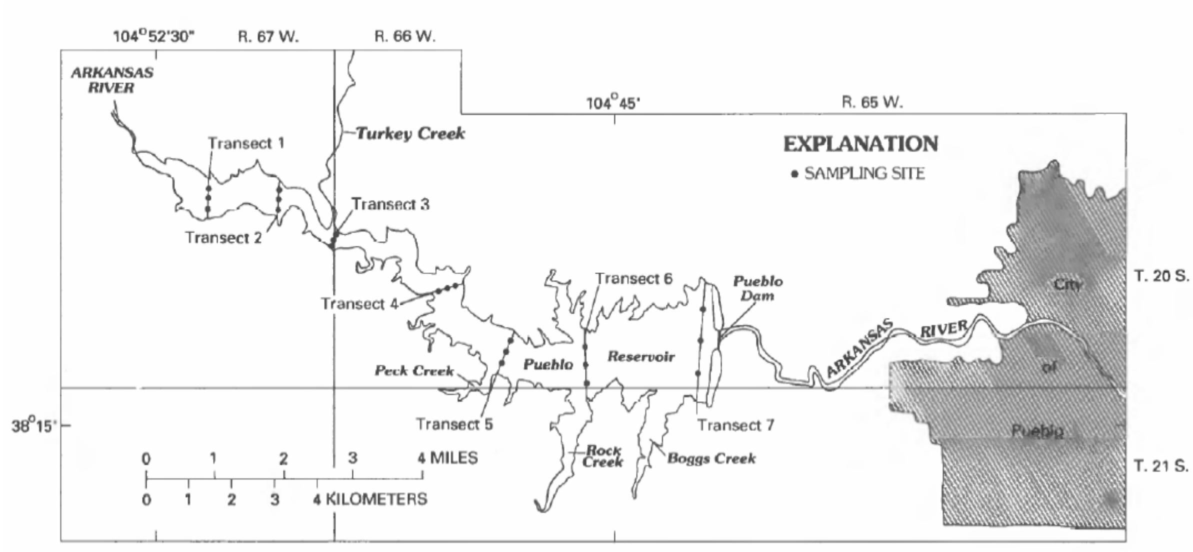


Figure 4-40. Location of Transects and Sampling Locations in Pueblo Reservoir
Source: USGS, 1994

4.11.1. Dissolved Oxygen in Pueblo Reservoir

Figure 4-41 displays how dissolved oxygen varies with depth and location for the months of May, June, August, and September (indicated as 5, 6, 8, and 9). No data are available between November and March. Monthly scatterplots are used to show the seasonal effects of stratification and mixing. Dissolved oxygen is generally near saturation at the surface (USGS, 1994), with warmer waters having a lower saturation concentration. In May, when inflowing water is warmer than the reservoir water, dissolved oxygen concentrations are lower at site 3B than the other two sites. In September, when inflowing waters are colder than reservoir water, dissolved oxygen concentrations are higher at site 3B. Dissolved oxygen decreases with depth when the reservoir is stratified in June and August. Anoxic conditions are apparent at the bottom at sites 5C and 7B during August. Fall turnover mixes the reservoir and restores dissolved oxygen levels to near saturation throughout the reservoir in September at sites 5C and 7B.

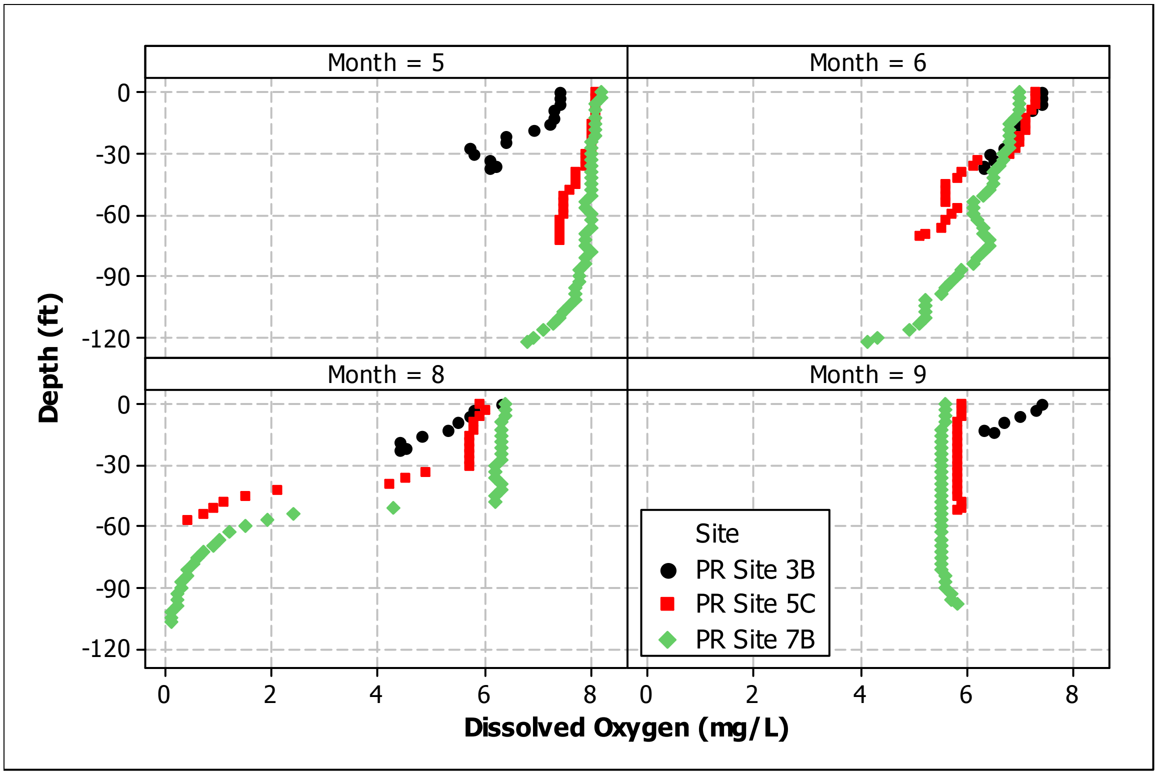


Figure 4-41. Pueblo Reservoir – Dissolved Oxygen and Depth Scatterplot per Month

Source: USGS, 2005b, May 2000 to September 2000

The dissolved oxygen WQS for Pueblo Reservoir is 6.0 mg/L and 7.0 mg/L during spawning. In stratified reservoirs, the WQS only apply to the epilimnion and metalimnion, the top two layers of the reservoir (USGS, 2005b). **Table 4-82** summarizes dissolved oxygen data measured within 12 feet of the reservoir surface. The 15th percentile is greater than the WQS of 6.0 mg/L.

Table 4-82. Dissolved Oxygen Data within 12 feet of Pueblo Reservoir Water Surface

15th Percentile	Median	85th Percentile	Number of Samples
6.1	7.2	8.3	828

Source: USGS, 2005b, April 1992 to August 2005

4.11.2. pH in Pueblo Reservoir

The pH of water in the reservoir typically ranges between 7.0 and 9.0 (see **Figure 4-42**). Biological processes such as photosynthesis and respiration affect reservoir pH (USGS, 1994). Generally, when the reservoir is stratified in the summer, pH values are highest near the surface and decrease with depth. **Table 4-83** summarizes pH statistics for Pueblo Reservoir. The historical data are within the boundaries of the WQS, between 6.5 and 9.

Table 4-83. pH in Pueblo Reservoir

15th Percentile	Median	85th Percentile	Number of Samples
7.8	8.1	8.4	3450

Source: USGS, 2005b, April 1992 to August 2005

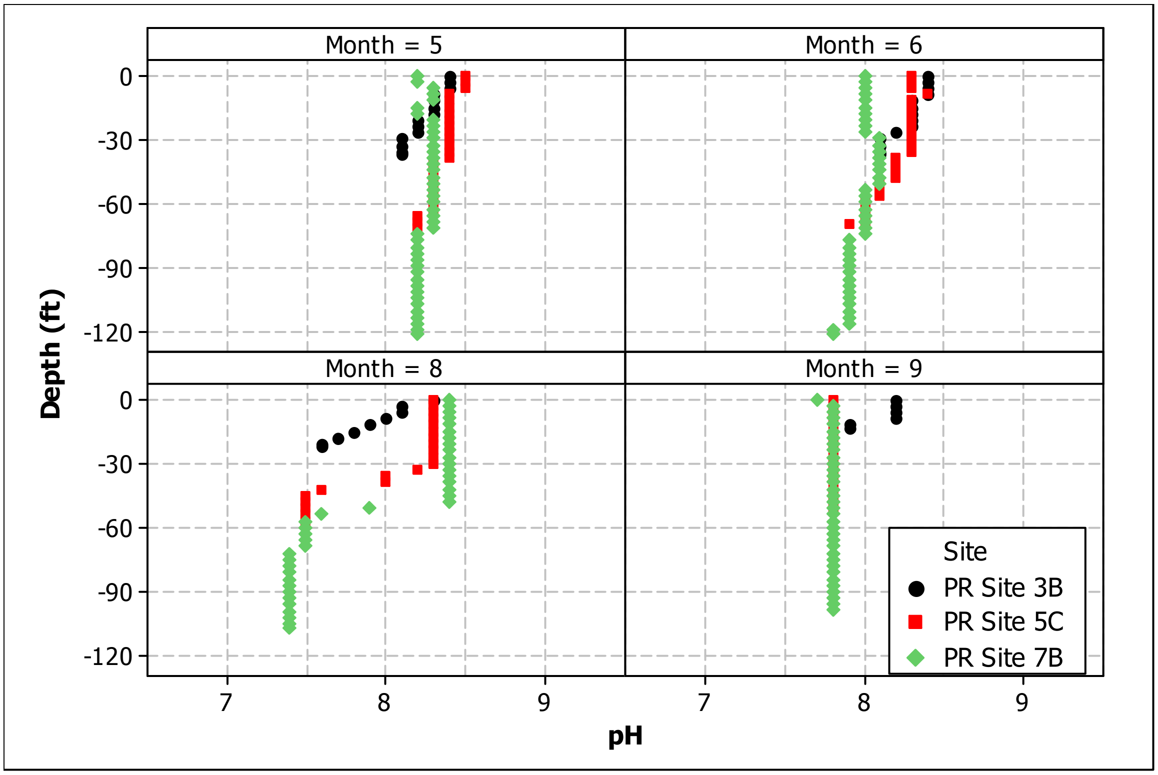


Figure 4-42. Pueblo Reservoir - pH and Depth Scatterplot per Month

Source: USGS, 2005b, May 2000 to September 2000

4.11.3. Temperature

Figure 4-43 summarizes temperature data with depth per month in Pueblo Reservoir. Pueblo Reservoir is well stratified from May through August. Summer stratification causes underflow and interflow of relatively cool water from the Arkansas River (USGS, 1994). The inflow enters the hypolimnion and can short circuit the reservoir reducing the residence time of inflows and increasing the residence time of water in the epilimnion (USGS, 1994).

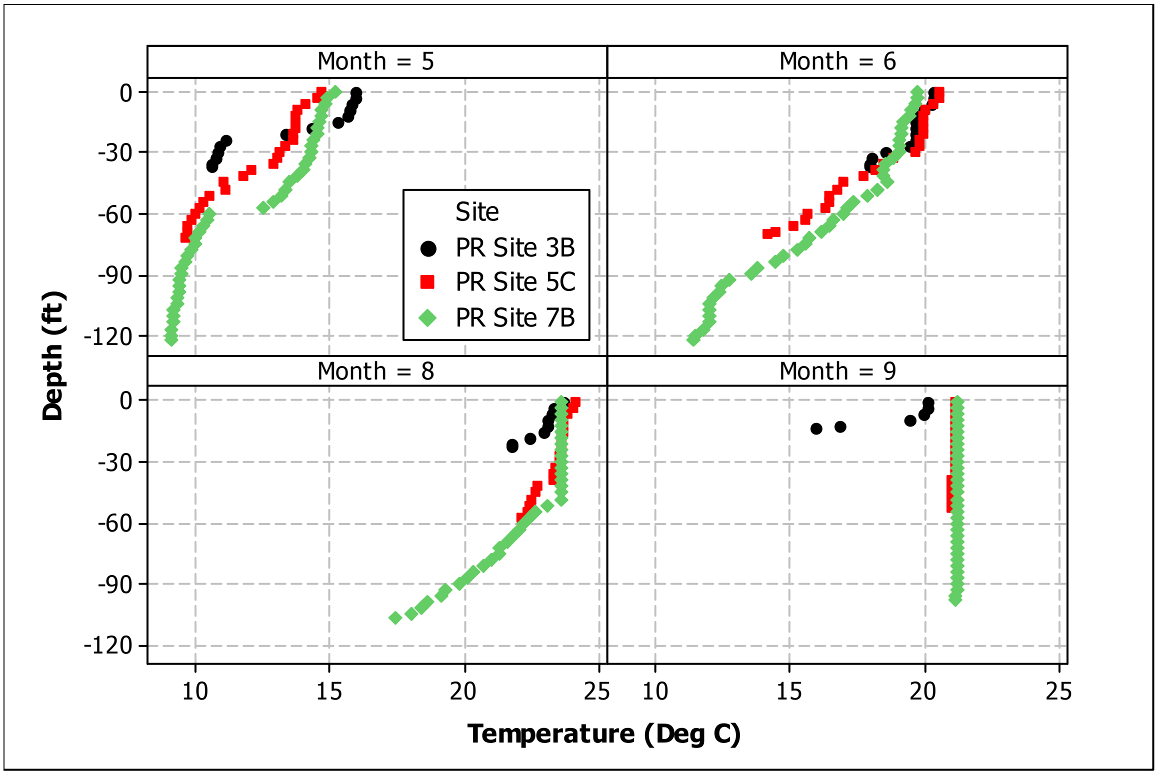


Figure 4-43. Pueblo Reservoir - Temperature and Depth Scatterplot per Month

Source: USGS, 2005b, April 2004 to September 2004

4.11.4. Salinity

Specific conductance concentrations in Pueblo Reservoir range from less than 200 µS/cm to more than 800 µS/cm, generally within the range of moderate salinity hazard for agriculture. Salinity varies seasonally within the reservoir as shown in **Figure 4-44**. Median specific conductance is similar in the spring and fall and is reduced in the summer when high flows enter the reservoir from the upper Arkansas River. Some of the reservoir data that does not correspond to a WQS are summarized using boxplots. Boxplots represent the median of the data, 25th and 75th percentile, as well as other descriptive statistics and outliers. Boxplots are a typical way of describing water quality data, but are not used for WQS comparisons, which typically use the 15th and 85th percentile. **Figure 4-45** describes what the symbols on a boxplot represent.

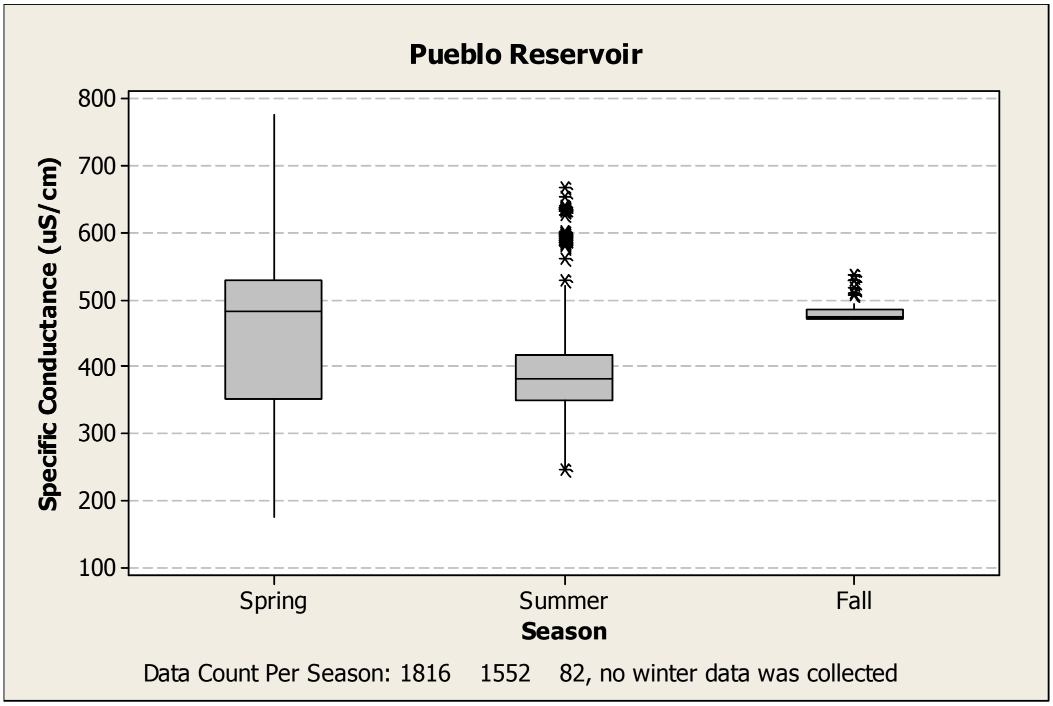


Figure 4-44. Salinity in Pueblo Reservoir by Season
Source: USGS, 2005b, Sites 3B, 5C, 7B April 1992 to August 2005

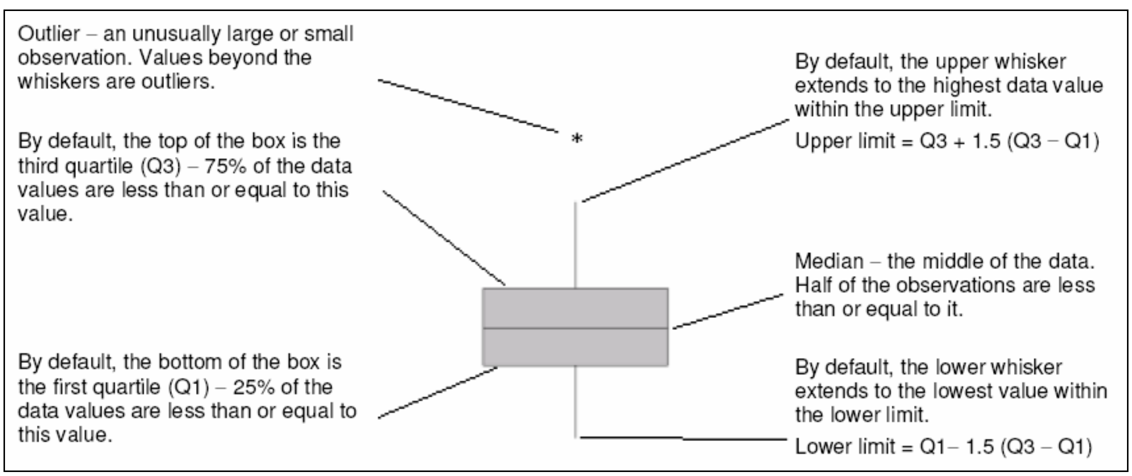


Figure 4-45. Description of Boxplot Statistics
Source: Minitab, 2005

Figure 4-46 depicts how salinity varied with depth in May, June, August, and September of 2000. Specific conductance stratification is apparent at sites 5C and 7B in June and at site 3B in May, August, and September. In June, the inflow specific conductance, as shown by Site 3b, is lower than reservoir specific conductance, as high runoff dilutes concentrations in the upper Arkansas River. By September, flows in the Arkansas River are lower and inflowing water has higher salinity than the reservoir water. According to USGS (1994), Pueblo Reservoir is typically weakly stratified in April and May with respect to salinity. It is more strongly stratified in June and July. Mixing occurs during the late summer, but is delayed in the upstream part of the reservoir due to underflow (USGS, 1994).

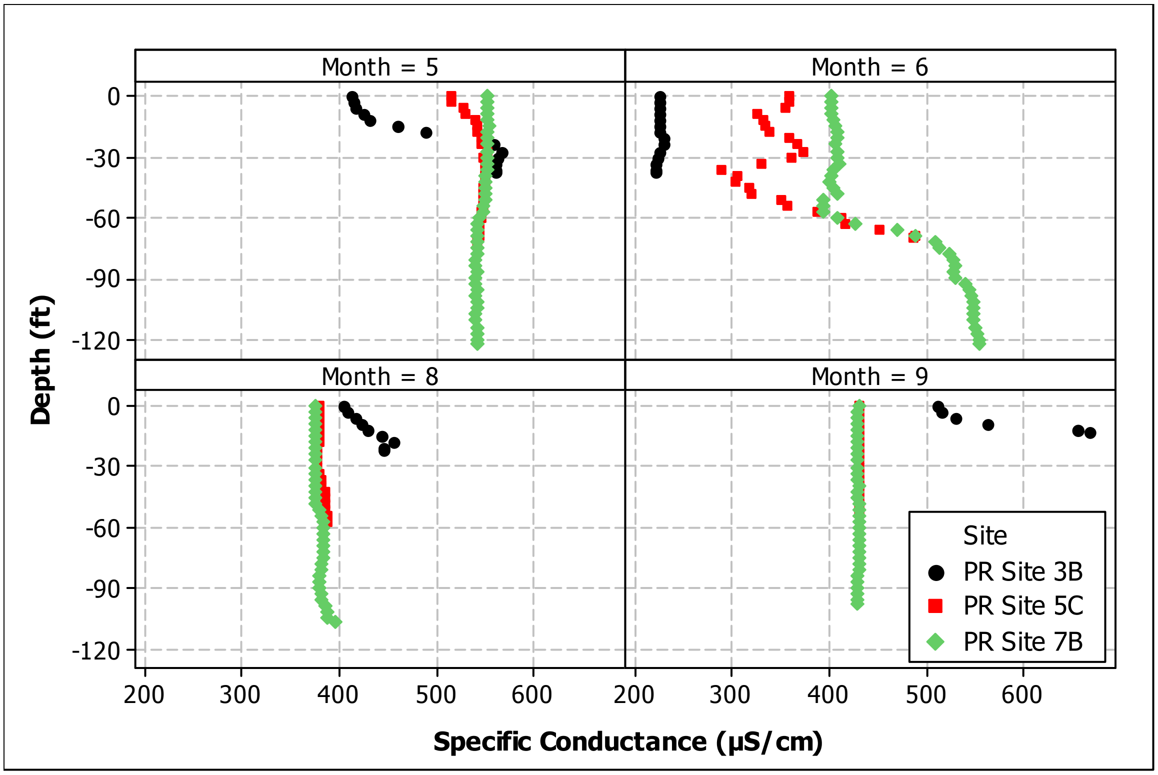


Figure 4-46. Salinity in Pueblo Reservoir

Source: USGS, 2005b, May 2000 to September 2000

4.11.5. Metals

A substantial percentage of many metals that enter Pueblo Reservoir from the upper Arkansas River Basin are removed from the water column through deposition (USGS, 1994). **Table 4-84** summarizes metal concentrations in Pueblo Reservoir and WQS. Historical data do not exceed WQS.

Table 4-84. Total-Recoverable and Dissolved Trace-Element Concentrations and WQS in Pueblo Reservoir (µg/L)

Parameter	15th Percentile	Median	85th Percentile	Max	# Samples	WQS
Arsenic, Total	0	1.0	1.65	3	10	50 (ac)
Cadmium, Dissolved	0	0.01	0.072	0.3	10	TVS (tr)(ac) = 8.4 TVS (ch) = 3.6
Copper, Dissolved	0.87	1.2	1.4	1.4	10	TVS (ac) = 24.2 TVS (ch) = 15.3
Iron, Dissolved	0	0	0	5	10	WS (ch) = 300
Iron, Total Recoverable	50.5	180	449.5	470	10	1000 (ch) (compared to median)
Lead, Dissolved	0	0	0	0	10	TVS (ac) = 127 TVS (ch) = 4.9
Manganese, Dissolved	0	0.9	6.57	33.3	24	WS (ch) = 50 TVS (ac) = 3,678
Zinc, Dissolved	0	0	0.865	1.0	10	TVS (ac) = 199 TVS (ch) = 201

Source: USGS 2005b, Sites 3B, 5C, 7B April 1992 to August 2005
WS = water supply WQS, ac = acute, ch = chronic, tr = trout
Note: TVS calculated based on mean hardness = 187 mg/L as $CaCO_3$. Hardness calculated from mean Ca^{++} and Mg^{++} concentrations measured at site 7B (USGS, 1994). No more recent hardness data is available from USGS.

4.11.6. Selenium

Table 4-85 summarizes selenium data for Pueblo Reservoir. Historical data do not exceed WQS.

Table 4-85. Dissolved Selenium Concentration and WQS in Pueblo Reservoir (µg/L)

15th Percentile	Median	85th Percentile	Max	WQS	# Samples (date range)
1.5	1.7	1.7	1.7	TVS (ac) = 18.4 TVS (ch) = 4.6	4 (2003 to 2004)

ac = acute, ch = chronic
Source: USGS, 2005b, Sites 3B, 5C, 7B

4.11.7. Arsenic

Table 4-86 summarizes total recoverable arsenic data in Pueblo Reservoir. Historical data do not exceed the acute WQS. There is no chronic WQS in Pueblo Reservoir.

Table 4-86. Total Recoverable Arsenic in Pueblo Reservoir (µg/L)

15th Percentile	Median	85th Percentile	Max	Acute WQS	# Samples (date range)
0	1.0	1.7	3	50	10 (2001 to 2003)

Source: USGS, 2005b, Sites 3B, 5C, 7B

4.11.8. Nutrients and Trophic State

Based on the mass ratios of biologically available nitrogen to phosphorus, USGS (1994) concluded that phosphorus may be a limiting nutrient to phytoplankton growth. This determination was based on the fact that, on average, phytoplankton utilize biologically available nitrogen (sum of dissolved ammonia, nitrite, and nitrate) and biologically available phosphorus (dissolved orthophosphorus) in a mass ratio of 7.2N:1P (USGS, 1994). Analysis of more recent data for Pueblo Reservoir indicates that phosphorus may remain the growth limiting nutrient. The calculated mass ratio per month is between 21N:1P and 34N:1P (see **Table 4-87**).

Table 4-87. Biologically Available Nitrogen and Phosphorus in Pueblo Reservoir

Month	N (mg/L as N)	P (mg/L as P)	N:P Ratio	# Samples
April	0.145	0.007	23	19
June	0.135	0.007	21	18
July	0.140	0.007	21	21
August	0.173	0.007	25	19
September	0.204	0.006	34	15

Note: Phosphorus data recorded as less than 0.007 were assumed to be equal to 0.007 for calculation purposes. N to P ratios are actually larger than represented due to this assumption.
Source: USGS, 2005b, Sites 3B, 5C, 7B April 1992 to August 2005

Table 4-88 compares nutrient concentrations in Pueblo Reservoir to WQS. The historical data do not exceed WQS. Comparison of individual unionized ammonia concentrations to the acute WQS shows that the acute standard is not exceeded (USGS, 2005b).

Table 4-88. Comparison of Nutrients to WQS – Pueblo Reservoir

Nutrient	15th Percentile (mg/L)	Median (mg/L)	85th Percentile (mg/L)	WQS (mg/L)	# Samples (date range)
Unionized Ammonia as N	0	0	0	0.02 (chronic)	46 (2001 to 2004)
Nitrate as N	0.06	0.16	0.25	10	97 (1992 to 2004)
Nitrite as N	0	0.01	0.01	0.05	97 (1992 to 2004)

*Note: unionized ammonia concentrations calculated from dissolved ammonia concentration. Nitrate concentrations are for dissolved nitrate plus nitrite as N, although WQS is for nitrate as N only. Nitrite concentrations are for dissolved nitrite.
Source: USGS, 2005b Sites 3B, 5C, 7B

Table 4-89 is a statistical summary of nutrient data in Pueblo Reservoir by season.

Table 4-89. Seasonal Statistical Summary of Nutrient Concentrations in Pueblo Reservoir

Parameter	Mean	Standard Dev	25th Percentile	Median	75th Percentile	# Samples
Ammonia plus organic nitrogen, dissolved (mg/L) as N						
Spring	N/A	N/A	N/A	N/A	N/A	0
Summer	0.193	0.016	0.18	0.19	0.21	21
Fall	N/A	N/A	N/A	N/A	N/A	0
Ammonia, dissolved (mg/L) as N						
Spring	0.042	0.02	0.025	0.042	0.058	38
Summer	0.02	0.025	0.009	0.013	0.022	55
Fall	0.036	0.012	0.024	0.038	0.046	4
Nitrite plus nitrate, dissolved (mg/L) as N						
Spring	0.202	0.089	0.138	0.202	0.253	38
Summer	0.124	0.088	0.055	0.095	0.172	55
Fall	0.167	0.018	0.147	0.172	0.181	4
Nitrite, dissolved (mg/L) as N						
Spring	0.007	0.004	0.005	0.005	0.007	38
Summer	0.006	0.004	0.003	0.006	0.009	55
Fall	0.006	0.001	0.005	0.006	0.006	4
Orthophosphate, dissolved (mg/L) as P						
Spring	0.002	0.005	0	0	0.003	38
Summer	0.001	0.002	0	0	0	55
Fall	0	0	0	0	0	4
Phosphorus, dissolved (mg/L)						
Spring	0.008	0.007	0.005	0.007	0.01	38
Summer	0.007	0.003	0.005	0.006	0.008	55
Fall	0.007	0.003	0.005	0.006	0.009	4
Phosphorus, total (mg/L)						
Spring	0.031	0.028	0.012	0.020	0.041	38
Summer	0.028	0.027	0.017	0.023	0.031	54
Fall	0.028	0.011	0.018	0.026	0.039	4

Source: USGS 2005b, Sites 3B, 5C, 7B April 1992 to August 2005, no winter data available
Spring = April to June, Summer = July to September, Fall = October to December

Chlorophyll *a* concentrations are highest in summer with median and mean concentrations of 7.2 and 10 mg/m^3 respectively. **Figure 4-47** depicts the chlorophyll *a* levels near the surface of Pueblo Reservoir by season. The mean summer chlorophyll *a* concentration corresponds to a TSI of 53 (Carlson, 1979).

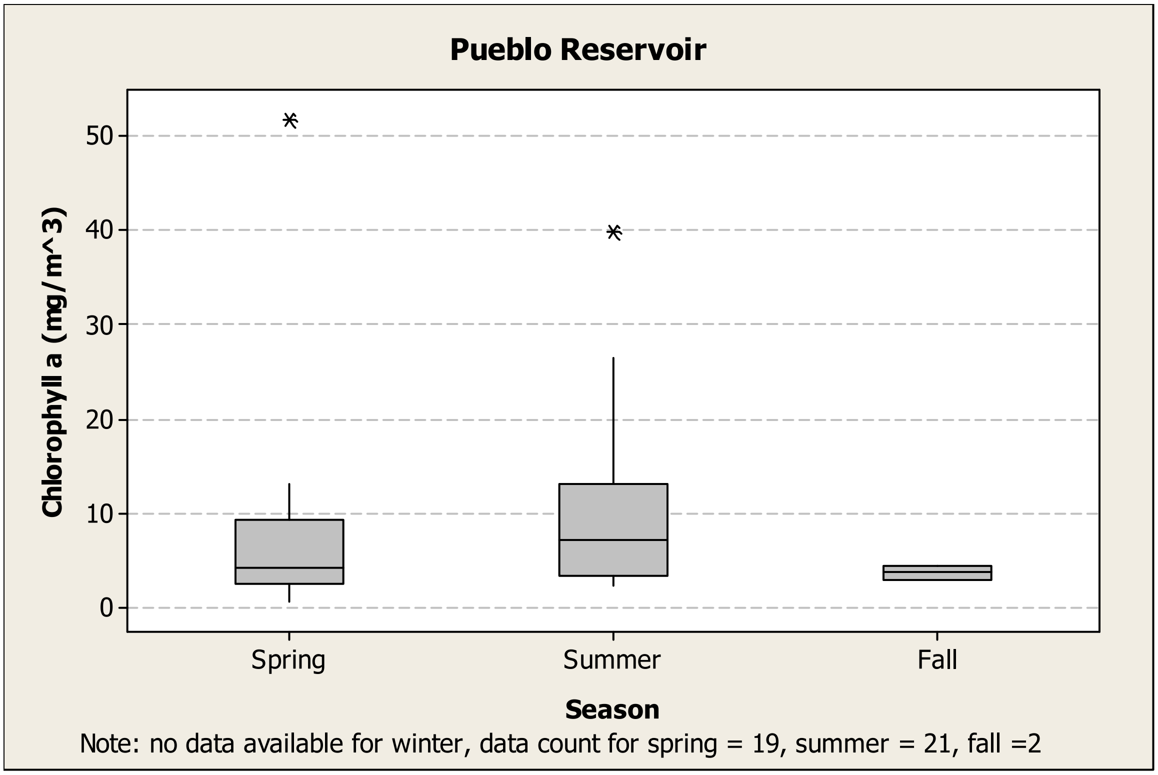


Figure 4-47. Chlorophyll *a* Concentrations Measured near Surface of Pueblo Reservoir

Source: USGS, 2005b, Sites 3B, 5C, 7B April 1992 to August 2005
Spring = April to June, Summer = July to September, Fall = October to December

Transparency measurements in Pueblo Reservoir indicate that particulate matter from the Arkansas River settles upon entering the reservoir increasing transparency in the direction of the dam. **Figure 4-48** depicts transparency per season per station. There are no transparency WQS, but Secchi disk depth can be an indicative of trophic status. The mean Secchi disk depth in summer from all stations is 1.8 meters.

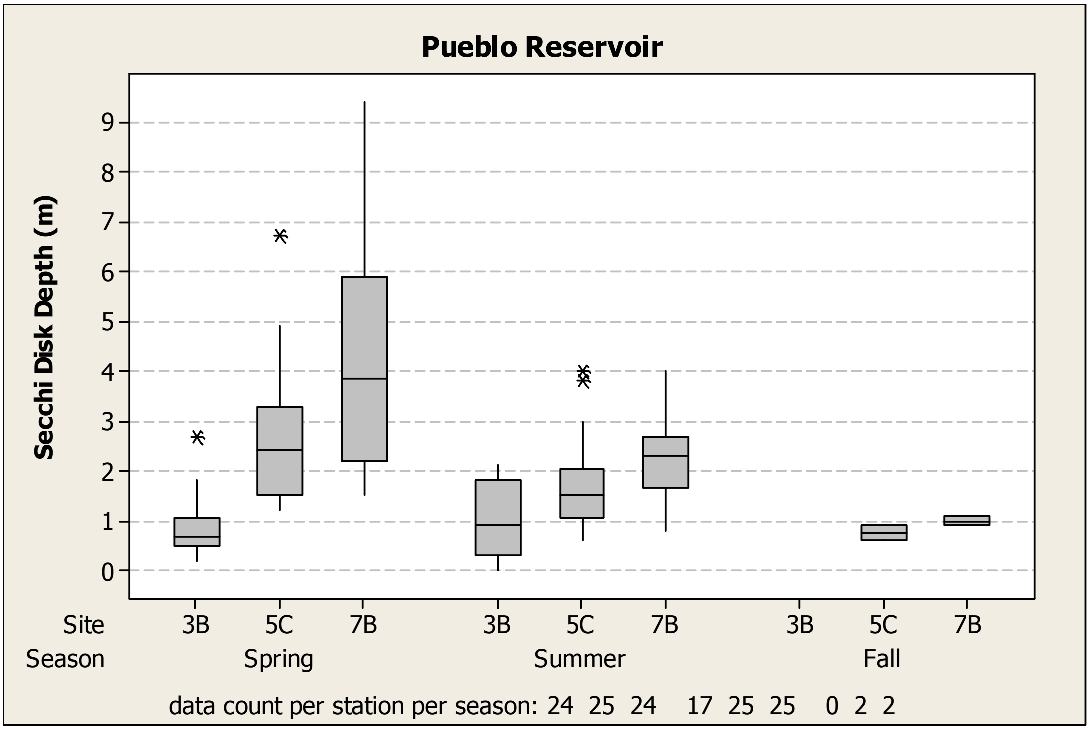


Figure 4-48. Secchi Disk Depths in Pueblo Reservoir

Source: USGS, 2005b, April 1992 to August 2005, note: no winter data available
Spring = April to June, Summer = July to September, Fall = October to December

Each of the methods for calculating TSI yields similar results as summarized in **Table 4-90**. A TSI of 52 to 54 indicates that Pueblo Reservoir is on the boundary between mesotrophic and eutrophic (Carlson, 1979).

Table 4-90. Pueblo Reservoir TSI Summary

Chlorophyll *a* (mg/m^3)	TSI (Chl)	Secchi Disk Depth (m)	TSI (SD)	Total Phosphorus (mg/m^3)	TSI (TP)
10	53	1.8	52	28	54

Source: USGS, 2005b, April 1992 to August 2005

4.12. Lake Meredith and Lake Henry

Lake Henry and Lake Meredith are off-stream storage reservoirs supplied by the Colorado Canal from the Arkansas River. Water enters Lake Henry from the Colorado Canal. Water is released from Lake Henry into the Sugar City Lateral and can be diverted from this lateral into Lake Meredith. Lake Meredith also receives water from Bob Creek. Water in each reservoir is primarily used for irrigation. Both lakes are shallow (10 to 15 feet deep) and experience large fluctuations in content (USGS, 1993).

A time series plot showing historical storage for the sum of Lake Henry and Lake Meredith contents is shown in the Water Resources Technical Report (MWH, 2005). The plot shows that it is not unusual for the contents of Lake Henry and Lake Meredith to be reduced to close to zero.
Water quality characterization of the lakes is based mainly on samples collected by Colorado Springs Utilities between 1994 and 2004. However, that data set does not include chlorophyll *a*, total phosphorus, or Secchi disk depth. Therefore, data collected between May and October of 1987 by USGS (1991) were used to characterize trophic state. Recent samples were available from CDPHE in STORET, but only included analysis of metals, and no nutrient or transparency information.

Lake Henry and Lake Meredith are only weakly stratified, if at all, in the summer (USGS, 1991). Therefore, the analysis of water quality parameters is not depth dependent.

4.12.1. Dissolved Oxygen

Table 4-91 summarizes dissolved oxygen data for Lake Henry and Lake Meredith. The 15th percentile of historical data is compared to the WQS of 5.0 mg/L to protect aquatic life. The dissolved oxygen WQS is not exceeded.

Table 4-91. Dissolved Oxygen (mg/L) – Lake Henry and Lake Meredith

Lake	15th Percentile	Median	85th Percentile	WQS	# Samples
Meredith	6.2	8.5	10.9	5.0	75
Henry	6.3	8.5	10.9	5.0	39

Source: Colorado Springs Utilities, 2005

4.12.2. pH

Table 4-92 summarizes pH data for Lake Henry and Lake Meredith. The 15th percentile and 85th percentile are compared to the WQS of 6.5 to 9. The 15th percentile and 85th percentile of historical data are within the range of the WQS.

Table 4-92. Lake Henry and Lake Meredith pH Data

Lake	15th Percentile	Median	85th Percentile	# Samples (date range)
Meredith	8.1	8.3	8.6	171
Henry	8.1	8.3	8.6	111

Source: Colorado Springs Utilities, 2005

4.12.3. Temperature

Figure 4-49 and **Figure 4-50** represent monthly temperature variation in Lake Meredith and Lake Henry, respectively. The WQS for Aquatic Life Class 1 water bodies is 30 °C. The historical data do not exceed WQS.

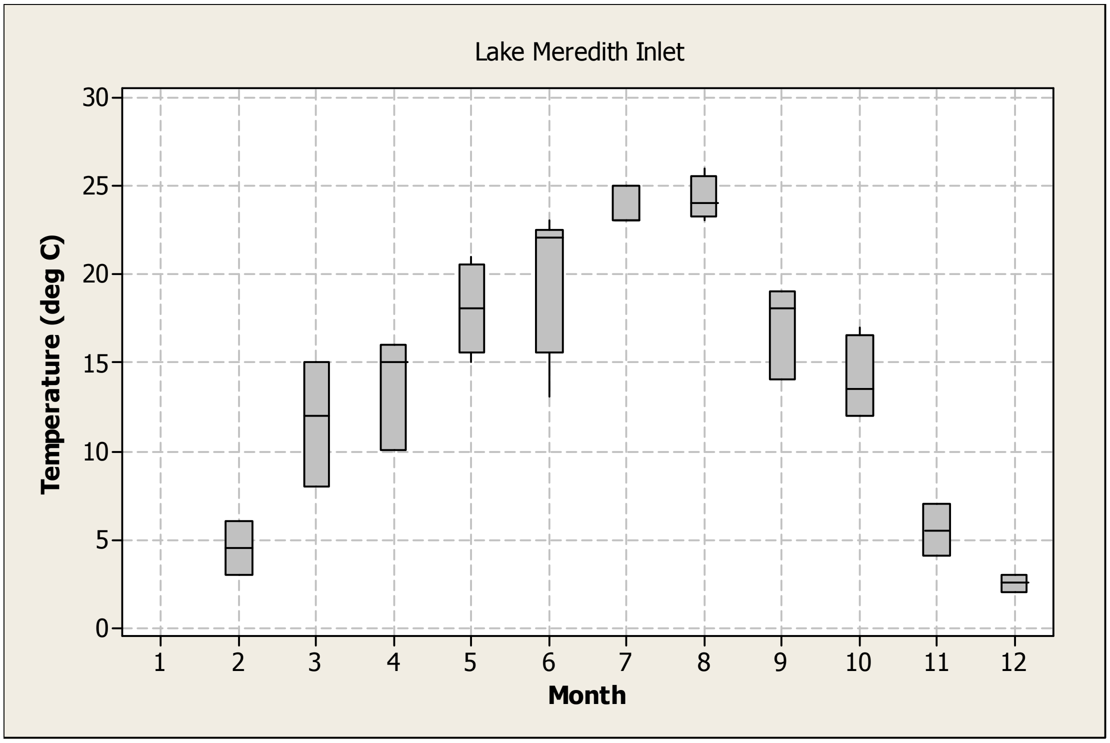


Figure 4-49. Lake Meredith Inlet Temperature Variation by Month
Source: Colorado Springs Utilities, 2005

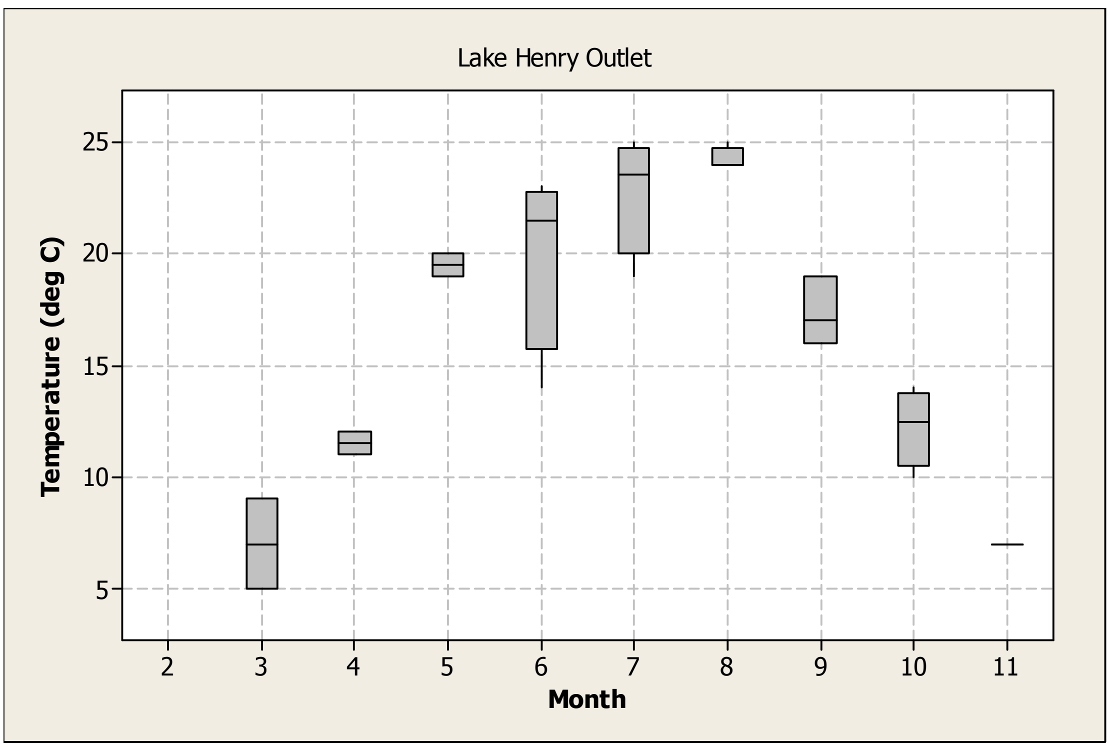


Figure 4-50. Lake Henry Outlet Temperature Variation by Month
Source: Colorado Springs Utilities, 2005

Both lakes have been shown to be weakly thermally stratified during some conditions and not during others (USGS, 1991). This is likely due to the shallow depths of both lakes, which allow weak thermal stratification to be overcome by wind and wave action. There is not sufficient recent data available to develop temperature profiles. However, on the two occasions when summer temperatures were measured near the surface and bottom of both lakes, the lakes were well mixed (Utilities data 1994 to 2004).

4.12.4. Salinity

The results of Colorado Springs Utilities' salinity measurements of Lake Henry and Lake Meredith are summarized in **Table 4-93**. Specific conductance was estimated by converting from TDS. The median specific conductance for Lake Henry and Lake Meredith were approximately 950 and 1,030 µS/cm respectively. Both lakes are generally within the high salinity hazard for crops, between 750 and 2,250 µS/cm.

Table 4-93. Lake Henry and Lake Meredith Salinity

Location	15th Percentile	Median	85th Percentile	# Samples
Henry TDS (mg/L)	548	644	693	87
Henry Specific Conductance (µS/cm)	806	946	1,019	
Meredith TDS (mg/L)	613	782	877	134
Meredith Specific Conductance (µS/cm)	806	1,029	1,154	

Lake Henry specific conductance calculated as TDS / 0.68; Lake Meredith specific conductance calculated as TDS / 0.76 according to USGS, 1991
Source: Colorado Springs Utilities, 2005

4.12.5. Metals

Table 4-94 summarizes metals data for Lake Meredith. Many of the samples were less than the MDL. The chronic WQS for dissolved metals is compared to the 85th percentile of historical data. The chronic WQS for total recoverable iron is compared to the median of historical data. Historical metals data do not exceed WQS.

Table 4-94. Lake Meredith Metals Data Summary (µg/L)

Parameter	15th Percentile	Median	85th Percentile	Maximum	WQS	# Samples
Cadmium, dissolved	0	0	0.4	0.6	TVS (ac) = 20 TVS (ch) = 6.4	92
Copper, dissolved	5	9	14	22	TVS (ac) = 52 TVS (ch) = 30	38
Iron, dissolved	0	0	0	0	None	6
Iron, total recoverable	395	730	1,900	2,500	(ch) = 1,000 (compare to median)	6
Lead, dissolved	0	0	0	2.7	TVS (ac) = 294 TVS (ch) = 11.4	97
Manganese, dissolved	0	0	0	13	TVS (ac) = 4807 TVS (ch) = 2656	38
Zinc, dissolved	0	0	0	10	TVS (ac) = 394 TVS (ch) = 397	98

Hardness dependent TVS based on mean hardness of 418 mg/L from Colorado Springs Utilities, 2005
ac = acute, ch = chronic
Source: Colorado Springs Utilities, 2005

Table 4-95 summarizes metals data for Lake Henry. None of the WQS are violated. Many of the samples were less than the MDL. Historical metals data do not exceed WQS.

Table 4-95. Lake Henry Metals Data Summary (µg/L)

Parameter	15th Percentile	Median	85th Percentile	Maximum	WQS	# Samples
Cadmium, dissolved	0	0	0.2	1	TVS (ac) = 19 TVS (ch) = 6.2	51
Copper, dissolved	3	6	11.9	30	TVS (ac) = 49 TVS (ch) = 29	55
Iron, dissolved	0	0	0	0	None	6
Iron, total recoverable	335	570	717.5	890	(ch) = 1,000 (compare to median)	6
Lead, dissolved	0	0	0	1.7	TVS (ac) = 280 TVS (ch) = 10.9	55
Manganese, dissolved	0	0	0	0	TVS (ac) = 4734 TVS (ch) = 1616	56
Zinc, dissolved	0	0	0	10	TVS (ac) = 379 TVS (ch) = 382	56

Hardness dependent TVS based on mean hardness of 399 mg/L from Colorado Springs Utilities, 2005
Source: Colorado Springs Utilities, 2005

4.12.6. Selenium

The chronic and acute WQS for selenium at Lake Henry and Lake Meredith are 4.6 and 18.4 µg/L, respectively. The selenium data for Lake Henry and Lake Meredith is summarized in **Table 4-96** and **Figure 4-51**. Comparison of the 85th percentile with the chronic standard shows that the chronic WQS is exceeded in both lakes. In addition, the acute standard is exceeded in Lake Meredith by a maximum concentration of 184 µg/L. Three samples collected at the Lake Meredith inlet sampling location between 1996 and 1998 had concentrations exceeding 100 µg/L.

Table 4-96. Dissolved Selenium Data for Lake Henry and Lake Meredith (µg/L)

Lake	15th Percentile	Median	85th Percentile	Maximum	WQS (acute/chronic)	# Samples
Meredith	3.4	7.0	12.0	184	18.4 / 4.6	146
Henry	3.5	6.1	11.0	18	18.4 / 4.6	96

Source: Colorado Springs Utilities, 2005

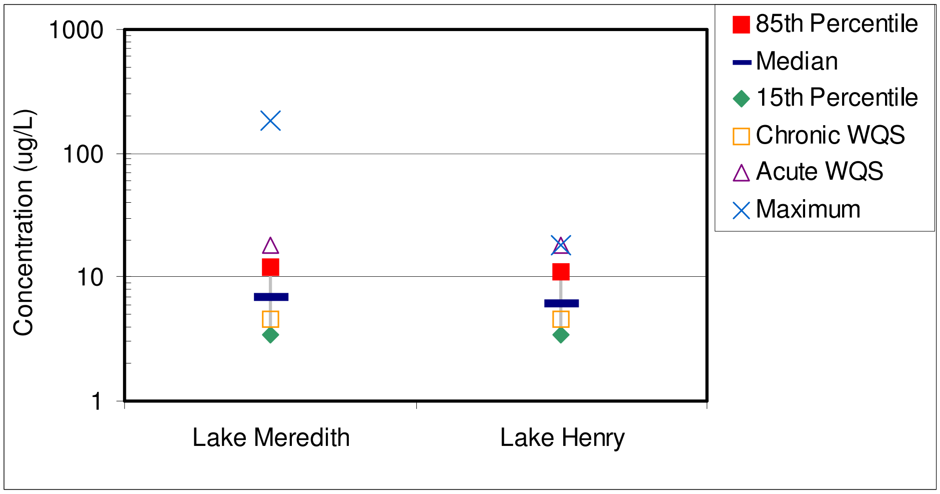


Figure 4-51. Dissolved Selenium Concentration and WQS – Lake Henry and Lake Meredith
Source: Colorado Springs Utilities, 2005

4.12.7. Arsenic

Total recoverable arsenic was measured six times in Lake Meredith in 1994 and 1995. All of the results were below the MDL of 4 µg/L. Total recoverable arsenic was also measured six times in Lake Henry. Only one result was above the MDL, with a concentration of 4 µg/L, well below the WQS of 50 µg/L (Colorado Springs Utilities, 2005).

4.12.8. Nutrients and Trophic State

Ammonia and nitrite are the only nutrients with WQS at Lake Henry and Lake Meredith. **Table 4-97** summarizes unionized ammonia concentrations in the lakes. The 85th percentile is well below the chronic WQS. Nitrite was not measured (Colorado Springs Utilities, 2005).

Table 4-97. Unionized Ammonia Statistics for Lake Henry and Lake Meredith

Lake	15th Percentile	Median	85th Percentile	Chronic WQS	# Samples
Meredith	0	0	0.007	0.06	57
Henry	0	0	0.011	0.06	29

Source: Colorado Springs Utilities, 2005

Total nitrogen concentrations in Lake Henry varied from 0.86 to 1.4 mg/L and averaged about 1.1 mg/L. Total phosphorus concentrations ranged from 0.030 to 0.106 mg/L and averaged about 0.066 mg/L. Lake Henry was shown to vary between phosphorus and nitrogen limiting for algal growth (USGS, 1993).

Total nitrogen concentrations in Lake Meredith varied from 0.3 mg/L to 2.0 mg/L and averaged 1.6 mg/L. Total phosphorus concentrations ranged from 0.062 to 0.148 mg/L and averaged 0.106 mg/L. Lake Meredith was also shown to vary between phosphorus and nitrogen limiting for algal growth (USGS, 1993).

USGS (1993) used Carlson's TSI for Secchi disk depth, total phosphorus concentration, and chlorophyll *a* concentration. The calculated TSI values for each variable in Lake Henry and Lake Meredith are summarized in **Table 4-98**. Because Lake Henry and Lake Meredith may not be phosphorus limited, the most reliable indicator of trophic state is chlorophyll *a* concentration. The chlorophyll *a* TSIs of 50 and 53 for Lake Henry and Lake Meredith respectively, indicate that both lakes are on the boundary between mesotrophic and eutrophic.

Table 4-98. Carlson's TSI Measurements for Lake Henry and Lake Meredith

TSI Variable	Lake Henry Site HEW2	Lake Meredith Average of sites M2B, M1B, M4B
TSI (SD)	87	85
TSI (TP)	62	73
TSI (Chl)	50	53

Source: USGS, 1993

4.13. Holbrook Reservoir

Holbrook Reservoir is part of the Holbrook agricultural irrigation system owned and operated by the Holbrook Irrigating Company (MWH, 2005).

Water is diverted from the Arkansas River to the Holbrook Canal near the Catlin Dam gage to fill Holbrook Reservoir. Holbrook Reservoir typically fills during the winter and during wet years, native streamflow contributes to Holbrook Reservoir contents throughout the winter and spring. The reservoir typically empties each year in the later summer or fall.

There is no water quality data for Holbrook Reservoir in STORET, USGS NWISweb, or the CDOW Riverwatch database to characterize existing conditions. Some generalizations about the water quality of Holbrook Reservoir can be made based on its location, operation, and size. Due to the shallow depth of Holbrook Reservoir, approximately 20 feet, it is likely to have weak stratification patterns, similar to Lake Henry or Lake Meredith. It is likely to be borderline eutrophic like Lake Henry due to their similar size and source water. Because Holbrook Reservoir empties nearly every year, evapoconcentration effects would be minimized. Concentrations of conservative constituents such as salinity are likely to be similar or slightly higher than those in the Arkansas River at the Catlin Dam gage.

5. Effects Analysis

The effects analysis describes the effects of the Proposed Action and No Action Alternative due to these actions alone. The purpose of this analysis is to "isolate" the effects of the actions. This section presents the effects analysis for water quality.

5.1. Effects Analysis Scenarios

The effects analysis compares simulated water quality between Existing Conditions, Proposed Action, and No Action Alternative scenarios. The basic assumptions for each of these scenarios are summarized in **Table 5-1** and discussed below. For more information, refer to the Aurora EA Excess Capacity Contract Water Resources Technical Report (MWH, 2005).

Table 5-1. Summary of Conditions for Each Alternative

Model Variable	Effect Scenario: Existing Conditions	No Action Alternative	Proposed Action
General Settings			
Municipal Demands	2004	2004	2004
Other Demand by Others	No	No	No
Agricultural Demands (1)	Historical	Historical	Historical
Otero Pump Station Capacity	118.5 mgd	118.5 mgd	118.5 mgd
Aurora Settings			
Excess Capacity in Pueblo Reservoir	10,000 ac-ft	0 ac-ft	10,000 ac-ft
Gravel Lakes Storage	0 ac-ft	10,000 ac-ft	0 ac-ft
USBR Contract Exchanges	0 ac-ft	0 ac-ft	10,000 ac-ft
Transmountain Diversions	Yes	Yes	Yes
Upper Arkansas Ranch water rights	Yes	Yes	Yes
Rocky Ford I Transfer	Yes	Yes (junior to RICD)	Yes
Colorado Canal	Yes	Yes	Yes
Rocky Ford II Transfer (2) (3)	Yes (50%)	Yes (100%)	Yes (100%)
Highline Lease	Yes	Yes	Yes
Pueblo FMP/RICD – Aurora	None	None	Full
ROY Storage – Aurora	No	No	Yes
Other Municipal Settings			
Pueblo Board of Water Works Excess Capacity Storage in Pueblo Reservoir	3,000 ac-ft	3,000 ac-ft	3,000 ac-ft
Pueblo West Excess Capacity Storage in Pueblo Reservoir	1,000 ac-ft	1,000 ac-ft	1,000 ac-ft
Colorado Springs Utilities Excess Capacity in Pueblo Res.	10,000 ac-ft	10,000 ac-ft	10,000 ac-ft
Pueblo FMP/RICD – Others (4)	None	None	None
ROY Storage – Others	No	No	No
Colorado Springs' Future Operations (5)	No	No	No

Notes:

(1) Agricultural demands are assumed to be the same as historical except for those systems that have been converted to municipal use, such as the Colorado Canal system, Rocky Ford Ditch, and Highline Canal lease.

(2) The percentage value indicates the percent of the total decreed yield that is changed and diverted by Aurora. By decree, water cannot be changed from a tract of land until revegetation is complete.

(3) During actual 2004 operations, because Aurora's Upper Basin exchange application (99CW170) was not finalized, Rocky Ford II water was diverted into the PBWW Excess Capacity account in Pueblo Reservoir, then moved to Twin Lakes by contract exchange with the PBWW (Simpson, 2005). The Upper Basin exchange was decreed in 2005. Therefore, the Quarter-Monthly Model operates per the decree. The differences in storage and streamflow between actual and simulated operations during 2004 are negligible.

(4) Due to limitations in the Quarter-Monthly Model, all Colorado Canal exchanges (including those by Colorado Springs Utilities, Pueblo West and the City of Fountain) are subject to the same Pueblo Flow Management Plan (FMP) conditions as other Aurora exchanges

(5) Colorado Springs Utilities future operations assumed to consist of increased ground water pumping and increased non-potable and potable reuse.

Source: MWH, 2005b

5.1.1. Existing Conditions

The primary goal of the Existing Conditions scenario was to simulate 2004 operational conditions in the river for the modeled period. Existing conditions differ from historical conditions in that Existing Conditions assume existing (2004) operations on the river for the entire study period (1982 to 2002). The historical conditions, on the other hand, reflect varied river operations and demands on the river during the 1982 through 2002 study period. The Existing Conditions scenario provides a basis of comparison to the Proposed Action and No Action Alternative.

Existing Conditions assume 2004 demands (unconstrained by drought-related conservation programs that were in effect), current levels of excess storage capacity contracts ("if-and-when" contracts) in Pueblo Reservoir, and facilities and decreed water rights as of the beginning of the year. The Aurora Rocky Ford I transfer, Rocky Ford II transfer, and Highline Canal lease are included in this condition. Fifty percent of the total decreed yield of the Rocky Ford II transfer was modeled for this condition, because by decree, water cannot be changed from a tract of land until revegetation is complete. Although the conditions of the Pueblo FMP are currently being administered, the Pueblo FMP is not included in this condition because Aurora's future participation in the Pueblo FMP is dependent on the adoption of the Proposed Action and No Action Alternative. The City of Aurora's existing "if-and-when" excess capacity contract was in place in 2004 and as a result was assumed for the Existing Conditions simulation.

5.1.2. Proposed Action

The Proposed Action scenario simulates operations of the Arkansas River assuming that the Proposed Action is implemented under existing operations. In-basin municipal demands were set to equal demands in the year 2004. As in-basin municipal demands increase, Aurora's effects on the Arkansas River Basin hydrology become relatively smaller. That is to say later in the contract period (closer to 2045), Aurora's effects would be dampened due to the exercise of senior exchanges made by other entities in the basin. The following operational differences are unique to the Proposed Action when compared with the Existing Conditions run:

- The City of Aurora would be permitted to exchange up to 10,000 acre-feet via contract exchanges from Pueblo Reservoir with Reclamation's Fry-Ark Project water in Twin Lakes and Turquoise Reservoir.
- The percent of the total decreed yield of the Rocky Ford II transfer that is simulated increases from 50 to 100 percent.
- The Pueblo FMP is simulated.
- Restoration of yield (ROY) storage is simulated.

Additionally, under the Proposed Action alternative, Aurora's current annual "if-and-when" excess capacity contracts for 10,000 acre-feet of storage in Pueblo Reservoir would become a long-term (40-year) excess capacity contract. In the Quarter-Monthly Model, however, the excess capacity contracts are simulated in the same manner for the Existing Conditions and Proposed Action. Settings for all other operations in the Arkansas River Basin are assumed to be the same as for the Existing Conditions scenario.

5.1.3. No Action Alternative

The No Action Alternative scenario simulates the future operations of the Arkansas River assuming that the No Action Alternative is implemented. For the purposes of this scenario, it was assumed that Aurora would not have an annual excess capacity contract with Reclamation. Municipal demands were set to equal demands in the year 2004 for the same reasons discussed for the Proposed Action. The following operational differences are unique to the No Action Alternative when compared with the Existing Conditions run:

- 10,000 acre-feet of gravel lakes storage by the City of Aurora is generally located adjacent to the Arkansas River east of the Fountain Creek confluence.
- The Rocky Ford I transfer is assumed to be junior to the City of Pueblo RICD, because its current decree does not allow an alternate point of diversion at any location other than Pueblo Reservoir.

- The percent of the total decreed yield of the Rocky Ford II transfer that is simulated increases from 50 to 100 percent.

Settings for all other operations in the Arkansas River Basin are the same as for the Existing Conditions scenario.

5.1.4. Hydrologic Year Summary

Use of hydrologic year classification allows the Quarter-Monthly water quality results to be summarized on a mean, dry, and wet year basis. This method was used in the Water Resources Technical Report (MWH, 2005) and is used on a limited basis to summarize water quantity information used in this report. The three summary conditions are:

- Overall Mean – Mean of all years in the 1982-2002 study period
- Mean Dry– Mean of the driest 30 percent of years in the study period
- Mean Wet – Mean of the wettest 30 percent of years in the study period

Based upon historical most probable flow forecasts available from the Natural Resources Conservation Service (NRCS), the years within the 1982-2002 study period were classified as dry, average or wet. NRCS estimates of most probable flows are made between January and June of each year and do not reflect actual flow in the river. However, decisions within the river basin are typically made using forecasts because they represent the most real-time information available (i.e., it is unknown from real-time streamflow whether the overall hydrologic condition for the year will be wet or dry), justifying its use as a hydrologic indicator.

5.2. Salinity Effects

The following section presents the salinity effects analysis based on results of salinity modeling at the Above Pueblo, Avondale, and Catlin Dam gages and the mass balance for Lake Henry and Lake Meredith. The quarter-monthly model results are included in their entirety in **Appendix C**. The 85^{th} percentile of quarter-monthly simulated specific conductance is compared to the secondary MCL and high salinity hazard for each scenario (Existing Conditions, Proposed Action, and No Action Alternative). This comparison is analogous to CDPHE's method of comparing ambient water quality data to chronic WQS, using the secondary MCL/high salinity hazard in place of a chronic WQS. Salinity results are expressed in terms of specific conductance with units of µS/cm.

The salinity model has several limitations. It is based on the historical relationship between flow and specific conductance at several stream gages. Therefore, the model assumes that the historical relationships hold true under the direct effects and cumulative effects conditions. The salinity model is used only to compare between alternatives, it is not intended to predict future water quality in the Arkansas River.

5.2.1. Above Pueblo Gage

Table 5-2 summarizes the 85^{th} percentile of quarter monthly specific conductance for each scenario and the differences between the scenarios at the Above Pueblo gage. The secondary MCL of 500 mg/L TDS is equal to approximately 740 µS/cm at the Above Pueblo gage using a regression relationship developed by USGS (2004). **Figure 5-1** depicts the annual average simulated specific conductance for each alternative.

Table 5-2. Above Pueblo Gage – Summary of Simulated Specific Conductance Effects

High Salinity Hazard / Secondary MCL*	85th Percentile of Quarter Monthly SC			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(%)
750 / 740	517	522	526	5	10	5	1%

SC = specific conductance
Effects (µS/cm) = Proposed Action - No Action specific conductance. Effects (%) = (Proposed Action - No Action)/No Action specific conductance.
* Secondary MCL of 500 mg/L TDS as specific conductance in µS/cm calculated from TDS using regression equation from USGS, 2004 for the Above Pueblo gage.

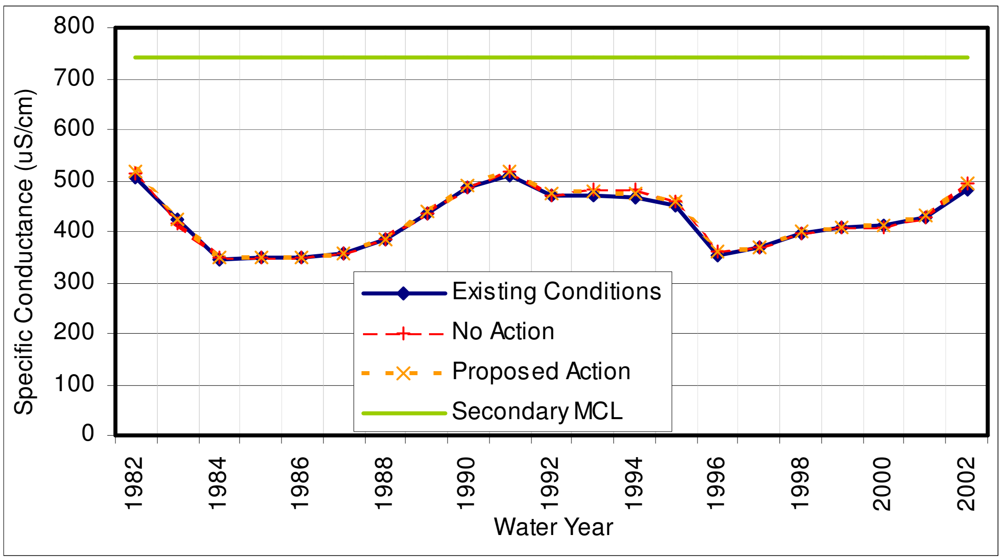


Figure 5-1. Above Pueblo Gage –Annual Average Simulated Specific Conductance

As shown in Figure 5-1, simulated specific conductance at the Above Pueblo gage was similar on an average annual basis for Existing Conditions, No Action Alternative, and Proposed Action. The 85th percentile of quarter-monthly specific conductance did not exceed either the high salinity hazard or secondary MCL for any scenario. The Proposed Action and No Action Alternative each resulted in a slight increase in the 85th percentile compared to Existing Conditions. The Proposed Action resulted in a 5 µS/cm increase over the No Action Alternative, an increase of 1 percent.

5.2.2. Avondale Gage

Table 5-3 summarizes the 85th percentile of quarter monthly specific conductance for each scenario and the differences between the scenarios. **Figure 5-2** depicts the annual average simulated salinity for each alternative.

Table 5-3. Avondale Gage - Summary of Simulated Specific Conductance Effects

High Salinity Hazard / Secondary MCL*	85th Percentile of Quarter Monthly SC			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(%)
750 / 742	1,116	1,126	1,118	10	2	-8	-1%

SC = specific conductance
Effects (µS/cm) = Proposed Action - No Action specific conductance. Effects (%) = (Proposed Action - No Action)/No Action.
* Secondary MCL of 500 mg/L TDS as µS/cm calculated from TDS using regression equation from USGS, 2004 for the Avondale gage.

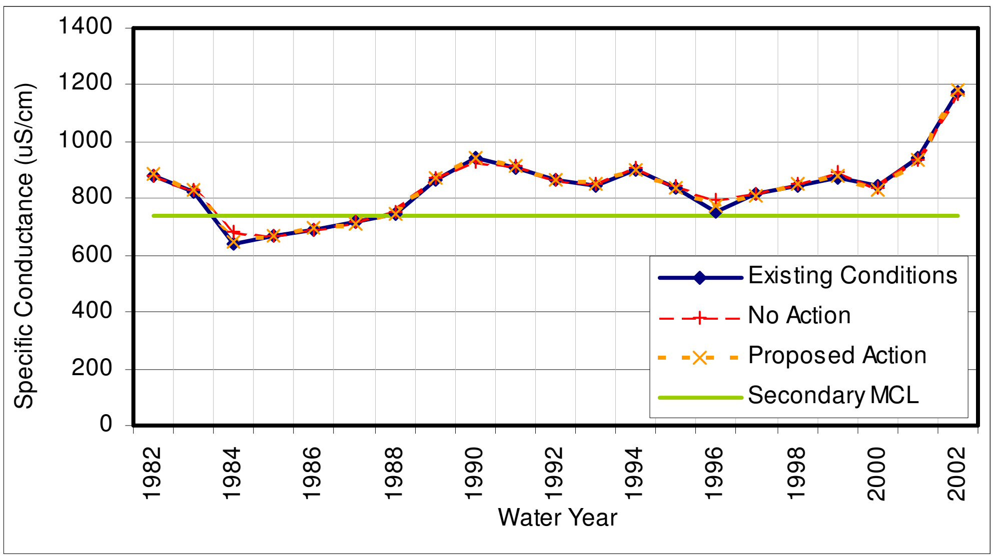


Figure 5-2. Avondale Gage –Annual Average Simulated Specific Conductance

As shown in Figure 5-2 simulated specific conductance at the Avondale gage was similar on an average annual basis for Existing Conditions, No Action Alternative, and Proposed Action. The 85th percentile of quarter-monthly specific conductance exceeded the high salinity hazard and secondary MCL in each scenario. The Proposed Action and No Action Alternative each resulted in a slight increase in the 85th percentile compared to Existing Conditions. The Proposed Action resulted in an 8 µS/cm decrease in salinity compared to the No Action, a decrease of less than 1 percent.

5.2.3. Catlin Dam Gage

Table 5-4 summarizes the 85th percentile of quarter monthly simulated specific conductance for each scenario and the differences between the scenarios. **Figure 5-3** depicts the annual average simulated specific conductance for each alternative.

Table 5-4. Catlin Dam Gage - Summary of Simulated Specific Conductance Effects

High Salinity Hazard / Secondary MCL*	85th Percentile of Quarter Monthly SC			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(%)
750 / 742	1,426	1,435	1,427	9	1	-7	-1%

SC = specific conductance
Effects (µS/cm) = Proposed Action - No Action specific conductance. Effects (%) = (Proposed Action - No Action)/No Action.
* Secondary MCL of 500 mg/L TDS as µS/cm calculated from TDS using regression equation from USGS, 2004 for the Avondale gage because no relationship was developed for the Catlin Dam gage.

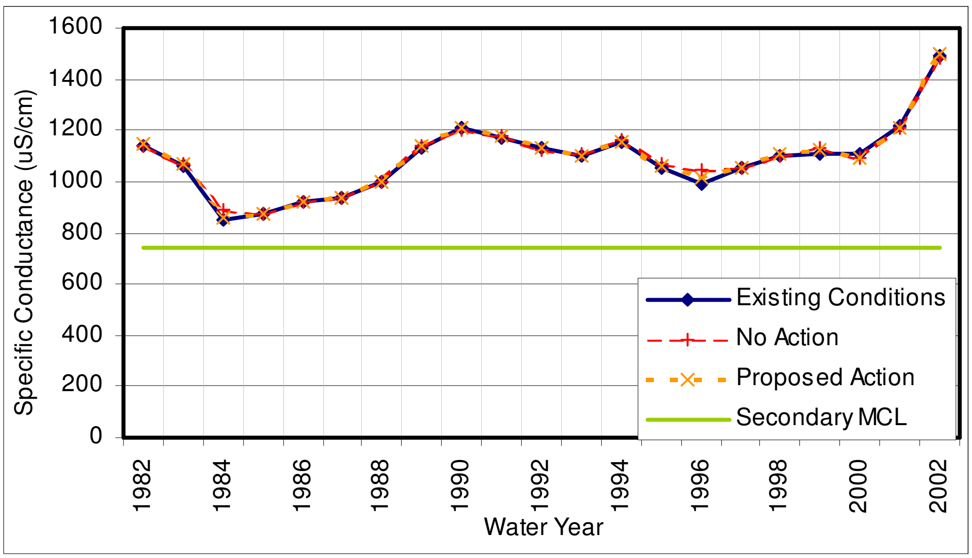


Figure 5-3. Catlin Dam Gage - Annual Average Simulated Specific Conductance

As shown in Figure 5-3 simulated specific conductance at the Catlin Dam gage was similar on an average annual basis for Existing Conditions, No Action Alternative, and Proposed Action. The 85th percentile exceeded the high salinity hazard and secondary MCL in each scenario. The Proposed Action and No Action Alternative each resulted in a slight increase in the 85th percentile of quarter-monthly specific conductance compared to Existing Conditions. The Proposed Action resulted in a 7 µS/cm decrease compared to the No Action Alternative, a decrease of less than 1 percent.

5.2.4. Lake Henry and Lake Meredith

A mass balance was performed to determine effects on salinity in Lake Henry and Lake Meredith. This analysis indicates the magnitude of the effects of changes in residence time, inflow concentration, and evapoconcentration on salinity. This analysis presents results for Lakes Meredith and Henry combined. The assumptions used in the mass balance are described in the Water Quality Model Documentation (MWH 2005).

Table 5-5 summarizes the 85th percentile of quarter-monthly simulated specific conductance for each scenario and the differences between the scenarios. **Figure 5-4** depicts the annual average simulated specific conductance for each alternative.

Table 5-5. Lake Henry and Lake Meredith - Summary of Simulated Specific Conductance Effects

High Salinity Hazard / Secondary MCL*	85th Percentile of Quarter Monthly SC			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(%)
750 / 772	1,247	1,260	1,249	13	3	-10	-1%

SC = specific conductance
Effects (µS/cm) = Proposed Action - No Action specific conductance. Effects (%) = (Proposed Action - No Action)/No Action.
* Secondary MCL as µS/cm calculated from TDS using regression of data from USGS, 1993.

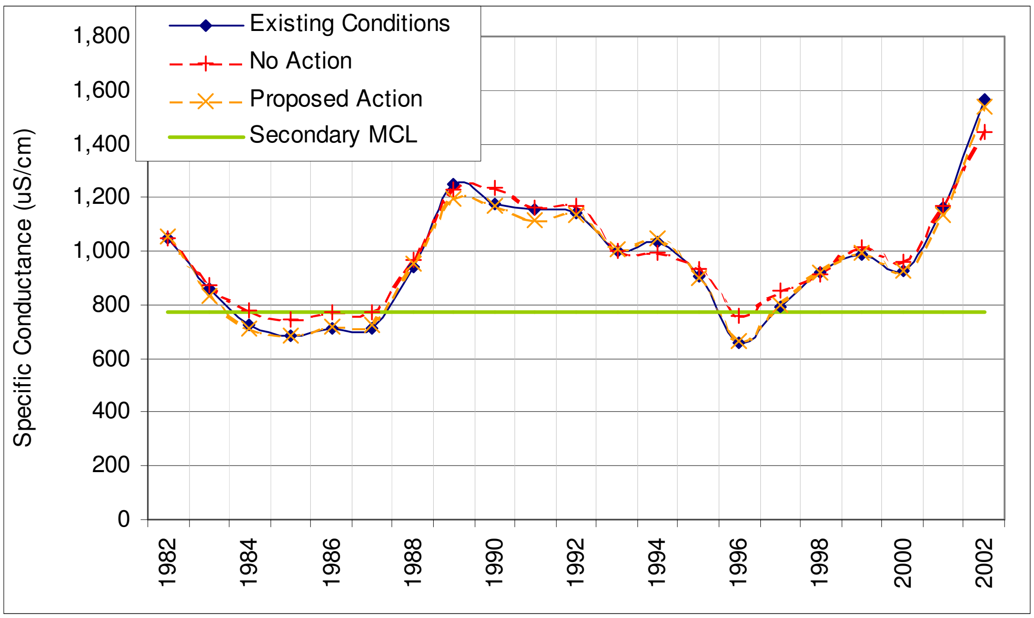


Figure 5-4. Lake Henry and Lake Meredith Annual Average Simulated Specific Conductance

As shown in Figure 5-4 simulated specific conductance in Lake Henry and Lake Meredith varied somewhat between the alternatives on an average annual basis. In several years, average annual concentrations for the No Action Alternative were higher than the Proposed Action and Existing Conditions. The 85th percentile of simulated specific conductance exceeded the high salinity hazard and secondary MCL in each scenario. The No Action Alternative and Proposed Action resulted in a slight increase in the 85th percentile compared to Existing Conditions. The Proposed Action resulted in a 10 µS/cm decrease compared to the No Action Alternative, a decrease of 1 percent.

Water in Lake Henry and Lake Meredith is primarily used for agricultural purposes. The lakes do not have a water supply use classification and therefore, changes in salinity in the lakes will not directly affect the cost of drinking water treatment. Some of the water from Lake Meredith returns to the Arkansas River, to a segment with a water supply use classification. A mass balance was performed to determine effects on the Arkansas River due to return flows from Lake Meredith. The simplified mass balance combines the salinity load from the Arkansas River at the Catlin Dam gage and Lake Meredith return flows to determine a simulated specific conductance for the combined flow (as shown in **Figure 5-5**).

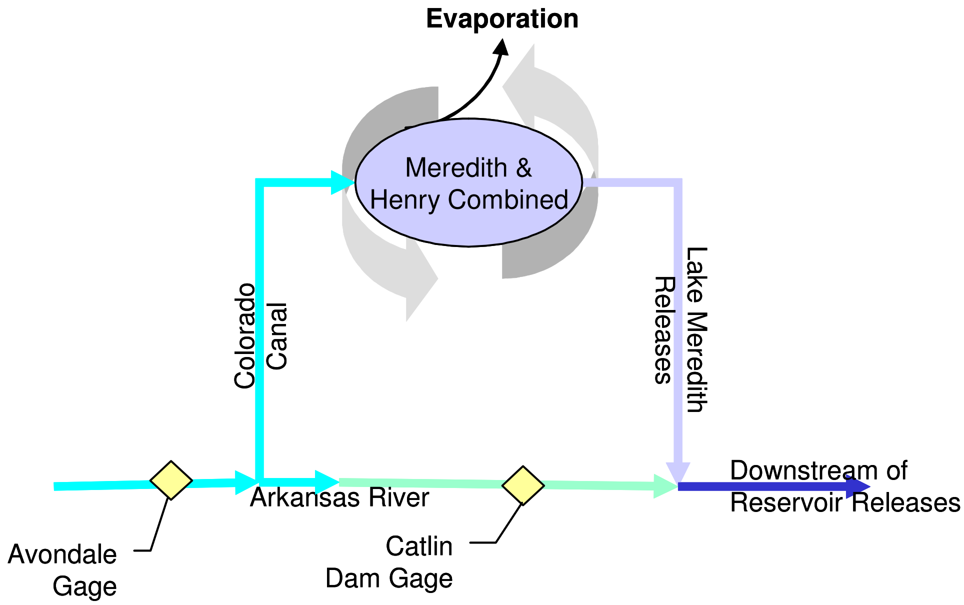


Figure 5-5. Schematic of Arkansas River and Lake Meredith Releases Combined

Table 5-6 summarizes the 85th percentile of quarter monthly simulated specific conductance at the combined flow location for each scenario and the differences between the scenarios. **Figure 5-6** depicts the annual average simulated specific conductance for each alternative.

Table 5-6. Arkansas River Downstream of Lake Meredith Return Flow - Summary of Simulated Specific Conductance Effects

High Salinity Hazard / Secondary MCL*	85th Percentile of Quarter Monthly SC			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(%)
750 / 742	1,399	1,410	1,400	11	1	-9	-1%

SC = specific conductance
Effects (µS/cm) = Proposed Action - No Action specific conductance. Effects (%) = (Proposed Action - No Action)/No Action.
* Secondary MCL of 500 mg/L TDS as µS/cm calculated from TDS using regression equation from USGS, 2004 for the Avondale gage because no relationship was available for gages further downstream.

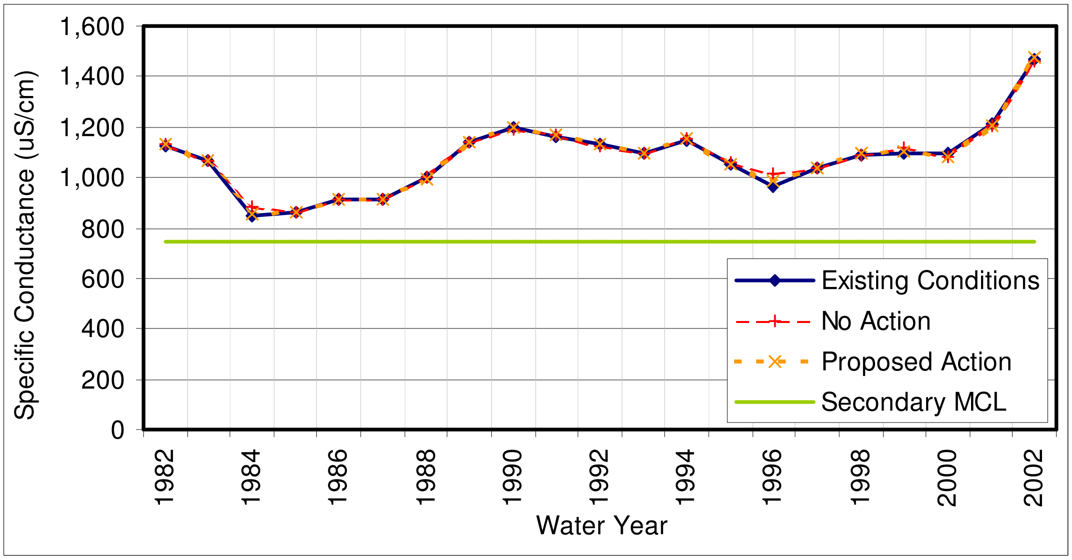


Figure 5-6. Arkansas River Downstream of Lake Meredith Return Flow Annual Average Simulated Specific Conductance

Simulated specific conductance at the combined flow location was similar on an average annual basis for Existing Conditions, No Action Alternative, and Proposed Action. The 85th percentile exceeded the high salinity hazard and secondary MCL in each scenario. The Proposed Action and No Action Alternative each resulted in a slight increase in the 85th percentile of quarter-monthly specific conductance compared to Existing Conditions. The Proposed Action resulted in an 9 µS/cm decrease in salinity compared to the No Action Alternative, a decrease of 1 percent.

5.3. Selenium Effects

The following section summarizes the results of selenium modeling for Existing Conditions, Proposed Action, and the No Action Alternative. The complete selenium model results are included in **Appendix D**. The selenium simulations are not used to predict future selenium concentrations but rather to compare the potential differences in selenium concentrations among alternatives. The modeling results are compared to the acute and chronic WQS. The chronic WQS is compared to the 85th percentile of modeled quarter-monthly concentrations. Quarter-monthly exceedences of the acute WQS are counted and the number of exceedences is compared for each scenario.

5.3.1. Above Pueblo Gage

Table 5-7 summarizes the 85th percentile of quarter monthly concentrations at the Above Pueblo gage for each scenario and the differences between the scenarios. **Table 5-8** summarizes the percentage of quarter-months exceeding the acute WQS for each scenario. **Figure 5-7** depicts the annual simulated median dissolved selenium concentration for each scenario and the WQS.

Table 5-7. Above Pueblo Gage Dissolved Selenium – Chronic Effects Summary

Chronic WQS	85th Percentile of Quarter Monthly Se			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(%)
6.0	4.4	4.4	4.4	0.0	0.0	0.0	0%

Se = dissolved selenium
Effects (µg/L) = Proposed Action - No Action selenium. Effects (%) = (Proposed Action - No Action)/No Action

Table 5-8. Above Pueblo Gage Dissolved Selenium – Acute Effects Summary

Acute WQS	Frequency of Acute WQS Exceedences			Change from Existing		Proposed Action – No Action Effects
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action	
(µg/L)	(%)	(%)	(%)	(%)	(%)	(%)
18.4	0%	0%	0%	0%	0%	0%

Effects (%) = Proposed Action - No Action exceedence percentage

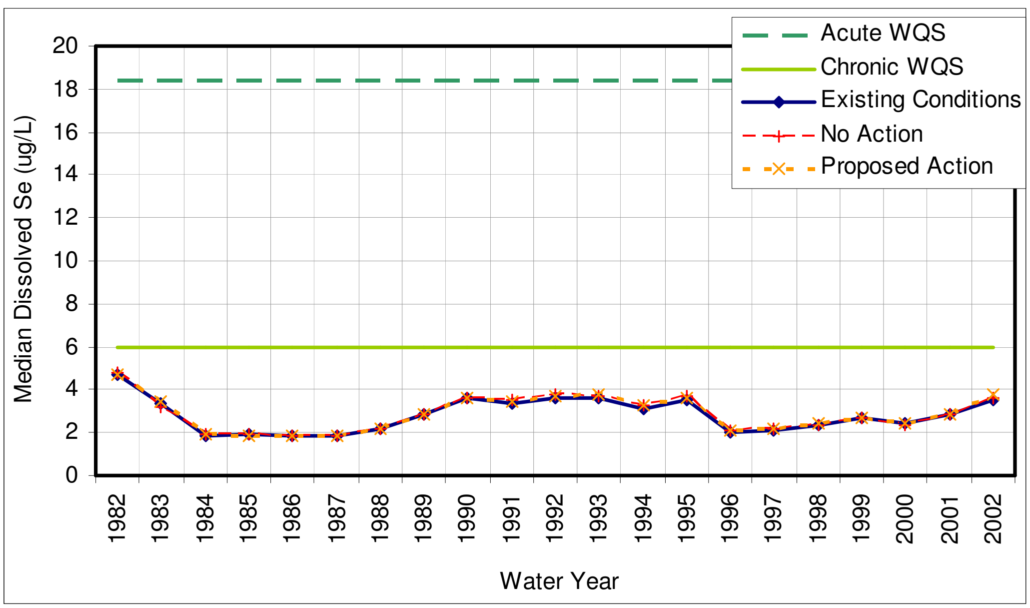


Figure 5-7. Annual Median Dissolved Selenium Concentrations – Above Pueblo Gage

Simulated dissolved selenium concentrations were similar on a median annual basis as well as the 85th percentile of all simulated quarter-months for Existing Conditions, No Action Alternative, and Proposed Action. The 85th percentile did not exceed the chronic WQS for any scenario. The acute WQS was not exceeded in any quarter months for any scenario. Dissolved selenium concentrations slightly increased for the Proposed Action and No Action Alternative compared to Existing Conditions.

5.3.2. Avondale Gage

Table 5-9 summarizes the 85th percentile of quarter monthly concentrations at the Avondale gage for each scenario and the differences between the scenarios. **Table 5-10** summarizes the percentage of quarter-months exceeding the TVS for each scenario. The TVS is used for comparison because the current acute WQS is a temporary modification to "Existing Quality", which does not facilitate a quantitative analysis. **Figure 5-8** depicts the annual simulated median dissolved selenium concentration for each scenario and the WQS.

Table 5-9. Avondale Gage Dissolved Selenium – Chronic Effects Summary

Chronic WQS	85th Percentile of Quarter Monthly Se			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(%)
Existing Quality§	17.0	17.2	17.0	0.2	0.0	-0.2	-1%

Se = dissolved selenium, §Temporary modification until 7/1/08
Effects (µg/L) = Proposed Action - No Action selenium. Effects (%) = (Proposed Action - No Action)/No Action

Table 5-10. Avondale Gage Dissolved Selenium – Acute Effects Summary

Acute WQS (TVS)	Frequency of Acute WQS Exceedences			Change from Existing		Proposed Action – No Action Effects
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action	
(µg/L)	(%)	(%)	(%)	(%)	(%)	(%)
Existing Quality§ 18.4	7.1%	8.1%	7.1%	1%	0%	-1%

§Temporary modification until 7/1/08, exceedences are compared to the TVS of 18.4 µg/L
Effects (%) = Proposed Action - No Action exceedence percentage.

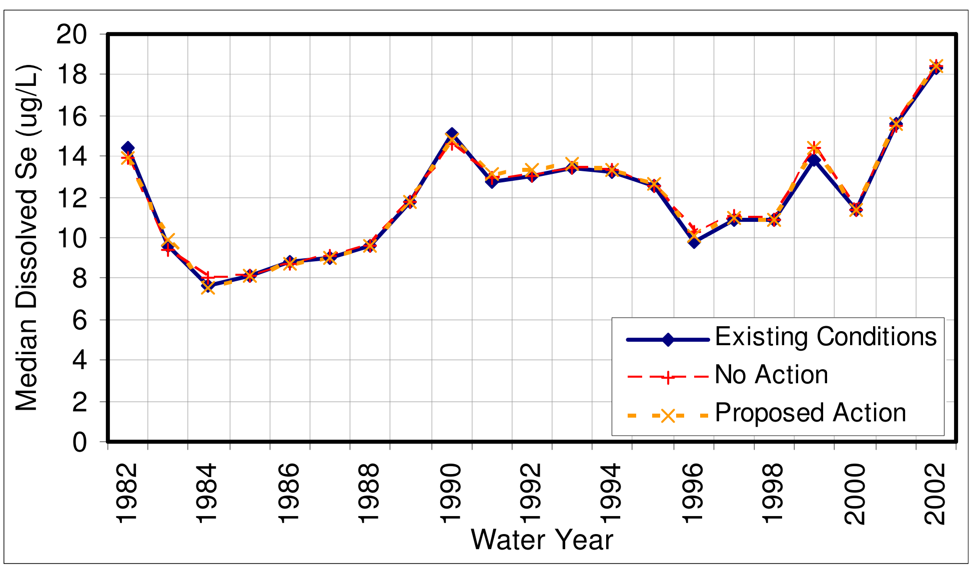


Figure 5-8. Annual Median Dissolved Selenium Concentrations – Avondale Gage

Annual median simulated dissolved selenium concentrations were similar for all of the scenarios at the Avondale gage. The 85th percentile of quarter-months for the No Action Alternative increased slightly compared to Existing Conditions. The 85th percentile of quarter-months for the Proposed Action was equal to the 85th percentile for Existing Conditions. The Proposed Action resulted in a slight decrease in 85th percentile concentration, 0.2 µg/L, or 1 percent, compared to the No Action Alternative. The acute TVS was exceeded slightly more frequently under the No Action Alternative than Existing Conditions. The Proposed Action resulted in no change in acute exceedences compared to Existing Conditions. The Proposed Action resulted in a 1 percent decrease in acute exceedences compared to the No Action Alternative.

5.3.3. Catlin Dam Gage

Table 5-11 summarizes the 85th percentile of quarter monthly simulated dissolved selenium concentrations at the Catlin Dam gage for each scenario and the differences between the scenarios. **Table 5-12** summarizes the percentage of quarter-months exceeding the acute WQS for each scenario. **Figure 5-9** depicts the annual simulated median dissolved selenium concentration for each scenario and the WQS.

Table 5-11. Catlin Dam Gage Dissolved Selenium – Chronic Effects Summary

Chronic WQS	85th Percentile of Quarter Monthly Se			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(%)
16.0	16.0	16.2	16.1	0.2	0.1	-0.1	-1%

Se = dissolved selenium
Effects (µg/L) = Proposed Action - No Action selenium. Effects (%) = (Proposed Action - No Action)/No Action

Table 5-12. Catlin Dam Gage Dissolved Selenium – Acute Effects Summary

Acute WQS	Frequency of Acute WQS Exceedences			Change from Existing		Proposed Action – No Action Effects
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action	
(µg/L)	(%)	(%)	(%)	(%)	(%)	(%)
18.4	0.5%	0.9%	0.5%	0%	0%	0%

Effects (%) = Proposed Action - No Action exceedence percentage.

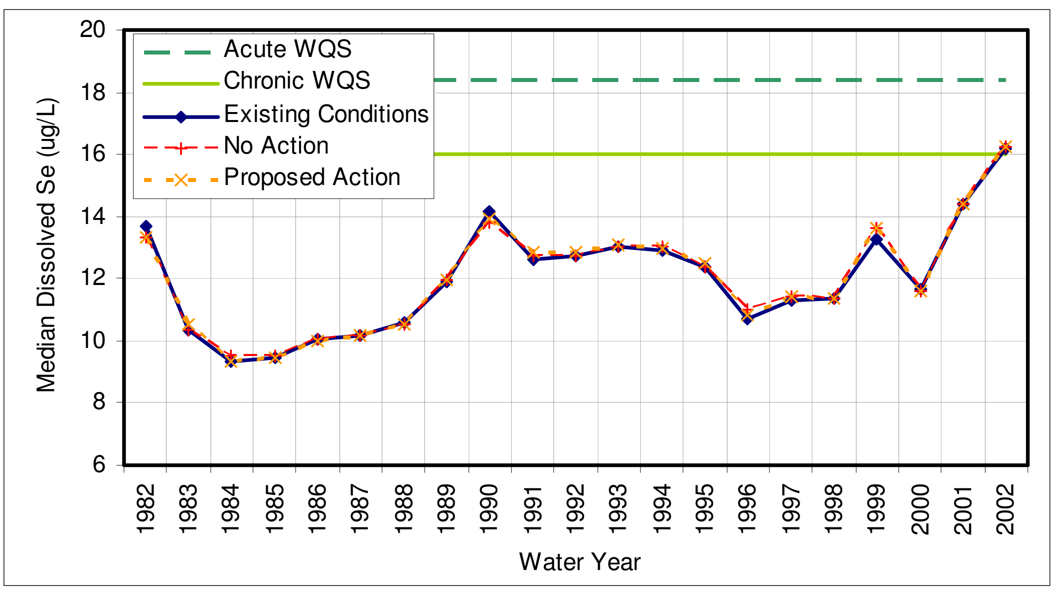


Figure 5-9. Annual Median Dissolved Selenium Concentrations – Catlin Dam Gage

Annual median dissolved selenium concentrations were similar for all of the scenarios at the Catlin Dam gage. The 85th percentiles of quarter-monthly selenium are all very close to the chronic WQS. The 85th percentile of quarter-months for the No Action Alternative and Proposed Action increased slightly compared to Existing Conditions. The acute WQS was exceeded slightly more frequently under the No Action Alternative than Existing Conditions and the Proposed Action, but the difference rounds to 0 percent.

5.3.4. Lake Henry and Lake Meredith

A selenium model was not created for Lake Henry and Lake Meredith. However, the effects of the salinity modeling in Lake Henry and Lake Meredith and selenium modeling at the Avondale gage give an indication of the effects to dissolved selenium concentrations in Lake Henry and Lake Meredith under the different scenarios. Because the other mechanisms that can potentially affect selenium concentrations, such as vegetative uptake and adsorption/desorption, are not well understood, these aspects of selenium in Lake Henry and Lake Meredith cannot be evaluated.

Inflows to Lake Henry and Lake Meredith are a combination of diversions from the Arkansas River, near Avondale, inflowing tributaries, and agricultural return flows. However, the actions considered in the EA would only directly affect concentrations in the Arkansas River, not the other inflows. Therefore, since simulated selenium concentrations at the Avondale gage are virtually the same for all of the alternatives, inflow concentrations to Lake Henry and Lake Meredith should be virtually the same for all of the alternatives.

Evaporation effects on selenium concentrations would be similar to the evaporation effects on specific conductance. The effects of evaporation on specific conductance were similar for all three scenarios, indicating that dissolved selenium concentrations would be similar for all three scenarios, and there would be minimal effects in Lake Henry and Lake Meredith.

5.4. Percentage of Flow from Fountain Creek

Table 5-13 and **Figure 5-10** summarize the simulated percentage of source water from Fountain Creek in the lower Arkansas River just downstream of the confluence. A large change in the percentage of flow from Fountain Creek could impact the water quality of the lower Arkansas River. Fountain Creek at the confluence has different water quality than the mainstem of the Arkansas River for several constituents including sediment and bacteria (USGS, 1998 and USGS, 2005b).

Table 5-13. Lower Arkansas River Annual Mean Percentage of Water from Fountain Creek – Effects Summary

Water Year	Existing Conditions	No Action	Proposed Action	Change from Existing		Proposed Action – No Action Effects
				No Action	Proposed Action	
1982	25%	24%	25%	-1%	0%	1%
1983	27%	27%	27%	0%	0%	0%
1984	14%	15%	14%	1%	0%	-1%
1985	24%	24%	24%	0%	0%	0%
1986	14%	13%	13%	-1%	-1%	0%
1987	17%	17%	17%	0%	0%	0%
1988	17%	17%	17%	0%	0%	0%
1989	17%	17%	17%	0%	0%	0%
1990	22%	20%	22%	-2%	0%	2%
1991	22%	21%	22%	-1%	0%	1%
1992	24%	23%	24%	-1%	0%	1%
1993	17%	17%	17%	0%	0%	0%
1994	25%	25%	25%	0%	0%	0%
1995	27%	27%	27%	0%	0%	0%
1996	25%	26%	25%	1%	0%	-1%
1997	30%	31%	30%	1%	0%	-1%
1998	35%	35%	35%	0%	0%	0%
1999	41%	41%	41%	0%	0%	0%
2000	34%	32%	33%	-2%	-1%	1%
2001	31%	30%	30%	-1%	-1%	0%
2002	57%	54%	58%	-3%	1%	4%
Average	**25%**	**25%**	**25%**	**0%**	**0%**	**0%**

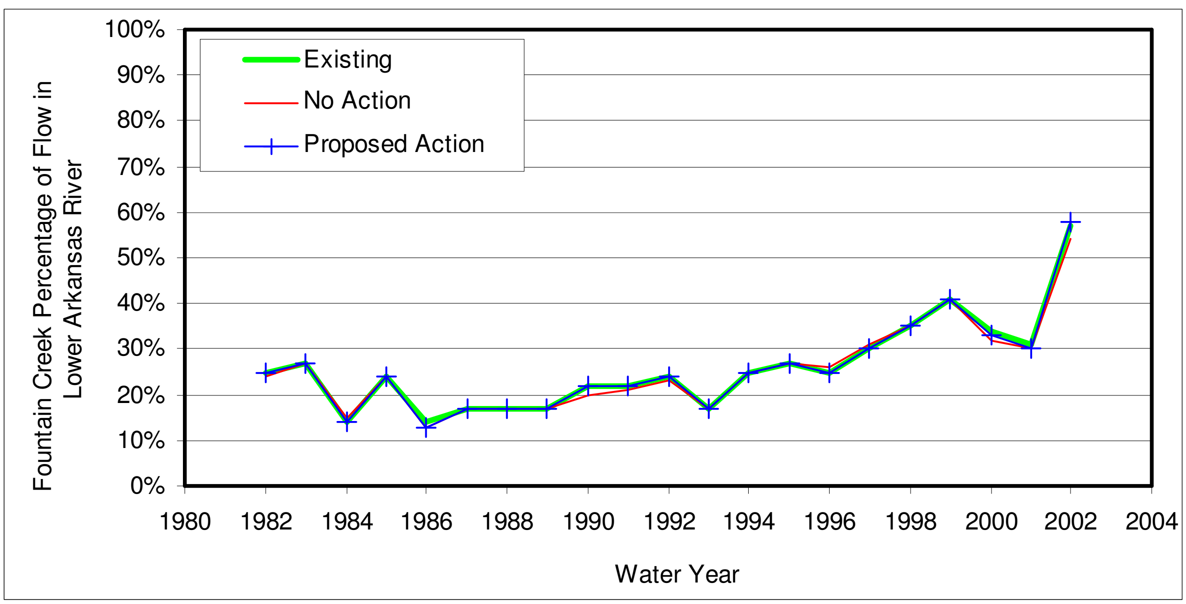


Figure 5-10. Lower Arkansas River – Annual Mean Percentage of Source Water from Fountain Creek Downstream of the Confluence

Based on the results of the Quarter-Monthly Model, the percentage of water in the lower Arkansas River downstream of the confluence would be similar for each of the three scenarios. The difference between the Proposed Action, No Action Alternative, and Existing Conditions is 4 percent or less each year. Because the percentage of flow from Fountain Creek is so similar for each of the scenarios, effects to water quality in the lower Arkansas River and lower Arkansas River reservoirs are not likely.

5.5. Metals Effects

Historical metals impairment is concentrated in the upper Arkansas River. Therefore, the metals effects analysis is focused on the upper Arkansas River.

Primary sources of metals in the upper watershed are historical mining activities and natural runoff over and through geologic formations in the watershed (USGS, 1998). Project operations will not affect surface hydrology in areas with historical mines or high-metal geology. Therefore, it is concluded that neither of the alternatives would have a significant effect on metals loading in the upper Arkansas River.

Table 5-14 summarizes monthly mean streamflow simulated at the Granite gage. The maximum mean monthly difference in streamflow is 6 percent. Flows for the Proposed Action are generally slightly lower than Existing conditions or the No Action Alternative. Such small differences in streamflow are unlikely to affect metals concentrations in the upper Arkansas River.

Table 5-14. Granite Gage – Monthly Mean Streamflow - Effects Summary

Month	Monthly Mean Streamflow			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	%
Oct	137	140	137	2	0	-2	-2%
Nov	132	132	132	0	0	0	0%
Dec	131	136	130	5	-1	-6	-4%
Jan	142	142	137	0	-5	-5	-3%
Feb	168	173	163	4	-6	-10	-6%
Mar	284	285	270	1	-14	-15	-5%
Apr	348	344	334	-4	-14	-10	-3%
May	639	660	634	21	-5	-26	-4%
Jun	1,335	1,378	1,337	43	2	-41	-3%
Jul	891	895	894	5	3	-1	0%
Aug	411	416	414	5	3	-3	-1%
Sep	191	193	187	2	-4	-6	-3%
Average	401	408	397	7	-3	-10	-3%

Effects (cfs) = Proposed Action - No Action discharge. Effects (%) = (Proposed Action - No Action)/No Action

USGS (2005) showed that releases from Turquoise Reservoir to Lake Fork dilute most metals concentrations in Lake Fork during low flow periods (see Figure 4-12). Therefore, increases in releases from Turquoise would potentially improve water quality and decreases in flow would potentially reduce water quality. Although the modeling results show some changes to flows at the Lake Fork gage, actual operations are expected to be somewhat different from the modeling results. The CWCB instream flow water right that is honored by Reclamation even when it is not in priority would not be affected by Aurora's Proposed Action and No Action Alternative. Therefore, there are no expected changes to metals concentrations in the Lake Fork due to any of the alternatives.

5.6. Nutrient Effects

As described in Section 3.3.2.6, the sources of nutrients are equal between Existing Conditions, the Proposed Action, and the No Action Alternative. Potential major nutrient sources in the middle and lower Arkansas River are WWTFs and non-point sources including urban runoff, agricultural return flows, septic tanks, and livestock (USGS, 1998). There is no difference in the magnitude of these sources between the No Action Alternative and Proposed Action. Therefore, the remaining factor to evaluate for nutrient effects is streamflow. Simulated flows were investigated at the Portland gage and the Avondale gage. These locations were chosen because they are located in close proximity (upstream) of study area reservoirs.

Table 5-15 summarizes monthly mean streamflow at the Portland gage. On a monthly mean basis, there is little difference in flow at the Portland gage between Existing Conditions, Proposed Action, and No Action Alternative. The maximum monthly mean difference between the Proposed Action and No Action Alternative is 3 percent. Such minor differences in flows are unlikely to affect nutrient concentrations.

Table 5-15. Portland Gage – Monthly Mean Streamflow - Effects Summary

Month	Monthly Mean Streamflow			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	%
Oct	412	414	412	2	0	-2	-1%
Nov	449	449	449	0	0	0	0%
Dec	407	411	406	5	-1	-6	-1%
Jan	384	384	379	0	-5	-5	-1%
Feb	389	393	383	4	-6	-10	-3%
Mar	507	508	493	1	-14	-15	-3%
Apr	576	572	562	-4	-14	-10	-2%
May	1,199	1,220	1,194	21	-5	-26	-2%
Jun	2,488	2,531	2,490	43	2	-41	-2%
Jul	1,538	1,543	1,542	5	4	-1	0%
Aug	856	861	858	5	3	-3	0%
Sep	460	462	456	2	-4	-6	-1%
Average	805	812	802	7	-3	-10	-1%

Effects (cfs) = Proposed Action - No Action discharge. Effects (%) = (Proposed Action - No Action)/No Action

Table 5-16 summarizes mean monthly flow at the Avondale gage. The difference in streamflow between the alternatives is small, on average, less than 1 percent. The maximum monthly mean difference in any month is 5 percent. Therefore, hydrologic differences between the Proposed Action and No Action Alternative are not expected to result in substantially different nutrient concentrations at the Avondale gage.

Table 5-16. Avondale Gage – Monthly Mean Streamflow - Effects Summary

Month	Monthly Mean Streamflow			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	%
Oct	450	442	450	-8	0	8	2%
Nov	491	477	480	-14	-11	3	1%
Dec	468	442	463	-26	-5	21	5%
Jan	491	490	491	-1	0	1	0%
Feb	527	523	525	-4	-2	2	0%
Mar	579	566	578	-13	-1	12	2%
Apr	920	936	927	16	7	-9	-1%
May	1,599	1,645	1,593	46	-6	-52	-3%
Jun	2,632	2,661	2,633	29	1	-28	-1%
Jul	1,583	1,578	1,589	-5	6	11	1%
Aug	991	989	987	-2	-4	-2	0%
Sep	487	486	490	-1	3	4	1%
Average	**935**	**936**	**934**	**1**	**-1**	**-2**	**0%**

Effects (cfs) = Proposed Action - No Action discharge. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

Since there is little difference in streamflow at the Portland and Avondale gages, effects on nutrient concentrations in the middle and lower Arkansas River due to the Proposed Action and No Action Alternative are expected to be minimal.

5.7. Reservoir Effects

Nutrient loading is an important part of general reservoir water quality due to its potential effects on algae growth and an increased rate of eutrophication. As discussed in Section 5.6, nutrient loading from external sources to study area reservoirs in not likely to change due to the Proposed Action and No Action Alternative. The following discussion evaluates characteristics of reservoirs affected by hydrology. Due to the different characteristics of the reservoirs in the study area, different methods are used to evaluate effects on the different reservoirs. **Table 5-17** summarizes the approach for each reservoir.

Table 5-17. Summary of Reservoir Effects Analysis Methods

Reservoir	Strongly Stratified	Source Water	Depth	Residence Time
Turquoise	Yes	Changes presented quantitatively. Effects analyzed qualitatively.	Changes presented quantitatively. Effects analyzed qualitatively.	Changes presented quantitatively. Effects analyzed qualitatively.
Pueblo	Yes	See analysis of Western Slope water in Turquoise Reservoir.	Changes presented quantitatively. Effects analyzed qualitatively.	Changes presented quantitatively. Effects analyzed qualitatively.
Henry and Meredith	No	See analysis of percentage of flow from Fountain Creek.	Changes presented, but not analyzed for effects because not stratified.	Results presented. Salinity effects analysis shows how residence time in Henry and Meredith effects salinity concentration.
Holbrook	No	See analysis of percentage of flow from Fountain Creek.	Changes presented, but not analyzed for effects because not stratified.	Cannot be calculated with available Quarter-Monthly Model results

5.7.1. Turquoise Reservoir

Simulated source water percentage from the Western Slope, depth, and residence time for Existing Conditions, Proposed Action, and the No Action Alternative are discussed below.

5.7.1.1. Source Water

To determine if a different mix of water enters Turquoise Reservoir under the alternatives, the percentage of flow from the Western Slope was calculated and compared for the scenarios. **Table 5-18** and **Figure 5-11** summarize the simulated percentage of source water from the Western Slope delivered to Turquoise Reservoir.

Table 5-18. Turquoise Reservoir Annual Mean Percentage of Source Water from Western Slope – Effects summary

Water Year	Existing Conditions	No Action	Proposed Action	Change from Existing		Proposed Action – No Action Effects
				No Action	Proposed Action	
1982	77%	77%	77%	0%	0%	0%
1983	77%	76%	77%	-1%	0%	1%
1984	92%	92%	92%	0%	0%	0%
1985	89%	90%	89%	1%	0%	-1%
1986	92%	92%	92%	-1%	0%	0%
1987	72%	69%	72%	-3%	0%	3%
1988	89%	89%	89%	0%	0%	0%
1989	78%	78%	78%	0%	0%	0%
1990	88%	89%	88%	0%	0%	-1%
1991	92%	92%	92%	0%	0%	0%
1992	86%	86%	86%	0%	0%	0%
1993	93%	93%	93%	0%	0%	0%
1994	81%	80%	81%	-1%	0%	1%
1995	90%	90%	90%	0%	0%	0%
1996	86%	87%	86%	1%	0%	-1%
1997	92%	92%	92%	-1%	0%	0%
1998	90%	90%	89%	-1%	-1%	-1%
1999	87%	86%	88%	-1%	1%	2%
2000	90%	89%	90%	-1%	0%	1%
2001	93%	93%	93%	0%	0%	0%
2002	75%	74%	74%	-1%	-1%	0%
Average	**87%**	**86%**	**87%**	**0%**	**0%**	**1%**

Effects (%) = Proposed Action (%) – No Action (%)

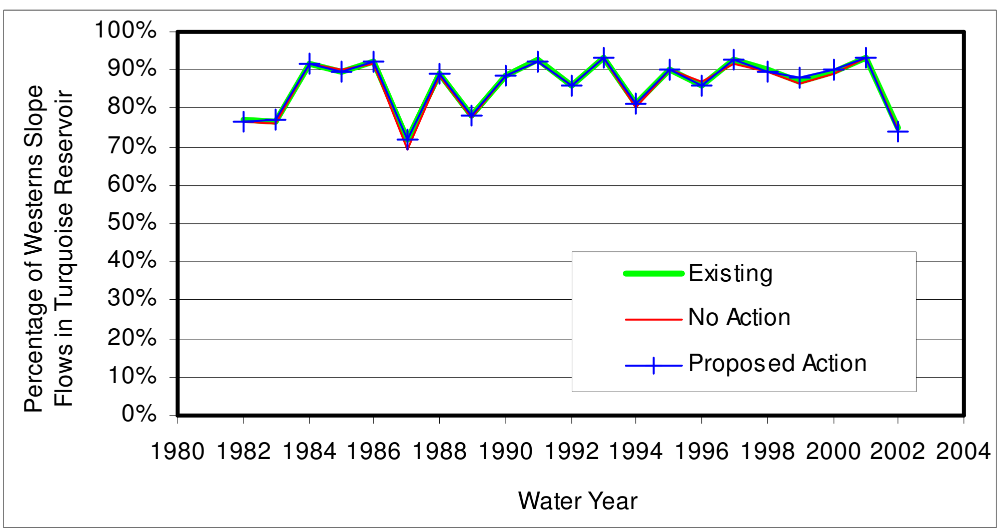


Figure 5-11. Turquoise Reservoir Annual Mean Percentage of Source Water from Western Slope

The percentages are nearly the same for the alternatives in every year. No effect on Turquoise Reservoir water quality due to differences in Western Slope water percentage is expected because results are very similar for each alternative.

Similarly, because there is little difference in the amount of Western Slope water in Turquoise Reservoir, there is not expected to be any effect on the water quality of Pueblo Reservoir due to changes in the amount of water from the Western Slope.

5.7.1.2. Depth

Table 5-19, **Figure 5-12**, and **Figure 5-13** summarize the simulated Turquoise Reservoir depths under the alternatives. The Proposed Action and Existing Conditions alternatives were almost identical. The No Action Alternative resulted in slightly shallower depth than Existing Conditions in most of the months. The minor differences in depth are unlikely to affect water quality.

Table 5-19. Turquoise Reservoir Monthly Mean Depth – Effects Summary

Month	Monthly Mean Streamflow			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	%
Oct	108	106	109	-2	1	3	3%
Nov	106	104	106	-2	0	2	2%
Dec	103	101	103	-2	0	2	2%
Jan	101	99	101	-2	0	2	2%
Feb	98	97	98	-1	0	1	1%
Mar	92	91	92	-1	0	1	1%
Apr	80	80	81	0	1	1	1%
May	78	77	78	-1	0	1	1%
Jun	101	99	101	-2	0	2	2%
Jul	112	110	111	-2	-1	1	1%
Aug	111	109	111	-2	0	2	2%
Sep	109	108	109	-1	0	1	1%
Average	**100**	**99**	**100**	**-1**	**0**	**1**	**1%**

Effects (ft) = Proposed Action - No Action depth. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

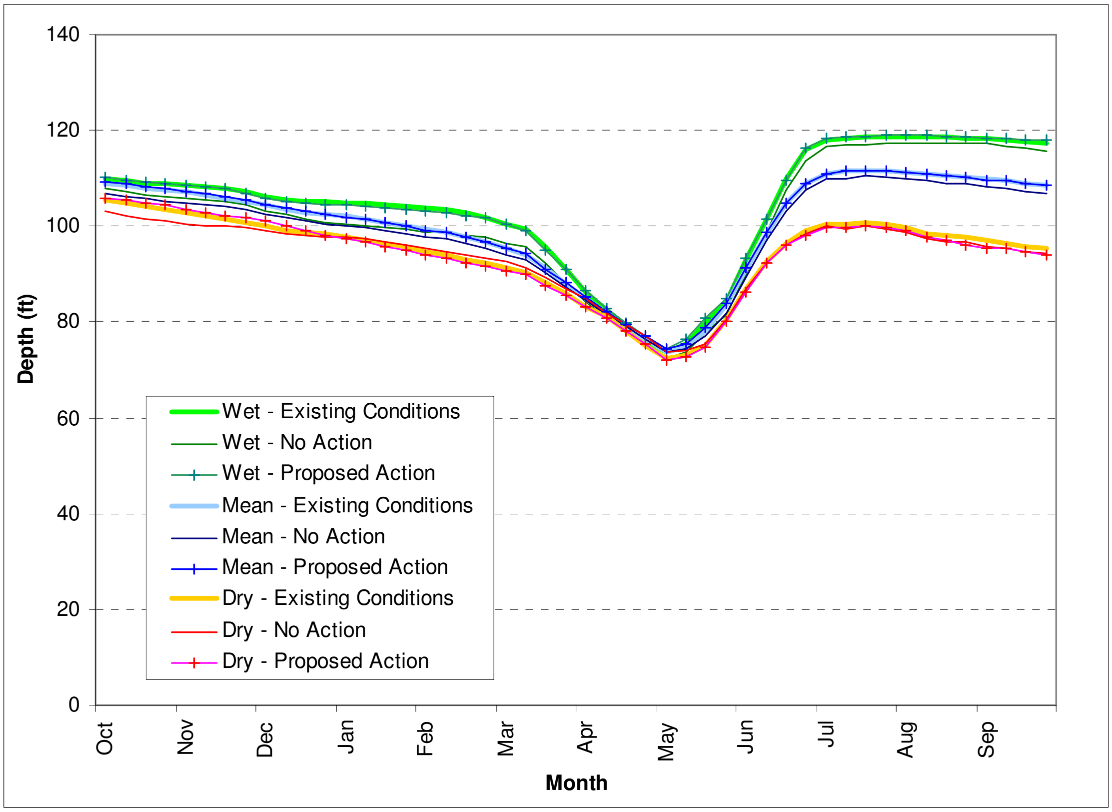


Figure 5-12. Turquoise Reservoir Quarter-Monthly Depth

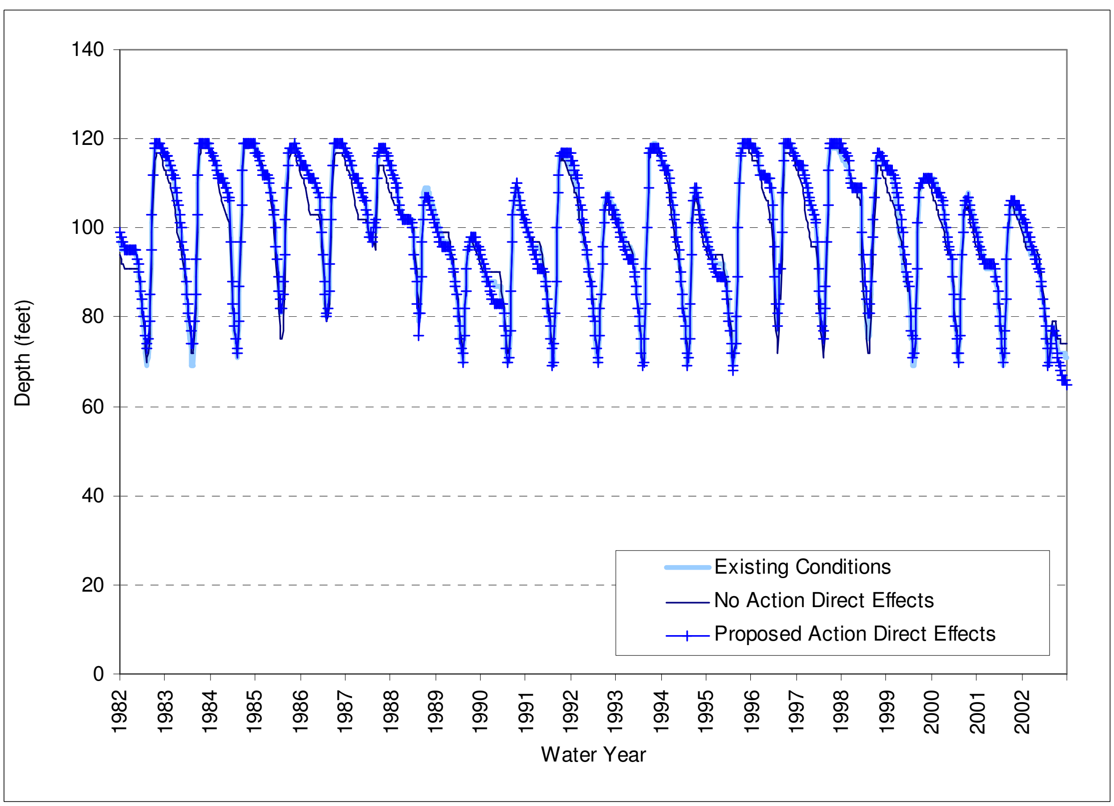


Figure 5-13. Turquoise Reservoir Time Series Depth

5.7.1.3. Residence Time

Residence time is the time necessary for the volume of water in a reservoir to be drained by outflow. Large increases in residence time could affect water quality, particularly eutrophication potential. Simulated annual average residence times are summarized in **Table 5-20** and **Figure 5-14**. Residence times are presented as annual averages due to the fluctuation that can occur over shorter time periods.

Table 5-20. Mean Annual Residence Time – Turquoise Reservoir –Effects Summary

Water Year	Existing Conditions	No Action	Proposed Action	Change from Existing		Proposed Action – No Action Effects	
				No Action	Proposed Action		
	(days)	(days)	(days)	(days)	(days)	(days)	%
1982	273	270	282	-3	9	12	4%
1983	202	205	200	3	-2	-5	-2%
1984	192	186	191	-6	-1	5	3%
1985	265	239	265	-26	0	26	11%
1986	286	299	286	13	0	-13	-4%
1987	314	314	319	0	5	5	2%
1988	346	367	332	21	-14	-35	-10%
1989	253	264	261	11	8	-3	-1%
1990	348	358	341	10	-7	-17	-5%
1991	352	360	382	8	30	22	6%
1992	250	249	244	-1	-6	-5	-2%
1993	258	251	254	-7	-4	3	1%
1994	229	226	226	-3	-3	0	0%
1995	219	224	219	5	0	-5	-2%
1996	257	235	258	-22	1	23	10%
1997	225	236	235	11	10	-1	0%
1998	277	264	296	-13	19	32	12%
1999	314	326	300	12	-14	-26	-8%
2000	268	277	265	9	-3	-12	-4%
2001	315	334	335	19	20	1	0%
2002	274	312	254	38	-20	-58	-19%
Average	**272**	**276**	**274**	**4**	**2**	**-2**	**-1%**

Effects (days) = Proposed Action – No Action days, Effects (%) = (Proposed Action - No Action)/No Action

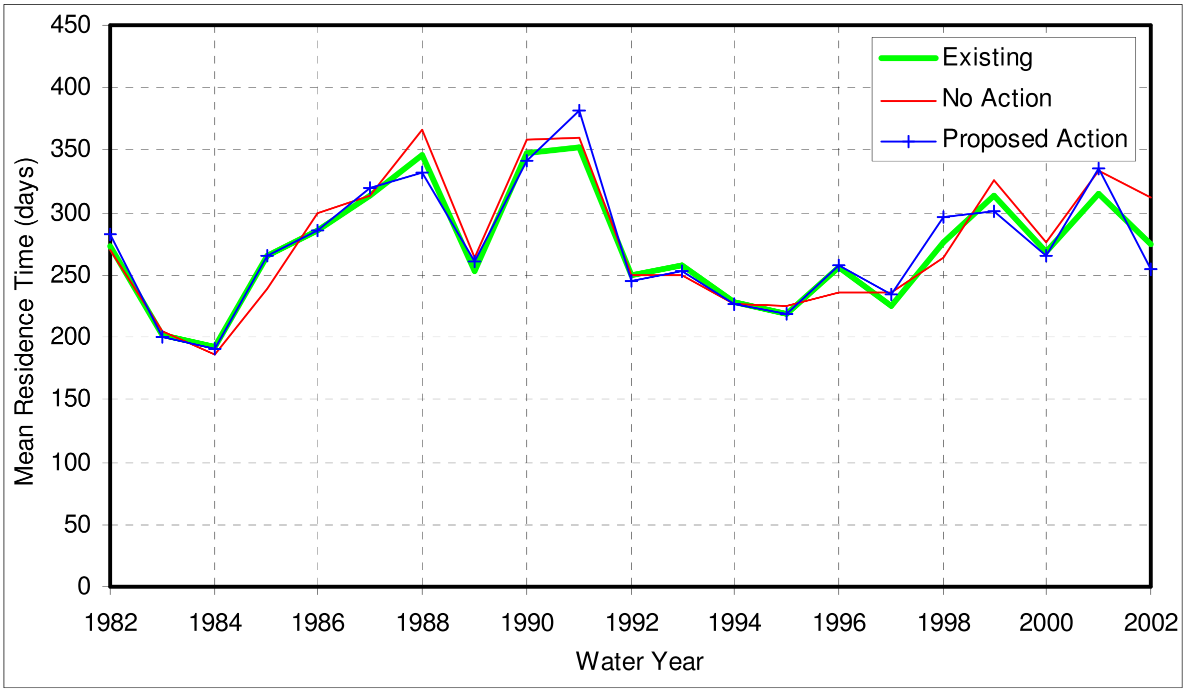


Figure 5-14. Mean Annual Residence Time – Turquoise Reservoir

Simulated residence times in Turquoise Reservoir varied from year to year and between the scenarios. Each alternative had the shortest residence time and the longest residence time in at least one year of the study period. On average, the residence times were very similar for each scenario. The maximum difference in residence time between the Proposed Action and No Action was 19 percent. On average, the Proposed Action resulted in a residence time 2 days, or 1 percent shorter than the No Action Alternative. Such small changes are unlikely to affect water quality in Turquoise Reservoir.

5.7.2. Pueblo Reservoir

Simulated depth and residence time for Pueblo Reservoir are discussed below.

5.7.2.1. Depth

The simulated depths in Pueblo Reservoir are summarized in **Table 5-21**, **Figure 5-15**, and **Figure 5-16**.

Table 5-21. Pueblo Reservoir Monthly Mean Depth – Effects Summary

Month	Monthly Mean Streamflow			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	%
Oct	127	121	124	-6	-3	3	2%
Nov	129	123	126	-6	-3	3	2%
Dec	132	128	130	-4	-2	2	2%
Jan	136	132	133	-4	-3	1	1%
Feb	138	134	136	-4	-2	2	1%
Mar	140	137	138	-3	-2	1	1%
Apr	139	135	137	-4	-2	2	1%
May	137	132	134	-5	-3	2	2%
Jun	136	131	133	-5	-3	2	2%
Jul	133	128	130	-5	-3	2	2%
Aug	131	124	128	-7	-3	4	3%
Sep	128	121	125	-7	-3	4	3%
Average	**134**	**129**	**131**	**-5**	**-3**	**2**	**2%**

Effects (ft) = Proposed Action - No Action depth. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

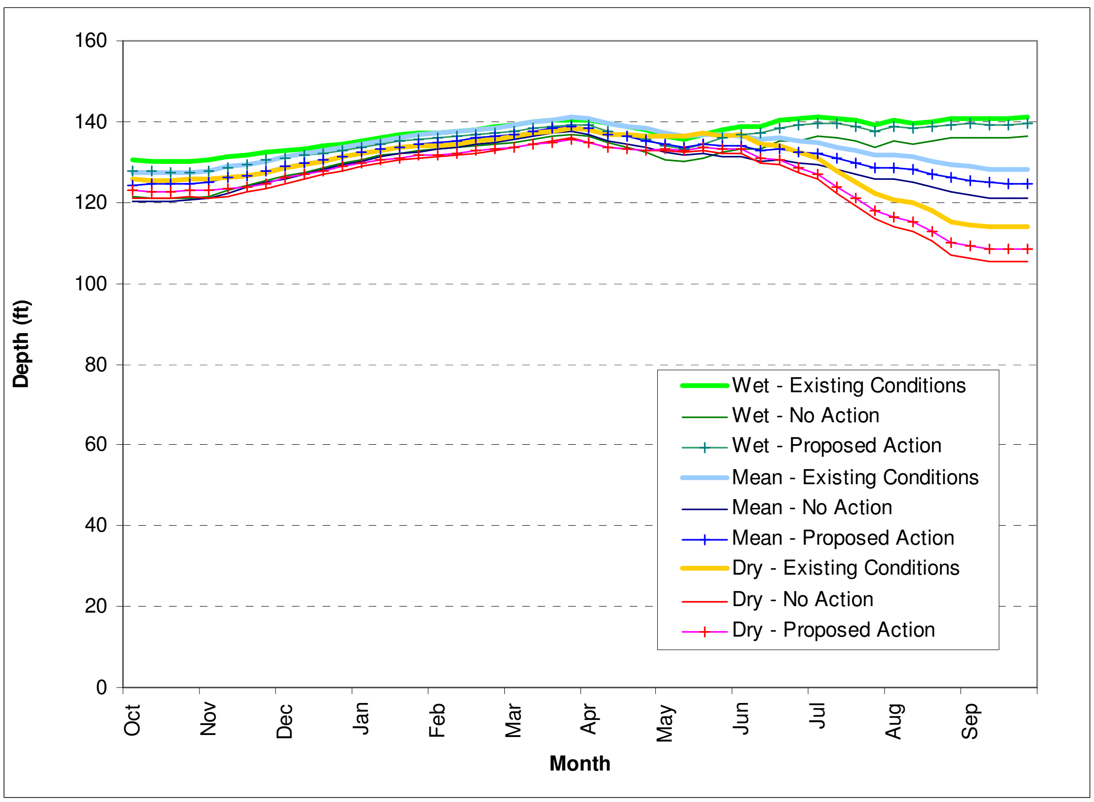


Figure 5-15. Pueblo Reservoir Quarter-Monthly Depth

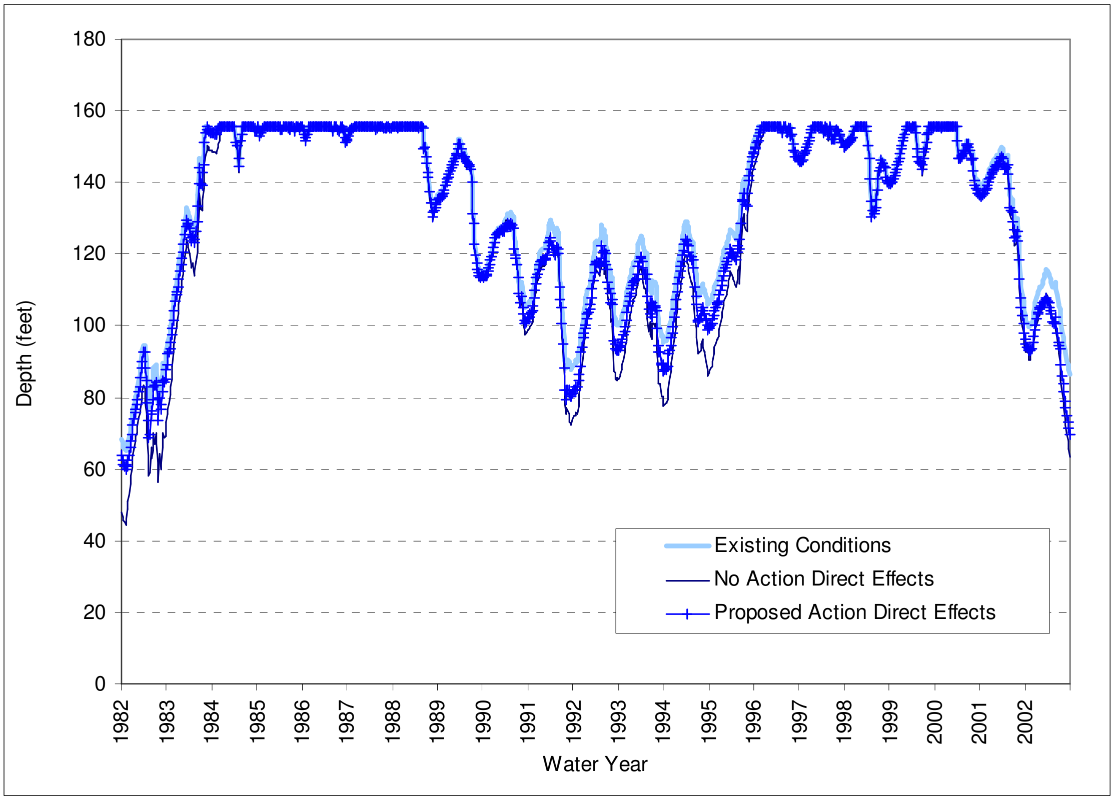


Figure 5-16. Pueblo Reservoir Time Series Depth

The No Action Alternative and Proposed Action resulted in shallower depths than Existing Conditions. There is no numerical threshold for the depth when stratification is disrupted because there are many factors, in addition to depth, affecting stratification. However, the minimal differences in monthly mean depth, 5 percent or less between the alternatives and between the alternatives and Existing Conditions, are unlikely to result in a change in stratification.

Stratification is most likely to be disrupted in study period years in Figure 5-16 when reservoir depths are unusually shallow, such as 1991 to 1995. The annual minimums shown in those years were simulated to occur in the fall, rather than summer. The reservoir typically mixes in the fall under Existing Conditions. In those unusual years, water quality effects of reduced depth are more likely for the No Action alternative. The most likely effect, if any, of upsetting the stratification pattern is that the reservoir would mix earlier than usual in the fall, combining layers of water of different qualities.

5.7.2.2. Residence Time

Residence time in Pueblo Reservoir is summarized in **Table 5-22** and **Figure 5-17**.

Table 5-22. Pueblo Reservoir Mean Annual Residence Time – Effects Summary

Water Year	Existing Conditions	No Action	Proposed Action	Change from Existing		Proposed Action – No Action Effects	
				No Action	Proposed Action		
	(days)	(days)	(days)	(days)	(days)	(days)	%
1982	29	14	25	-15	-4	11	79%
1983	92	73	88	-19	-4	15	21%
1984	99	99	99	0	0	0	0%
1985	110	109	110	-1	0	1	1%
1986	127	126	127	-1	0	1	1%
1987	124	123	124	-1	0	1	1%
1988	152	148	150	-4	-2	2	1%
1989	143	138	140	-5	-3	2	1%
1990	105	95	100	-10	-5	5	5%
1991	81	67	72	-14	-9	5	7%
1992	77	58	66	-19	-11	8	14%
1993	67	48	57	-19	-10	9	19%
1994	72	49	62	-23	-10	13	27%
1995	63	47	57	-16	-6	10	21%
1996	139	141	141	2	2	0	0%
1997	129	129	129	0	0	0	0%
1998	159	155	158	-4	-1	3	2%
1999	131	129	131	-2	0	2	2%
2000	171	163	166	-8	-5	3	2%
2001	124	112	116	-12	-8	4	4%
2002	107	77	84	-30	-23	7	9%
Average	**109**	**100**	**105**	**-9**	**-4**	**5**	**5%**

Effects (days) = Proposed Action – No Action days, Effects (%) = (Proposed Action - No Action)/No Action

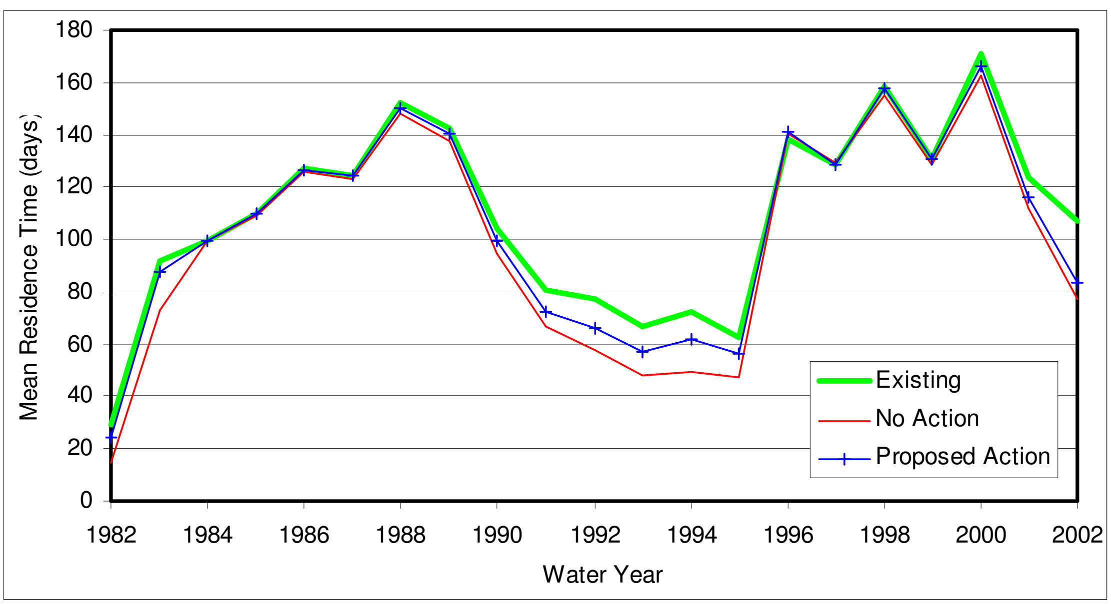


Figure 5-17. Pueblo Reservoir Mean Annual Residence Time

Shorter residence times are generally beneficial to water quality. In almost every year, residence time in Pueblo Reservoir is decreased under the Proposed Action and No Action Alternative compared to

Existing Conditions. On average, the Proposed Action resulted in annual mean residence time 4 days shorter than Existing Conditions. On average, the No Action Alternative resulted in annual mean residence time 9 days shorter than Existing Conditions. In years when residence times were shortest, on the order of 30 to 50 days, differences between the scenarios were greater. On average, the No Action Alternative resulted in a residence time 5 days shorter than the Proposed Action, a difference of 5 percent. The overall decrease in residence time due to the Proposed Action and No Action Alternative could potentially improve water quality in Pueblo Reservoir compared to Existing Conditions. The potential benefits of reduced residence time are greater for the No Action Alternative than the Proposed Action.

5.7.3. Lake Meredith

Simulated depth in Lake Meredith is discussed below. Residence time in Lakes Henry and Meredith is estimated together and discussed below.

5.7.3.1. Depth

The monthly simulated depths in Lake Meredith are summarized in **Table 5-23** and **Figure 5-18** for Existing Conditions, Proposed Action, and the No Action Alternative.

Table 5-23. Lake Meredith Mean Monthly Depth – Effects Summary

Month	Monthly Mean Streamflow			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	%
Oct	6.9	8.2	7.1	1.3	0.1	-1.1	-13%
Nov	6.8	8.0	7.0	1.3	0.2	-1	-13%
Dec	7.2	8.5	7.5	1.3	0.3	-1	-12%
Jan	7.8	9.1	8.1	1.3	0.3	-1	-11%
Feb	7.9	9.3	8.2	1.3	0.3	-1.1	-12%
Mar	9.7	10.7	9.8	1.0	0.2	-0.9	-8%
Apr	9.3	10.6	9.4	1.4	0.1	-1.2	-11%
May	7.9	9.2	8.1	1.2	0.2	-1.1	-12%
Jun	6.2	8.2	6.5	2.0	0.2	-1.7	-21%
Jul	7.2	8.9	7.2	1.7	0.1	-1.7	-19%
Aug	7.2	8.7	7.3	1.6	0.1	-1.4	-16%
Sep	7.1	8.4	7.2	1.4	0.2	-1.2	-14%
Average	**7.6**	**9.0**	**7.8**	**1.4**	**0.2**	**-1.2**	**-13%**

Effects (ft) = Proposed Action - No Action depth. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

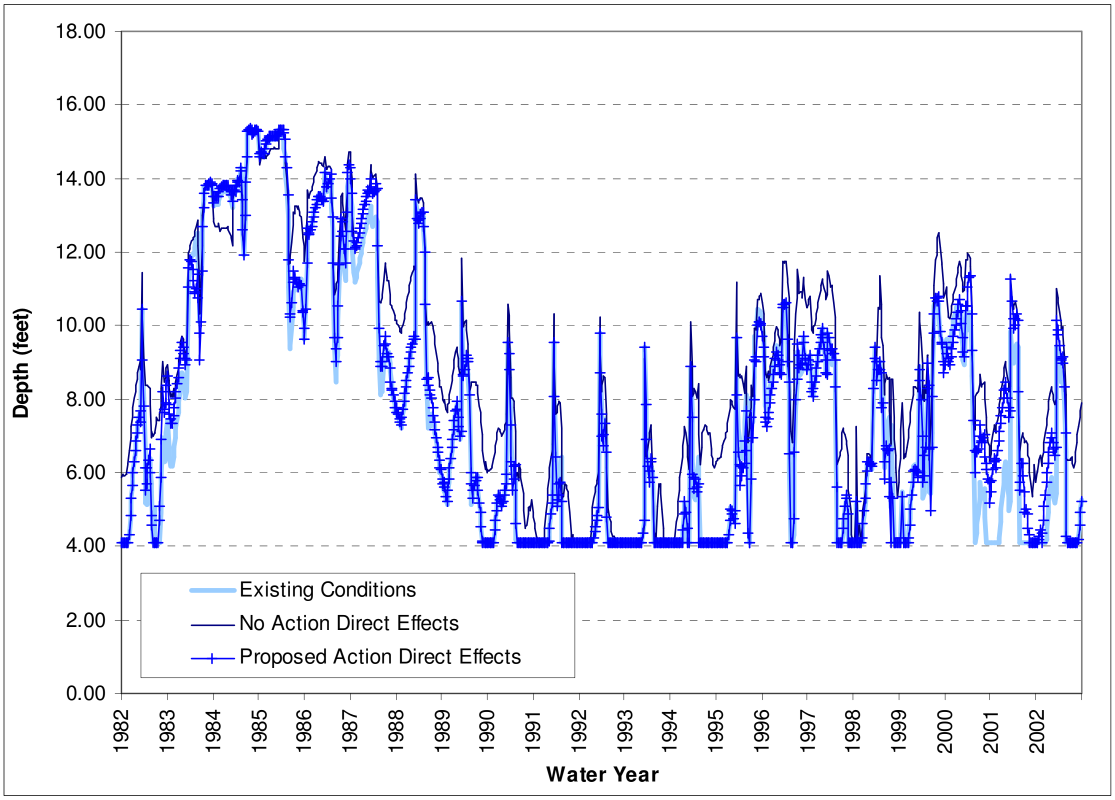


Figure 5-18. Lake Meredith Time Series Depth

Average depths are generally greater under the Proposed Action than under Existing Conditions, and even greater under the No Action Alternative. The greater average depth of the No Action Alternative could make summer stratification stronger than typical for Lake Henry and Lake Meredith. However, even under wet conditions, summer depths are less than 11 feet, and stratification is likely to be weak, if it occurs at all. Potential impacts from depth changes are not evaluated for reservoirs that do not strongly stratify.

5.7.3.2. Residence Time

Annual residence time for Lake Meredith and Lake Henry combined is summarized in **Table 5-24** and **Figure 5-19.** Residence time for Lake Henry and Lake Meredith is calculated for the combined lakes due to the way they were modeled in the Quarter-Monthly Model.

Table 5-24. Lakes Henry and Meredith Mean Annual Residence Time – Effects Summary

Water Year	Existing Conditions	No Action	Proposed Action	Change from Existing: No Action	Change from Existing: Proposed Action	Proposed Action – No Action Effects	
	(days)	(days)	(days)	(days)	(days)	(days)	(%)
1982	39	77	40	38	0	-38	-49%
1983	165	228	140	63	-25	-88	-38%
1984	256	291	279	35	24	-12	-4%
1985	237	300	246	63	8	-54	-18%
1986	220	303	233	84	14	-70	-23%
1987	165	219	177	55	13	-42	-19%
1988	159	221	155	62	-4	-66	-30%
1989	89	141	91	51	2	-50	-35%
1990	50	101	49	51	0	-51	-51%
1991	51	86	50	35	-1	-36	-42%
1992	51	76	51	24	-1	-25	-33%
1993	38	58	38	20	0	-20	-34%
1994	42	92	40	50	-2	-52	-57%
1995	73	114	65	42	-8	-49	-43%
1996	107	160	107	53	0	-54	-33%
1997	95	135	97	40	2	-39	-29%
1998	76	94	74	18	-2	-20	-21%
1999	78	127	76	49	-2	-51	-40%
2000	129	180	158	52	29	-22	-12%
2001	61	129	95	68	34	-34	-26%
2002	87	162	96	75	9	-65	-40%
Average	**108**	**157**	**112**	**49**	**4**	**-45**	**-28%**

Effects (days) = Proposed Action – No Action days, Effects (%) = (Proposed Action - No Action)/No Action

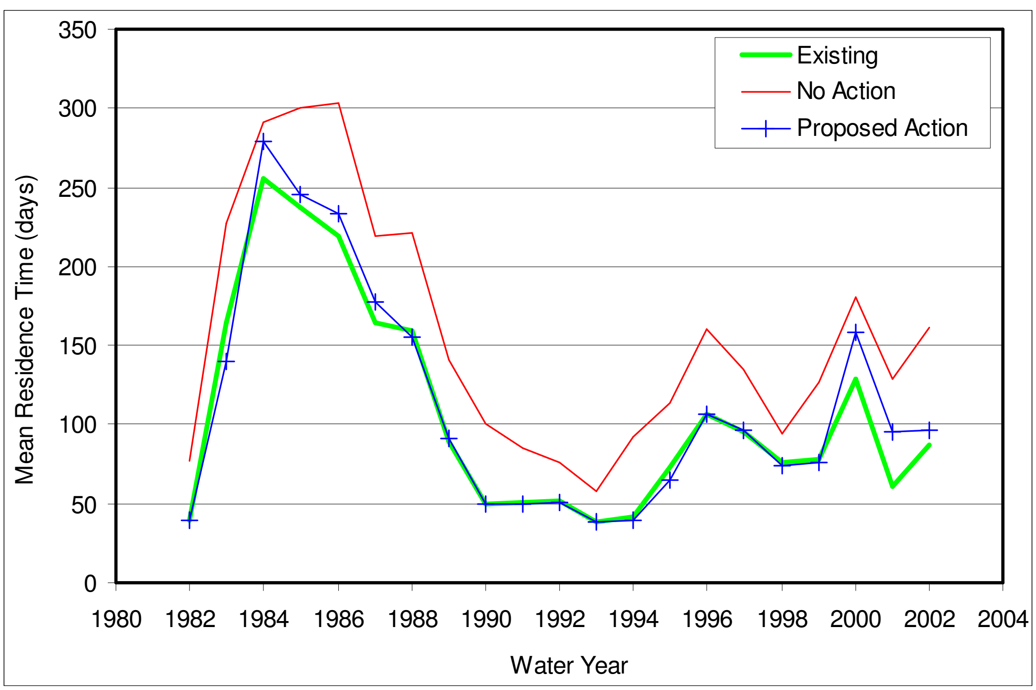


Figure 5-19. Lakes Henry and Meredith Mean Annual Residence Time

The Proposed Action and Existing Conditions would result in similar residence times. The No Action Alternative would result in an average residence time 49 days longer than Existing Conditions and 45 days longer than the Proposed Action. In reservoirs that do not strongly stratify, two potential adverse effects of increasing residence time are evapoconcentration and increased algae production. Therefore, due to its longer residence time, the No Action Alternative could potentially result in undesirable water quality effects compared to Existing Conditions and the Proposed Action.

The salinity model showed that evapoconcentration effects are similar for the alternatives. Algae growth and its effects cannot be estimated without a reservoir model. However, the simulated residence times for the No Action Alternative are generally within the range simulated for Existing Conditions over the study period. Therefore, the No Action Alternative could potentially result in slightly more algae growth than the other alternatives, but it is not likely to result in water quality worse than has been observed historically in Lake Henry and Lake Meredith.. Additionally, because the reservoirs are shallow, mixing due to wind and wave action is likely to reaerate the water to counteract the loss of oxygen due to decomposition and algal respiration.

5.7.4. Lake Henry

Simulated depth in Lake Henry is summarized in **Table 5-25** and **Figure 5-20**.

Table 5-25. Lake Henry Mean Monthly Depth – Effects Summary

Month	Monthly Mean Streamflow			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	%
Oct	8.5	9.2	8.6	0.7	0.1	-0.6	-7%
Nov	8.4	9.0	8.5	0.6	0.1	-0.5	-6%
Dec	8.9	9.1	8.9	0.2	0.0	-0.2	-2%
Jan	9.3	9.3	9.3	0.0	0.0	0	0%
Feb	10.7	10.7	10.7	0.0	0.0	0	0%
Mar	12.1	12.2	12.2	0.1	0.1	0	0%
Apr	12.3	12.3	12.3	0.0	0.0	0	0%
May	11.8	12.0	11.7	0.2	-0.1	-0.3	-3%
Jun	10.9	11.8	10.9	0.9	0.0	-0.9	-8%
Jul	10.7	11.3	10.8	0.6	0.1	-0.5	-4%
Aug	9.9	10.6	10.0	0.7	0.1	-0.6	-6%
Sep	8.9	9.8	9.1	0.9	0.2	-0.7	-7%
Average	**10.2**	**10.6**	**10.2**	**0.4**	**0.0**	**-0.4**	**-4%**

Effects (ft) = Proposed Action - No Action depth. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

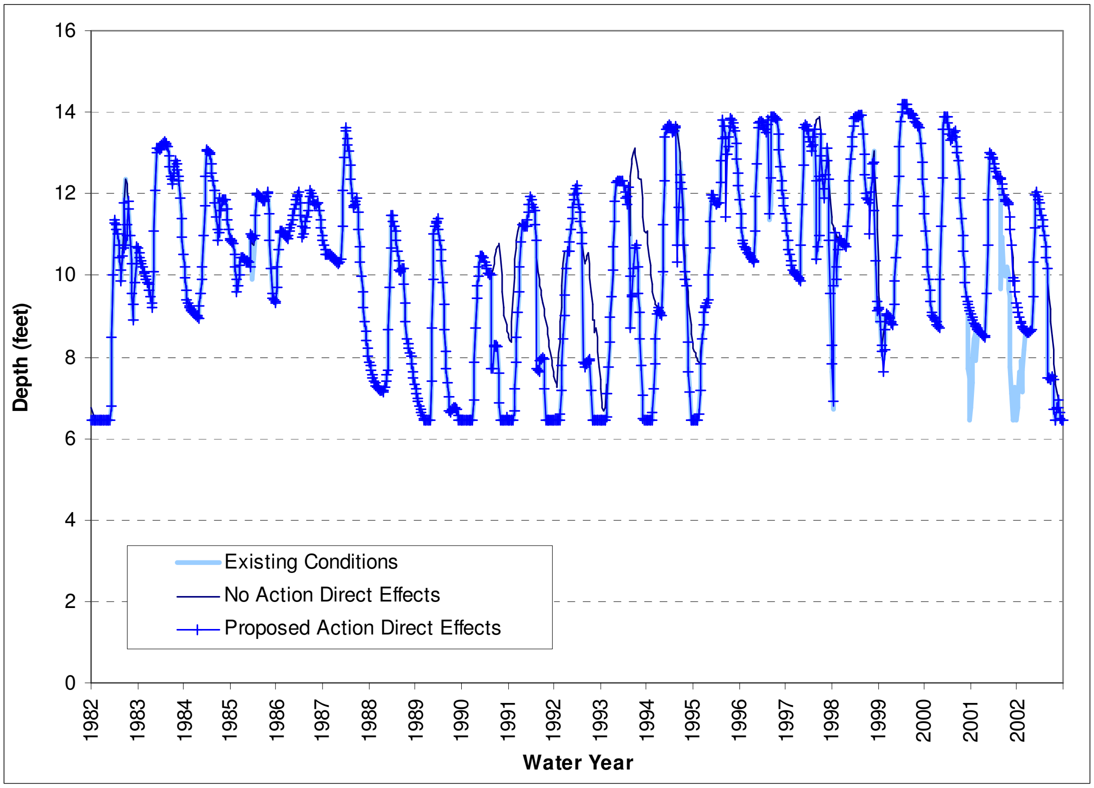


Figure 5-20. Lake Henry Time Series Depth

Depth in Lake Henry is similar under Existing Conditions, Proposed Action, and No Action Alternative scenarios. This similarity is partially due to the way the Quarter-Monthly Model makes changes to Lake Meredith volume prior to making changes in Lake Henry, which may not be the way the reservoirs are operated in reality. Potential impacts from depth changes are not evaluated for reservoirs that do not strongly stratify.

5.7.5. Holbrook Reservoir

Simulated depth in Holbrook Reservoir is summarized in **Table 5-26**, **Figure 5-21**, and **Figure 5-22**. Residence time calculations and mass balance calculations could not be performed for Holbrook Reservoir with the available modeling results.

Table 5-26. Holbrook Reservoir Mean Monthly Depth – Effects Summary

Month	Monthly Mean Streamflow			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	%
Oct	6.4	6.4	8.4	0.0	2.0	2.0	31%
Nov	7.0	7.0	9.0	0.0	2.0	2.0	29%
Dec	8.4	8.4	9.7	0.0	1.3	1.3	15%
Jan	11.1	11.1	11.9	0.0	0.8	0.8	7%
Feb	12.9	12.9	13.5	0.0	0.6	0.6	5%
Mar	14.0	14.0	14.8	0.0	0.8	0.8	6%
Apr	13.8	13.8	14.5	0.0	0.7	0.7	5%
May	12.9	12.9	13.3	0.0	0.4	0.4	3%
Jun	12.4	12.4	13.0	0.0	0.6	0.6	5%
Jul	9.8	9.8	11.0	0.0	1.2	1.2	12%
Aug	7.4	7.4	9.0	0.0	1.6	1.6	22%
Sep	6.4	6.4	8.3	0.0	1.9	1.9	30%
Average	**10.2**	**10.2**	**11.4**	**0.0**	**1.2**	**1.2**	**12%**

Effects (ft) = Proposed Action - No Action depth. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

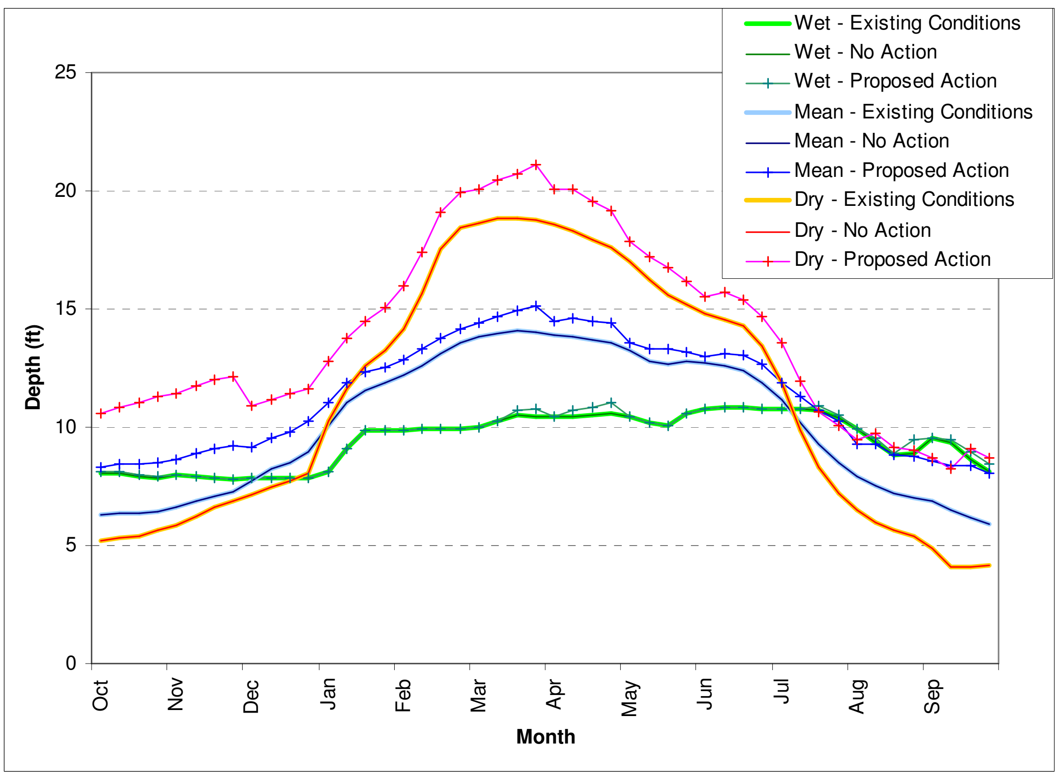


Figure 5-21. Holbrook Reservoir Quarter-Monthly Depth

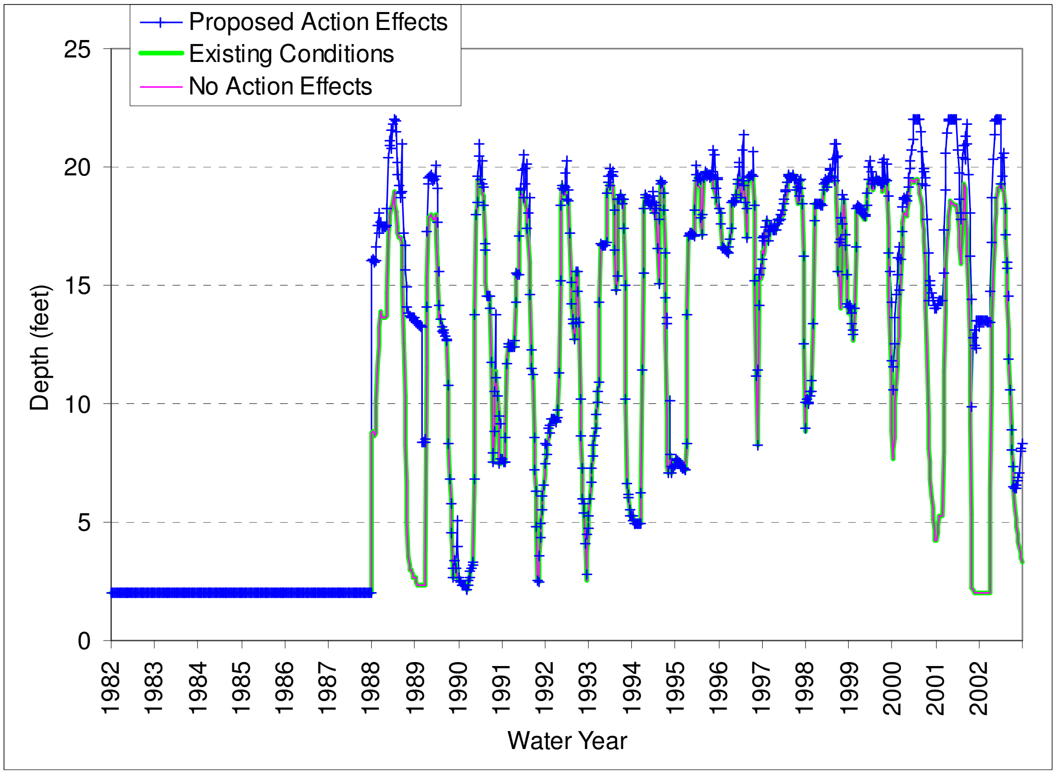


Figure 5-22. Holbrook Reservoir Time Series Depth

Note: no data available prior to 1988

The No Action Alternative and Existing Conditions result in equal depths in Holbrook Reservoir because of the assumption that Aurora does not utilize ROY storage under Existing Conditions or the No Action Alternative. The Proposed Action alternative results in greater depths and more storage in Holbrook Reservoir on average. As shown in Figure 5-22 there are some years when depths are equal for the three scenarios, but certain years such as between 2000 and 2002 when the Proposed Action results in greater depths. Qualitatively, the Proposed Action generally results in additional seasonal storage in Holbrook Reservoir. Additional water would be stored and then moved out of the reservoir, rather than remain in the reservoir for extended periods. Because substantial evapoconcentration is not likely, no adverse effects to water quality are expected due to the Proposed Action.

5.8. Effects Summary

Changes to water quality in the study area would be minimal due to the Proposed Action and No Action Alternative. Analysis of salinity, dissolved selenium, metals, nutrients, and changes to source water all resulted in little to no change between Existing Conditions, Proposed Action and the No Action Alternative. The most substantial changes simulated were:

- Pueblo Reservoir depth was simulated to decrease in some years due to the Proposed Action and No Action compared to Existing Conditions. The No Action Alternative was simulated to result in shallower depths than the Proposed Action. In those particular years, changes to the stratification pattern are not very likely because the reservoir is still 70 feet deep. But, changes to the stratification pattern are more likely for the Proposed Action and No Action Alternative than Existing Conditions. The most likely effect of upsetting the stratification pattern is that the reservoir would mix earlier than usual in the fall, combining layers of water of different qualities. On an average monthly basis, the reservoir depths only differ by a maximum of 6 feet between Existing Conditions, Proposed Action, and the No Action Alternative. Therefore, on an average basis, no substantial change to the stratification pattern due to differences in depth would be expected.

- Residence time in Lake Henry and Lake Meredith increases for the No Action Alternative on an average annual basis by 49 days compared to Existing Conditions and by 45 days compared to the Proposed Action. The results of the salinity modeling indicated that the 85th percentile of specific conductance did not substantially increase compared to Existing Conditions or the Proposed Action. There could be additional algal growth for the No Action Alternative due to the increased residence time, but wind and wave action is likely to keep the reservoirs well aerated.

6. Cumulative Effects Analysis

The cumulative effects analysis describes the effects of the Proposed Action and No Action Alternative when combined with other reasonably foreseeable actions in the basin. The purpose of this analysis is to show the effects of the Proposed Action and No Action Alternative coupled with other projects in the basin to simulate expected future conditions. This section presents the cumulative effects analysis for water quality.

6.1. Cumulative Effects Analysis Scenarios

The cumulative effects analysis compares simulated water quality between Existing Conditions, Proposed Action, and the No Action Alternative using assumptions summarized below.

The cumulative effects analysis for this project is based on reasonably foreseeable future actions that, if implemented, would contribute to the effects of the Proposed Action or No Action Alternative. The year 2045 was used as the time period for the assessment of cumulative effects because this is the approximate end of the proposed 40-year contract period for the storage and exchange contracts between Aurora and Reclamation under the Proposed Action.

Reclamation has defined reasonably foreseeable projects involving federal action as those for which NEPA permitting has been successfully completed and are awaiting completion of implementation (i.e., construction or operational implementation). Consequently, there are no reasonably foreseeable projects at this time. Nevertheless, Reclamation has determined for purposes of this analysis that the reasonably foreseeable actions for the cumulative effects analysis are to be based on anticipated changes in water demand, use, and storage in the year 2045. Anticipated reasonably foreseeable actions include:

- Municipal entities would increase use of Fry-Ark and native water.
- Consistent with the Pueblo Board of Water Works Excess Capacity Contract, storage in Pueblo Reservoir would increase from 3,000 acre-feet to 15,000 acre-feet.
- Colorado Springs Utilities' Excess Capacity Contract for storage in Pueblo Reservoir would be reduced from 10,000 acre-feet to 1,000 acre-feet.
- Colorado Springs Utilities would increase ground water pumping and potable reuse to meet future demands.
- Colorado Springs Utilities would construct a 25,000 acre-foot reservoir in the Fountain Creek Basin as part of the reuse plan.
- All entities currently participating in ROY storage would continue their participation.

Because the No Action Alternative includes the development of gravel pit water storage, reasonably foreseeable actions in the vicinity of the gravel pit storage site were assessed. No reasonably foreseeable actions or activities were identified near the potential area of gravel pit storage.

In addition to reasonably foreseeable actions, there were other model variables that required definition. A summary of these variables for the Existing Conditions, Proposed Action, and No Action Alternative is presented in **Table 6-1**. The cumulative effects Existing Conditions scenario is identical to the Existing Conditions in the Effects Analysis (Section 5). Other than the items mentioned above, the definitions for No Action Alternative and Proposed Action are the same as described in Section 5.

Table 6-1. Summary of Simulation Model Variable Settings for Cumulative Effects Analysis

Model Variable	Cumulative Effects Scenario		
	Existing Condition	No Action Alternative	Proposed Action
General Settings			
Municipal Demands	2004	2045	2045
Other Demand by Others	No	Yes	Yes
Agricultural Demands (1)	Historical	Historical	Historical
Otero Pump Station Capacity	118.5 mgd	118.5 mgd	118.5 mgd
Aurora Settings			
Excess Capacity in Pueblo Res.	10,000 ac-ft	0 ac-ft	10,000 ac-ft
Gravel Lakes Storage	0 ac-ft	10,000 ac-ft	0 ac-ft
USBR Contract Exchanges	0 ac-ft	0 ac-ft	10,000 ac-ft
Transmountain Diversions	Yes	Yes	Yes
Upper Arkansas Ranch water rights	Yes	Yes	Yes
Rocky Ford I Transfer	Yes	Yes (junior to RICD)	Yes
Colorado Canal	Yes	Yes	Yes
Rocky Ford II Transfer (2) (3)	Yes (50%)	Yes (100%)	Yes (100%)
Highline Lease	Yes	Yes	Yes
Pueblo FMP/RICD – Aurora	None	None	Full
ROY Storage – Aurora	No	No	Yes
Other Municipal Settings			
Pueblo Board of Water Works Excess Capacity Storage in Pueblo Reservoir	3,000 ac-ft	15,000 ac-ft	15,000 ac-ft
Pueblo West Excess Capacity Storage in Pueblo Reservoir	1,000 ac-ft	1,000 ac-ft	1,000 ac-ft
Colorado Springs Utilities Excess Capacity in Pueblo Res.	10,000 ac-ft	1,000 ac-ft	1,000 ac-ft
Pueblo FMP/RICD – Others (4)	None	None	None
ROY Storage – Others	No	Yes	Yes
Colorado Springs Future Operations (5)	No	Yes	Yes

Notes:

(1) Agricultural demands are assumed to be the same as historical except for those systems that have been converted to municipal use, such as the Colorado Canal system, Rocky Ford Ditch and Highline Canal lease.

(2) The percentage value indicates the percent of the total decreed yield that is changed and diverted by Aurora. By decree, water cannot be changed from a tract of land until revegetation is complete.

(3) During actual 2004 operations, because Aurora's Upper Basin exchange application (99CW170) was not finalized, Rocky Ford II water was diverted into the PBWW Excess Capacity account in Pueblo Reservoir, then moved to Twin Lakes by contract exchange with the PBWW (Simpson, 2005). It is reasonably expected that the Upper Basin exchange application will be decreed in 2005. Therefore, the model will operate per the decree. The differences in storage and streamflow between actual and simulated operations during 2004 are negligible.

(4) Due to limitations in the model, all Colorado Canal exchanges (including those by Colorado Springs Utilities, Pueblo West and the City of Fountain) are subject to the same Pueblo FMP conditions as other Aurora exchanges

(5) Colorado Springs Utilities future operations were assumed to consist of increased ground water pumping and increased non-potable and potable reuse.

Source: MWH, 2005b

It is important to note that for the water quality cumulative effects analysis, although water demand and wastewater discharge are set to 2045 levels, land use factors such as agricultural practices and development are assumed equal to historical. The cumulative effects analysis does not speculate on future changes in land use, irrigation practices, or return flows, or subsequent impacts on water quality. Although changes in water quality could occur as a result of such changes they are not the result of the action and no action alternatives, and are not included in the cumulative effects analysis because the exact location and extent of the changes are unknown.

6.2. Salinity Cumulative Effects

The following section presents the salinity cumulative effects analysis based on results of specific conductance modeling at the Above Pueblo, Avondale, and Catlin Dam gages and the mass balance for Lake Henry and Lake Meredith. The quarter-monthly model results are included in their entirety in **Appendix C**. The 85th percentile of quarter-monthly simulated specific conductance is compared to the secondary MCL/high salinity hazard for each scenario.

6.2.1. Above Pueblo Gage

Table 6-2 summarizes the 85th percentile of quarter monthly specific conductance for each scenario and the differences between the scenarios. **Figure 6-1** depicts the annual average simulated specific conductance for each alternative.

Table 6-2. Above Pueblo Gage – Summary of Simulated Specific Conductance Cumulative Effects

High Salinity Hazard / Secondary MCL*	85th Percentile of Quarter Monthly SC			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(%)
750 / 740	517	533	535	16	18	2	0%

SC = specific conductance
Effects (µS/cm) = Proposed Action - No Action specific conductance. Effects (%) = (Proposed Action - No Action)/No Action.
* Secondary MCL of 500 mg/L TDS as µS/cm calculated from TDS using regression equation from USGS, 2004 for the Above Pueblo gage.

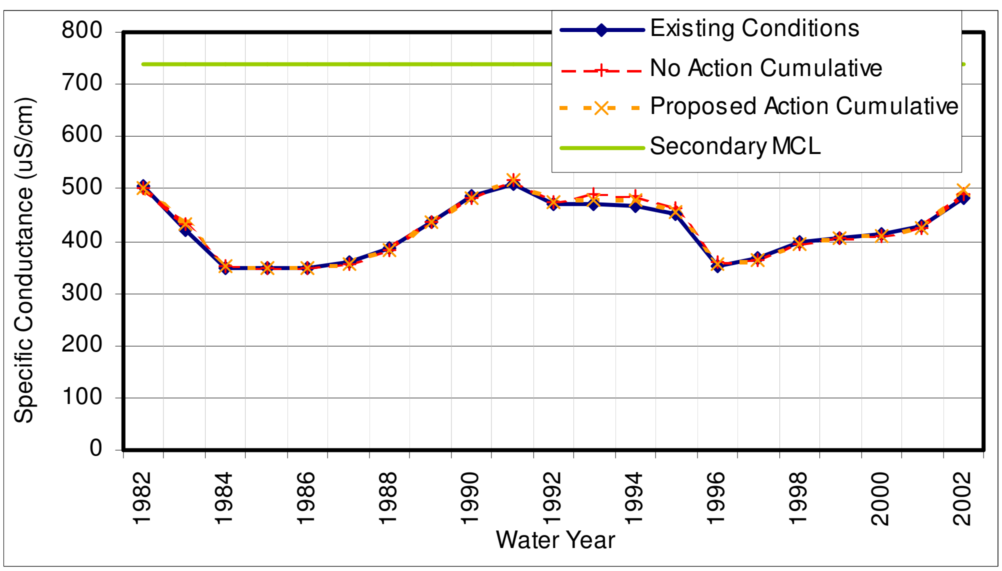


Figure 6-1. Above Pueblo Gage –Annual Average Simulated Specific Conductance – Cumulative Effects

As shown in Figure 6-1 simulated specific conductance at the Above Pueblo gage was similar on an average annual basis for Existing Conditions, No Action Alternative, and Proposed Action. The 85th percentile did not exceed either the high salinity hazard or secondary MCL for any scenario. The Proposed Action and No Action Alternative each resulted in a slight increase in the 85th percentile of salinity concentration compared to Existing Conditions. The Proposed Action resulted in a 2 µS/cm increase in salinity over the No Action Alternative, a percentage difference of 0 percent.

6.2.2. Avondale Gage

Table 6-3 summarizes the 85th percentile of quarter monthly specific conductance for each specific conductance and the differences between the scenarios. **Figure 6-2** depicts the annual average simulated salinity for each alternative.

Table 6-3. Avondale Gage - Summary of Simulated Specific Conductance Cumulative Effects

High Salinity Hazard / Secondary MCL*	85th Percentile of Quarter Monthly SC			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(%)
750 / 742	1,116	1,093	1,088	-23	-28	-5	0%

SC = specific conductance
Effects (µS/cm) = Proposed Action - No Action specific conductance. Effects (%) = (Proposed Action - No Action)/No Action.
* Secondary MCL of 500 mg/L TDS as µS/cm calculated from TDS using regression equation from USGS, 2004 for the Avondale gage.

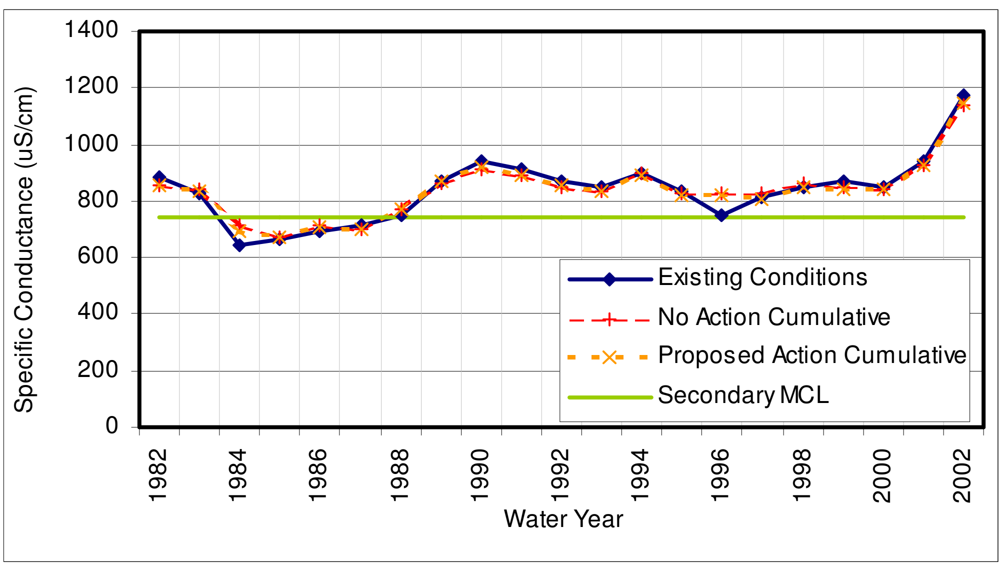


Figure 6-2. Avondale Gage – Annual Average Simulated Specific Conductance – Cumulative Effects

Simulated specific conductance at the Avondale gage was similar on an average annual basis for the No Action Alternative and Proposed Action. In some years the Existing Conditions scenario resulted in higher salinity and in some years lower salinity than the Proposed Action and No Action Alternative. The 85th percentile exceeded the high salinity hazard and secondary MCL in each scenario. The Proposed Action and No Action Alternative each resulted in a decrease in the 85th percentile of salinity compared to Existing Conditions. The Proposed Action resulted in a 5 µS/cm decrease in salinity compared to the No Action, a decrease of 0 percent.

6.2.3. Catlin Dam Gage

Table 6-4 summarizes the 85th percentile of quarter monthly concentrations for each scenario and the differences between the scenarios. **Figure 6-3** depicts the annual average simulated salinity for each alternative.

Table 6-4. Catlin Dam Gage - Summary of Simulated Specific Conductance Cumulative Effects

High Salinity Hazard / Secondary MCL*	85th Percentile of Quarter Monthly SC			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(%)
750 / 742	1,426	1,398	1,390	-28	-36	-8	-1%

SC = specific conductance
Effects (µS/cm) = Proposed Action - No Action specific conductance. Effects (%) = (Proposed Action - No Action)/No Action.
* Secondary MCL of 500 mg/L TDS as µS/cm calculated from TDS using regression equation from USGS, 2004 for the Avondale gage because no relationship was available for the Catlin Dam gage.

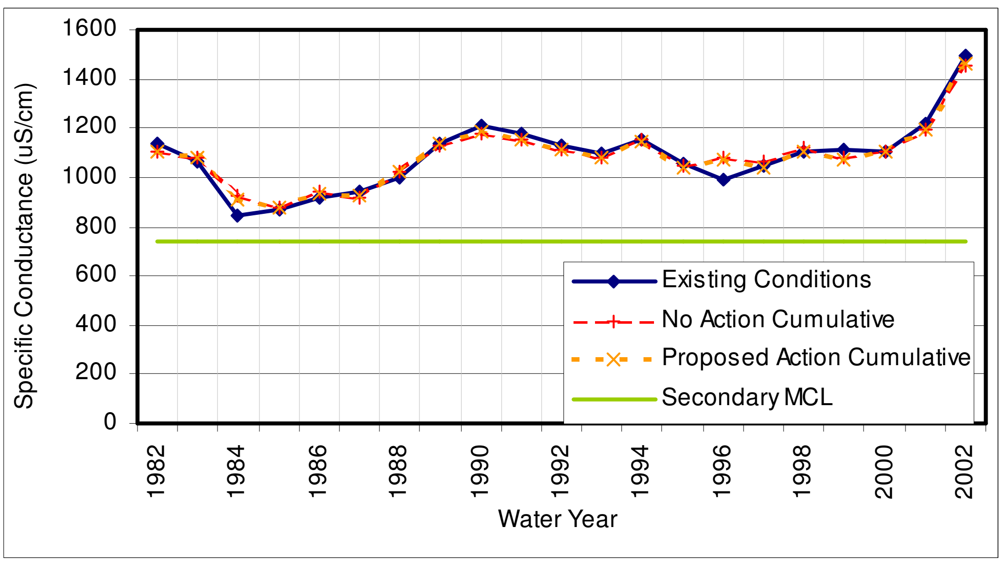


Figure 6-3. Catlin Dam Gage - Annual Average Simulated Specific Conductance – Cumulative Effects

Simulated salinity at the Catlin Dam gage was similar on an average annual basis for the No Action Alternative and Proposed Action. In some years the Existing Conditions scenario resulted in higher salinity and in some years lower salinity than the Proposed Action and No Action Alternative. The 85th percentile exceeds the high salinity hazard and secondary MCL in each scenario. The Proposed Action and No Action Alternative each result in a decrease in the 85th percentile of salinity concentration compared to Existing Conditions. The Proposed Action results in an 8 µS/cm decrease in salinity compared to the No Action Alternative, a decrease of 1 percent.

6.2.4. Lake Henry and Lake Meredith

Table 6-5 summarizes the 85th percentile of quarter monthly simulated specific conductance for each scenario and the differences between the scenarios. **Figure 6-4** depicts the annual average simulated specific conductance for each scenario.

Table 6-5. Lake Henry and Lake Meredith - Summary of Simulated Specific Conductance Cumulative Effects

High Salinity Hazard / Secondary MCL*	85th Percentile of Quarter Monthly SC			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(%)
750 / 772	1,247	1,238	1,241	-8	-6	3	0%

SC = specific conductance
Effects (µS/cm) = Proposed Action - No Action specific conductance. Effects (%) = (Proposed Action - No Action)/No Action.
* Secondary MCL as µS/cm calculated from TDS using regression of data from USGS, 1993.

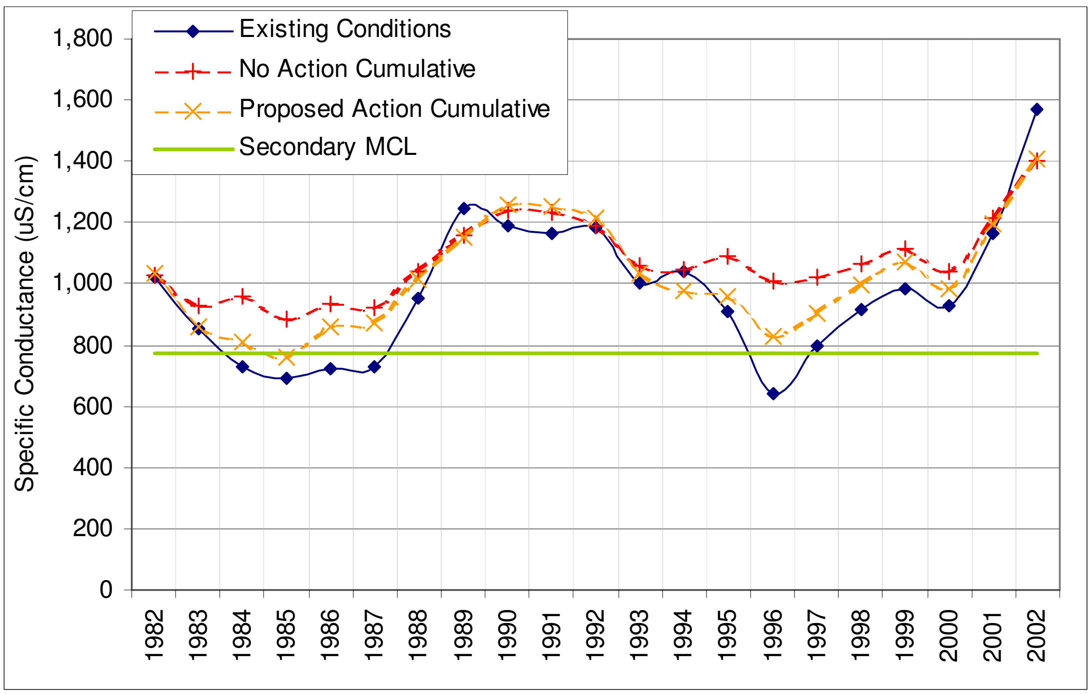


Figure 6-4. Lake Henry and Lake Meredith Annual Average Simulated Specific Conductance – Cumulative Effects

Annual average simulated salinity in Lake Henry and Lake Meredith generally increased for the Proposed Action and No Action Alternative compared to Existing Conditions. The No Action Alternative generally resulted in higher annual average salinity. The 85th percentile exceeded the high salinity hazard and secondary MCL in each scenario. Both the No Action Alternative and Proposed Action resulted in slightly lower 85th percentile concentrations than Existing Conditions. The Proposed Action resulted in an 85th percentile 3 µS/cm higher than the No Action Alternative, a difference that rounds to zero percent.

The boxplot of quarter-monthly results in **Appendix C** shows how median concentrations were higher than Existing Conditions, but the 85th percentile was lower. The boxplot shows that the Proposed Action and No Action Alternative result in less spread in the data.

The greater average annual salinity under the Proposed Action and No Action Alternative is likely due to the longer residence times under both alternatives leading to evapoconcentration of salts. The longer residence times are primarily due to the assumptions made in the Quarter-Monthly Model regarding Colorado Springs' operations for the cumulative effects scenarios. Colorado Springs' storage in Pueblo Reservoir is reduced from 10,000 acre-feet for the effects scenarios to 1,000 acre-feet for the cumulative effects scenarios. This allows less of Colorado Springs' reusable water to be exchanged into Pueblo Reservoir, which causes more reusable water to flow down the Arkansas River. This water is then recaptured at Colorado Canal and put into Colorado Springs' Meredith and Henry accounts. The additional water in Meredith and Henry takes longer to exchange out, causing water to remain in the reservoirs longer than under Existing Conditions.

Table 6-6 summarizes the 85th percentile of quarter monthly concentrations at the combined flow location for each scenario and the differences between the scenarios. **Figure 6-6** depicts the annual average simulated specific conductance for each alternative.

Table 6-6. Arkansas River Downstream of Lake Meredith Return Flow - Summary of Simulated Specific Conductance Cumulative Effects

High Salinity Hazard / Secondary MCL*	85th Percentile of Quarter Monthly SC			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(µS/cm)	(%)
750 / 742	1,399	1,382	1,377	-16	-22	-5	0%

SC = specific conductance
Effects (µS/cm) = Proposed Action - No Action specific conductance. Effects (%) = (Proposed Action - No Action)/No Action.
* Secondary MCL of 500 mg/L TDS as µS/cm calculated from TDS using regression equation from USGS, 2004 for the Avondale gage because no relationship was available for the Catlin Dam gage.

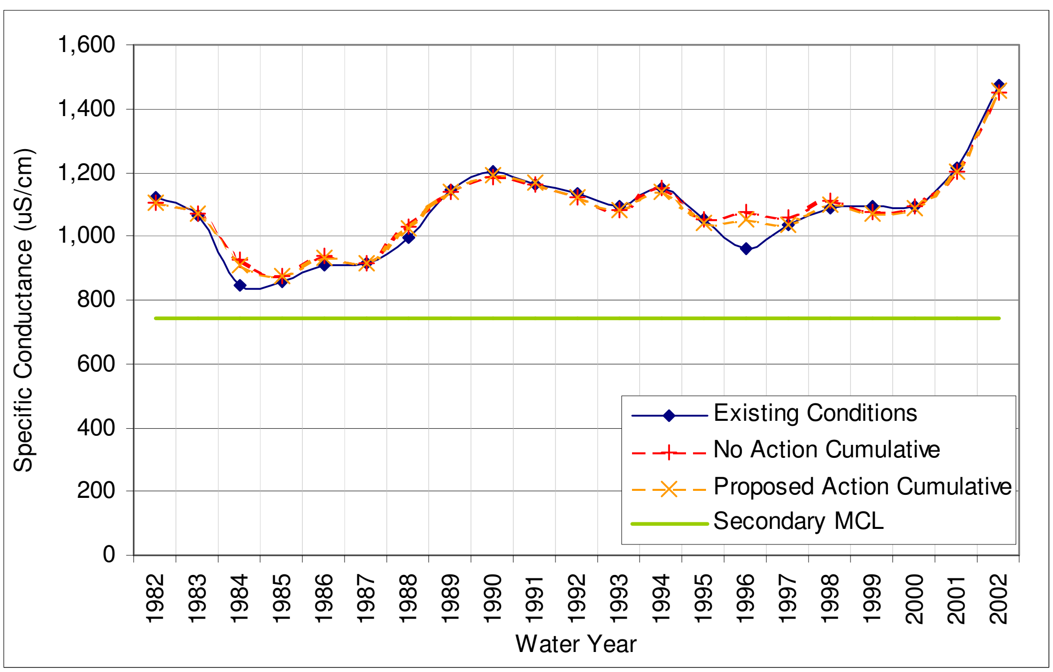


Figure 6-5. Arkansas River Downstream of Lake Meredith Return Flow Annual Average Simulated Specific Conductance – Cumulative Effects

Simulated specific conductance at the combined flow location was similar on an average annual basis for Existing Conditions, Proposed Action, and No Action Alternative. The 85th percentile exceeded the high salinity hazard and secondary MCL in each scenario. The Proposed Action and No Action Alternative each resulted in a decrease in the 85th percentile of specific conductance compared to Existing Conditions. The Proposed Action resulted in a reduction of the 85th percentile of 5 µS/cm compared to the No Action Alternative, a difference that rounds to zero percent.

6.3. Selenium Cumulative Effects

The following section summarizes the results of selenium modeling at the Above Pueblo, Avondale, and Catlin Dam gages. The selenium modeling is not used to predict future selenium concentrations but rather to compare the potential differences in selenium concentrations among alternatives. Simulated selenium concentrations are compared to acute and chronic WQS.

6.3.1. Above Pueblo Gage

Table 6-7 summarizes the 85th percentile of quarter monthly dissolved selenium concentrations at the Above Pueblo gage for each scenario and the differences between the scenarios. **Table 6-8** summarizes the percentage of quarter-months exceeding the acute WQS for each scenario. **Figure 6-6** depicts the annual simulated median dissolved selenium concentration for each scenario and the WQS.

Table 6-7. Above Pueblo Gage Simulated Dissolved Selenium – Chronic Cumulative Effects Summary

Chronic WQS	85th Percentile of Quarter Monthly Se			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(%)
6	4.4	4.4	4.4	0.0	0.0	0.0	0%

Se = dissolved selenium
Effects (µg/L) = Proposed Action - No Action selenium. Effects (%) = (Proposed Action - No Action)/No Action

Table 6-8. Above Pueblo Gage Simulated Dissolved Selenium – Acute Cumulative Effects Summary

Acute WQS	Frequency of Acute WQS Exceedences			Change from Existing		Proposed Action – No Action Effects
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action	
(µg/L)	(%)	(%)	(%)	(%)	(%)	(%)
18.4	0%	0%	0%	0%	0%	0%

Effects (%) = Proposed Action - No Action exceedence percentage.

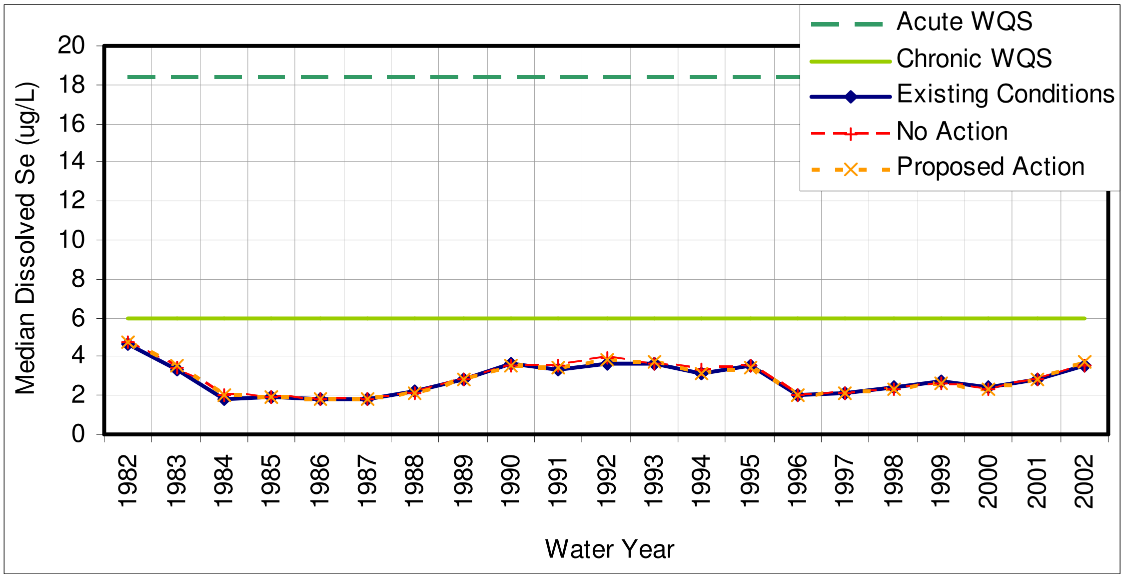


Figure 6-6. Annual Median Simualted Dissolved Selenium Concentrations – Above Pueblo Gage – Cumulative Effects

Simulated dissolved selenium concentrations were similar on a median annual basis and for the 85th percentile of all simulated quarter months for Existing Conditions, No Action Alternative, and Proposed Action. The 85th percentile did not exceed the chronic WQS for any scenario. The acute WQS was not exceeded in any quarter months for any scenario.

6.3.2. Avondale Gage

Table 6-9 summarizes the 85th percentile of quarter monthly dissolved selenium concentrations at the Avondale gage for each scenario and the differences between the scenarios. **Table 6-10** summarizes the percentage of quarter-months exceeding the acute TVS for each scenario. The TVS is used for comparison because the current acute WQS is a temporary modification to "Existing Quality", which does not facilitate a quantitative analysis. **Figure 6-7** depicts the annual simulated median dissolved selenium concentration for each scenario and the WQS.

Table 6-9. Avondale Gage Dissolved Selenium – Chronic Cumulative Effects Summary

Chronic WQS	85th Percentile of Quarter Monthly Se			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(%)
Existing Quality§	17.0	16.5	16.4	-0.5	-0.6	-0.1	-1%

Se = dissolved selenium, §Temporary modification until 7/1/08
Effects (µg/L) = Proposed Action - No Action selenium. Effects (%) = (Proposed Action - No Action)/No Action

Table 6-10. Avondale Gage Dissolved Selenium – Acute Cumulative Effects Summary

Acute WQS (TVS)	Frequency of Acute WQS Exceedences			Change from Existing		Proposed Action – No Action Effects
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action	
(µg/L)	(%)	(%)	(%)	(%)	(%)	(%)
Existing Quality[§] 18.4	7.1%	5.1%	4.0%	-2%	-3%	-1%

[§]Temporary modification until 7/1/08, exceedences are compared to the TVS of 18.4 µg/L
Effects (%) = Proposed Action - No Action exceedence percentage.

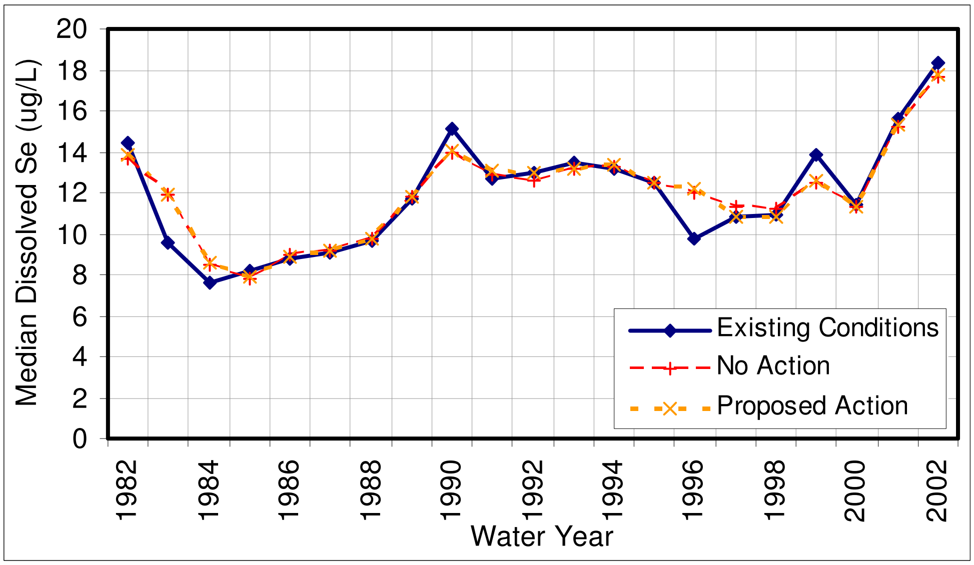


Figure 6-7. Annual Median Simulated Dissolved Selenium Concentrations – Avondale Gage – Cumulative Effects

Annual median dissolved selenium concentrations were similar for the Proposed Action and No Action Alternative, but varied compared to Existing Conditions. In some years Existing Conditions resulted in higher median concentrations and in some years lower median concentrations. The 85th percentile of dissolved selenium concentrations decreased for the No Action Alternative and Proposed Action compared to Existing Conditions. The Proposed Action resulted in a slight decrease in concentration, 0.1 µg/L, or 1 percent, compared to the No Action Alternative. The acute TVS was exceeded less frequently under the No Action Alternative and Proposed Action then under Existing Conditions. The Proposed Action resulted in a 1 percent decrease in acute exceedences compared to the No Action Alternative.

6.3.3. Catlin Dam Gage

Table 6-11 summarizes the 85th percentile of quarter monthly dissolved selenium concentrations at the Catlin Dam gage for each scenario and the differences between the scenarios. **Table 6-12** summarizes the percentage of quarter-months exceeding the acute WQS for each scenario. **Figure 6-8** depicts the annual simulated median dissolved selenium concentration for each scenario and the WQS.

Table 6-11. Catlin Dam Gage Simulated Dissolved Selenium – Chronic Cumulative Effects Summary

Chronic WQS	85th Percentile of Quarter Monthly Se			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(%)
16	16.0	15.9	15.7	-0.1	-0.3	-0.2	-1%

Se = dissolved selenium
Effects (µg/L) = Proposed Action - No Action selenium. Effects (%) = (Proposed Action - No Action)/No Action

Table 6-12. Catlin Dam Gage Simulated Dissolved Selenium – Acute Cumulative Effects Summary

Acute WQS	Frequency of Acute WQS Exceedences			Change from Existing		Proposed Action – No Action Effects
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action	
(µg/L)	(%)	(%)	(%)	(%)	(%)	(%)
18.4	0.5%	0.1%	0.1%	0%	0%	0%

Effects (%) = Proposed Action - No Action exceedence percentage.

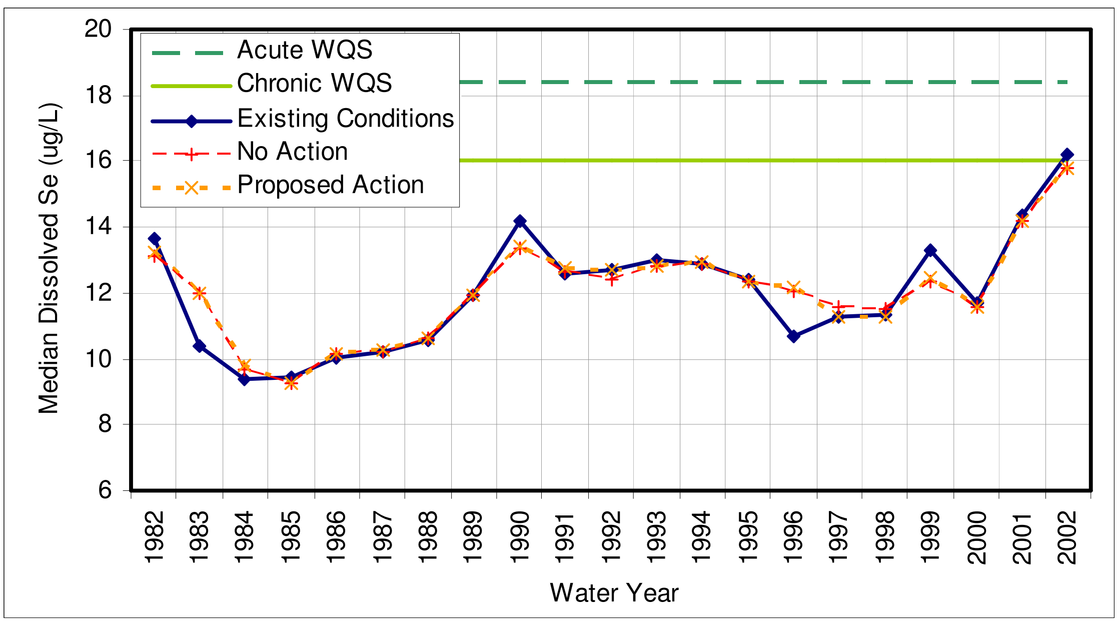


Figure 6-8. Annual Median Dissolved Selenium Concentrations – Catlin Dam Gage – Cumulative Effects

Annual median dissolved selenium concentrations were similar for the Proposed Action and No Action Alternative but varied compared to Existing Conditions. In some years Existing Conditions resulted in higher median concentrations and in some years lower median concentrations. The simulated 85th percentile of quarter-monthly dissolved selenium concentrations is very close to the chronic WQS for each scenario. The 85th percentile of dissolved selenium concentrations decreased for the No Action Alternative and Proposed Action compared to Existing Conditions. The acute WQS was exceeded slightly less frequently under the No Action Alternative and Proposed Action compared to Existing Conditions.

6.3.4. Lake Henry and Lake Meredith

Concentrations of dissolved selenium at the Avondale gage were similar for the Proposed Action and No Action Alternative and slightly less than Existing Conditions. The Proposed Action and No Action Alternative are likely to result in slightly higher median dissolved selenium concentrations than Existing Conditions due to evapoconcentration, similar to the salinity results. The other mechanisms that could potentially affect selenium concentrations in Lake Henry and Lake Meredith are not well enough understood to be evaluated.

6.4. Percentage of Flow from Fountain Creek

Table 6-13 and **Figure 6-9** summarize the simulated percentage of source water from Fountain Creek in the lower Arkansas River just downstream of the confluence. A significant change in the percentage of flow from Fountain Creek could impact the water quality of the lower Arkansas River.

Table 6-13. Lower Arkansas River Annual Mean Percentage of Water from Fountain Creek - Cumulative Effects

Water Year	Existing Conditions	No Action	Proposed Action	Change from Existing		Proposed Action – No Action Effects
				No Action	Proposed Action	
1982	25%	28%	28%	3%	3%	0%
1983	27%	29%	29%	2%	2%	0%
1984	14%	17%	16%	3%	2%	-1%
1985	24%	26%	25%	2%	1%	-1%
1986	14%	17%	16%	3%	2%	-1%
1987	17%	20%	20%	3%	3%	0%
1988	17%	23%	23%	6%	6%	0%
1989	17%	25%	25%	8%	8%	0%
1990	22%	26%	27%	4%	5%	1%
1991	22%	27%	28%	5%	6%	1%
1992	24%	29%	30%	5%	6%	1%
1993	17%	21%	21%	4%	4%	0%
1994	25%	28%	28%	3%	3%	0%
1995	27%	28%	28%	1%	1%	0%
1996	25%	31%	30%	6%	5%	-1%
1997	30%	34%	33%	4%	3%	-1%
1998	35%	43%	41%	8%	6%	-2%
1999	41%	42%	41%	1%	0%	-1%
2000	34%	38%	38%	4%	4%	0%
2001	31%	35%	35%	4%	4%	0%
2002	57%	61%	63%	4%	6%	2%
Average	**25%**	**29%**	**28%**	**4%**	**3%**	**-1%**

Effects (%) = Proposed Action (%) – No Action (%)

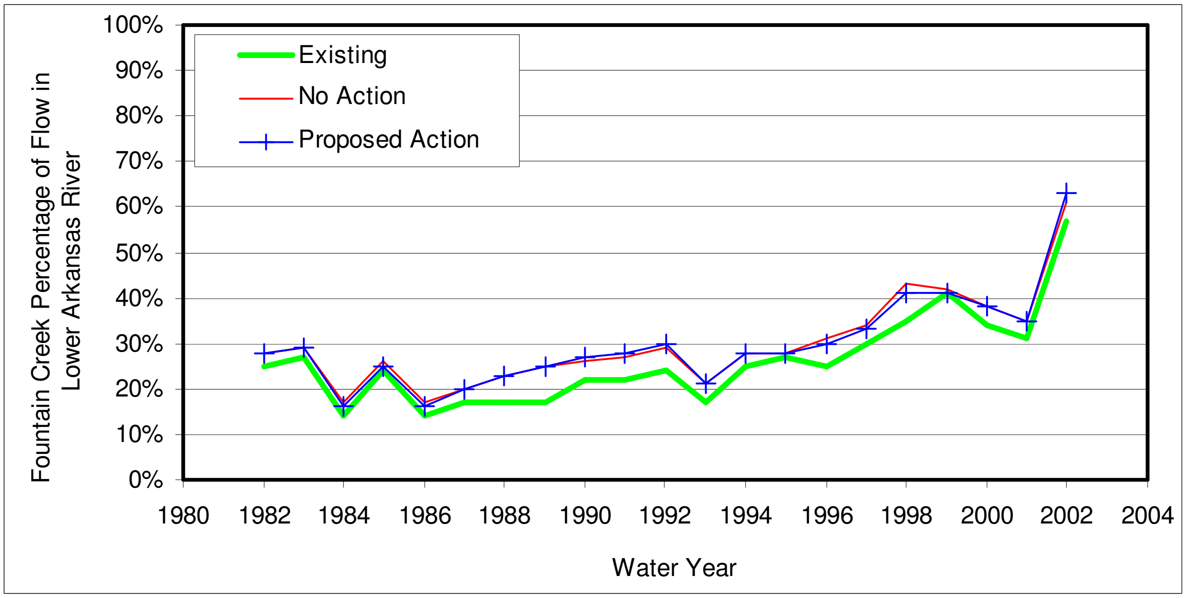


Figure 6-9. Lower Arkansas River - Annual Mean Percentage of Source Water from Fountain Creek Downstream of the Confluence Cumulative Effects

On an average annual basis, the percentage of flow from Fountain Creek increased for the Proposed Action and No Action Alternative compared to Existing Conditions. The increase is primarily due to increased wastewater return flows in Fountain Creek from municipalities in the Fountain Creek basin. Cumulative effects scenarios result in an annual average increase in percentage of flow from Fountain Creek between 0 and 8 percent compared to Existing Conditions. However, the No Action Alternative and Proposed Action are very similar, varying by only 2 percent each year. The difference between the Proposed Action and No Action Alternative is so small that water quality effects in the lower Arkansas River and lower Arkansas River reservoirs are not likely.

6.5. Metals Cumulative Effects

Primary sources of metals in the upper watershed are historical mining activities and natural runoff over and through geologic formations in the watershed (USGS, 1998). Project operations under cumulative effects conditions will not affect the surface hydrology in areas with historical mines or high-metal geology. Therefore, metals loading is equal for the Proposed Action and No Action Alternative.

Table 6-14 summarizes monthly mean streamflow simulated at the Granite gage. The maximum mean monthly difference in streamflow between the Proposed Action and No Action Alternative is 11 percent. On average, the flows for all of the alternatives are similar. Flows for the Proposed Action are generally slightly lower than Existing conditions or the No Action Alternative. Such small differences in streamflow are unlikely to affect metals concentrations in the upper Arkansas River.

Table 6-14. Granite Gage – Monthly Mean Streamflow Summary of Cumulative Effects

Month	Monthly Mean Streamflow			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	%
Oct	137	146	141	9	3	-5	-4%
Nov	132	133	132	0	0	0	0%
Dec	131	142	140	11	9	-2	-1%
Jan	142	152	143	10	1	-9	-6%
Feb	168	173	155	5	-14	-19	-11%
Mar	284	267	249	-17	-35	-18	-7%
Apr	348	319	326	-28	-22	7	2%
May	639	763	758	124	118	-6	-1%
Jun	1,335	1,314	1,298	-21	-37	-16	-1%
Jul	891	892	885	1	-6	-7	-1%
Aug	411	414	410	2	-1	-4	-1%
Sep	191	195	187	5	-4	-9	-4%
Average	401	409	402	8	1	-7	-2%

Effects (cfs) = Proposed Action - No Action discharge. Effects (%) = (Proposed Action - No Action)/No Action

Cumulative effects on releases from Turquoise Reservoir to Lake Fork are expected to be minimal and less than what is shown by the model results. Therefore, there are no expected changes to metals concentrations in the Lake Fork due to any of the alternatives.

6.6. Nutrients Cumulative Effects

As described in Section 3.3.2.6, the reasonably foreseeable actions for the cumulative effects analysis include water demand levels for the year 2045. This results in additional wastewater discharges to surface waters. However, the amount of additional discharge to surface waters is equal for the Proposed Action and No Action Alternative. In fact, the magnitude of all nutrient sources is equal for the Proposed Action and No Action Alternative under cumulative effects conditions. Therefore, the remaining factor to evaluate for nutrient effects is streamflow. Simulated flows were investigated at the Portland gage and the Avondale gage. These locations were chosen because they are located in close proximity (upstream) of study area reservoirs.

Table 6-15 summarizes monthly mean streamflow at the Portland gage. On a monthly mean basis, there is little difference in flow at the Portland gage between the Proposed Action, and No Action Alternative. The maximum mean monthly difference between the Proposed Action and No Action Alternative is 5 percent. Such minor differences in flows are unlikely to affect nutrient concentrations. There are slightly larger differences in streamflow between Existing Conditions and the cumulative effects alternatives, particularly during high flows. Overall, there is little differences in streamflow for all of the alternatives.

Table 6-15. Portland Gage – Monthly Mean Streamflow Summary of Cumulative Effects

Month	Monthly Mean Streamflow			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	%
Oct	412	419	413	6	1	-5	-1%
Nov	449	447	447	-2	-2	0	0%
Dec	407	415	413	9	7	-2	0%
Jan	384	392	383	8	-1	-9	-2%
Feb	389	391	372	2	-17	-19	-5%
Mar	507	487	469	-20	-38	-18	-4%
Apr	576	543	549	-33	-26	6	1%
May	1,199	1,317	1,312	118	113	-6	0%
Jun	2,488	2,461	2,445	-28	-44	-16	-1%
Jul	1,538	1,535	1,527	-4	-11	-7	0%
Aug	856	853	850	-2	-6	-4	0%
Sep	460	461	452	1	-7	-9	-2%
Average	805	810	803	5	-3	-7	-1%

Effects (cfs) = Proposed Action - No Action discharge. Effects (%) = (Proposed Action - No Action)/No Action

Streamflow at the Avondale gage is similar for the Proposed Action, No Action Alternative, and Existing Conditions. The average annual difference in streamflow between the No Action Alternative and Proposed Action is 0 percent and the maximum mean monthly difference is 2 percent as shown in **Table 6-16**. Therefore, hydrologic differences between the Proposed Action and No Action Alternative are not expected to result in substantially different nutrient concentrations at the Avondale gage.

Table 6-16. Avondale Gage – Monthly Mean Streamflow Summary of Cumulative Effects

Month	Monthly Mean Streamflow			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	%
Oct	450	476	482	26	32	6	1%
Nov	491	535	539	44	48	4	1%
Dec	468	472	474	4	6	2	0%
Jan	491	493	501	2	10	8	2%
Feb	527	554	560	27	33	6	1%
Mar	579	620	618	41	39	-2	0%
Apr	920	919	918	-1	-2	-1	0%
May	1,599	1,693	1,680	94	81	-13	-1%
Jun	2,632	2,637	2,602	5	-30	-35	-1%
Jul	1,583	1,585	1,583	2	0	-2	0%
Aug	991	1,006	1,007	15	16	1	0%
Sep	487	491	493	4	6	2	0%
Average	**935**	**957**	**955**	**22**	**20**	**-2**	**0%**

Effects (cfs) = Proposed Action - No Action discharge. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

Minimal difference in nutrient concentrations in the middle and lower Arkansas River would be expected between the Proposed Action and No Action Alternative.

6.7. Reservoir Cumulative Effects

Nutrient loading is an important part of general reservoir water quality due to its potential effects on algae growth and an increased rate of eutrophication. As discussed in Section 6.6, nutrient loading from external sources to study area reservoirs is not likely to change due to the Proposed Action and No Action Alternative. The following discussion evaluates characteristics of reservoirs affected by hydrology.

6.7.1. Turquoise Reservoir

Simulated depth, source water, and residence time for Existing Conditions, Proposed Action, and No Action Alternative cumulative effects are discussed below.

6.7.1.1. Source Water

Table 6-17 and **Figure 6-10** summarize the simulated percentage of source water from the Western Slope delivered to Turquoise Reservoir compared to native runoff from the tributary watershed.

Table 6-17. Turquoise Reservoir Annual Mean Percentage of Source Water from Western Slope - Cumulative Effects

Water Year	Existing Conditions	No Action	Proposed Action	Change from Existing		Proposed Action – No Action Effects
				No Action	Proposed Action	
1982	77%	77%	77%	0%	0%	0%
1983	77%	76%	76%	-1%	-1%	0%
1984	92%	92%	92%	0%	0%	0%
1985	89%	90%	89%	1%	0%	-1%
1986	92%	92%	92%	0%	0%	0%
1987	72%	71%	74%	-1%	2%	3%
1988	89%	89%	90%	0%	1%	1%
1989	78%	77%	78%	-1%	0%	1%
1990	88%	89%	88%	1%	0%	-1%
1991	92%	92%	92%	0%	0%	0%
1992	86%	86%	86%	0%	0%	0%
1993	93%	93%	93%	0%	0%	0%
1994	81%	80%	81%	-1%	0%	1%
1995	90%	90%	90%	0%	0%	0%
1996	86%	87%	86%	1%	0%	-1%
1997	92%	92%	93%	0%	1%	1%
1998	90%	90%	90%	0%	0%	0%
1999	87%	87%	88%	0%	1%	1%
2000	90%	90%	90%	0%	0%	0%
2001	93%	94%	94%	1%	1%	0%
2002	75%	76%	76%	1%	1%	0%
Average	**87%**	**87%**	**87%**	**0%**	**0%**	**0%**

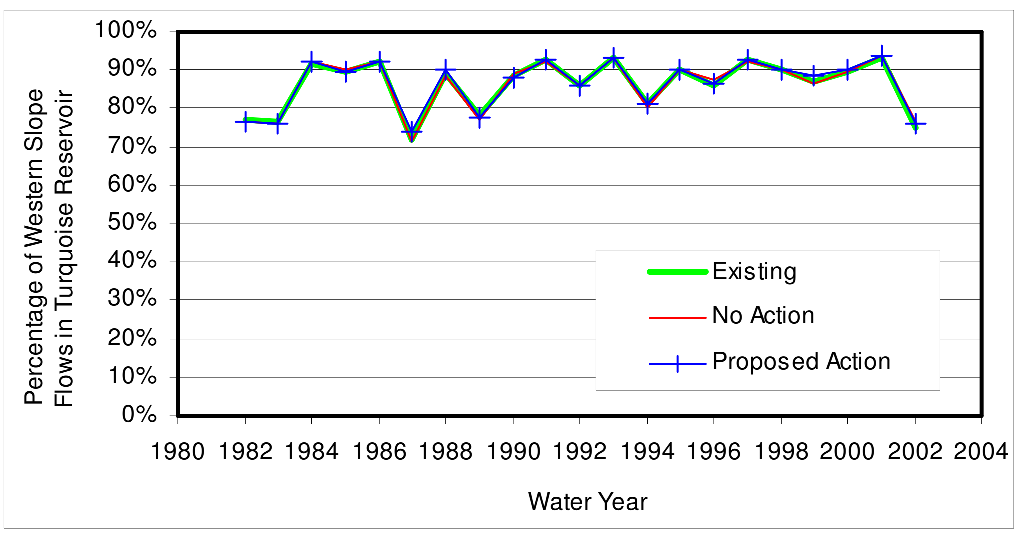


Figure 6-10. Turquoise Reservoir Annual Mean Percentage of Source Water from Western Slope Cumulative Effects

The percentages of water from the Western Slope were nearly the same for the alternatives in every year. On average there was no difference in the percentage of water from the Western Slope. Therefore, there would be no effect on water quality due to differences in Western Slope water percentage.

6.7.1.2. Depth

Table 6-18, **Figure 6-11** and **Figure 6-12** summarize the simulated depth of Turquoise Reservoir under the Proposed Action, No Action Alternative, and Existing Conditions.

Table 6-18. Turquoise Reservoir Mean Monthly Depth Cumulative Effects

Month	Monthly Mean Depth			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	%
Oct	108	106	107	-2	-1	1	1%
Nov	106	104	105	-2	-1	1	1%
Dec	103	101	102	-2	-1	1	1%
Jan	101	99	99	-2	-2	0	0%
Feb	98	96	97	-3	-1	1	1%
Mar	92	90	92	-2	-1	2	2%
Apr	80	81	82	0	1	1	1%
May	78	77	78	-1	0	1	1%
Jun	101	100	100	-1	-1	0	0%
Jul	112	111	111	-1	-1	0	0%
Aug	111	110	110	-1	-1	0	0%
Sep	109	108	109	-1	-1	1	1%
Average	**100**	**98**	**99**	**-2**	**-1**	**1**	**1%**

Effects (ft) = Proposed Action - No Action depth. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

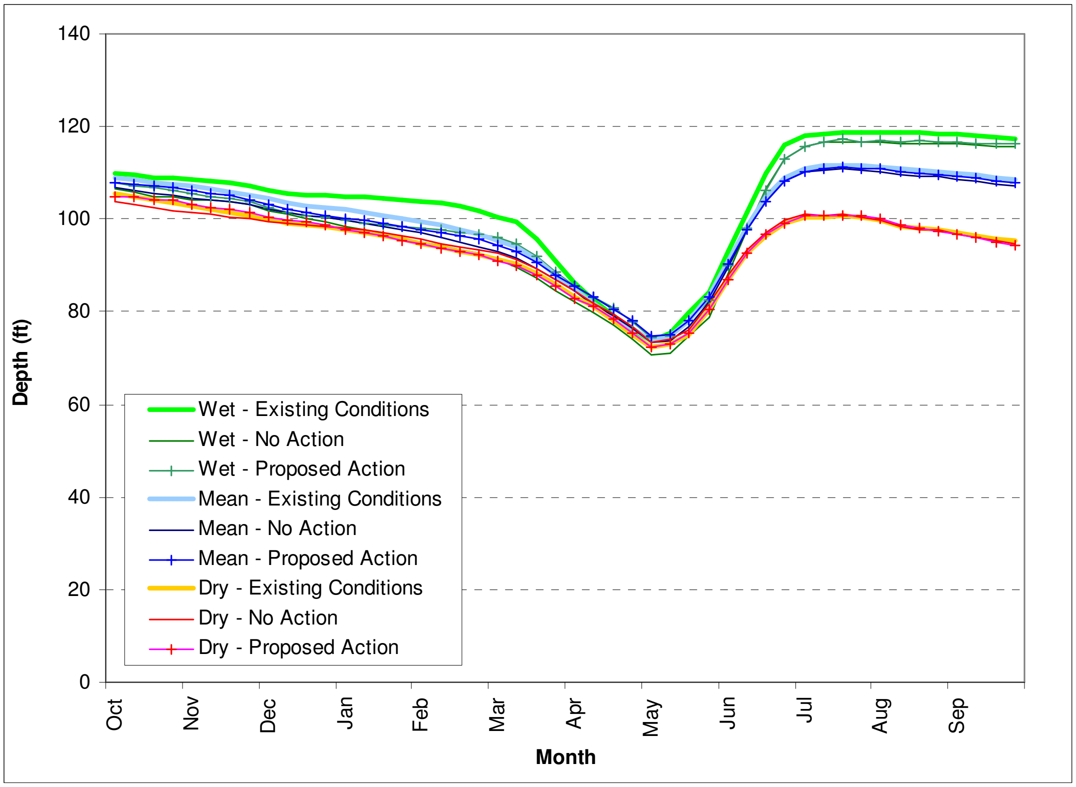


Figure 6-11. Turquoise Reservoir Quarter-Monthly Depth Cumulative Effects

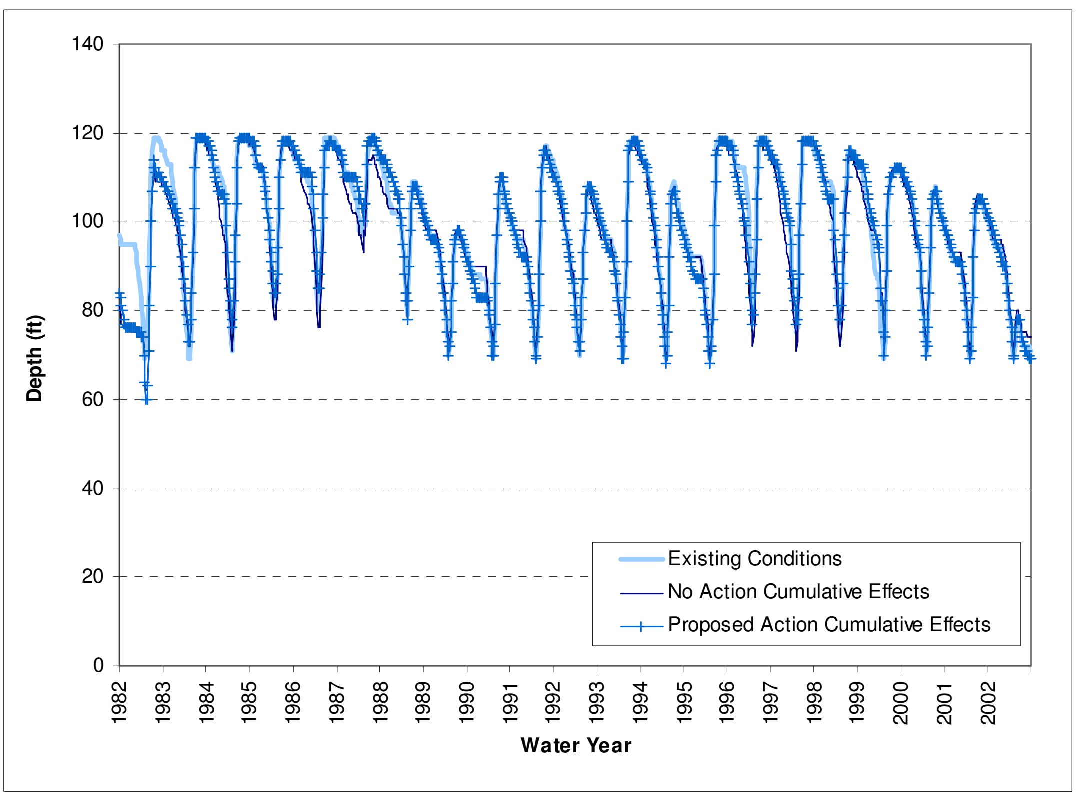


Figure 6-12. Turquoise Reservoir Depth Time Series Cumulative Effects

There was very little difference in reservoir depth between the scenarios. On average, the depths under the different scenarios were within 1 foot of each other, 1 percent different. The minor differences in depth would not be expected to affect water quality.

Similarly, because there is little difference in the amount of Western Slope water in Turquoise Reservoir, there is not expected to be any effect on the water quality of Pueblo Reservoir due to changes in the amount of water from the Western Slope.

6.7.1.3. Residence Time

Cumulative effects on residence time in Turquoise Reservoir are summarized in **Table 6-19** and **Figure 6-13**.

Table 6-19. Mean Annual Residence Time – Turquoise Reservoir – Cumulative Effects

Water Year	Existing Conditions	No Action	Proposed Action	Change from Existing		Proposed Action – No Action Effects	
				No Action	Proposed Action		
	(days)	(days)	(days)	(days)	(days)	(days)	%
1982	273	215	234	-58	-39	19	9%
1983	202	223	225	21	23	2	1%
1984	192	181	192	-11	0	11	6%
1985	265	250	267	-15	2	17	7%
1986	286	277	282	-9	-4	5	2%
1987	314	301	317	-13	3	16	5%
1988	346	357	302	11	-44	-55	-15%
1989	253	268	264	15	11	-4	-1%
1990	348	361	362	13	14	1	0%
1991	352	336	333	-16	-19	-3	-1%
1992	250	252	252	2	2	0	0%
1993	258	258	261	0	3	3	1%
1994	229	224	226	-5	-3	2	1%
1995	219	214	202	-5	-17	-12	-6%
1996	257	222	248	-35	-9	26	12%
1997	225	226	229	1	4	3	1%
1998	277	256	269	-21	-8	13	5%
1999	314	348	300	34	-14	-48	-14%
2000	268	276	260	8	-8	-16	-6%
2001	315	319	314	4	-1	-5	-2%
2002	274	291	262	17	-12	-29	-10%
Average	**272**	**269**	**267**	**-3**	**-5**	**-2**	**-1%**

Effects (days) = Proposed Action – No Action days, Effects (%) = (Proposed Action - No Action)/No Action

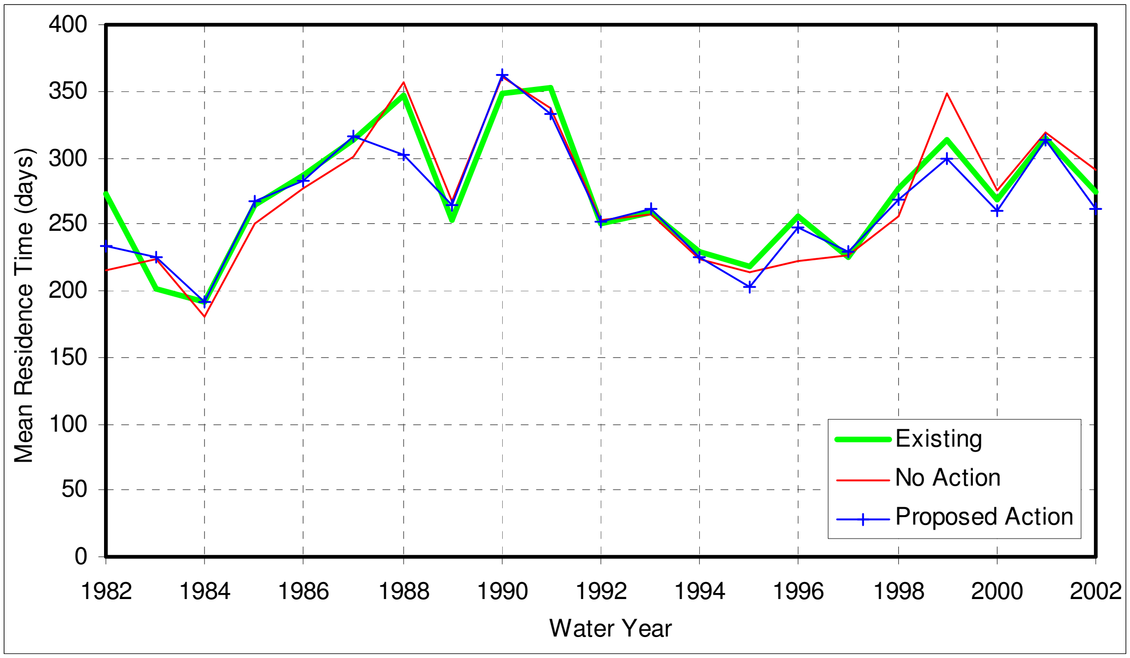


Figure 6-13. Mean Annual Residence Time – Turquoise Reservoir – Cumulative Effects

On average, the Proposed Action and No Action Alternative resulted in slightly shorter residence times than Existing Conditions. However, residence times were generally similar for all of the alternatives. The biggest difference in residence time between the Proposed Action and No Action Alternative was 55 days, or 15 percent. The average residence time under the Proposed Action was 2 days, or 1 percent, shorter than the No Action Alternative. Such small changes are unlikely to affect the water quality of Turquoise Reservoir.

6.7.2. Pueblo Reservoir

Simulated depth and residence time for Pueblo Reservoir are discussed below for cumulative effects scenarios.

6.7.2.1. Depth

The simulated depth of Pueblo Reservoir is summarized in **Table 6-20**, **Figure 6-14**, and **Figure 6-15**.

Table 6-20. Pueblo Reservoir Mean Monthly Depth Cumulative Effects

Month	Monthly Mean Depth			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	%
Oct	127	120	123	-7	-4	3	3%
Nov	129	122	125	-7	-4	3	2%
Dec	132	126	129	-6	-3	3	2%
Jan	136	131	132	-5	-4	1	1%
Feb	138	133	134	-5	-4	1	1%
Mar	140	135	136	-5	-4	1	1%
Apr	139	132	134	-7	-5	2	2%
May	137	130	132	-7	-5	2	2%
Jun	136	129	132	-7	-4	3	2%
Jul	133	126	129	-7	-4	3	2%
Aug	131	123	126	-8	-5	3	2%
Sep	128	120	123	-8	-5	3	3%
Average	**134**	**127**	**130**	**-7**	**-4**	**3**	**2%**

Effects (ft) = Proposed Action - No Action depth. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

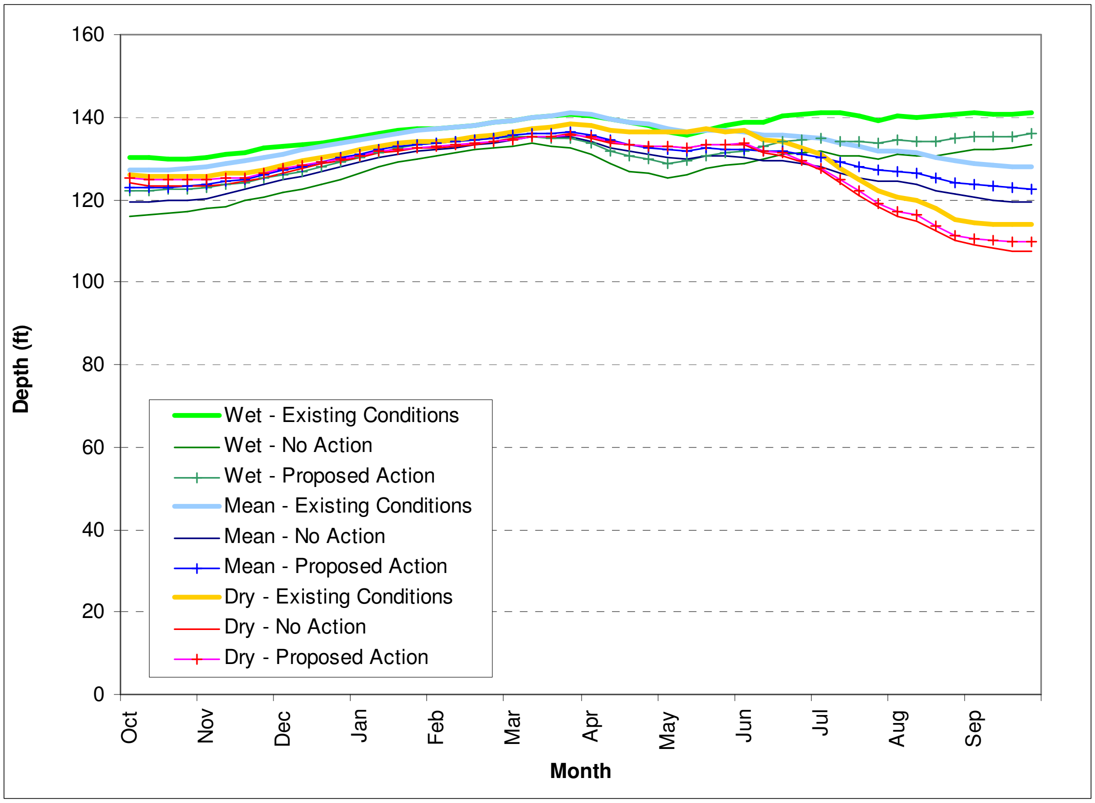


Figure 6-14. Pueblo Reservoir Quarter-Monthly Depth Cumulative Effects

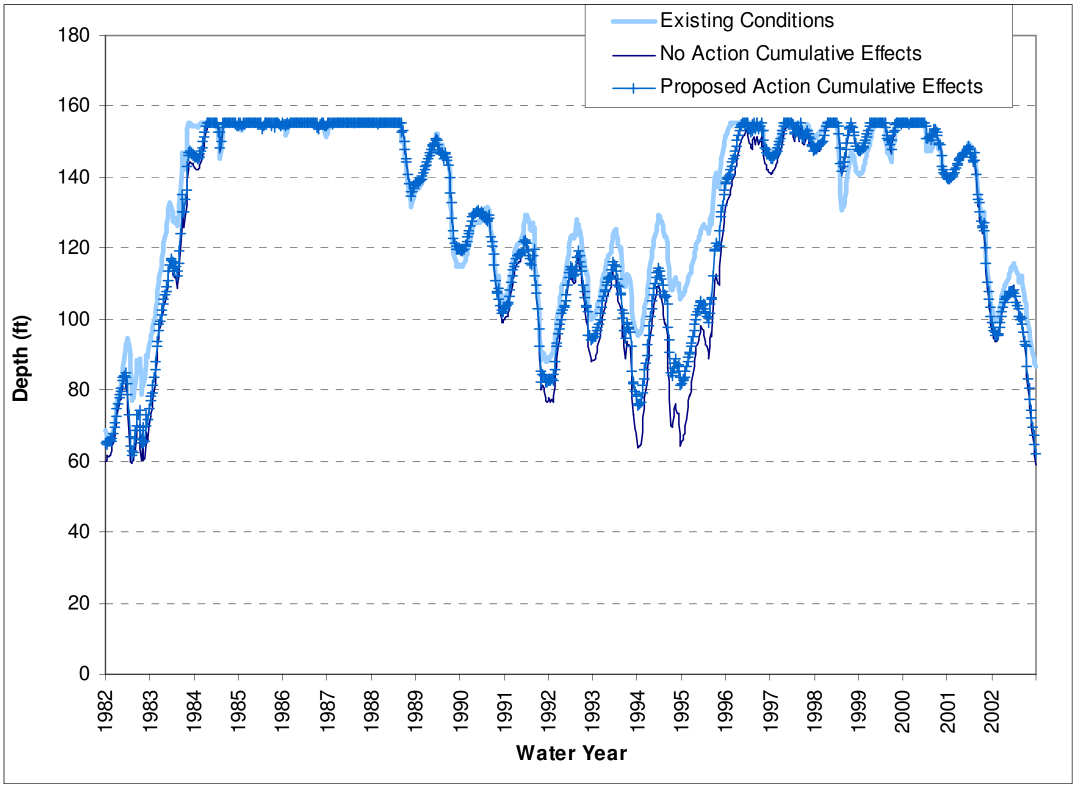


Figure 6-15. Pueblo Reservoir Time Series Depth Cumulative Effects

The No Action Alternative and Proposed Action result in shallower depths than Existing Conditions. There is no numerical threshold for the depth when stratification is disrupted because there are many factors, in addition to depth, affecting stratification. However, the minimal differences in monthly mean depth, less than 5 percent between the alternatives and less than 10 percent between the alternatives and Existing Conditions, are unlikely to result in a change in stratification.

Stratification is most likely to be disrupted in study period years in Figure 6-15 when reservoir depths are unusually shallow, such as 1991 to 1995. The annual minimums shown in those years were simulated to occur in the fall, rather than summer. The reservoir typically mixes in fall under Existing Conditions. In those unusual years, water quality effects of reduced depth are more likely for the No Action alternative. The most likely effect, if any, of upsetting the stratification pattern is that the reservoir would mix earlier than usual in the fall, combining layers of water of different qualities. Effects are more likely for the No Action Alternative.

6.7.2.2. Residence Time

Residence time in Pueblo Reservoir is summarized in **Table 6-21** and **Figure 6-16**.

Table 6-21. Pueblo Reservoir Mean Annual Residence Time Cumulative Effects

Water Year	Existing Conditions	No Action	Proposed Action	Change from Existing		Proposed Action – No Action Effects	
				No Action	Proposed Action		
	(days)	(days)	(days)	(days)	(days)	(days)	(%)
1982	29	16	19	-13	-10	3	19%
1983	92	64	71	-27	-21	7	11%
1984	99	100	100	1	1	0	0%
1985	110	108	109	-1	-1	1	1%
1986	127	129	129	2	2	0	0%
1987	124	122	123	-3	-2	1	1%
1988	152	156	157	4	4	1	1%
1989	143	149	149	6	7	0	0%
1990	105	100	104	-5	-1	4	4%
1991	81	68	72	-13	-9	4	6%
1992	77	58	64	-19	-13	6	10%
1993	67	42	49	-24	-17	7	17%
1994	72	33	43	-39	-29	10	30%
1995	63	29	39	-34	-24	10	34%
1996	139	129	141	-9	2	12	9%
1997	129	121	124	-7	-4	3	2%
1998	159	178	178	19	20	0	0%
1999	131	130	131	-1	0	1	1%
2000	171	172	174	1	2	2	1%
2001	124	116	119	-7	-5	3	3%
2002	107	77	81	-30	-27	4	5%
Average	**109**	**100**	**104**	**-10**	**-6**	**4**	**4%**

Effects (days) = Proposed Action – No Action days, Effects (%) = (Proposed Action - No Action)/No Action

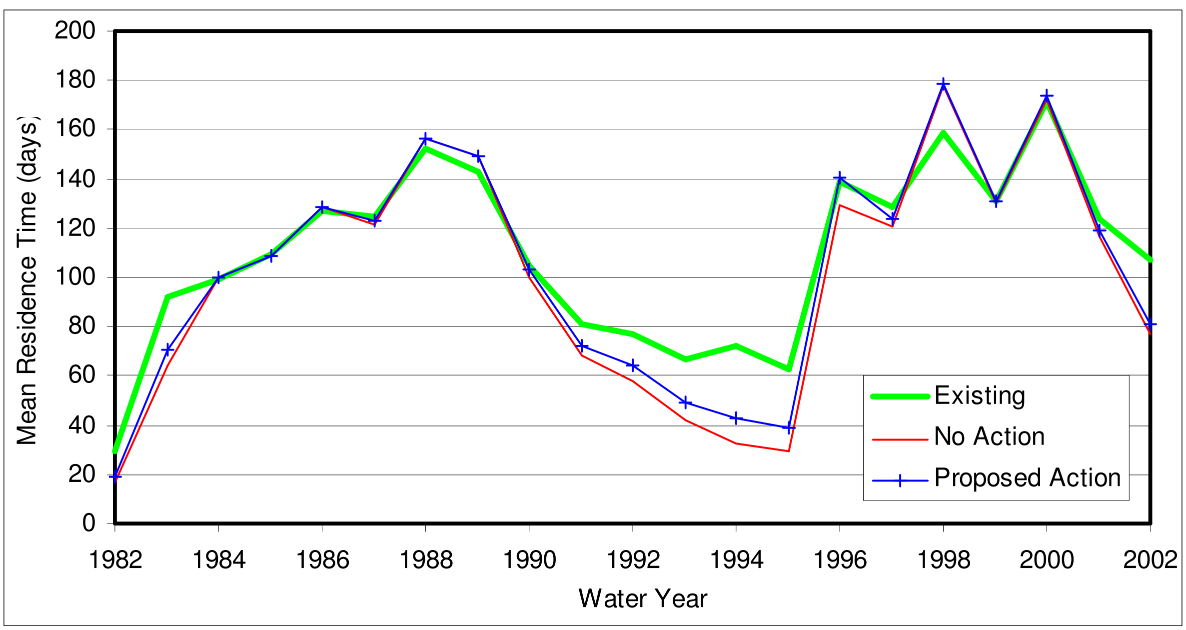


Figure 6-16. Pueblo Reservoir Mean Annual Residence Time Cumulative Effects

Shorter residence times are generally beneficial to water quality. In almost every year, residence time in Pueblo Reservoir was decreased under the Proposed Action and No Action Alternative compared to Existing Conditions. On average, the Proposed Action resulted in annual mean residence time 6 days shorter than Existing Conditions. On average, the No Action Alternative resulted in annual mean residence time 10 days shorter than Existing Conditions. In years when residence times were shortest, on the order of 30 to 50 days, differences between the scenarios were greater. On average, the No Action Alternative resulted in a residence time 4 days shorter than the Proposed Action, a difference of 4 percent. The overall decrease in residence time due to the Proposed Action and No Action Alternative could potentially improve water quality in Pueblo Reservoir compared to Existing Conditions. The potential benefits of reduced residence time are greater for the No Action Alternative than the Proposed Action.

6.7.3. Lake Meredith

Simulated depth in Lake Meredith is discussed below. The residence time in Lakes Henry and Meredith is calculated together and discussed below.

6.7.3.1. Depth

The simulated depth of Lake Meredith under the Proposed Action, No Action Alternative and Existing Conditions is summarized in **Table 6-22** and **Figure 6-17**.

Table 6-22. Lake Meredith Mean Monthly Depth Cumulative Effects

Month	Monthly Mean Depth			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	%
Oct	6.9	11.0	9.8	4.1	2.9	-1.2	-11%
Nov	6.8	11.2	10.1	4.4	3.3	-1.1	-10%
Dec	7.2	11.1	10.2	4.0	3.0	-0.9	-8%
Jan	7.8	11.1	10.1	3.3	2.3	-1.0	-9%
Feb	7.9	10.7	9.7	2.8	1.8	-1.0	-9%
Mar	9.7	11.2	10.1	1.5	0.5	-1.1	-10%
Apr	9.3	11.4	10.0	2.1	0.7	-1.4	-12%
May	7.9	11.0	9.6	3.1	1.7	-1.4	-13%
Jun	6.2	10.8	9.1	4.5	2.8	-1.7	-16%
Jul	7.2	11.1	9.4	4.0	2.2	-1.7	-15%
Aug	7.2	11.1	9.5	3.9	2.4	-1.6	-14%
Sep	7.1	11.0	9.6	3.9	2.5	-1.4	-13%
Average	**7.6**	**11.1**	**9.8**	**3.5**	**2.2**	**-1.3**	**-12%**

Effects (ft) = Proposed Action - No Action depth. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

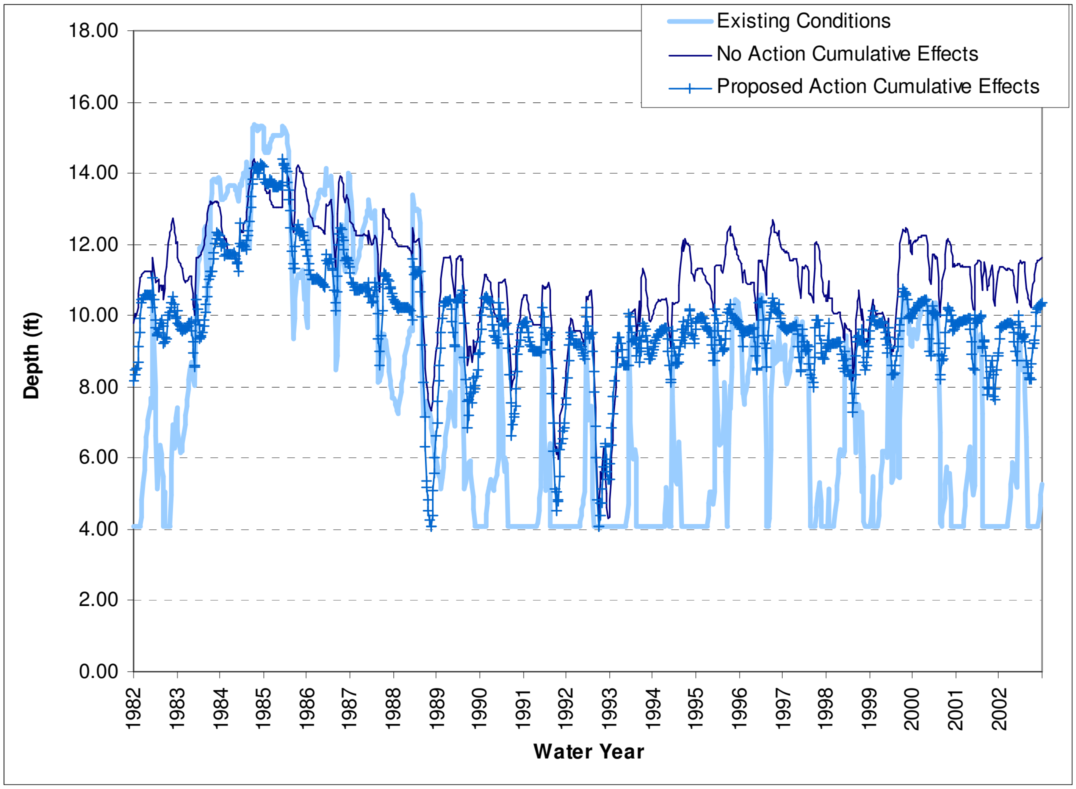


Figure 6-17. Lake Meredith Time Series Depth Cumulative Effects

Under cumulative effects conditions, the No Action Alternative and Proposed Action resulted in much greater average depths in Lake Meredith than under Existing Conditions. Potential effects from depth changes are not evaluated for reservoirs that do not strongly stratify.

6.7.3.2. Residence Time

Residence time in Lakes Henry and Meredith is summarized in **Table 6-23** and **Figure 6-18**. Residence time for Lake Henry and Lake Meredith is calculated for the combined lakes due to the way that Lakes Henry and Meredith were modeled in the Quarter-Monthly Model.

Table 6-23. Lakes Henry and Meredith Mean Annual Residence Time Cumulative Effects

Water Year	Existing Conditions	No Action	Proposed Action	Change from Existing		Proposed Action – No Action Effects	
				No Action	Proposed Action		
	(days)	(days)	(days)	(days)	(days)	(days)	(%)
1982	39	206	137	166	98	-68	-33%
1983	165	365	201	200	36	-165	-45%
1984	256	378	295	122	39	-83	-22%
1985	237	360	323	123	85	-38	-10%
1986	220	391	304	171	84	-87	-22%
1987	165	319	254	154	89	-65	-20%
1988	159	228	169	70	10	-59	-26%
1989	89	211	200	122	111	-11	-5%
1990	50	237	242	187	193	6	2%
1991	51	190	176	139	125	-14	-8%
1992	51	153	166	102	115	13	8%
1993	38	226	196	188	158	-30	-13%
1994	42	249	167	208	125	-83	-33%
1995	73	307	187	234	114	-120	-39%
1996	107	291	191	184	84	-100	-34%
1997	95	245	191	150	96	-54	-22%
1998	76	206	203	130	127	-3	-1%
1999	78	206	151	128	73	-55	-27%
2000	129	297	213	168	85	-84	-28%
2001	61	273	197	212	136	-76	-28%
2002	87	380	300	293	213	-80	-21%
Average	**108**	**272**	**212**	**164**	**104**	**-60**	**-22%**

Effects (days) = Proposed Action – No Action days, Effects (%) = (Proposed Action - No Action)/No Action

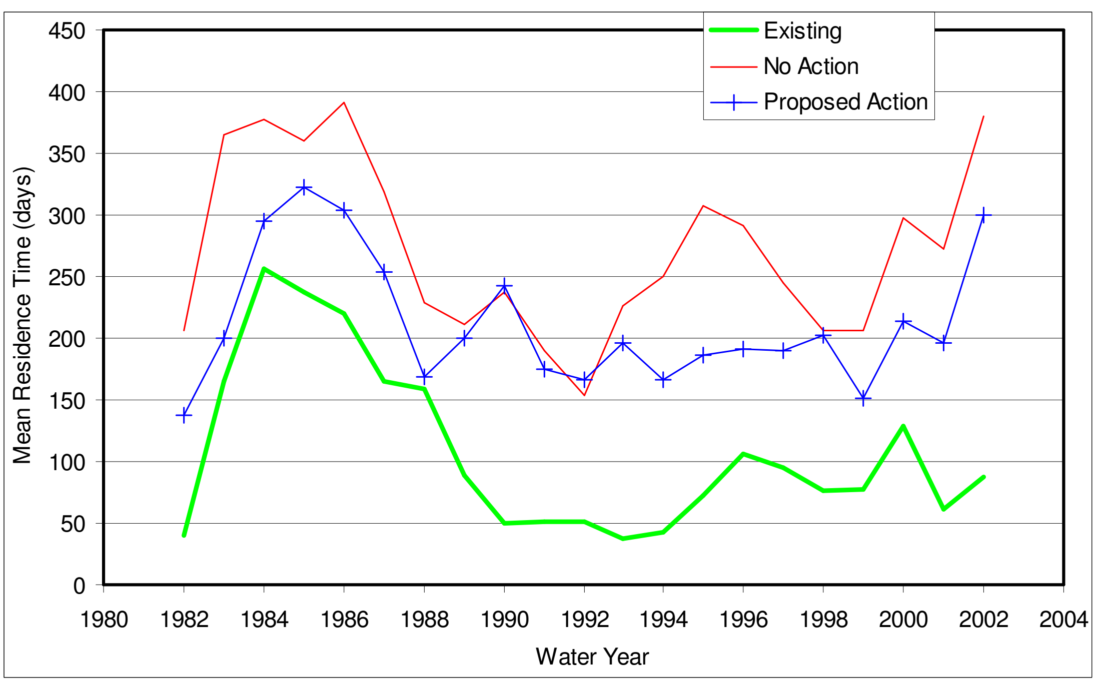


Figure 6-18. Lakes Henry and Meredith Mean Annual Residence Time Cumulative Effects

The cumulative effects No Action Alternative and Proposed Action resulted in generally longer residence times than the Existing Conditions simulation. The No Action Alternative resulted in 22 percent longer residence time than the Proposed Action. In reservoirs that do not strongly stratify, two potential adverse effects of increasing residence time are evapoconcentration and increased algae production.

Although the salinity model indicated an increased annual average concentration of dissolved constituents (see Figure 6-4), effects of the Proposed Action and No Action are based on the 85th percentile of simulated data. The 85th percentile of specific conductance was reduced for the cumulative effects Proposed Action and No Action, compared to Existing Conditions.

Both the Proposed Action and No Action Alternative could potentially result in more algae growth than Existing Conditions due to the longer residence time. Without a reservoir model, the likely amount of increased algae growth cannot be quantified. However, the reservoirs are shallow, and mixing due to wind and wave action is likely to reaerate the water to counteract the loss of oxygen due to decomposition and algal respiration.

6.7.4. Lake Henry

Simulated depth in Lake Henry is summarized in **Table 6-24** and **Figure 6-19**.

Table 6-24. Lake Henry Mean Monthly Depth Cumulative Effects

Month	Monthly Mean Depth			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	%
Oct	8.5	9.4	9.4	0.9	0.9	0	0%
Nov	8.4	9.2	9.2	0.8	0.8	0	0%
Dec	8.9	9.2	9.2	0.3	0.3	0	0%
Jan	9.3	9.3	9.3	0.0	0.0	0	0%
Feb	10.7	10.7	10.7	0.0	0.0	0	0%
Mar	12.1	12.1	12.1	0.0	0.0	0	0%
Apr	12.3	12.3	12.3	0.0	0.0	0	0%
May	11.8	12.0	12.0	0.2	0.2	0	0%
Jun	10.9	11.8	11.8	0.9	0.9	0	0%
Jul	10.7	11.3	11.3	0.6	0.6	0	0%
Aug	9.9	10.7	10.7	0.8	0.8	0	0%
Sep	8.9	10.0	10.0	1.1	1.1	0	0%
Average	**10.2**	**10.7**	**10.7**	**0.5**	**0.5**	**0**	**0%**

Effects (ft) = Proposed Action - No Action depth. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

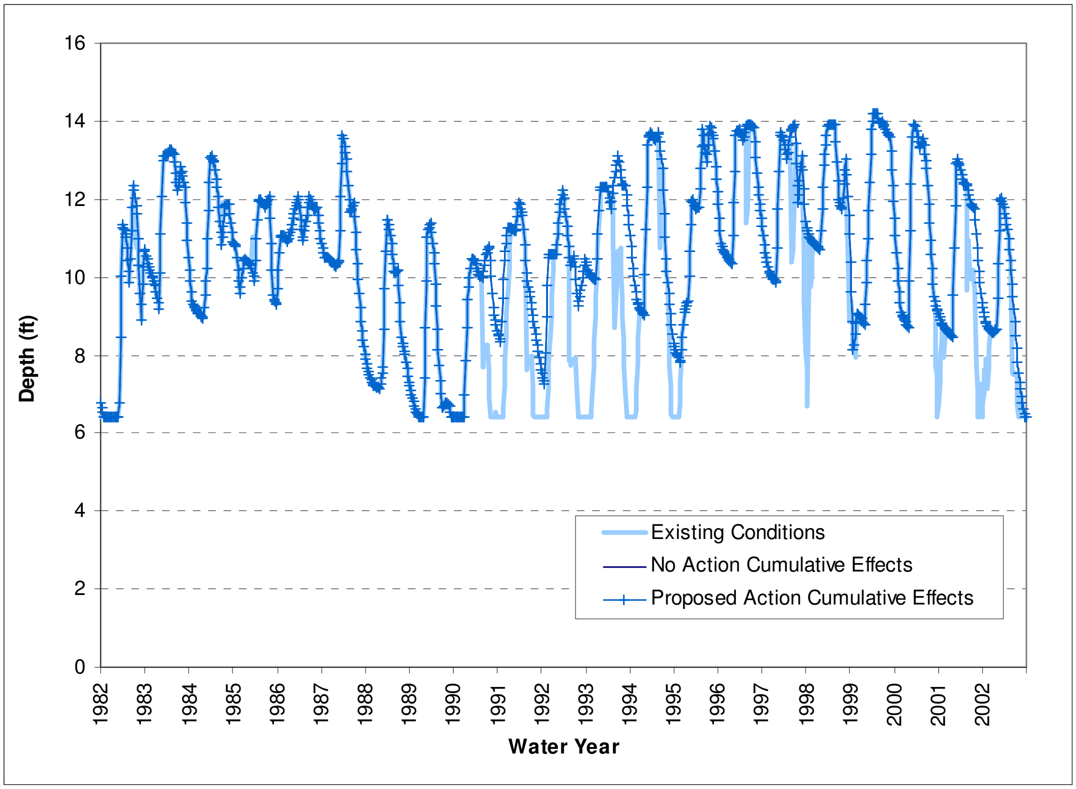


Figure 6-19. Lake Henry Time Series Depth Cummulative Effects

Depths under the No Action Alternative and Proposed Action are exactly the same due to the way the Quarter-Monthly Model simulates storage in the reservoirs. Potential impacts from depth changes are not evaluated for reservoirs that do not strongly stratify.

6.7.5. Holbrook Reservoir

Holbrook Reservoir simulated depth is summarized in **Table 6-25**, **Figure 6-20**, and **Figure 6-21**. Residence time calculations and mass balance calculations could not be performed for Holbrook Reservoir with the available modeling results.

Table 6-25. Holbrook Reservoir Mean Monthly Depth Cumulative Effects

Month	Monthly Mean Depth			Change from Existing		Proposed Action – No Action Effects	
	Existing Conditions	No Action	Proposed Action	No Action	Proposed Action		
	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	%
Oct	6.4	6.4	8.2	0.0	1.9	1.8	28%
Nov	7.0	7.0	8.8	0.0	1.8	1.8	26%
Dec	8.4	8.4	9.7	0.0	1.4	1.3	15%
Jan	11.1	11.1	12.0	0.0	0.8	0.9	8%
Feb	12.9	12.9	13.5	0.0	0.7	0.6	5%
Mar	14.0	14.0	14.6	0.0	0.7	0.6	4%
Apr	13.8	13.8	14.4	0.0	0.7	0.6	4%
May	12.9	12.9	13.1	0.0	0.2	0.2	2%
Jun	12.4	12.4	12.8	0.0	0.4	0.4	3%
Jul	9.8	9.8	10.9	0.0	1.1	1.1	11%
Aug	7.4	7.4	8.5	0.0	1.0	1.1	15%
Sep	6.4	6.4	8.0	0.0	1.7	1.6	25%
Average	**10.2**	**10.2**	**11.2**	**0.0**	**1.0**	**1.0**	**10%**

Effects (ft) = Proposed Action - No Action depth. Effects (%) = (Proposed Action - No Action)/No Action
Source: MWH, 2005b

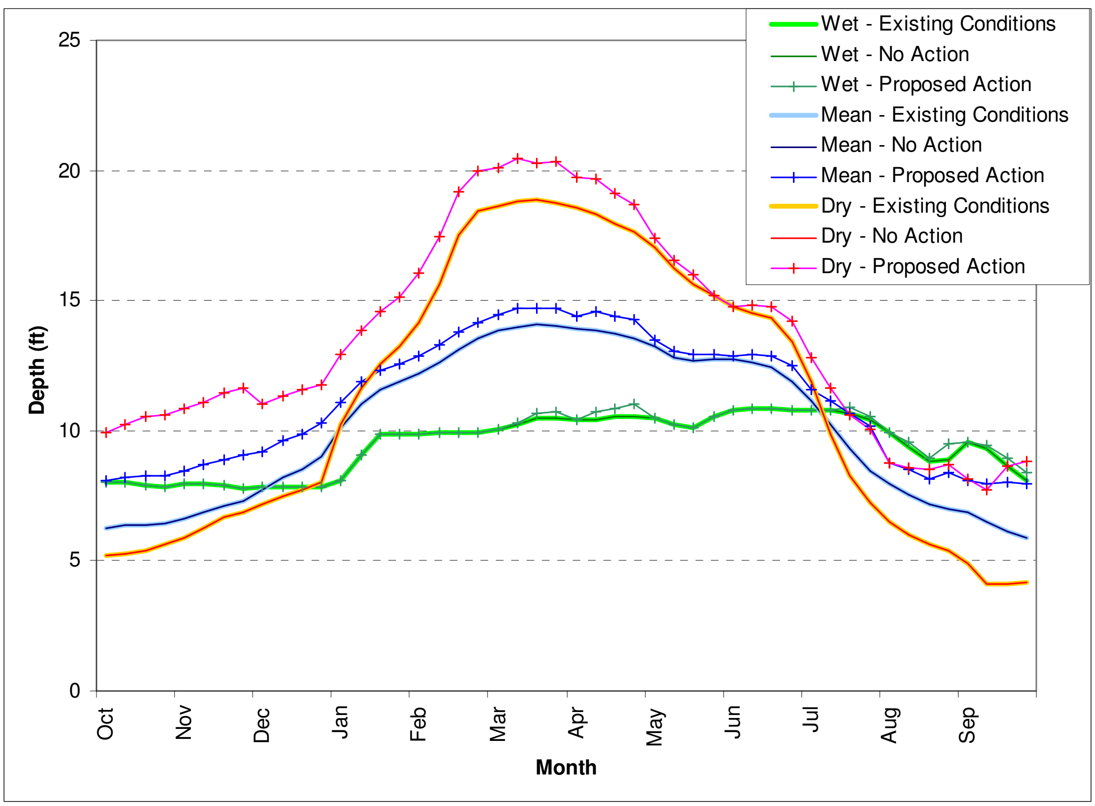


Figure 6-20. Holbrook Reservoir Quarter-Monthly Depth Cumulative Effects

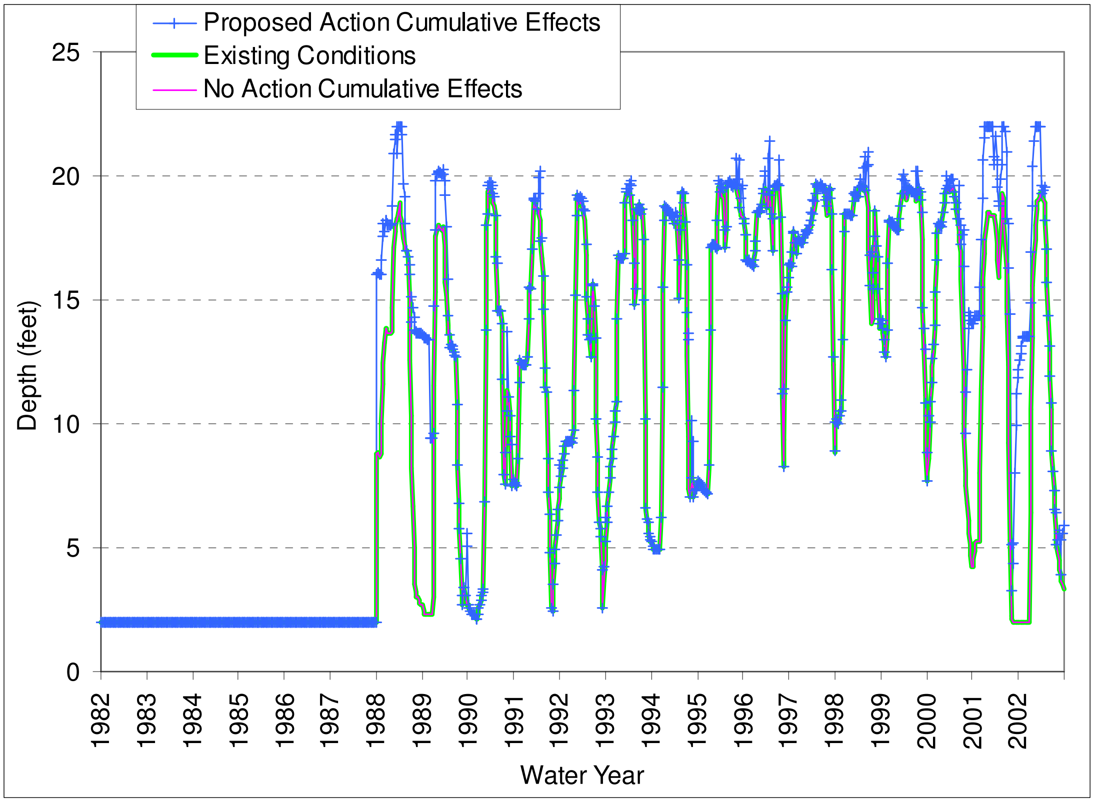


Figure 6-21. Holbrook Reservoir Time Series Depth Cumulative Effects

Note: no data available prior to 1988

The No Action Alternative and Existing Conditions resulted in equal depths in Holbrook Reservoir because of the assumption that Aurora does not utilize ROY storage under the Existing Conditions or the No Action Alternative. The Proposed Action alternative resulted in greater depths and more storage in Holbrook Reservoir on average. Qualitatively, the Proposed Action generally results in additional seasonal storage in Holbrook Reservoir. Additional water would be stored and then moved out of the reservoir, rather than remain in the reservoir for extended periods. Because substantial evapoconcentration is not likely, no adverse effects to water quality are expected due to the Proposed Action.

6.8. Cumulative Effects Summary

Changes to water quality in the study area would be minimal due to the Proposed Action and No Action Alternative under cumulative effects conditions. Analysis of salinity, dissolved selenium, metals, nutrients, and changes to source water all resulted in little to no change between Existing Conditions, Proposed Action and the No Action Alternative. The most substantial changes simulated were:

- Pueblo Reservoir depth was simulated to decrease in some years due to the Proposed Action and the No Action Alternative compared to the direct effects scenarios. The No Action Alternative was simulated to result in shallower depths than the Proposed Action. In those particular years, changes to the stratification pattern are not very likely because the reservoir is still at least 60 feet deep. But, changes to the stratification pattern are more likely for the Proposed Action and No Action Alternative than Existing Conditions. The most likely effect of upsetting the stratification pattern is that the reservoir would mix earlier than usual in the fall, combining layers of water of different qualities. On an average monthly basis, the reservoir depths only differ by a maximum of 7 feet between Existing Conditions, Proposed Action, and the No Action Alternative. Therefore, on an average basis, no substantial change to the stratification pattern due to differences in depth would be expected.

- Residence time in Lake Henry and Lake Meredith increases on an average annual basis for both the Proposed Action and No Action Alternative compared to Existing Conditions. The primary concern of increasing the residence time of a well-mixed reservoir is that constituents could evapoconcentrate. However, the results of the salinity modeling indicated that the 85^{th} percentile of specific conductance actually decreased for the Proposed Action and No Action Alternative compared to Existing Conditions. Therefore, adverse effects of the increased residence time are not expected.

7. References

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Appendix A – Water Quality Standards

Regulation 32 includes numeric standards for each stream segment in the Study Area. The standards for the Study Area are summarized in Table A-1. In some cases Table Value Standards (TVS) are adopted for particular parameters. TVS refers to numeric criteria set forth in the Basic Standards and Methodologies for Surface Water. The TVS are listed in Table A-2.

Table A-1. Arkansas Basin Water Quality Standards

Basin	Seg	Segment Description	Phys & Bio	Inorganic* mg/L		Metals µg/L			Temp. mods and qualifiers
Upper Arkansas River	2c	Mainstem of the Arkansas River between Lake Fork and Lake Creek	D.O.=6.0 mg/L D.O.(sp)=7.0 mg/L pH=6.5-9.0 F. Coli=200/100mL E. Coli=126/100mL	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	Temporary modifications: no Zn(ac) Zn(ch)=250 Expiration date of 12/31/07.
Upper Arkansas River	3	Mainstem of the Arkansas River between Lake Creek and Pueblo Reservoir inlet	D.O.=6.0 mg/L D.O.(sp)=7.0 mg/L pH=6.5-9.0 F. Coli=200/100mL E. Coli=126/100mL	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	Temporary modifications: Pb(ch)=1.8 Zn(ch)=101 Expiration date of 12/31/07.
Upper Arkansas River	5	All tributaries to the Arkansas River, including wetlands, lakes and reservoirs, from the source to immediately below the confluence with Browns Creeks, except for specific listings in segments 6 through 12 (includes Turquoise Reservoir).	D.O.=6.0 mg/L D.O.(sp)=7.0 mg/L pH=6.5-9.0 F. Coli=200/100mL E. Coli=126/100mL	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	Temporary modifications: Zn(ch)=78 Expiration date of 12/31/07
Upper Arkansas River	10	Mainstem of Lake Creek, including all tributaries, wetlands, lakes and reservoirs, from the source to the confluence with the Arkansas River, except for the specific listing in segment 11 (includes Twin Lakes Reservoir).	D.O.=6.0 mg/L D.O.(sp)=7.0 mg/L pH=6.5-9.0 F. Coli=200/100mL E. Coli=126/100mL	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac)=TVS	Cu(ch)=8 Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
Middle Arkansas River	1	Pueblo Reservoir	D.O.=6.0 mg/L D.O.(sp)=7.0 mg/L pH=6.5-9.0 F. Coli=200/100mL E. Coli=126/100mL	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
Middle Arkansas River	2	Mainstem of the Arkansas River between Pueblo Reservoir outlet and Wildhorse/Dry Creek Arroyo	D.O.=6.0 mg/L D.O.(sp)=7.0 mg/L pH=6.5-9.0 F. Coli=200/100mL E. Coli=126/100mL	NH_3(ac)=TVS NH_3(ch)=0.02 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=50(Trec) Cd(ac)=TVS(tr) Cd(ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	Temporary modification: Se(ch)=6, based on uncertainty. Expiration date of 12/31/07

Basin	Seg	Segment Description	Phys & Bio	Inorganic* mg/L		Metals µg/L			Temp. mods and qualifiers
Middle Arkansas River	3	Mainstem of the Arkansas River between Wildhorse/Dry Creek Arroyo and Fountain Creek	D.O.=5.0 mg/L pH=6.5-9.0 F. Coli=200/100mL E. Coli=126/100mL	NH_3(ac)=TVS NH_3(ch)=0.06 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=50(Trec) Cd(ac/ch)=TVS CrIII(ac)=TVS (Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	Temporary modification: Se(ch)=11.7, based on uncertainty. Expiration date of 12/31/07
Lower Arkansas River	1a	Mainstem of the Arkansas River between Fountain Creek to above the Colorado Canal Headgate	D.O.=5.0 mg/L pH=6.5-9.0 F. Coli=200/100mL E. Coli=126/100mL	NH_3(ac)=TVS NH_3(ch)=0.1 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.5 NO_3=10 Cl=250 SO_4=287	As(ac)=50(Trec) Cd(ac/ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1600(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac/ch)=TVS Zn(ac/ch)=TVS	Temporary modification: Se(ac/ch) = existing quality, based on uncertainty Expiration date of 7/1/08
Lower Arkansas River	1b	Mainstem of the Arkansas River from the Colorado Canal headgate to the inlet of John Martin Reservoir	D.O.=5.0 mg/L pH=6.5-9.0 F. Coli=200/100mL E. Coli=126/100mL	NH_3(ac)=TVS NH_3(ch)=0.1 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.5 NO_3=10 Cl=250 SO_4=1078	As(ac)=50(Trec) Cd(ac/ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=2000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis)	Hg(ch)=0.01(tot) Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac/ch)=TVS Zn(ac/ch)=TVS	Temporary modification: Se(ch) = 14, based on uncertainty Expiration date of 12/31/07`
Lower Arkansas River	10	Two Buttes Reservoir, Two Buttes Pond, Hasty Lake, Holbrook Reservoir, Burchfield Lake, Nee-Skah (Queens) Reservoir, Adobe Creek Reservoir, Neeso Pah Reservoir, Nee Noshe Reservoir; Nee Gronda Reservoir.	D.O.=5.0 mg/L pH=6.5-9.0 F. Coli=200/100mL E. Coli=126/100mL	NH_3(ac)=TVS NH_3(ch)=0.06 CL_2(ac)=0.019 CL_2(ch)=0.011 CN=0.005 S=0.002	B=0.75 NO_2=0.05 NO_3=10 Cl=250 SO_4=WS	As(ac)=100(Trec) Cd(ac/ch)=TVS CrIII(ac)=50(Trec) CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=WS(dis) Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Mn(ch)=WS(dis) Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	
Lower Arkansas River	12	Lake Henry, Lake Meredith	D.O.=5.0 mg/L pH=6.5-9.0 F. Coli=200/100mL E. Coli=126/100mL	NH_3(ac)=TVS NH_3(ch)=0.06 CL_2(ac)=0.019 CL_2(ch)=0.011	CN=0.005 S=0.002 B=0.75 NO_2=0.5	As(ac)=100(Trec) Cd(ac/ch)=TVS CrIII(ac/ch)=TVS CrVI(ac/ch)=TVS Cu(ac/ch)=TVS	Fe(ch)=1000(Trec) Pb(ac/ch)=TVS Mn(ac/ch)=TVS Hg(ch)=0.01(tot)	Ni(ac/ch)=TVS Se(ac/ch)=TVS Ag(ac)=TVS Ag(ch)=TVS(tr) Zn(ac/ch)=TVS	

*Ammonia water quality standard is for un-ionized ammonia

Note: WS indicated that for all surface waters with an actual water supply use, the less restrictive of the following two options shall apply as numerical standards, as specified in the Basic Standards and Methodologies at 31.11(6):

(i) existing quality as of January 1, 2000; or (ii) Iron=300 µg/L (dissolved), Manganese=50 µg/L (dissolved), SO_4=250 mg/L; For all surface waters with a "water supply" classification that are not in actual use as a water supply, no water supply standards are applied for iron, manganese or sulfate, unless the Commission determines as the result of a site-specific rulemaking hearing that such standards are appropriate.

CDPHE, 2004b

Table A-2. Table Value Standards

Parameter[1]	Acute Standard (1 day)[2][3] (µg/L unless otherwise stated)	Chronic Standard (30 day)[2][3] (µg/L unless otherwise stated)
Ammonia[4]	Cold water = 0.43/FT/FPH/2 (mg/L) Warm water = 0.62/FT/FPH/2 (mg/L)	N/A
Cadmium	$= (1.13667-[\ln hardness)*(0.04184)]*e^{(1.128[\ln(hardness)]-3.6867)}$ Trout $= (1.13667-[\ln hardness)*(0.04184)]*e^{(1.128[\ln(hardness)]-3.828)}$	$(1.10167-[\ln hardness)*(0.04184)]*e^{(0.7852[\ln(hardness)]-2.715)}$
Chromium III[5]	$= e^{(0.819[\ln(hardness)]+2.5736)}$	$= e^{(0.819[\ln(hardness)]+0.5340}$
Chromium VI[5]	= 16	= 11
Copper	$= e^{(0.9422[\ln(hardness)]-1.7408}$	$= e^{(0.8545[\ln(hardness)]-1.7428)}$
Lead	$= (1.46203-[\ln(hardness)*(0.145712)]*e^{(1.273[\ln(hardness)]-1.46}$	$= (1.46203-[(\ln(hardness)*(0.145712)])*e^{(1.273[\ln(hardness)]-4.705}$
Manganese	$= e^{(0.3331[\ln(hardness)]+6.4676)}$	$= e^{(0.3331[\ln(hardness)]+5.8743)}$
Nickel	$= e^{(0.846[\ln(hardness)]+2.253}$	$= e^{(0.846[\ln(hardness)]+0.0554}$
Selenium[6]	= 18.4	= 4.6
Silver	$= \frac{1}{2}e^{(1.72[\ln(hardness)]-6.52}$	$= e^{(1.72[\ln(hardness)]-9.06}$ Trout $= e^{(1.72[\ln(hardness)]-10.51}$
Uranium	$= e^{(1.1021[\ln(hardness)]+2.7088}$	$= e^{(1.1021[\ln(hardness)]+2.2382}$
Zinc	$= e^{(0.8473[\ln(hardness)]+0.8618}$	$= e^{(0.8473[\ln(hardness)]+0.8699}$

(1) Metals are stated as dissolved unless otherwise specified

(2) Hardness values to be used in equations are in mg/l as calcium carbonate and shall be no greater than 400 mg/L. The hardness values used in calculating the appropriate metal standard should be based on the lower 95 percent confidence limit of the mean hardness value at the periodic low flow criteria as determined from a regression analysis of site-specific data. Where insufficient site-specific data exists to define the mean hardness value at the periodic low flow criteria, representative regional data shall be used to perform the regression analysis. Where a regression analysis is not appropriate, a site-specific method should be used. In calculating a hardness value, regression analyses should not be extrapolated past the point that data exist.

(3) Both acute and chronic numbers adopted as stream standards are levels not to be exceeded more than once every three years on average.

(4) $FT = 10^{0.03(20-TCAP)}$ Where TCAP is $\leq T \leq 30$; or $FT = 10^{0.03(20-T)}$ Where 0 is $\leq T \leq TCAP$; TCAP = 20° C when cold water aquatic life species present; TCAP = 25° C when cold water aquatic life species absent; FPH = 1 where $8 \leq pH \leq 9$; $FPH = [1+10^{(7.4-pH)}]/1.25$ where $6.5 \leq pH \leq 8$. FPH means the acute pH adjustment factor, defined by the above formulas; FT means the acute temperature adjustment factor, defined by the above formulas; T means temperature measured in degrees Celsius; TCAP means temperature CAP – the maximum temperature which affects the toxicity of ammonia to salmonid and non-salmonid fish groups. Note: if the calculated acute value is less than the chronic value, then the chronic value shall be used as the acute standard.

(5) Unless the stability of the chromium valence state in receiving water can be clearly demonstrated, the standard for chromium should be in terms of chromium VI. In no case can the sum of the instream levels of Hexavalent and Trivalent Chromium exceed the water supply standard of 50 µg/L total chromium in those water classified for domestic water use.

(6) Selenium is a bioaccumulative metal and subject to a range of toxicity values depending upon numerous site-specific variables.

CDPHE, 2004b

TABLE I PHYSICAL AND BIOLOGICAL PARAMETERS								
Parameter	Recreational			Aquatic Life			Agriculture	Domestic Water Supply
	CLASS E (Existing Primary Contact) and CLASS U (Undetermined Use)	CLASS P (Potential Primary Contact Use)	CLASS N (Not Primary Contact Use)	CLASS 1 COLD WATER BIOTA	CLASS 1 WARM WATER BIOTA	CLASS 2		
PHYSICAL								
D.O. (mg/l)[(1)(9)]	3.0(A)	3.0(A)	3.0(A)	6.0[(2)](G) 7.0(spawning)	6.0[(2)](G) 7.0(spawning)	5.0(A)	3.0(A)	3.0(A)
pH (Std. Units)[(3)]	6.5–9.0 (Bm)	6.5–9.0 (Bm)	6.5–9.0 (Bm)	6.5–9.0(A)	6.5–9.0(A)	6.5–9.0(A)		5.0–9.0(A)
Suspended Solids[(4)]								
Temperature (°C)[(5)] effective through 12/30/07				Max 20 °C, with 3 °C Increase[(5)](G)	Max 30 °C, with 3 °C Increase[(5)](G)			
Temperature (°C)[(6)] effective 12/31/07				19.3 °C (MWAT)[a]; 23.8 °C (DM)[b] ; 12.6 (sp[c])(MWAT); 17.8 °C (ct [d]) (MWAT) 25.6 °C (ct) (DM); 16.3 (ct/sp) (MWAT); 24.2 °C (cw[e]) (MWAT); 29.4 °C (cw)(DM) ;	29.2 °C (MWAT); 32.5 °C (DM)	Cold: 19.3 °C (MWAT)[a]; 23.8 °C (DM)[b] ; 12.6 (sp[c])(MWAT); Warm: 29.2 °C (MWAT); 32.5 °C (DM)		
BIOLOGICAL:								
E. coli per 100 ml	126[(7)]	205[(7)]	630[(7)]					630
Note: Capital letters In parentheses refer to references listed in section 31.16(3); Numbers in parentheses refer to Table 1 footnotes.								

Temperature Definitions
[a] MWAT = Maximum weekly average maximum temperature
[b] DM = Daily maximum
[c] sp = Spawning, season is dependent on the species expected to be present in the segment; implemented as a MWAT.
[d] ct = cutthroat
[e] cw = cool water

Proposed temperature water quality standards, not yet accepted for the Arkansas River Basin

Source: CDPHE 2005b

Appendix B – Permitted Dischargers

Discharge permits are issued by the Water Quality Control Division to comply with basic, narrative, and numeric standards and control regulations so that discharges protect the classified uses (CDPHE, 2004b). The following is a summary of the discharge limits of major dischargers between Turquoise Reservoir and John Martin Reservoir organized by county. Gray rows in the charts represent exceptions including future changes to limits and seasonal differences in discharge limits. Generally, an exception is represented by * or ** in the main chart with the explanation of the exception directly below in gray. Permit information was obtained from EPA's Envirofacts database in March of 2004 (EPA, 2005b).

Chaffee County

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0045748	Buena Vista Sanitation District	WWTP	Sewerage System	Arkansas River	Chaffee	38.800000	-106.104722

Average	Max Daily Flow (MGD)	BOD5 (mg/L)	Solids, Total Suspended (mg/L)	Fecal Coliform, (Number/100 ml)	Total Residual Chlorine (mg/L)	pH (max-min)	Oil & Grease (mg/L)	Total Ammonia as N (mg/L)	
30-day	1.50	30	30	1,210	0.07	---	---		---
7-day	---	45	45	2,420	---	---	---		---
daily max	---	---	---	---	0.10	6.5-9.0	10		---
								*Month	30-day Avg
								January	4.3
								February	3.7
								March	2.5
								April	2.8
								May	2.7
								June	5.3
								July	5.4
								August	2.8
								September	2.2
								October	2.1
								November	1.7
								December	3.0

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0040339	City of Salida	Salida WWTP	Sewerage System	Arkansas River	Chaffee	38.515000	-105.974166
Average	**Max Daily Flow (MGD)**	**BOD5 (mg/L)**	**Solids, Total Suspended (mg/L)**	**Fecal Coliform, (Number/100 ml)**	**Total Residual Chlorine (mg/L)**	**pH (max-min)**	**Oil & Grease (mg/L)**
30-day	2.1	30	30	---	---	---	---
7-day	---	45	45	5,400	---	---	---
daily max	---	---	---	---	0.94	6.5-9.0	10
Rolling	---	---	---	2,700	0.30	---	---

Average	Total Ammonia as N (mg/L)		Acute Whole Effluent Toxicity	Silver, Dissolved (as Ag) (µg/L)	Lead, Dissolved (as Pb) (µg/L)
daily max		---	LC50 > 100%	---	---
Rolling		*	---	1.0	25
	*Season	Rolling Avg.			
	January	8.4			
	February	5.9			
	March	5.9			
	April	8.4			
	May	17.4			
	June	8.4			
	July	8.4			
	August	8.4			
	September	8.4			
	October	5.9			
	November	8.4			
	December	17.4			

Fremont County

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0039748	Fremont Sanitation District	Rainbow Park WWTP	Sewerage System	Arkansas River	Fremont	38.388056	-105.073333
Average	**Max Daily Flow (MGD)**	**BOD5 (mg/L)**	**Solids, Total Suspended (mg/L)**	**Fecal Coliform, (Number/100 ml)**	**Total Residual Chlorine (mg/L)**	**pH (max-min)**	**Oil & Grease (mg/L)**
30-day	8.0	30	30	2,073	0.04	---	---
7-day	---	45	45	4,146	---	---	---
daily max	---	---	---	---	0.05	6.5-9.0	10

Average	Total Ammonia as N (mg/L)		Acute Whole Effluent Toxicity	Mercury, Total (µg/L)	Lead, Dissolved (as Pb) (µg/L)	Cyanide, Weak Acid, Dissociable (µg/L)	Zinc, Potentially Dissolved (µg/L)
30-day		*	---	0.2	6.0	78	234
Daily max		---	LC50 > 100%	---	---	---	---
	* Month	Total Ammonia					
	January	8.6					
	February	6.6					
	March	4.1					
	April	4.2					
	May	2.9					
	June	3.5					
	July	3.6					
	August	3.3					
	September	2.8					
	October	3.1					
	November	3.3					
	December	3.5					

Otero County

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0021571	City of Fowler	Fowler WWTP	Sewerage System	Arkansas River	Otero	38.133333	-104.750000
Average	**Max Daily Flow (MGD)**	**BOD5 (mg/L)**	**Solids, Total Suspended (mg/L)**	**Fecal Coliform, (Number/100 ml)**	**Total Residual Chlorine (mg/L)**	**pH (max-min)**	**Oil & Grease (mg/L)**
30-day	0.108	30	105	200	---	---	---
7-day	---	45	160	400	---	---	---
daily max	---	---	---	---	0.5	6.5-9.0	10

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0021261	City of La Junta	La Junta WWTP	Sewerage System	King Arroyo to Arkansas River	Otero	37.986944	-103.529444
Average	**Max Daily Flow (MGD)**	**BOD5 (mg/L)**	**Solids, Total Suspended (mg/L)**	**Fecal Coliform, (Number/100 ml)**	**Total Residual Chlorine (mg/L)**	**pH (max-min)**	**Oil & Grease (mg/L)**
30-day	2.3	30	30	200	0.055	---	---
7-day	---	45	45	400	---	---	---
daily max	---	---	---	---	0.022	6.5-9.0	10

Average	Total Ammonia as N (mg/L)		Acute Whole Effluent Toxicity	Mercury, Total (µg/L)	Selenium, Total (as Se) (µg/L)
30-day		---	---	0.01	27.1
daily max		*	LC50 > 100%	---	---
	*Month(s)	30-day Avg			
	Nov – Jan	---			
	February	23.4			
	March	17.1			
	April	14.4			
	May	14.2			
	June	15.2			
	July	19.2			
	August	13.6			
	September	13.7			
	October	16.9			

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0039519	North La Junta Sanitation District	WWTP	Sewerage Facilities	Arkansas River	Otero	N/A	N/A
Average	**Max Daily Flow (MGD)**	**BOD5 (mg/L)**	**Solids, Total Suspended (mg/L)**	**Fecal Coliform, (Number/100 ml)**	**Total Residual Chlorine (mg/L)**	**pH (max-min)**	**Oil & Grease (mg/L)**
30-day	0.0625	30	75	5,900	---	---	---
7-day	---	45	110	11,800	---	---	---
daily max	---	---	---	---	0.5	6.5-9.0	10

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0023850	City of Rocky Ford	City of Rocky Ford Wastewater Treatment Facility	Sewerage System	Ditch to Arkansas River	Otero	38.062520	-103.701770

Average	Max Daily Flow (MGD)	BOD5 (mg/L)	Solids, Total Suspended (mg/L)	Fecal Coliform, (Number/100 ml)	Total Residual Chlorine (mg/L)	pH (max-min)	Oil & Grease (mg/L)	Mercury, Total (µg/L)
30-day	1.2	25	75	6000*	0.23	---	---	0.2
7-day	---	45	110	12000*	---	---	---	------
daily max	---	---	---	---	0.31	6.5-9.0	10	-
				* beginning 7-1-06				
				30-day avg = 1213 and 7-day avg = 2426				

Pueblo County

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
COG584022	Affordable Residential Cmm Lpl	WWTP	Sewerage System	Arkansas River	Pueblo	38.269167	-104.478333
Average	**Max Daily Flow (MGD)**	**BOD5 (mg/L)**	**Solids, Total Suspended (mg/L)**	**Fecal Coliform, (Number/100 ml)**	**Total Residual Chlorine (mg/L)**	**pH (max-min)**	**Oil & Grease (mg/L)**
30-day	0.12	30	30	6,000	---	---	---
7-day	---	45	45	12,000	---	---	---
daily max	---	---	---	---	0.5	6.0-9.0	10

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
COG581008	Lake Pueblo State Park	Arkansas Point WWTF	Sewerage System	West Pueblo Ditch	Pueblo	N/A	N/A

Average	Max Daily Flow (MGD)	BOD5 (mg/L)	Solids, Total Suspended (mg/L)	Fecal Coliform, (Number/100 ml)	pH (max-min)	Oil & Grease (mg/L)
30-day	0.135	30	75	6,000	---	---
7-day	---	45	110	12,000	---	---
daily max	---	---	---	---	6.0-9.0	10

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0026646	City of Pueblo	Pueblo WWTP	Sewerage System	Arkansas River	Pueblo	38.257359	-104.579335
Average	**Max Daily Flow (MGD)**	**BOD5 (mg/L)**	**Solids, Total Suspended (mg/L)**	**Fecal Coliform, (Number/100 ml)**	**Total Residual Chlorine (mg/L)**	**pH (max-min)**	**Oil & Grease (mg/L)**
30-day	19.0	25	30	1,412	0.082	---	---
7-day	---	40	45	2,824	---	---	---
daily max	---	---	---	---	0.088	6.5-9.0	10

Average	% Effect Statre 7-day Ceriodaphnia	% Effect Statre 7-day Pimephales	Iron, Dissolved (as Fe) (mg/L)	Iron, Total Recoverable (µg/L)
30-day	---	---	753	2,375
daily max	*	*	---	---
*Quarter	% Effect Ceriodaphnia	% Effect Pimephales		
1	13.6	13.6		
2	9.7	9.7		
3	13.0	13.0		
4	13.6	13.6		

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0000621	DBA Rocky Mountain Steel Mills	CF&I Steel, L.P.	Steel Works	Arkansas River	Pueblo	38.152500	-104.334300
Average	**Max Daily Flow (MGD)**	**BOD5 (mg/L)**	**Solids, Total Suspended (mg/L)**	**Fecal Coliform, (Number/100 ml)**	**pH (max-min)**	**Oil & Grease (mg/L)**	**Total Ammonia as N (mg/L)**
30-day	57.0	30	2,531*	200	---	462.5*	200*
7-day	---	45	---	---	---	---	---
daily max	---	---	---	400	6.5-9.0	---	---
			*6,630 lbs/day max			*1727.5 lbs/day max	* 300 lbs/day max

Average	% Effect Statre 7-day Ceriodaphnia	% Effect Statre 7-day Pimephales	Lead, Total (as Pb) (mg/L)	Zinc, Total (as Zn) (µg/L)
30-day	---	---	4*	20,000*
daily max	32	32	---	---
			* 10 lbs/day max	*47 lbs/day max

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0040789	Pueblo West Metro District	WWTP	Sewerage System	Pesthouse Gulch to Dry Creek	Pueblo	38.314167	-104.674722

Average	Max Daily Flow (MGD)	BOD5 (mg/L)	Solids, Total Suspended (mg/L)	Fecal Coliform, (Number/100 ml)	Total Residual Chlorine (mg/L)	pH (max-min)	Oil & Grease (mg/L)	Acute Whole Effluent Toxicity
30-day	---	25	30	2,000	---	---	---	---
7-day	---	40	45	4,000	---	---	---	---
daily max	1.8	---	---	---	0.5	6.5-9.0	10	LC50 > 100%

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0000612	Public Service Company of Colorado	Camanche Station	Electrical Services	St. Charles River	Pueblo	38.201995	-104.570904

Average	Fecal Coliform, (Number/100 ml)	Total Residual Chlorine (mg/L)	pH (max-min)	Oil & Grease (mg/L)	% Effect Statre 7-day Pimephales	Copper, Potentially Dissolved, (µg/L)	Zinc, Potentially Dissolved (µg/L)	Temperature (degrees Farenheit)
30-day	200	11	---	11.5	---	29	---	---
7-day	400	---	---	---	---	---	---	---
daily max	---	19	6.5-9.0	17.0	100	50	379	86

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
COG640025	Pueblo Board of Water Works	Whitlock Treatment Plant	Water Treatment	Arkansas River	Pueblo	38.270402	-104.610228

Average	Solids, Total Suspended (mg/L)	Total Residual Chlorine (mg/L)	pH (max-min)	Oil & Grease (mg/L)
30-day	30	0.042	---	---
7-day	45	---	---	---
daily max	---	0.054	6.5-9.0	10

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
COG640089	Pueblo West Metro District	Treatment Plant #1	Water Treatment	Arkansas River	Pueblo	38.314167	-104.674722

Average	Solids, Total Suspended (mg/L)	Total Residual Chlorine (mg/L)	pH (max-min)	Oil & Grease (mg/L)
30-day	30	0.5	---	---
7-day	45	---	---	---
daily max	---	0.5	6.5-9.0	10

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
COG600328	Fountain Valley Power, LLC		Electrical Services	Fountain Creek	Pueblo	38.558611	-104.696388

Average	Solids, Total Suspended (mg/L)	Total Residual Chlorine (mg/L)	pH (max-min)	Oil & Grease (mg/L)
30-day	30	---	---	---
7-day	45	---	---	---
daily max	---	0.50	6.5-9.0	10

Lake County

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0000591	Asarco Incorporated	Black Cloud Mine	Lead and Zinc Ores	Iowa Gulch	Lake	39.22611	-106.226

Average	Max Daily Flow (MGD)	Solids, Total Suspended (mg/L)	pH (max-min)	Oil & Grease (mg/L)	Total Ammonia as N (mg/L)		Acute Whole Effluent Toxicity	Copper, Total (as Cu) (mg/L)	Mercury, Total, as Hg (µg/L)
30-day	1.15	20	---	---		*	---	0.05	0.01
7-day	---	30	---	---		---	---	---	---
daily max	---	---	6.5-9.0	10		---	LC50 > 100%	0.1	2
					* season	30-day Avg			
					January	3.6			
					February	3.6			
					March	6.4			
					April	6.4			
					May	6.4			
					June	3.4			
					July	3.4			
					August	1.5			
					September	3.9			
					October	3.9			
					November	3.9			
					December	9.0			

Average	Lead, Potentially Dissolved (µg/L)	Lead, Dissolved (as Pb) (µg/L)	Cyanide, Weak Acid, Dissociable (µg/L)	Zinc, Total (as Zn) (µg/L)	Cadmium, Total, as Cd (µg/L)	Manganese, Total Recoverable (µg/L)
30-day	2.4	200	---	500	50	1000
daily max	61	400	30	1000	100	2000

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0021164	Leadville Sanitation District	WWTF	Sewerage System	California Gulch	Lake	39.23	-106.327777

Average	Max Daily Flow (MGD)	BOD5 (mg/L)	Solids, Total Suspended (mg/L)	Fecal Coliform, (Number/100 ml)	Total Residual Chlorine (mg/L)	pH (max-min)	Oil & Grease (mg/L)	Total Ammonia as N (mg/L)	
30-day	1.15	30	30	1500	0.32	---	---	*	
7-day	---	45	45	3000	---	---	---	---	
daily max	---	---	---	---	0.5	6.5-9.0	10	---	
								*Season	30-day Avg
								January	26
								February	31.5
								March	34.9
								April	69.8
								May	215.5
								June	140
								July	87.8
								August	42.3
								September	122.7
								October	23.1
								November	29.7
								December	25.8

Permit #	Operating Agency	Facility Name	Type of Discharge	Discharge Location	County	Latitude	Longitude
CO0021717	USBOR	Leadville Drainage Tunnel	Land, mineral, wildlife and forest conservation	East fork of Arkansas River	Lake	39.275556	-106.286944

Average	Solids, Total Suspended (mg/L)	pH (max-min)	Oil & Grease (mg/L)	% Effect Statre 7-day Ceriodaphnia	% Effect Statre 7-day Pimephales	Mercury, Total, as Hg (µg/L)	Selenium, Total Recoverable (µg/L)	Iron, Total Recoverable (µg/L)
30-day	30	---	---	---	---	0.01	5	1000
daily max	45	6.5-9.0	10	pass	pass	---	20	---

Average	Copper, Potentially Dissolved, (µg/L)	Silver, Potentially Dissolved (µg/L)	Lead, Potentially Dissolved (µg/L)	Zinc, Potentially Dissolved (µg/L)	Cadmium, Potentially Dissolved (µg/L)	Manganese, Total Recoverable (µg/L)	Aluminum, Potentially Dissolved (µg/L)	Arsenic, Total Recoverable (µg/L)
30-day	9.4*	0.05*	2.7*	84*	0.9*	1000	87	50
daily max	13.7*	1.3*	62*	93*	2.9*	---	750	50
	* for Jan-April	* for Jan-April	* for Jan-April	* for Jan-April	* for Jan-April			
Sept-Dec 30-day Avg	14	.11	5.4	129	1.4			
Sept-Dec Daily Max	22	3	140	143	5.1			

APPENDIX C – SALINITY MODEL RESULTS

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
OCT1	1982	566	566	575	568	560	1,137	1,137	1,139	1,100	1,125	1,452	1,452	1,455	1,408	1,437
OCT2	1982	578	581	584	553	531	1,109	1,109	1,110	1,087	1,084	1,419	1,420	1,421	1,393	1,388
OCT3	1982	558	547	551	521	512	922	922	918	985	982	1,204	1,204	1,200	1,275	1,272
OCT4	1982	550	510	548	529	520	1,001	983	999	1,006	1,004	1,294	1,275	1,293	1,299	1,296
NOV1	1982	580	581	594	580	583	945	950	953	957	959	1,228	1,234	1,236	1,239	1,241
NOV2	1982	580	611	583	572	570	983	993	984	942	941	1,273	1,285	1,274	1,224	1,223
NOV3	1982	601	654	617	601	608	1,166	1,182	1,171	1,121	1,122	1,482	1,499	1,487	1,428	1,430
NOV4	1982	610	666	616	600	598	1,163	1,245	1,164	1,114	1,186	1,477	1,569	1,479	1,421	1,503
DEC1	1982	628	676	640	630	641	1,139	1,156	1,142	1,101	1,120	1,451	1,470	1,455	1,406	1,428
DEC2	1982	623	662	627	612	614	1,157	1,169	1,158	1,136	1,139	1,472	1,485	1,473	1,447	1,450
DEC3	1982	615	631	618	605	606	1,111	1,117	1,112	1,095	1,097	1,420	1,426	1,420	1,400	1,402
DEC4	1982	603	601	603	597	593	1,106	1,108	1,106	1,090	1,091	1,414	1,416	1,414	1,394	1,395
JAN1	1982	600	587	605	601	598	1,139	1,138	1,140	1,122	1,123	1,451	1,450	1,452	1,430	1,432
JAN2	1982	597	591	594	590	589	1,108	1,107	1,107	1,091	1,091	1,415	1,414	1,414	1,395	1,395
JAN3	1982	682	686	729	723	749	1,032	1,034	1,046	1,035	1,042	1,329	1,331	1,344	1,330	1,338
JAN4	1982	681	660	682	687	683	1,045	1,040	1,046	1,037	1,036	1,345	1,338	1,345	1,333	1,332
FEB1	1982	643	649	640	641	639	1,058	1,060	1,057	1,043	1,042	1,360	1,362	1,359	1,341	1,341
FEB2	1982	634	649	635	632	633	1,130	1,136	1,130	1,109	1,111	1,439	1,446	1,439	1,415	1,417
FEB3	1982	717	711	743	746	755	1,174	1,175	1,179	1,146	1,150	1,486	1,488	1,493	1,453	1,458
FEB4	1982	674	673	667	670	663	1,153	1,155	1,151	1,120	1,120	1,464	1,467	1,462	1,425	1,426
MAR1	1982	624	657	634	634	635	1,093	1,106	1,096	1,071	1,073	1,396	1,410	1,400	1,370	1,372
MAR2	1982	600	635	615	625	626	1,182	1,205	1,185	1,143	1,155	1,498	1,524	1,501	1,453	1,467
MAR3	1982	576	600	581	602	603	1,280	1,341	1,277	985	959	1,607	1,676	1,605	1,271	1,241
MAR4	1982	567	582	573	610	608	1,276	1,334	1,278	1,042	996	1,604	1,668	1,605	1,337	1,284
APR1	1982	551	565	555	610	609	1,282	1,119	1,276	967	947	1,611	1,429	1,605	1,253	1,229
APR2	1982	564	575	528	613	622	1,058	909	914	911	910	1,361	1,188	1,197	1,189	1,187
APR3	1982	566	576	572	623	629	828	836	838	867	858	1,098	1,108	1,109	1,139	1,129
APR4	1982	563	570	584	567	609	749	754	767	808	846	994	1,003	1,015	1,069	1,112
MAY1	1982	515	498	520	443	414	698	685	709	671	701	937	925	951	909	948
MAY2	1982	510	512	491	404	390	727	723	713	680	656	965	962	950	913	885
MAY3	1982	500	502	501	468	474	1,062	1,046	1,106	972	1,025	1,365	1,347	1,414	1,260	1,321
MAY4	1982	364	396	318	318	308	646	676	648	640	617	872	908	881	865	838
JUN1	1982	287	354	282	284	289	494	530	490	494	497	643	679	639	642	641
JUN2	1982	258	313	252	255	251	421	450	417	429	429	578	602	575	585	585
JUN3	1982	239	284	424	223	235	384	417	531	385	393	490	527	652	496	501
JUN4	1982	228	289	458	223	224	351	392	539	348	346	439	469	647	425	419
JUL1	1982	261	270	276	248	247	385	381	390	386	380	539	526	539	534	523
JUL2	1982	280	274	283	289	292	393	386	394	419	422	568	560	569	589	592
JUL3	1982	322	284	324	302	299	433	394	428	452	447	627	584	618	647	641
JUL4	1982	312	287	397	273	267	442	427	502	419	411	499	486	563	475	464
AUG1	1982	294	297	297	306	306	690	696	691	691	693	919	926	920	919	921
AUG2	1982	510	399	533	514	516	647	570	663	649	648	837	753	855	838	836
AUG3	1982	369	382	355	366	361	555	558	545	552	547	688	690	675	683	676
AUG4	1982	481	440	495	514	517	665	634	664	689	683	869	833	864	897	888
SEP1	1982	419	419	398	397	389	919	907	897	890	906	1,198	1,184	1,173	1,164	1,182
SEP2	1982	389	412	388	408	409	627	629	624	640	640	825	824	820	840	839
SEP3	1982	386	406	385	406	401	600	603	598	618	608	792	791	789	813	799
SEP4	1982	348	380	339	350	345	713	724	704	705	712	954	966	943	945	953
OCT1	1983	359	423	359	362	365	693	730	688	694	704	932	973	927	933	944
OCT2	1983	380	386	383	384	385	758	747	786	766	772	1,011	998	1,044	1,019	1,027
OCT3	1983	418	409	427	421	422	909	906	912	894	915	1,188	1,184	1,191	1,169	1,193
OCT4	1983	435	408	438	425	423	1,060	1,054	1,061	1,045	1,047	1,360	1,354	1,361	1,342	1,344
NOV1	1983	428	408	426	417	415	1,077	1,073	1,076	1,064	1,068	1,381	1,377	1,379	1,365	1,369
NOV2	1983	440	424	447	436	437	1,057	1,054	1,058	1,047	1,050	1,358	1,355	1,359	1,345	1,348
NOV3	1983	459	449	478	461	469	1,028	1,026	1,032	1,023	1,026	1,325	1,323	1,330	1,318	1,322
NOV4	1983	528	484	549	540	541	1,054	1,193	1,058	1,046	1,215	1,353	1,510	1,358	1,343	1,534
DEC1	1983	581	550	605	598	604	1,104	1,100	1,108	1,088	1,113	1,409	1,405	1,413	1,389	1,418
DEC2	1983	639	577	661	655	666	1,161	1,152	1,165	1,138	1,141	1,472	1,462	1,477	1,445	1,449
DEC3	1983	588	508	558	569	554	1,156	1,142	1,150	1,127	1,126	1,466	1,452	1,460	1,433	1,432
DEC4	1983	517	502	496	510	508	1,158	1,156	1,153	1,131	1,132	1,470	1,469	1,464	1,438	1,440
JAN1	1983	491	491	490	501	500	1,109	1,111	1,109	1,092	1,094	1,415	1,417	1,415	1,394	1,396
JAN2	1983	487	491	492	505	506	1,124	1,125	1,125	1,107	1,107	1,432	1,433	1,433	1,411	1,411
JAN3	1983	490	494	496	518	520	1,078	1,079	1,079	1,067	1,067	1,379	1,380	1,380	1,365	1,366
JAN4	1983	493	498	499	524	527	1,081	1,082	1,082	1,071	1,071	1,383	1,384	1,384	1,370	1,371
FEB1	1983	494	499	500	528	531	1,080	1,081	1,082	1,071	1,071	1,383	1,384	1,384	1,370	1,371
FEB2	1983	497	502	502	534	537	1,084	1,088	1,086	1,075	1,078	1,387	1,391	1,388	1,375	1,378
FEB3	1983	496	501	502	535	538	1,063	1,066	1,064	1,057	1,059	1,363	1,367	1,365	1,354	1,357
FEB4	1983	500	507	506	548	551	1,016	1,046	1,044	1,043	1,045	1,311	1,345	1,343	1,339	1,342
MAR1	1983	505	511	511	552	554	1,021	1,041	1,039	1,043	1,044	1,314	1,337	1,335	1,338	1,340
MAR2	1983	508	515	514	555	556	1,043	1,080	1,044	1,063	1,072	1,339	1,381	1,341	1,361	1,370
MAR3	1983	510	516	516	555	555	738	741	741	905	889	971	976	975	1,176	1,157
MAR4	1983	508	514	514	551	551	757	753	764	890	866	998	990	1,005	1,159	1,129
APR1	1983	505	509	510	545	543	754	747	776	811	793	994	984	1,021	1,061	1,038
APR2	1983	502	505	506	540	536	694	691	706	765	757	910	904	926	1,000	991
APR3	1983	499	501	504	533	528	726	713	744	738	724	952	935	976	965	946
APR4	1983	492	490	498	519	514	741	725	750	740	729	972	951	983	968	954
MAY1	1983	485	481	491	506	500	721	710	750	728	716	945	931	984	953	937

NA = no action, PA = proposed action, CE = cumulative effects

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
MAY2	1983	481	477	488	500	494	669	660	683	680	666	872	860	891	884	865
MAY3	1983	480	476	488	499	493	745	739	761	754	739	974	967	994	985	965
MAY4	1983	471	455	476	478	466	676	651	652	678	662	878	844	840	880	857
JUN1	1983	443	403	441	409	395	572	541	569	535	523	722	680	717	664	648
JUN2	1983	406	373	402	361	352	548	523	546	512	501	679	645	677	621	603
JUN3	1983	334	285	320	275	256	426	383	414	374	355	487	437	471	415	390
JUN4	1983	238	199	223	197	192	339	307	328	316	309	305	270	295	292	280
JUL1	1983	217	203	210	208	203	302	289	296	299	293	264	245	249	266	256
JUL2	1983	227	220	224	222	220	339	331	334	334	329	408	400	400	407	397
JUL3	1983	235	235	234	235	237	497	497	491	500	494	697	696	688	701	692
JUL4	1983	247	249	247	250	252	579	584	581	590	583	780	784	781	793	783
AUG1	1983	241	240	241	240	240	542	552	541	549	553	744	755	743	752	756
AUG2	1983	241	239	238	239	240	532	559	547	555	560	735	767	754	763	768
AUG3	1983	257	255	252	258	259	563	621	606	616	623	776	846	830	840	849
AUG4	1983	274	277	273	282	283	620	735	719	722	737	844	981	964	967	984
SEP1	1983	291	299	293	305	306	680	697	680	686	700	922	941	922	929	944
SEP2	1983	309	322	314	329	331	720	740	723	847	868	977	999	981	1,123	1,147
SEP3	1983	324	342	332	348	350	1,084	1,154	1,087	1,093	1,140	1,393	1,470	1,396	1,403	1,455
SEP4	1983	338	358	346	365	365	1,149	1,182	1,152	1,160	1,184	1,466	1,503	1,470	1,478	1,505
OCT1	1984	346	365	354	371	370	667	692	660	683	634	918	948	909	932	876
OCT2	1984	347	367	358	373	370	792	807	791	760	813	1,061	1,080	1,060	1,021	1,085
OCT3	1984	338	371	346	378	377	951	1,029	954	960	1,063	1,242	1,330	1,245	1,251	1,368
OCT4	1984	341	360	342	375	379	916	924	915	923	926	1,202	1,211	1,201	1,208	1,212
NOV1	1984	345	341	346	347	356	839	837	838	839	844	1,112	1,110	1,111	1,110	1,116
NOV2	1984	349	345	349	350	346	886	885	886	970	883	1,165	1,164	1,165	1,259	1,160
NOV3	1984	352	350	353	356	353	940	1,002	1,001	998	999	1,228	1,297	1,296	1,291	1,292
NOV4	1984	356	353	357	358	355	821	1,306	1,066	1,056	1,264	1,091	1,639	1,370	1,357	1,591
DEC1	1984	360	358	361	363	360	732	1,060	752	1,024	1,045	983	1,361	1,008	1,319	1,343
DEC2	1984	362	359	363	364	362	734	1,040	734	1,028	1,029	987	1,339	987	1,324	1,325
DEC3	1984	367	363	369	368	367	774	1,046	775	1,036	1,037	1,036	1,347	1,037	1,334	1,335
DEC4	1984	378	379	381	380	380	686	1,032	688	1,022	1,024	930	1,331	932	1,318	1,319
JAN1	1984	389	393	392	390	390	707	710	709	1,003	1,004	950	953	952	1,293	1,295
JAN2	1984	399	402	402	399	395	768	770	770	976	1,037	1,025	1,027	1,027	1,264	1,333
JAN3	1984	402	404	404	403	398	851	853	853	867	1,070	1,125	1,127	1,127	1,142	1,372
JAN4	1984	406	407	408	407	404	742	742	743	756	997	994	995	996	1,009	1,289
FEB1	1984	409	410	411	410	408	808	808	809	822	821	1,072	1,072	1,073	1,086	1,084
FEB2	1984	410	410	411	412	410	848	849	849	861	861	1,119	1,120	1,120	1,132	1,131
FEB3	1984	412	412	414	414	412	875	876	876	888	888	1,150	1,151	1,151	1,163	1,163
FEB4	1984	414	414	415	416	414	873	874	874	884	884	1,146	1,147	1,147	1,157	1,157
MAR1	1984	418	417	419	419	417	823	824	824	840	839	1,090	1,090	1,090	1,107	1,106
MAR2	1984	420	420	422	422	420	879	884	880	894	897	1,154	1,159	1,154	1,169	1,173
MAR3	1984	419	418	420	422	420	600	600	600	663	665	799	800	799	885	887
MAR4	1984	413	413	414	418	417	583	583	583	626	627	773	774	774	833	835
APR1	1984	404	405	406	413	412	595	602	595	690	695	798	806	797	924	931
APR2	1984	399	400	400	411	410	553	551	551	593	600	720	718	717	781	793
APR3	1984	397	400	399	408	409	639	628	643	648	636	848	835	853	857	842
APR4	1984	397	400	398	406	408	730	712	728	728	713	964	942	961	960	942
MAY1	1984	396	399	398	405	407	518	516	520	543	546	637	633	640	683	686
MAY2	1984	391	394	393	401	403	654	666	650	651	666	866	883	861	860	881
MAY3	1984	368	369	369	381	382	595	572	596	565	554	795	763	796	743	724
MAY4	1984	343	342	343	349	347	421	417	422	417	421	508	496	509	468	483
JUN1	1984	307	304	308	312	310	390	402	394	398	398	475	514	486	477	476
JUN2	1984	298	294	298	304	302	391	387	391	427	421	525	522	525	580	569
JUN3	1984	283	279	283	290	287	346	342	346	351	349	415	414	415	423	423
JUN4	1984	265	262	265	272	270	318	314	318	321	320	361	354	362	358	364
JUL1	1984	237	235	237	242	241	308	307	308	310	309	342	344	342	342	343
JUL2	1984	229	227	229	231	231	295	295	295	292	293	379	384	380	372	375
JUL3	1984	229	228	229	230	230	337	337	337	336	335	478	479	478	479	480
JUL4	1984	233	233	233	235	235	433	434	433	436	436	572	573	572	577	578
AUG1	1984	238	238	238	239	239	399	400	399	403	403	544	544	544	550	550
AUG2	1984	246	246	246	246	247	457	457	457	463	463	651	652	651	660	661
AUG3	1984	280	282	280	278	279	415	416	415	413	414	466	467	465	462	464
AUG4	1984	305	307	305	302	303	439	440	438	436	439	540	541	539	537	539
SEP1	1984	311	312	311	308	309	527	526	527	531	529	716	713	716	721	719
SEP2	1984	319	321	319	316	317	592	598	592	608	621	820	828	820	841	855
SEP3	1984	314	318	315	311	314	649	652	649	731	753	897	900	897	993	1,017
SEP4	1984	311	310	311	311	311	756	756	756	756	777	1,021	1,021	1,021	1,022	1,045
OCT1	1985	320	319	320	320	319	855	867	860	843	769	1,116	1,131	1,122	1,101	1,014
OCT2	1985	329	329	329	328	328	658	658	658	660	668	876	876	876	876	889
OCT3	1985	326	326	325	326	325	540	540	540	587	586	703	703	703	772	771
OCT4	1985	326	326	326	326	326	575	575	575	586	585	757	757	757	769	769
NOV1	1985	333	332	333	333	332	634	626	626	626	626	840	830	830	828	828
NOV2	1985	344	343	344	343	343	737	737	737	667	669	977	977	977	888	890
NOV3	1985	356	355	356	354	354	709	725	724	668	668	946	967	965	894	894
NOV4	1985	365	365	365	364	364	730	705	730	737	713	974	946	974	982	954
DEC1	1985	374	374	374	373	373	723	727	723	731	735	967	973	967	975	981
DEC2	1985	382	381	382	380	380	702	702	702	710	710	942	942	942	950	950

NA = no action, PA = proposed action, CE = cumulative effects

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
DEC3	1985	387	387	387	385	385	721	721	721	730	730	967	967	967	976	976
DEC4	1985	388	388	388	387	386	729	729	729	736	736	975	975	974	980	981
JAN1	1985	391	391	391	390	389	756	756	756	761	762	1,007	1,007	1,007	1,012	1,012
JAN2	1985	396	396	396	394	394	741	740	741	748	748	989	989	989	996	996
JAN3	1985	398	398	398	396	396	735	735	735	736	736	983	983	983	983	983
JAN4	1985	400	400	400	399	398	688	688	688	691	691	924	924	924	926	925
FEB1	1985	400	400	400	398	398	707	707	707	711	711	952	951	951	954	954
FEB2	1985	409	409	408	406	406	669	669	669	672	672	900	900	900	901	901
FEB3	1985	416	417	417	414	414	652	652	652	654	654	872	872	872	872	873
FEB4	1985	422	422	422	420	419	698	698	698	699	699	931	931	931	930	930
MAR1	1985	423	423	423	421	420	744	744	744	743	743	990	990	990	987	987
MAR2	1985	422	422	422	420	420	764	765	763	761	763	1,014	1,016	1,013	1,009	1,011
MAR3	1985	422	422	422	420	419	699	702	698	701	704	939	942	937	938	943
MAR4	1985	423	422	423	420	420	686	688	685	685	688	915	918	914	912	917
APR1	1985	419	419	419	416	416	628	630	627	626	629	839	842	837	835	840
APR2	1985	413	413	413	410	410	592	589	590	588	588	779	775	776	772	773
APR3	1985	407	406	407	405	405	670	665	663	673	666	889	884	879	891	883
APR4	1985	403	403	403	403	402	698	705	700	707	702	915	924	917	925	920
MAY1	1985	399	398	398	398	398	554	556	554	569	570	671	676	671	701	699
MAY2	1985	375	375	375	377	376	542	543	542	546	547	670	672	670	674	677
MAY3	1985	358	358	357	360	359	546	546	546	548	550	682	683	682	682	684
MAY4	1985	343	341	342	342	341	488	482	488	477	477	601	588	600	568	568
JUN1	1985	326	322	325	323	322	429	416	429	423	423	527	493	527	504	505
JUN2	1985	296	290	295	296	295	358	352	357	365	364	340	334	338	354	355
JUN3	1985	278	272	277	280	278	344	338	343	356	350	384	378	383	402	388
JUN4	1985	266	261	266	268	266	340	339	343	357	355	440	438	442	454	453
JUL1	1985	267	264	267	267	267	394	390	409	435	434	575	574	595	619	618
JUL2	1985	267	265	267	267	267	402	397	403	438	446	577	571	579	620	629
JUL3	1985	261	260	262	261	262	421	419	421	420	425	507	505	507	507	517
JUL4	1985	255	253	255	255	256	439	438	439	437	440	519	518	521	519	521
AUG1	1985	258	257	259	258	259	597	595	590	592	597	802	801	794	794	802
AUG2	1985	268	267	268	266	267	636	634	641	646	648	861	862	868	874	879
AUG3	1985	279	278	279	277	278	950	1,061	944	1,012	1,134	1,239	1,364	1,232	1,308	1,445
AUG4	1985	289	289	289	286	287	986	1,008	987	987	1,004	1,280	1,304	1,280	1,281	1,300
SEP1	1985	297	298	298	294	296	1,134	1,143	1,134	1,097	1,142	1,447	1,457	1,447	1,406	1,455
SEP2	1985	304	305	305	299	302	1,051	927	1,048	886	875	1,348	1,208	1,345	1,160	1,146
SEP3	1985	306	308	307	302	305	1,041	1,047	1,041	1,039	1,046	1,341	1,348	1,341	1,339	1,346
SEP4	1985	308	308	308	306	307	877	1,060	887	1,071	1,078	1,157	1,362	1,168	1,375	1,382
OCT1	1986	313	312	313	310	311	810	812	811	1,000	962	1,081	1,083	1,081	1,294	1,250
OCT2	1986	317	317	317	315	315	673	659	659	730	716	917	901	902	983	967
OCT3	1986	320	320	321	318	319	567	558	558	735	743	784	774	774	989	998
OCT4	1986	324	324	324	322	322	572	564	564	709	721	790	781	781	958	972
NOV1	1986	327	327	328	325	326	1,087	1,090	1,082	1,066	1,089	1,391	1,395	1,386	1,367	1,393
NOV2	1986	331	331	331	328	329	1,061	1,063	1,062	862	800	1,361	1,363	1,361	1,133	1,061
NOV3	1986	334	334	335	332	332	1,025	1,025	1,025	673	673	1,321	1,321	1,321	911	911
NOV4	1986	341	341	341	338	339	827	782	875	698	664	1,095	1,043	1,150	940	900
DEC1	1986	348	348	349	345	346	665	665	666	676	677	903	903	903	914	914
DEC2	1986	352	352	352	349	350	674	674	674	688	688	916	917	917	931	932
DEC3	1986	354	354	355	352	352	681	681	681	694	694	925	925	925	938	939
DEC4	1986	359	360	360	356	357	657	657	657	669	670	894	895	894	907	907
JAN1	1986	365	365	365	362	362	729	730	729	739	740	980	980	980	989	990
JAN2	1986	369	369	369	365	366	785	785	785	793	794	1,044	1,044	1,045	1,052	1,053
JAN3	1986	369	369	369	366	367	786	786	786	799	799	1,049	1,049	1,050	1,063	1,063
JAN4	1986	372	372	373	370	370	762	762	762	778	778	1,023	1,022	1,023	1,039	1,039
FEB1	1986	376	376	377	374	374	748	748	748	766	767	1,007	1,007	1,007	1,026	1,026
FEB2	1986	390	391	391	387	388	730	731	730	747	748	985	986	986	1,003	1,004
FEB3	1986	397	398	398	393	394	748	749	749	761	762	1,004	1,005	1,004	1,016	1,018
FEB4	1986	397	397	397	394	394	817	822	817	830	835	1,084	1,090	1,085	1,098	1,104
MAR1	1986	400	400	401	397	397	812	820	812	809	817	1,080	1,089	1,080	1,075	1,083
MAR2	1986	405	405	406	402	402	773	782	772	772	782	1,033	1,045	1,033	1,031	1,043
MAR3	1986	410	409	410	406	406	771	784	769	769	784	1,030	1,046	1,028	1,026	1,044
MAR4	1986	413	413	413	409	409	778	790	776	777	790	1,040	1,055	1,038	1,036	1,052
APR1	1986	413	412	413	409	409	718	715	715	714	714	968	965	965	961	962
APR2	1986	412	412	412	408	408	775	763	775	767	760	1,035	1,020	1,035	1,024	1,015
APR3	1986	412	411	412	407	408	757	767	754	752	753	1,017	1,030	1,013	1,010	1,011
APR4	1986	411	411	411	407	407	716	715	710	717	728	970	970	963	968	981
MAY1	1986	411	410	411	406	406	696	693	693	702	719	950	947	946	952	972
MAY2	1986	410	410	410	406	406	669	667	669	704	720	915	913	915	954	972
MAY3	1986	409	409	409	404	405	630	630	630	660	648	869	869	869	899	883
MAY4	1986	405	404	405	400	400	535	507	535	530	529	744	698	744	725	724
JUN1	1986	389	385	389	380	380	452	448	451	446	446	543	538	539	525	526
JUN2	1986	353	347	353	346	347	423	416	422	425	426	482	473	481	488	491
JUN3	1986	327	321	326	326	325	381	375	380	390	387	424	420	422	443	432
JUN4	1986	291	286	290	294	291	348	343	347	350	353	390	386	388	392	394
JUL1	1986	262	257	261	265	262	338	334	338	338	335	402	397	402	401	399
JUL2	1986	251	247	251	255	253	342	338	341	341	338	440	436	439	439	437
JUL3	1986	253	249	253	256	255	385	382	385	384	382	511	508	511	510	509

NA = no action, PA = proposed action, CE = cumulative effects

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
JUL4	1986	258	256	259	261	260	437	434	437	444	426	631	628	630	641	618
AUG1	1986	269	268	270	271	270	824	771	923	923	966	1,090	1,029	1,203	1,203	1,253
AUG2	1986	282	281	283	282	281	745	770	770	957	838	1,005	1,035	1,034	1,244	1,109
AUG3	1986	294	293	294	293	292	827	825	832	859	871	1,093	1,091	1,099	1,129	1,142
AUG4	1986	303	303	303	301	301	709	688	709	699	687	959	936	959	947	934
SEP1	1986	309	310	310	307	307	583	583	584	665	673	807	806	807	908	917
SEP2	1986	316	317	317	314	313	535	536	525	692	707	747	747	735	942	959
SEP3	1986	322	323	322	318	319	633	628	632	770	790	874	869	874	1,036	1,058
SEP4	1986	326	327	327	322	322	1,194	1,275	1,194	1,192	1,550	1,516	1,606	1,516	1,513	1,911
OCT1	1987	331	332	331	327	326	1,089	1,159	1,089	1,092	999	1,397	1,476	1,397	1,397	1,295
OCT2	1987	335	336	335	331	331	1,154	1,165	1,154	946	756	1,471	1,483	1,470	1,235	1,017
OCT3	1987	338	339	339	334	334	1,230	1,237	1,228	734	741	1,554	1,562	1,552	991	999
OCT4	1987	342	343	342	338	338	943	914	785	718	722	1,231	1,198	1,050	969	975
NOV1	1987	345	346	345	341	341	692	682	686	668	671	936	925	928	907	911
NOV2	1987	348	348	348	343	343	710	746	778	695	698	957	1,000	1,037	938	941
NOV3	1987	355	355	355	350	350	632	633	646	641	640	862	862	880	870	870
NOV4	1987	363	364	364	359	359	736	681	736	748	696	991	925	992	1,003	942
DEC1	1987	369	370	369	365	365	691	692	691	703	703	937	938	938	949	950
DEC2	1987	374	374	374	370	369	729	730	729	742	742	982	983	982	995	995
DEC3	1987	378	379	378	374	374	685	686	685	698	698	929	930	930	942	943
DEC4	1987	380	381	380	376	376	722	722	722	735	735	973	974	974	987	987
JAN1	1987	380	381	380	376	376	731	731	731	742	742	983	984	983	994	994
JAN2	1987	383	384	384	379	379	786	786	786	789	789	1,048	1,049	1,048	1,049	1,049
JAN3	1987	397	398	397	392	392	788	789	788	801	801	1,052	1,053	1,052	1,065	1,066
JAN4	1987	411	413	412	406	406	800	801	800	803	803	1,059	1,060	1,059	1,061	1,062
FEB1	1987	421	424	422	414	416	766	768	766	773	774	1,021	1,024	1,022	1,028	1,029
FEB2	1987	423	425	424	419	419	772	776	772	781	784	1,028	1,033	1,028	1,037	1,041
FEB3	1987	434	435	435	430	430	743	747	743	752	756	993	999	993	1,002	1,007
FEB4	1987	444	445	444	439	439	736	741	737	747	751	986	992	986	996	1,001
MAR1	1987	446	447	447	442	442	818	823	818	821	825	1,075	1,080	1,075	1,077	1,082
MAR2	1987	448	449	448	444	444	729	733	729	735	740	970	976	970	976	982
MAR3	1987	449	449	449	445	445	750	757	749	747	755	992	1,001	990	987	997
MAR4	1987	447	447	447	443	443	734	740	734	741	746	980	988	980	987	994
APR1	1987	446	446	446	442	442	737	735	734	734	735	981	978	978	976	977
APR2	1987	445	444	444	440	440	624	623	623	621	623	831	830	830	825	829
APR3	1987	437	437	437	433	433	519	519	519	519	519	652	652	652	651	653
APR4	1987	423	423	423	419	419	527	527	527	528	531	683	685	683	683	688
MAY1	1987	403	403	403	400	400	497	497	497	498	499	611	611	610	608	610
MAY2	1987	377	376	376	374	372	468	466	468	463	461	551	545	550	526	520
MAY3	1987	342	339	341	338	335	439	437	439	438	436	466	461	470	460	451
MAY4	1987	311	305	311	307	305	458	441	461	467	463	571	538	578	584	577
JUN1	1987	297	291	297	297	295	384	377	384	397	393	476	470	476	499	497
JUN2	1987	283	278	283	285	282	372	368	372	381	375	371	370	372	392	382
JUN3	1987	263	261	264	267	264	366	364	367	378	376	462	460	462	474	473
JUN4	1987	265	263	265	267	266	414	413	415	432	428	550	550	551	574	567
JUL1	1987	263	262	263	265	264	453	445	446	468	465	614	603	603	630	625
JUL2	1987	267	266	267	269	268	527	535	534	578	538	751	761	760	807	767
JUL3	1987	274	274	274	275	275	718	696	649	740	740	984	959	905	1,005	1,007
JUL4	1987	282	283	283	282	282	794	802	726	718	809	1,072	1,080	995	988	1,088
AUG1	1987	289	290	290	289	289	870	875	848	849	878	1,156	1,162	1,131	1,133	1,164
AUG2	1987	296	297	296	295	295	579	599	615	652	621	812	838	857	896	861
AUG3	1987	303	304	303	301	302	1,430	1,449	1,430	1,426	1,444	1,777	1,798	1,778	1,773	1,793
AUG4	1987	309	310	309	307	307	718	683	718	744	728	962	919	962	989	969
SEP1	1987	314	316	315	312	313	829	850	821	863	849	1,102	1,125	1,092	1,138	1,120
SEP2	1987	319	321	320	317	318	800	774	771	807	805	1,069	1,040	1,036	1,073	1,072
SEP3	1987	317	319	318	315	316	823	807	805	822	821	1,097	1,079	1,077	1,095	1,093
SEP4	1987	318	319	319	318	317	850	849	848	847	848	1,129	1,128	1,127	1,126	1,127
OCT1	1988	323	323	323	322	322	1,004	1,163	1,154	1,145	1,153	1,304	1,481	1,471	1,460	1,468
OCT2	1988	328	328	328	327	327	962	1,017	966	1,161	1,178	1,255	1,317	1,259	1,477	1,495
OCT3	1988	332	332	332	331	331	858	860	858	888	889	1,137	1,139	1,137	1,170	1,172
OCT4	1988	335	336	336	334	334	801	803	802	830	832	1,073	1,075	1,073	1,104	1,106
NOV1	1988	338	339	339	337	337	776	777	776	796	797	1,041	1,043	1,042	1,062	1,063
NOV2	1988	342	342	342	341	341	745	745	745	762	763	1,003	1,004	1,003	1,021	1,022
NOV3	1988	345	345	345	344	344	748	748	748	760	760	1,003	1,004	1,004	1,016	1,016
NOV4	1988	348	348	348	347	347	816	735	817	830	749	1,085	990	1,085	1,099	1,004
DEC1	1988	354	354	354	353	353	694	695	694	710	710	942	943	943	959	959
DEC2	1988	363	364	364	362	362	687	688	688	704	705	935	936	935	952	953
DEC3	1988	370	371	371	369	369	711	712	711	725	725	962	963	962	976	976
DEC4	1988	374	374	374	372	372	729	730	730	747	747	986	987	986	1,004	1,004
JAN1	1988	375	375	375	373	373	738	739	739	756	756	997	998	998	1,016	1,016
JAN2	1988	377	378	378	376	376	706	707	707	722	722	958	958	958	974	974
JAN3	1988	385	386	386	383	383	702	703	703	717	716	951	952	952	966	966
JAN4	1988	395	397	396	393	392	725	726	726	734	734	973	974	974	981	981
FEB1	1988	404	405	405	401	401	763	764	764	774	773	1,019	1,020	1,020	1,029	1,029
FEB2	1988	412	414	414	409	409	764	766	765	774	774	1,019	1,021	1,020	1,029	1,029
FEB3	1988	415	418	417	411	411	760	762	761	771	772	1,016	1,018	1,017	1,026	1,026
FEB4	1988	409	411	410	408	408	763	764	763	774	775	1,018	1,020	1,019	1,030	1,030

NA = no action, PA = proposed action, CE = cumulative effects

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
MAR1	1988	417	417	417	416	415	754	755	754	766	766	1,007	1,008	1,007	1,019	1,020
MAR2	1988	423	423	423	422	422	835	840	835	847	853	1,103	1,110	1,104	1,117	1,123
MAR3	1988	428	428	428	427	427	835	851	833	836	854	1,104	1,123	1,101	1,103	1,124
MAR4	1988	430	430	430	429	429	818	837	816	819	840	1,083	1,107	1,081	1,084	1,109
APR1	1988	431	431	431	431	430	856	871	851	852	871	1,127	1,145	1,122	1,122	1,144
APR2	1988	433	432	433	432	432	761	759	758	761	762	1,015	1,012	1,011	1,014	1,015
APR3	1988	433	433	433	432	432	758	767	755	760	773	1,014	1,026	1,010	1,015	1,031
APR4	1988	433	432	432	431	431	832	873	827	836	895	1,106	1,154	1,100	1,108	1,176
MAY1	1988	432	432	432	430	431	967	971	929	927	977	1,260	1,264	1,217	1,214	1,269
MAY2	1988	432	432	432	430	431	889	883	878	895	906	1,173	1,167	1,161	1,176	1,189
MAY3	1988	429	429	429	428	428	596	594	594	621	611	801	799	799	829	814
MAY4	1988	425	425	425	423	423	782	787	782	768	755	1,047	1,052	1,046	1,025	1,010
JUN1	1988	412	410	411	407	406	552	515	546	546	535	761	701	751	739	724
JUN2	1988	386	379	383	377	376	477	463	466	497	495	589	557	560	632	627
JUN3	1988	368	357	364	362	362	555	544	565	617	613	768	757	782	844	841
JUN4	1988	354	345	351	354	354	465	457	467	486	485	612	603	616	639	640
JUL1	1988	344	338	341	350	348	453	449	451	495	489	619	616	617	669	663
JUL2	1988	346	342	344	352	349	513	502	502	538	537	709	698	697	735	736
JUL3	1988	356	353	355	359	357	562	529	540	632	610	796	760	771	873	850
JUL4	1988	367	366	367	368	366	491	487	501	526	523	682	677	696	724	720
AUG1	1988	373	373	373	373	371	571	571	570	585	586	763	763	762	778	779
AUG2	1988	375	375	375	374	373	845	814	789	877	827	1,115	1,079	1,050	1,150	1,092
AUG3	1988	380	380	380	378	377	562	568	560	596	595	785	793	782	820	820
AUG4	1988	387	387	387	385	384	599	604	597	636	635	836	843	832	873	873
SEP1	1988	393	393	393	391	390	1,209	1,274	1,186	1,179	1,185	1,533	1,605	1,507	1,496	1,503
SEP2	1988	394	394	395	392	392	858	877	852	884	885	1,136	1,159	1,130	1,163	1,164
SEP3	1988	394	394	394	392	392	888	887	882	902	904	1,171	1,171	1,164	1,184	1,186
SEP4	1988	396	396	397	394	394	1,164	1,175	1,165	1,142	1,150	1,483	1,495	1,483	1,455	1,464
OCT1	1989	399	399	399	397	397	1,158	1,217	1,164	1,097	1,092	1,475	1,541	1,482	1,405	1,399
OCT2	1989	403	403	403	401	400	987	987	988	946	965	1,284	1,284	1,286	1,234	1,257
OCT3	1989	406	406	406	404	404	1,014	1,014	1,015	964	979	1,315	1,315	1,316	1,255	1,272
OCT4	1989	409	410	410	407	407	1,131	1,131	1,132	1,109	1,108	1,446	1,446	1,446	1,418	1,417
NOV1	1989	413	413	413	411	410	1,169	1,168	1,169	999	1,026	1,486	1,486	1,487	1,294	1,325
NOV2	1989	416	416	416	414	413	998	998	998	944	949	1,293	1,293	1,294	1,230	1,235
NOV3	1989	422	423	423	420	420	1,063	1,064	1,064	1,046	1,046	1,368	1,368	1,368	1,345	1,345
NOV4	1989	434	435	435	432	432	1,061	1,112	1,061	1,044	1,084	1,364	1,422	1,365	1,342	1,388
DEC1	1989	442	443	444	440	440	1,128	1,131	1,128	1,111	1,113	1,440	1,443	1,440	1,420	1,422
DEC2	1989	446	447	447	444	443	1,140	1,143	1,141	1,121	1,123	1,454	1,457	1,454	1,431	1,433
DEC3	1989	448	449	449	446	445	1,156	1,159	1,156	1,135	1,137	1,471	1,474	1,471	1,446	1,448
DEC4	1989	455	456	456	453	452	1,146	1,149	1,146	1,127	1,130	1,460	1,463	1,460	1,438	1,440
JAN1	1989	466	468	468	463	462	1,136	1,139	1,137	1,120	1,122	1,449	1,452	1,449	1,429	1,431
JAN2	1989	472	474	474	468	468	1,132	1,133	1,132	1,116	1,116	1,444	1,445	1,445	1,425	1,425
JAN3	1989	472	475	474	469	469	1,059	1,060	1,060	1,050	1,050	1,362	1,362	1,362	1,350	1,350
JAN4	1989	478	480	480	474	474	967	968	968	964	964	1,257	1,258	1,258	1,252	1,252
FEB1	1989	480	482	482	477	476	907	908	908	911	911	1,190	1,192	1,191	1,193	1,193
FEB2	1989	478	480	482	477	475	857	859	859	863	863	1,131	1,133	1,133	1,136	1,136
FEB3	1989	482	484	488	481	479	842	844	845	844	844	1,110	1,112	1,113	1,111	1,110
FEB4	1989	489	491	493	488	486	863	865	866	864	864	1,133	1,135	1,135	1,132	1,132
MAR1	1989	486	488	490	485	484	823	825	825	828	828	1,087	1,089	1,089	1,090	1,090
MAR2	1989	477	478	480	477	476	851	855	852	854	857	1,120	1,125	1,121	1,123	1,126
MAR3	1989	473	473	475	473	471	1,034	1,135	1,089	741	741	1,332	1,446	1,394	986	986
MAR4	1989	471	472	474	471	470	768	767	762	768	773	1,023	1,022	1,016	1,020	1,027
APR1	1989	470	471	473	470	469	736	737	729	738	747	984	986	976	985	996
APR2	1989	471	471	473	471	469	741	751	751	756	756	992	1,005	1,005	1,009	1,009
APR3	1989	471	472	473	471	470	717	715	715	720	749	965	966	964	968	1,001
APR4	1989	469	469	471	469	468	763	740	757	771	766	1,023	997	1,016	1,029	1,022
MAY1	1989	457	457	459	459	458	849	818	825	838	844	1,126	1,091	1,097	1,112	1,117
MAY2	1989	455	455	456	457	455	747	761	785	776	769	1,002	1,020	1,047	1,031	1,024
MAY3	1989	448	447	449	448	447	621	573	627	639	639	842	770	851	858	859
MAY4	1989	437	430	438	434	432	635	599	617	737	692	874	828	852	993	939
JUN1	1989	420	404	419	415	413	536	531	541	571	573	734	730	743	780	783
JUN2	1989	410	399	409	411	409	570	566	568	606	607	766	764	765	814	815
JUN3	1989	376	366	373	390	388	489	489	487	546	543	683	684	681	754	749
JUN4	1989	372	365	370	387	385	495	499	493	535	540	701	708	699	743	750
JUL1	1989	382	376	381	392	391	470	474	469	514	517	665	671	663	710	714
JUL2	1989	388	384	388	391	391	472	471	472	546	551	594	595	594	726	733
JUL3	1989	394	392	394	393	393	546	538	551	578	567	764	755	771	797	786
JUL4	1989	397	395	397	396	396	496	495	496	525	522	672	675	672	708	705
AUG1	1989	395	393	396	395	395	544	539	545	564	557	749	744	750	768	759
AUG2	1989	393	391	393	393	393	589	572	589	607	597	810	789	810	826	813
AUG3	1989	399	398	399	399	400	800	789	808	954	927	1,068	1,057	1,078	1,242	1,212
AUG4	1989	412	411	412	411	411	903	935	917	972	910	1,189	1,225	1,205	1,264	1,193
SEP1	1989	423	423	424	422	422	948	947	945	1,019	967	1,242	1,241	1,238	1,318	1,260
SEP2	1989	430	429	431	428	429	1,002	1,000	1,002	1,026	994	1,297	1,296	1,298	1,322	1,287
SEP3	1989	435	434	436	433	434	1,302	1,343	1,302	1,243	1,254	1,636	1,682	1,637	1,569	1,581
SEP4	1989	440	439	441	438	438	1,261	1,331	1,312	1,245	1,261	1,590	1,669	1,647	1,570	1,589
OCT1	1990	445	444	446	442	443	1,466	1,474	1,465	1,344	1,371	1,818	1,827	1,816	1,681	1,710

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Above Pueblo Gage					**Avondale Gage**					**Catlin Dam Gage**				
Qtr-Mo	**Water Year**	**1 - Existing**	**2 - NA**	**3 - PA**	**4 - PA CE**	**5 - NA CE**	**1 - Existing**	**2 - NA**	**3 - PA**	**4 - PA CE**	**5 - NA CE**	**1 - Existing**	**2 - NA**	**3 - PA**	**4 - PA CE**	**5 - NA CE**
OCT2	1990	450	449	451	447	448	1,045	1,047	1,046	1,016	1,061	1,349	1,352	1,349	1,312	1,364
OCT3	1990	454	453	455	451	452	1,112	1,096	1,113	1,061	1,077	1,423	1,406	1,424	1,363	1,382
OCT4	1990	456	456	458	453	454	1,116	1,093	1,116	1,082	1,068	1,428	1,403	1,429	1,388	1,373
NOV1	1990	459	459	460	456	457	1,060	1,035	1,060	1,047	1,029	1,364	1,337	1,365	1,347	1,327
NOV2	1990	461	461	462	458	459	1,078	1,068	1,086	1,049	1,035	1,384	1,373	1,393	1,350	1,335
NOV3	1990	474	475	476	471	472	1,088	1,088	1,088	1,079	1,079	1,395	1,395	1,396	1,384	1,384
NOV4	1990	487	488	489	483	484	1,076	1,100	1,077	1,069	1,090	1,382	1,409	1,383	1,373	1,396
DEC1	1990	497	499	499	492	493	1,116	1,119	1,117	1,101	1,103	1,427	1,430	1,427	1,408	1,411
DEC2	1990	502	504	504	497	498	1,131	1,134	1,132	1,113	1,115	1,443	1,446	1,444	1,421	1,424
DEC3	1990	510	511	512	504	505	1,247	1,251	1,247	1,213	1,216	1,573	1,577	1,574	1,534	1,538
DEC4	1990	517	519	520	512	513	1,004	1,007	1,005	1,001	1,003	1,301	1,304	1,302	1,295	1,297
JAN1	1990	527	531	530	523	524	1,163	1,167	1,164	1,144	1,146	1,479	1,483	1,480	1,456	1,459
JAN2	1990	549	559	555	548	553	1,168	1,171	1,170	1,148	1,150	1,484	1,487	1,486	1,461	1,462
JAN3	1990	568	582	576	570	577	1,100	1,105	1,103	1,090	1,091	1,407	1,413	1,410	1,394	1,396
JAN4	1990	571	584	579	574	579	1,063	1,068	1,066	1,056	1,058	1,366	1,371	1,369	1,356	1,358
FEB1	1990	570	581	577	572	577	1,002	1,009	1,006	1,001	1,004	1,297	1,303	1,301	1,293	1,296
FEB2	1990	578	590	585	580	586	989	998	993	987	992	1,280	1,290	1,285	1,277	1,282
FEB3	1990	584	598	592	587	593	921	931	926	925	929	1,201	1,212	1,207	1,203	1,208
FEB4	1990	574	586	581	576	581	947	955	951	947	951	1,231	1,240	1,236	1,229	1,234
MAR1	1990	567	571	569	562	565	876	878	877	870	872	1,141	1,144	1,142	1,133	1,135
MAR2	1990	570	571	572	562	563	929	941	930	924	935	1,210	1,223	1,210	1,202	1,215
MAR3	1990	569	569	571	562	561	1,209	1,270	1,200	1,089	1,050	1,529	1,597	1,519	1,393	1,348
MAR4	1990	568	566	570	562	559	1,175	1,232	1,173	1,046	1,005	1,490	1,554	1,487	1,344	1,296
APR1	1990	563	561	568	560	555	1,093	1,158	1,095	909	888	1,399	1,472	1,400	1,186	1,161
APR2	1990	559	556	565	558	550	1,109	1,048	1,110	961	923	1,417	1,349	1,419	1,248	1,205
APR3	1990	556	552	563	556	548	1,083	882	1,093	894	883	1,389	1,159	1,400	1,171	1,159
APR4	1990	554	550	561	555	545	975	900	894	899	900	1,265	1,179	1,170	1,175	1,178
MAY1	1990	542	534	547	543	531	720	717	725	724	718	942	940	948	946	939
MAY2	1990	534	525	539	535	523	809	814	802	802	823	1,067	1,075	1,059	1,058	1,082
MAY3	1990	534	527	540	536	525	1,090	1,015	1,084	978	1,103	1,397	1,313	1,389	1,267	1,409
MAY4	1990	531	525	537	531	521	711	675	727	709	695	920	864	942	913	894
JUN1	1990	472	440	469	454	443	590	561	588	603	591	777	743	775	799	787
JUN2	1990	368	321	352	346	334	419	374	404	408	394	452	399	435	441	422
JUN3	1990	335	325	334	334	329	437	427	435	473	468	610	601	609	659	654
JUN4	1990	377	380	385	380	378	487	488	493	531	517	677	678	682	733	714
JUL1	1990	383	388	389	386	386	538	537	542	553	550	736	735	739	748	745
JUL2	1990	364	365	366	366	365	537	533	539	550	545	715	710	717	727	721
JUL3	1990	366	371	370	370	371	514	509	517	528	520	683	678	686	695	685
JUL4	1990	377	385	382	383	385	573	567	577	586	579	781	772	786	791	780
AUG1	1990	381	389	386	387	390	704	678	707	706	682	951	920	954	949	920
AUG2	1990	383	388	386	388	389	1,087	974	969	930	938	1,391	1,265	1,258	1,211	1,220
AUG3	1990	390	398	394	396	398	627	613	645	658	637	851	833	874	884	858
AUG4	1990	409	423	416	417	422	767	725	772	819	771	1,033	985	1,038	1,088	1,032
SEP1	1990	429	446	438	439	445	882	846	889	964	906	1,167	1,127	1,175	1,256	1,190
SEP2	1990	441	458	451	452	457	1,089	1,040	1,095	1,140	1,056	1,400	1,346	1,406	1,454	1,360
SEP3	1990	448	464	458	458	463	1,258	1,278	1,262	1,247	1,224	1,587	1,610	1,592	1,574	1,547
SEP4	1990	451	466	460	461	466	958	963	1,010	1,054	985	1,246	1,252	1,305	1,352	1,275
OCT1	1991	451	464	459	460	464	888	902	893	927	917	1,165	1,181	1,171	1,208	1,196
OCT2	1991	453	466	461	462	466	898	910	903	879	918	1,178	1,192	1,183	1,154	1,199
OCT3	1991	451	462	458	459	462	823	831	827	840	833	1,090	1,101	1,095	1,108	1,101
OCT4	1991	448	458	454	455	458	808	814	811	822	813	1,073	1,081	1,077	1,088	1,077
NOV1	1991	443	448	447	448	449	780	784	782	795	787	1,037	1,043	1,040	1,053	1,044
NOV2	1991	447	455	452	453	455	766	767	768	771	769	1,017	1,018	1,020	1,021	1,018
NOV3	1991	455	463	460	461	463	1,035	1,037	1,037	1,026	1,027	1,332	1,335	1,334	1,321	1,322
NOV4	1991	467	477	473	473	476	1,094	1,117	1,096	1,079	1,098	1,399	1,424	1,401	1,381	1,401
DEC1	1991	476	486	482	483	486	1,257	1,263	1,259	1,220	1,223	1,582	1,588	1,584	1,539	1,543
DEC2	1991	494	507	502	502	507	1,255	1,262	1,258	1,221	1,225	1,581	1,588	1,583	1,542	1,545
DEC3	1991	513	531	524	523	530	1,313	1,321	1,316	1,269	1,274	1,645	1,654	1,648	1,595	1,600
DEC4	1991	539	563	553	551	560	1,148	1,157	1,152	1,131	1,135	1,461	1,470	1,464	1,440	1,445
JAN1	1991	612	726	659	686	847	899	942	920	927	977	1,173	1,220	1,196	1,202	1,256
JAN2	1991	692	835	758	799	900	982	1,047	1,016	1,024	1,063	1,267	1,338	1,303	1,310	1,353
JAN3	1991	711	811	763	793	843	1,018	1,083	1,055	1,062	1,090	1,305	1,377	1,346	1,352	1,383
JAN4	1991	704	767	741	759	772	1,017	1,053	1,041	1,041	1,047	1,307	1,348	1,334	1,333	1,339
FEB1	1991	693	744	720	737	773	1,075	1,102	1,089	1,083	1,102	1,373	1,403	1,389	1,380	1,401
FEB2	1991	685	732	708	724	761	1,033	1,062	1,046	1,045	1,066	1,325	1,357	1,340	1,337	1,360
FEB3	1991	667	683	688	701	670	1,048	1,058	1,058	1,053	1,040	1,343	1,355	1,355	1,348	1,333
FEB4	1991	629	622	665	675	597	1,107	1,106	1,124	1,108	1,077	1,412	1,411	1,430	1,411	1,376
MAR1	1991	594	586	618	616	572	1,107	1,106	1,116	1,098	1,084	1,413	1,412	1,423	1,401	1,386
MAR2	1991	586	581	598	589	569	1,170	1,219	1,195	1,168	1,188	1,486	1,540	1,514	1,482	1,505
MAR3	1991	581	575	592	583	564	1,236	1,376	1,268	951	916	1,558	1,714	1,594	1,232	1,190
MAR4	1991	576	569	586	576	557	1,207	1,376	1,246	942	898	1,528	1,716	1,571	1,225	1,173
APR1	1991	570	563	581	570	552	1,213	887	1,012	926	879	1,535	1,163	1,307	1,207	1,153
APR2	1991	569	562	580	569	552	904	888	937	894	885	1,184	1,166	1,221	1,171	1,161
APR3	1991	568	562	580	571	552	964	987	960	954	981	1,253	1,279	1,247	1,240	1,271
APR4	1991	568	562	580	572	554	1,047	1,105	1,049	1,039	1,092	1,347	1,412	1,349	1,337	1,398
MAY1	1991	568	562	580	573	553	845	837	910	882	839	1,107	1,099	1,185	1,151	1,100
MAY2	1991	563	551	572	563	534	879	924	919	920	946	1,155	1,209	1,201	1,199	1,232

NA = no action, PA = proposed action, CE = cumulative effects

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
MAY3	1991	556	540	562	549	517	1,158	936	1,073	958	869	1,474	1,224	1,379	1,244	1,142
MAY4	1991	471	405	444	374	318	604	523	571	543	500	816	713	774	744	699
JUN1	1991	391	327	354	321	296	582	536	556	568	554	771	719	742	764	748
JUN2	1991	371	357	360	335	333	438	424	428	425	427	488	470	476	501	504
JUN3	1991	361	336	355	337	335	463	439	458	467	459	602	576	596	614	607
JUN4	1991	352	344	353	360	360	470	463	472	519	519	647	640	650	710	711
JUL1	1991	379	390	388	399	399	494	500	505	544	534	677	684	689	734	721
JUL2	1991	417	432	427	430	434	542	550	552	572	571	733	742	744	764	763
JUL3	1991	442	449	450	447	446	601	603	607	619	615	794	797	801	814	810
JUL4	1991	441	439	444	436	430	574	570	576	582	573	756	753	758	763	752
AUG1	1991	429	416	425	415	402	660	642	658	648	631	864	840	861	846	824
AUG2	1991	383	345	366	351	319	614	573	603	597	562	819	770	807	795	753
AUG3	1991	372	370	366	361	374	660	638	659	679	664	891	865	891	911	893
AUG4	1991	405	428	410	410	430	796	781	806	834	806	1,060	1,041	1,070	1,100	1,067
SEP1	1991	439	469	448	456	482	805	806	813	847	836	1,068	1,068	1,077	1,114	1,100
SEP2	1991	458	481	465	474	484	912	911	921	992	945	1,197	1,196	1,206	1,285	1,231
SEP3	1991	474	494	479	486	498	1,010	1,059	1,013	1,089	1,037	1,309	1,364	1,313	1,395	1,336
SEP4	1991	482	503	488	506	524	1,415	1,602	1,418	1,328	1,348	1,762	1,968	1,765	1,663	1,685
OCT1	1992	486	506	493	510	527	1,261	1,337	1,252	1,223	1,251	1,589	1,674	1,579	1,544	1,576
OCT2	1992	491	512	498	513	533	1,137	1,128	1,141	1,065	1,079	1,452	1,442	1,456	1,368	1,383
OCT3	1992	495	515	501	516	537	1,193	1,182	1,193	1,094	1,107	1,513	1,502	1,513	1,400	1,414
OCT4	1992	498	516	504	517	539	1,335	1,328	1,301	1,168	1,181	1,671	1,662	1,632	1,481	1,496
NOV1	1992	496	511	501	513	533	915	919	925	897	912	1,192	1,197	1,204	1,168	1,185
NOV2	1992	490	498	493	503	516	1,060	1,051	1,061	997	1,007	1,358	1,348	1,359	1,284	1,296
NOV3	1992	497	513	502	513	544	1,017	1,022	1,019	1,008	1,016	1,308	1,313	1,309	1,296	1,305
NOV4	1992	532	570	550	552	570	1,034	1,063	1,040	1,030	1,051	1,330	1,363	1,337	1,325	1,348
DEC1	1992	564	615	587	599	655	1,165	1,180	1,171	1,147	1,161	1,479	1,495	1,485	1,456	1,473
DEC2	1992	566	602	583	595	621	1,241	1,252	1,244	1,212	1,220	1,564	1,577	1,568	1,530	1,539
DEC3	1992	568	596	582	591	607	1,235	1,245	1,239	1,208	1,214	1,558	1,569	1,562	1,526	1,533
DEC4	1992	565	569	579	584	566	1,132	1,135	1,136	1,119	1,115	1,442	1,446	1,447	1,426	1,421
JAN1	1992	557	559	581	587	559	1,015	1,017	1,027	1,021	1,009	1,308	1,311	1,321	1,312	1,300
JAN2	1992	558	569	581	586	574	961	966	973	972	966	1,246	1,252	1,260	1,257	1,250
JAN3	1992	552	555	571	569	551	962	964	972	966	957	1,247	1,248	1,258	1,250	1,240
JAN4	1992	550	552	564	562	551	950	952	958	954	948	1,233	1,235	1,242	1,236	1,229
FEB1	1992	545	547	558	557	547	929	930	937	933	928	1,208	1,210	1,217	1,211	1,205
FEB2	1992	543	548	560	560	553	944	949	954	950	947	1,226	1,231	1,237	1,230	1,227
FEB3	1992	540	544	552	553	549	944	948	951	947	946	1,227	1,230	1,234	1,228	1,227
FEB4	1992	527	528	536	537	533	984	986	988	980	980	1,272	1,274	1,277	1,266	1,265
MAR1	1992	521	521	528	529	525	990	991	993	982	981	1,276	1,277	1,279	1,265	1,265
MAR2	1992	520	519	527	527	523	1,142	1,160	1,143	1,117	1,133	1,449	1,470	1,450	1,420	1,438
MAR3	1992	514	511	518	519	514	1,217	1,275	1,201	960	926	1,536	1,601	1,517	1,242	1,203
MAR4	1992	507	502	509	509	503	1,155	1,209	1,143	930	889	1,467	1,527	1,453	1,208	1,161
APR1	1992	497	488	498	495	486	887	789	906	820	789	1,161	1,044	1,182	1,079	1,043
APR2	1992	500	508	509	516	530	909	874	935	914	884	1,181	1,140	1,212	1,186	1,151
APR3	1992	522	542	539	566	552	750	755	755	771	761	981	985	986	1,003	992
APR4	1992	517	514	522	531	511	769	783	764	793	792	1,017	1,036	1,011	1,045	1,046
MAY1	1992	489	458	480	475	433	782	741	765	753	742	1,040	994	1,021	1,002	993
MAY2	1992	454	416	439	426	397	764	711	757	749	713	1,021	961	1,014	999	958
MAY3	1992	418	355	392	356	308	655	540	634	596	555	896	758	872	819	775
MAY4	1992	383	348	358	328	319	539	511	521	546	544	724	692	704	740	739
JUN1	1992	386	356	373	359	344	620	602	614	674	668	837	816	830	905	898
JUN2	1992	353	316	333	330	325	469	434	451	473	463	618	580	599	630	618
JUN3	1992	332	315	319	331	323	505	492	493	560	550	701	689	688	770	761
JUN4	1992	325	313	319	330	327	469	458	464	493	486	608	597	603	643	634
JUL1	1992	330	330	331	339	330	506	505	511	544	523	705	705	712	748	722
JUL2	1992	355	367	362	367	374	499	503	505	526	529	686	691	692	712	716
JUL3	1992	377	388	383	386	393	587	574	592	613	607	814	799	819	838	831
JUL4	1992	385	390	388	388	388	570	566	572	607	600	792	787	795	832	822
AUG1	1992	391	398	393	395	402	562	553	564	590	584	782	770	784	809	800
AUG2	1992	387	378	384	382	367	729	680	726	732	688	984	927	981	983	932
AUG3	1992	388	390	387	388	395	643	630	642	656	662	873	856	872	882	891
AUG4	1992	395	405	399	390	389	495	499	497	520	524	592	594	596	650	659
SEP1	1992	399	393	397	390	386	636	639	645	705	683	868	872	878	947	923
SEP2	1992	408	408	405	405	415	646	656	643	705	689	883	896	880	950	931
SEP3	1992	420	429	421	424	435	750	771	746	817	797	1,008	1,032	1,003	1,082	1,060
SEP4	1992	432	447	436	442	456	987	1,032	997	1,042	1,046	1,283	1,333	1,295	1,343	1,347
OCT1	1993	451	473	460	468	494	1,103	1,168	1,113	1,168	1,135	1,413	1,486	1,425	1,484	1,446
OCT2	1993	459	481	469	479	499	1,281	1,369	1,284	1,201	1,208	1,611	1,709	1,615	1,520	1,527
OCT3	1993	462	479	471	475	487	1,139	1,161	1,143	1,088	1,093	1,452	1,476	1,457	1,392	1,398
OCT4	1993	466	481	474	478	487	1,003	1,011	1,007	984	988	1,298	1,307	1,303	1,273	1,278
NOV1	1993	491	537	512	527	583	927	951	938	927	953	1,208	1,234	1,220	1,204	1,233
NOV2	1993	512	605	566	596	663	854	906	884	888	923	1,120	1,177	1,154	1,154	1,192
NOV3	1993	527	558	556	566	574	961	972	971	958	961	1,246	1,258	1,257	1,239	1,242
NOV4	1993	512	529	520	519	525	1,035	1,126	1,037	1,013	1,014	1,332	1,435	1,335	1,304	1,305
DEC1	1993	509	519	514	512	511	1,114	1,116	1,114	1,088	1,080	1,421	1,423	1,422	1,390	1,381
DEC2	1993	506	515	509	507	508	1,183	1,185	1,184	1,156	1,136	1,499	1,501	1,500	1,468	1,444
DEC3	1993	504	514	508	507	510	1,244	1,246	1,245	1,209	1,210	1,568	1,571	1,569	1,527	1,528

NA = no action, PA = proposed action, CE = cumulative effects

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
DEC4	1993	497	497	498	494	482	1,105	1,105	1,105	1,078	1,074	1,412	1,412	1,412	1,381	1,376
JAN1	1993	493	493	492	490	485	973	973	973	964	962	1,262	1,262	1,262	1,250	1,249
JAN2	1993	521	560	536	546	610	925	941	931	932	957	1,207	1,225	1,214	1,214	1,241
JAN3	1993	567	643	598	621	702	1,023	1,050	1,034	1,029	1,058	1,318	1,348	1,330	1,323	1,354
JAN4	1993	618	726	665	698	786	1,017	1,059	1,035	1,035	1,067	1,309	1,355	1,329	1,327	1,362
FEB1	1993	656	765	707	742	828	1,000	1,046	1,021	1,023	1,058	1,289	1,339	1,312	1,312	1,350
FEB2	1993	663	750	705	735	793	1,021	1,055	1,038	1,034	1,056	1,312	1,350	1,331	1,324	1,349
FEB3	1993	629	664	651	664	651	1,010	1,023	1,018	1,009	1,004	1,300	1,315	1,310	1,297	1,292
FEB4	1993	579	577	587	585	533	1,018	1,017	1,020	1,003	986	1,311	1,309	1,313	1,293	1,274
MAR1	1993	562	566	579	566	567	1,012	1,013	1,017	998	998	1,304	1,306	1,310	1,287	1,287
MAR2	1993	566	573	582	572	573	1,059	1,187	1,062	1,039	1,095	1,360	1,503	1,362	1,336	1,399
MAR3	1993	565	567	575	567	558	1,015	1,019	1,008	807	790	1,309	1,313	1,300	1,060	1,039
MAR4	1993	561	561	570	561	549	1,162	1,185	1,161	985	935	1,474	1,501	1,473	1,272	1,214
APR1	1993	555	550	562	552	537	985	883	962	896	869	1,272	1,152	1,245	1,167	1,135
APR2	1993	549	545	556	548	539	828	810	841	821	804	1,087	1,064	1,102	1,077	1,056
APR3	1993	550	551	559	552	544	815	799	809	806	796	1,077	1,056	1,067	1,062	1,052
APR4	1993	551	549	557	552	543	791	786	799	797	784	1,045	1,039	1,055	1,050	1,036
MAY1	1993	538	520	536	527	504	737	729	753	747	723	985	980	1,005	998	971
MAY2	1993	525	501	521	510	473	717	709	724	700	717	957	954	968	935	960
MAY3	1993	486	407	448	406	342	537	486	517	496	456	713	656	694	652	607
MAY4	1993	373	357	355	311	301	439	418	424	394	386	517	479	496	455	442
JUN1	1993	358	315	340	300	291	444	409	429	408	399	547	504	531	505	491
JUN2	1993	345	308	328	319	289	452	424	436	463	436	622	593	605	641	613
JUN3	1993	284	253	267	268	274	387	360	374	381	383	416	383	402	407	406
JUN4	1993	246	245	247	262	257	344	343	347	370	360	426	424	430	451	433
JUL1	1993	246	237	244	243	236	372	365	370	392	388	521	515	519	541	537
JUL2	1993	262	264	265	264	267	393	395	396	394	391	547	550	550	546	544
JUL3	1993	286	288	290	290	292	442	444	445	436	438	621	624	624	612	615
JUL4	1993	305	313	310	314	321	547	562	550	579	594	775	793	778	810	827
AUG1	1993	338	359	350	357	375	642	665	650	689	712	881	908	890	933	961
AUG2	1993	373	396	387	391	413	548	564	562	591	604	762	779	778	808	824
AUG3	1993	399	424	415	416	447	584	602	601	635	657	805	826	823	860	886
AUG4	1993	414	436	430	429	456	677	676	693	689	735	922	921	940	935	986
SEP1	1993	416	430	428	426	436	972	943	979	1,027	996	1,261	1,229	1,269	1,322	1,287
SEP2	1993	417	433	429	428	450	719	714	729	756	754	970	964	980	1,010	1,008
SEP3	1993	422	441	435	434	459	913	891	920	935	921	1,198	1,174	1,207	1,222	1,206
SEP4	1993	427	447	441	441	467	1,092	1,093	1,100	1,083	1,093	1,401	1,402	1,409	1,390	1,401
OCT1	1994	433	452	445	448	474	926	941	936	950	965	1,213	1,230	1,224	1,239	1,256
OCT2	1994	437	455	449	453	471	1,058	1,067	1,064	1,057	1,065	1,362	1,372	1,369	1,360	1,369
OCT3	1994	437	447	446	449	452	945	951	950	940	942	1,231	1,237	1,236	1,224	1,226
OCT4	1994	437	448	446	448	456	900	906	905	889	894	1,180	1,187	1,186	1,166	1,171
NOV1	1994	436	446	444	445	444	900	905	904	891	891	1,178	1,184	1,183	1,167	1,166
NOV2	1994	434	441	441	438	440	933	936	936	918	919	1,215	1,218	1,218	1,196	1,197
NOV3	1994	435	441	440	439	444	1,066	1,068	1,068	1,055	1,057	1,369	1,371	1,370	1,355	1,357
NOV4	1994	448	471	460	463	495	1,080	1,136	1,083	1,062	1,115	1,384	1,448	1,388	1,363	1,422
DEC1	1994	457	480	468	474	496	1,158	1,166	1,161	1,139	1,146	1,472	1,481	1,475	1,450	1,457
DEC2	1994	462	479	471	477	486	1,142	1,148	1,144	1,123	1,127	1,454	1,460	1,456	1,431	1,435
DEC3	1994	459	467	468	473	470	1,152	1,156	1,154	1,134	1,136	1,466	1,471	1,468	1,445	1,446
DEC4	1994	503	570	534	553	639	1,032	1,058	1,043	1,040	1,070	1,330	1,359	1,342	1,337	1,370
JAN1	1994	549	614	582	595	637	1,210	1,228	1,218	1,192	1,204	1,530	1,550	1,539	1,509	1,521
JAN2	1994	562	609	585	596	634	1,254	1,265	1,260	1,227	1,236	1,579	1,591	1,585	1,548	1,557
JAN3	1994	588	639	614	627	665	1,187	1,200	1,194	1,168	1,177	1,503	1,517	1,510	1,480	1,490
JAN4	1994	607	661	637	651	688	1,093	1,110	1,102	1,088	1,099	1,397	1,415	1,407	1,390	1,401
FEB1	1994	600	632	620	629	639	1,086	1,097	1,093	1,077	1,080	1,388	1,401	1,396	1,376	1,380
FEB2	1994	573	586	583	592	594	1,080	1,087	1,083	1,067	1,070	1,380	1,388	1,385	1,365	1,368
FEB3	1994	545	550	551	562	554	1,027	1,031	1,030	1,021	1,019	1,322	1,326	1,325	1,313	1,311
FEB4	1994	534	549	543	559	564	1,043	1,051	1,047	1,037	1,041	1,341	1,349	1,345	1,333	1,336
MAR1	1994	535	556	547	563	575	1,022	1,031	1,026	1,020	1,026	1,316	1,326	1,321	1,313	1,319
MAR2	1994	540	560	552	568	575	1,063	1,077	1,066	1,055	1,065	1,362	1,378	1,365	1,351	1,363
MAR3	1994	542	560	554	570	574	1,186	1,279	1,226	951	928	1,502	1,606	1,546	1,231	1,205
MAR4	1994	539	551	548	560	555	1,195	1,113	1,194	944	908	1,512	1,419	1,510	1,223	1,180
APR1	1994	539	553	549	562	565	868	840	856	853	848	1,135	1,100	1,119	1,114	1,107
APR2	1994	536	545	544	554	552	783	777	785	790	783	1,028	1,018	1,029	1,032	1,023
APR3	1994	541	556	551	561	566	755	755	748	757	766	997	997	986	996	1,007
APR4	1994	536	535	539	543	524	697	698	705	711	696	911	915	922	927	910
MAY1	1994	520	502	515	511	498	675	661	680	679	659	882	868	891	889	865
MAY2	1994	511	511	510	514	515	567	567	567	569	569	626	627	630	629	626
MAY3	1994	402	335	374	340	285	505	455	491	458	415	619	565	610	556	505
MAY4	1994	314	303	304	279	270	465	443	458	427	418	579	541	571	518	504
JUN1	1994	368	365	366	356	364	462	455	457	449	455	452	425	433	422	425
JUN2	1994	332	320	328	334	341	419	409	417	429	433	495	484	493	508	509
JUN3	1994	309	299	308	320	312	423	418	422	451	444	543	541	542	584	574
JUN4	1994	307	308	306	321	323	429	436	429	461	459	584	594	584	623	616
JUL1	1994	356	387	370	388	409	565	599	577	621	648	792	828	805	849	880
JUL2	1994	398	422	413	425	430	879	880	807	874	970	1,164	1,165	1,081	1,153	1,263
JUL3	1994	414	422	422	429	421	997	1,000	968	1,037	1,035	1,296	1,300	1,264	1,337	1,335
JUL4	1994	411	405	412	409	394	860	894	873	895	907	1,140	1,179	1,156	1,176	1,192

NA = no action, PA = proposed action, CE = cumulative effects

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
AUG1	1994	408	401	406	403	399	1,145	1,197	1,144	1,107	1,195	1,458	1,516	1,457	1,412	1,514
AUG2	1994	417	424	421	422	426	1,093	1,154	1,094	1,093	1,199	1,400	1,467	1,400	1,398	1,518
AUG3	1994	430	444	436	437	441	693	677	701	764	752	942	922	952	1,023	1,007
AUG4	1994	445	466	454	453	464	802	795	806	844	881	1,063	1,054	1,068	1,109	1,153
SEP1	1994	455	469	463	459	460	849	843	852	889	858	1,110	1,102	1,113	1,155	1,118
SEP2	1994	462	474	470	463	469	760	756	765	819	810	1,018	1,013	1,024	1,083	1,074
SEP3	1994	467	475	473	463	466	786	778	790	806	797	1,048	1,039	1,053	1,068	1,058
SEP4	1994	477	493	485	476	493	929	938	935	934	943	1,215	1,225	1,221	1,218	1,228
OCT1	1995	483	496	492	482	488	942	947	944	930	949	1,217	1,223	1,220	1,202	1,224
OCT2	1995	478	477	481	473	469	916	915	917	904	914	1,194	1,194	1,196	1,180	1,192
OCT3	1995	467	458	465	459	450	857	852	855	856	852	1,126	1,121	1,124	1,124	1,119
OCT4	1995	465	458	462	459	457	860	857	858	859	859	1,132	1,128	1,130	1,130	1,129
NOV1	1995	467	458	462	457	454	856	852	854	878	877	1,126	1,121	1,123	1,150	1,149
NOV2	1995	476	478	475	467	469	926	927	926	909	910	1,206	1,207	1,206	1,185	1,186
NOV3	1995	486	499	495	480	495	1,058	1,062	1,061	1,036	1,040	1,358	1,363	1,361	1,333	1,338
NOV4	1995	494	515	506	500	520	979	1,020	984	970	1,008	1,268	1,316	1,275	1,257	1,300
DEC1	1995	500	519	511	508	525	886	898	892	888	898	1,162	1,174	1,168	1,162	1,172
DEC2	1995	503	522	514	513	529	841	853	848	847	856	1,107	1,121	1,115	1,111	1,122
DEC3	1995	505	523	516	515	528	944	952	948	939	944	1,227	1,236	1,232	1,219	1,226
DEC4	1995	519	551	535	538	574	1,139	1,149	1,143	1,119	1,129	1,450	1,460	1,454	1,426	1,436
JAN1	1995	534	568	551	556	581	1,148	1,157	1,151	1,129	1,136	1,459	1,469	1,463	1,437	1,444
JAN2	1995	548	587	568	575	611	1,154	1,162	1,158	1,135	1,142	1,466	1,475	1,471	1,443	1,451
JAN3	1995	580	648	612	626	704	1,168	1,183	1,175	1,152	1,167	1,483	1,498	1,490	1,463	1,479
JAN4	1995	618	697	660	674	740	1,156	1,175	1,166	1,138	1,153	1,468	1,488	1,479	1,446	1,463
FEB1	1995	642	725	687	695	768	1,193	1,214	1,204	1,165	1,183	1,509	1,532	1,521	1,477	1,496
FEB2	1995	625	678	655	654	680	1,209	1,226	1,217	1,172	1,181	1,527	1,545	1,536	1,484	1,494
FEB3	1995	609	640	628	632	649	1,114	1,126	1,120	1,091	1,098	1,420	1,433	1,427	1,392	1,400
FEB4	1995	607	655	633	648	702	1,057	1,080	1,069	1,055	1,079	1,356	1,382	1,369	1,351	1,379
MAR1	1995	644	680	682	701	716	1,000	1,018	1,018	1,013	1,021	1,287	1,308	1,308	1,300	1,309
MAR2	1995	624	631	649	667	668	991	1,000	1,003	999	1,005	1,278	1,289	1,292	1,285	1,292
MAR3	1995	599	624	618	650	656	1,241	1,295	1,248	951	938	1,564	1,624	1,572	1,228	1,212
MAR4	1995	592	610	607	632	630	979	1,078	1,073	922	899	1,265	1,378	1,373	1,194	1,166
APR1	1995	580	595	593	613	613	909	900	915	922	908	1,184	1,171	1,190	1,196	1,178
APR2	1995	572	582	584	597	561	884	871	883	874	853	1,152	1,136	1,150	1,136	1,114
APR3	1995	566	575	578	586	563	806	807	806	806	796	1,045	1,045	1,043	1,042	1,031
APR4	1995	565	572	575	581	566	749	750	750	752	745	968	968	968	968	961
MAY1	1995	557	560	565	565	550	724	726	729	727	719	929	933	937	933	924
MAY2	1995	553	554	560	554	535	779	782	782	776	771	1,014	1,019	1,018	1,010	1,005
MAY3	1995	512	439	490	436	375	541	510	532	509	480	614	576	606	576	542
MAY4	1995	386	323	358	329	308	509	478	497	487	474	582	542	568	561	543
JUN1	1995	342	316	327	312	301	493	479	488	470	462	554	537	551	517	502
JUN2	1995	329	329	323	285	281	439	433	434	401	396	449	429	444	391	382
JUN3	1995	247	201	226	206	248	338	302	320	315	355	289	259	270	247	286
JUN4	1995	219	196	212	205	205	341	320	333	331	329	309	281	294	295	289
JUL1	1995	252	249	254	235	234	349	348	351	342	338	309	317	314	312	301
JUL2	1995	190	170	179	172	176	285	262	274	263	273	243	222	232	223	230
JUL3	1995	192	189	189	182	182	263	260	263	266	267	233	230	238	268	261
JUL4	1995	213	219	215	211	217	326	332	330	326	328	415	420	422	418	417
AUG1	1995	237	242	241	238	243	366	370	371	374	375	515	518	522	527	524
AUG2	1995	256	262	260	259	264	743	777	746	765	797	1,009	1,046	1,013	1,033	1,068
AUG3	1995	268	273	271	271	274	816	801	811	796	802	1,081	1,064	1,075	1,057	1,066
AUG4	1995	266	263	265	264	260	513	519	512	512	517	719	725	718	718	724
SEP1	1995	284	290	290	294	300	1,011	1,046	1,012	1,014	1,048	1,309	1,348	1,311	1,312	1,351
SEP2	1995	306	309	313	311	306	1,110	1,201	1,111	1,110	1,213	1,415	1,518	1,417	1,415	1,532
SEP3	1995	320	324	327	322	319	1,118	1,168	1,120	1,117	1,165	1,426	1,483	1,428	1,425	1,479
SEP4	1995	336	341	345	336	335	1,036	1,048	1,038	1,035	1,045	1,332	1,346	1,335	1,332	1,343
OCT1	1996	353	361	360	354	369	911	915	915	905	911	1,192	1,196	1,195	1,182	1,189
OCT2	1996	367	382	376	374	390	915	922	919	910	916	1,196	1,204	1,201	1,187	1,194
OCT3	1996	377	396	388	387	404	1,043	1,050	1,047	999	1,009	1,342	1,349	1,346	1,290	1,302
OCT4	1996	373	370	380	380	377	1,087	1,053	1,089	838	863	1,391	1,352	1,394	1,104	1,133
NOV1	1996	370	373	378	376	386	1,116	1,117	1,118	1,077	1,084	1,422	1,423	1,424	1,376	1,384
NOV2	1996	366	384	382	375	387	953	1,042	1,064	992	996	1,238	1,339	1,363	1,280	1,285
NOV3	1996	366	398	389	383	406	695	1,054	1,052	1,029	1,037	938	1,353	1,351	1,324	1,333
NOV4	1996	374	416	402	399	429	769	1,162	995	980	1,137	1,028	1,477	1,288	1,270	1,447
DEC1	1996	381	409	403	400	409	719	934	854	921	939	969	1,219	1,127	1,202	1,223
DEC2	1996	358	384	382	374	372	750	959	764	943	944	1,007	1,248	1,022	1,228	1,229
DEC3	1996	361	389	388	375	407	774	1,045	788	1,017	1,026	1,033	1,343	1,049	1,311	1,320
DEC4	1996	382	413	405	390	410	806	1,031	817	1,028	1,034	1,068	1,326	1,081	1,322	1,328
JAN1	1996	374	395	389	375	381	758	770	766	1,026	1,029	1,012	1,024	1,020	1,320	1,322
JAN2	1996	369	384	381	367	372	758	766	764	1,025	1,026	1,012	1,020	1,018	1,318	1,319
JAN3	1996	368	379	377	364	370	791	796	795	1,006	1,007	1,051	1,057	1,056	1,297	1,299
JAN4	1996	371	379	378	364	371	780	784	784	880	883	1,038	1,043	1,042	1,154	1,157
FEB1	1996	372	379	379	365	372	777	781	781	811	814	1,035	1,039	1,039	1,073	1,077
FEB2	1996	374	380	380	366	373	789	793	792	808	812	1,049	1,053	1,053	1,070	1,075
FEB3	1996	382	387	387	371	377	775	779	778	884	887	1,034	1,037	1,037	1,158	1,162
FEB4	1996	383	388	388	377	383	722	725	726	721	725	969	973	973	966	970
MAR1	1996	387	391	392	381	387	761	764	764	757	761	1,016	1,020	1,020	1,011	1,015

NA = no action, PA = proposed action, CE = cumulative effects

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
MAR2	1996	388	391	392	382	388	881	888	883	894	1,158	1,157	1,165	1,160	1,170	1,470
MAR3	1996	389	393	394	385	389	824	826	826	1,085	1,087	1,090	1,093	1,094	1,388	1,390
MAR4	1996	390	394	394	386	390	804	807	808	813	816	1,069	1,072	1,073	1,077	1,080
APR1	1996	390	393	394	386	392	704	707	708	705	709	947	950	951	946	951
APR2	1996	388	391	392	386	395	666	669	668	678	689	904	907	907	918	929
APR3	1996	387	390	391	388	396	803	818	817	1,032	969	1,070	1,087	1,087	1,328	1,257
APR4	1996	386	391	390	390	399	760	816	771	919	826	1,023	1,087	1,035	1,202	1,094
MAY1	1996	386	391	390	392	400	735	781	728	845	797	995	1,047	986	1,118	1,061
MAY2	1996	385	390	389	389	396	595	673	597	626	633	827	924	829	857	865
MAY3	1996	370	374	373	365	370	443	442	446	436	445	568	561	571	535	545
MAY4	1996	335	337	339	333	336	480	473	491	477	480	598	580	618	586	586
JUN1	1996	324	324	327	327	329	412	412	415	450	456	558	561	563	620	625
JUN2	1996	294	294	296	302	301	373	372	375	395	394	455	454	454	503	503
JUN3	1996	267	266	267	277	275	346	345	346	355	355	446	446	446	461	456
JUN4	1996	259	259	260	268	268	349	346	349	350	350	469	461	469	470	466
JUL1	1996	262	262	262	268	268	508	511	505	504	502	731	734	728	728	725
JUL2	1996	272	273	272	276	275	544	535	541	544	536	695	681	690	693	682
JUL3	1996	285	285	286	286	285	788	891	773	986	1,142	1,044	1,163	1,026	1,271	1,449
JUL4	1996	297	297	298	295	293	560	562	572	571	569	765	767	780	776	773
AUG1	1996	307	307	308	303	302	1,233	1,318	1,234	1,220	1,270	1,554	1,649	1,554	1,539	1,596
AUG2	1996	315	316	316	311	308	539	539	542	534	526	748	749	752	741	732
AUG3	1996	324	325	325	318	315	677	691	694	668	683	909	928	930	899	916
AUG4	1996	334	335	335	326	323	787	780	784	785	792	1,038	1,030	1,035	1,036	1,044
SEP1	1996	343	344	344	334	331	755	698	748	868	839	1,006	940	1,000	1,138	1,103
SEP2	1996	350	351	352	340	336	924	934	950	900	909	1,204	1,217	1,234	1,175	1,185
SEP3	1996	355	356	357	343	339	1,030	1,020	1,022	1,006	986	1,324	1,313	1,315	1,295	1,272
SEP4	1996	348	349	350	342	341	1,053	1,058	1,053	1,071	1,076	1,350	1,356	1,350	1,371	1,376
OCT1	1997	352	353	354	347	346	1,128	1,129	1,129	1,111	1,110	1,437	1,437	1,437	1,416	1,416
OCT2	1997	357	358	359	352	351	1,129	1,129	1,129	1,144	1,143	1,438	1,438	1,438	1,454	1,453
OCT3	1997	362	363	364	356	356	1,202	1,202	1,202	1,178	1,178	1,520	1,521	1,521	1,493	1,492
OCT4	1997	366	367	367	360	360	1,039	1,040	1,040	888	899	1,335	1,336	1,336	1,160	1,173
NOV1	1997	369	370	370	364	363	1,118	1,118	1,122	1,001	1,001	1,423	1,424	1,428	1,291	1,290
NOV2	1997	372	373	374	367	367	1,112	1,112	1,115	1,062	1,062	1,417	1,417	1,421	1,360	1,360
NOV3	1997	375	376	377	370	370	1,077	1,078	1,078	1,059	1,059	1,379	1,379	1,379	1,357	1,357
NOV4	1997	378	379	379	373	373	1,065	1,105	1,065	1,049	1,165	1,365	1,410	1,365	1,345	1,477
DEC1	1997	380	381	382	376	376	1,094	1,096	1,094	1,073	1,074	1,398	1,400	1,398	1,373	1,375
DEC2	1997	386	387	387	381	381	1,079	1,081	1,079	1,062	1,063	1,382	1,384	1,382	1,361	1,363
DEC3	1997	402	403	403	394	395	1,075	1,077	1,076	1,059	1,060	1,378	1,381	1,379	1,359	1,360
DEC4	1997	412	413	413	403	404	1,095	1,097	1,095	1,076	1,078	1,401	1,404	1,401	1,379	1,381
JAN1	1997	409	410	410	401	402	1,089	1,091	1,089	1,074	1,075	1,394	1,397	1,395	1,376	1,378
JAN2	1997	407	408	408	401	402	1,065	1,065	1,065	1,052	1,052	1,367	1,368	1,368	1,351	1,352
JAN3	1997	416	418	418	408	410	1,000	1,044	951	1,090	1,091	1,293	1,343	1,238	1,394	1,394
JAN4	1997	426	427	427	415	415	838	839	839	1,008	1,009	1,107	1,108	1,108	1,301	1,302
FEB1	1997	424	426	426	414	414	906	906	906	912	1,031	1,184	1,185	1,185	1,190	1,325
FEB2	1997	423	424	424	415	414	964	966	964	970	1,038	1,251	1,253	1,252	1,257	1,333
FEB3	1997	425	426	426	418	416	888	890	888	894	1,095	1,164	1,166	1,164	1,170	1,398
FEB4	1997	424	425	425	420	418	941	942	941	948	1,082	1,225	1,227	1,225	1,231	1,383
MAR1	1997	427	428	428	422	421	900	902	901	889	889	1,179	1,180	1,179	1,164	1,164
MAR2	1997	434	435	435	429	427	872	877	872	884	887	1,146	1,152	1,147	1,158	1,163
MAR3	1997	436	437	437	431	430	776	782	775	771	776	1,032	1,040	1,031	1,025	1,032
MAR4	1997	435	435	436	430	428	694	694	694	694	704	931	931	931	928	939
APR1	1997	431	432	432	426	426	668	672	667	688	677	900	907	899	924	910
APR2	1997	425	425	425	422	426	777	735	732	731	735	1,036	986	982	979	985
APR3	1997	423	424	424	422	427	687	697	705	682	710	930	944	953	922	956
APR4	1997	423	424	424	423	427	791	818	803	781	801	1,028	1,062	1,044	1,016	1,040
MAY1	1997	423	423	424	422	427	799	813	812	806	803	1,050	1,067	1,065	1,057	1,053
MAY2	1997	422	422	422	421	425	740	745	712	711	722	978	985	942	937	952
MAY3	1997	419	419	419	416	419	575	568	576	555	556	743	732	743	700	700
MAY4	1997	405	404	405	398	400	540	519	540	525	526	688	641	688	653	652
JUN1	1997	356	352	358	354	355	465	463	473	469	470	525	522	543	533	531
JUN2	1997	287	284	289	288	288	382	387	384	395	395	288	320	292	343	343
JUN3	1997	247	245	247	257	256	333	331	333	345	342	300	297	299	311	303
JUN4	1997	244	241	244	252	251	363	363	365	376	373	424	428	426	434	430
JUL1	1997	255	252	255	262	260	415	418	415	429	425	567	575	568	580	575
JUL2	1997	266	264	267	271	269	497	505	498	495	495	704	714	704	702	703
JUL3	1997	275	274	276	278	277	568	582	568	562	564	799	816	799	792	795
JUL4	1997	281	280	282	282	281	724	722	705	704	729	966	965	944	942	972
AUG1	1997	285	285	286	286	285	550	547	554	556	548	721	717	727	728	718
AUG2	1997	287	287	288	288	287	504	504	505	504	503	658	658	659	657	656
AUG3	1997	294	294	296	294	293	622	620	623	619	616	841	838	842	836	833
AUG4	1997	305	305	307	304	302	733	743	733	725	734	977	989	978	965	976
SEP1	1997	316	316	318	313	311	675	659	676	674	684	907	887	908	902	915
SEP2	1997	327	328	329	322	320	955	919	956	924	977	1,242	1,201	1,243	1,204	1,265
SEP3	1997	334	335	337	327	325	848	847	854	827	878	1,120	1,119	1,126	1,093	1,152
SEP4	1997	338	340	342	330	328	687	686	690	691	704	930	928	934	932	947
OCT1	1998	341	342	344	334	332	1,183	1,254	1,180	1,141	1,273	1,500	1,579	1,496	1,451	1,600
OCT2	1998	345	346	347	338	336	1,168	1,104	1,169	1,121	1,127	1,483	1,410	1,484	1,428	1,435

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Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
OCT3	1998	348	349	351	342	340	817	818	819	837	848	1,084	1,084	1,085	1,105	1,117
OCT4	1998	353	354	356	346	345	802	802	803	796	806	1,055	1,055	1,056	1,047	1,058
NOV1	1998	356	357	359	350	349	908	1,017	909	827	792	1,184	1,309	1,184	1,087	1,048
NOV2	1998	359	360	362	353	352	796	812	798	793	793	1,055	1,074	1,057	1,050	1,050
NOV3	1998	361	362	364	356	355	800	801	801	797	797	1,059	1,060	1,060	1,054	1,054
NOV4	1998	368	368	370	363	362	821	874	822	817	866	1,081	1,145	1,082	1,075	1,134
DEC1	1998	379	380	382	374	374	766	772	768	764	770	1,018	1,025	1,019	1,014	1,021
DEC2	1998	392	393	395	387	386	798	799	799	796	797	1,057	1,058	1,058	1,053	1,054
DEC3	1998	404	405	407	397	397	1,042	1,044	1,043	1,025	1,027	1,338	1,340	1,339	1,318	1,319
DEC4	1998	405	408	407	399	399	806	800	1,046	1,028	1,030	1,066	1,060	1,343	1,321	1,323
JAN1	1998	416	418	417	406	407	786	787	786	1,036	1,037	1,042	1,043	1,043	1,330	1,332
JAN2	1998	422	424	424	411	411	836	836	836	897	899	1,101	1,102	1,102	1,172	1,173
JAN3	1998	425	426	426	414	412	813	813	814	812	875	1,074	1,074	1,075	1,071	1,146
JAN4	1998	427	429	429	417	414	851	852	852	852	920	1,119	1,119	1,120	1,118	1,197
FEB1	1998	427	428	429	418	416	834	834	834	836	835	1,098	1,098	1,099	1,099	1,098
FEB2	1998	429	430	430	420	419	832	833	833	835	835	1,096	1,098	1,097	1,098	1,098
FEB3	1998	440	441	442	430	429	820	821	820	820	821	1,080	1,082	1,081	1,080	1,080
FEB4	1998	438	439	440	430	429	864	865	865	866	866	1,133	1,135	1,134	1,134	1,134
MAR1	1998	435	436	437	430	429	897	899	898	904	904	1,172	1,173	1,173	1,178	1,179
MAR2	1998	437	438	439	432	431	913	918	914	919	924	1,190	1,196	1,191	1,196	1,202
MAR3	1998	435	435	436	432	431	606	607	607	658	658	787	790	789	865	864
MAR4	1998	431	432	433	433	433	569	572	572	615	613	737	744	743	810	807
APR1	1998	433	434	435	439	439	620	621	625	683	681	813	815	819	901	899
APR2	1998	434	434	436	440	440	591	583	590	632	629	758	743	758	822	818
APR3	1998	435	435	437	437	438	592	584	592	626	628	761	747	760	814	818
APR4	1998	439	439	441	440	442	535	535	537	556	557	649	654	651	698	697
MAY1	1998	440	440	443	442	443	543	540	545	562	563	671	666	675	708	709
MAY2	1998	438	437	440	440	441	581	589	582	626	629	754	769	756	823	826
MAY3	1998	436	436	438	439	440	831	836	819	772	838	1,098	1,104	1,083	1,025	1,103
MAY4	1998	429	429	431	427	430	670	670	671	678	683	899	900	901	905	911
JUN1	1998	413	415	417	413	416	627	610	641	594	584	844	819	862	791	773
JUN2	1998	403	398	406	401	402	1,204	1,242	1,205	1,180	1,180	1,522	1,565	1,523	1,494	1,494
JUN3	1998	398	389	401	395	395	1,318	1,376	1,319	1,254	1,301	1,650	1,715	1,651	1,578	1,630
JUN4	1998	395	387	398	393	394	1,187	1,191	1,188	1,166	1,170	1,507	1,511	1,508	1,482	1,485
JUL1	1998	386	380	388	389	390	1,148	1,158	1,149	1,123	1,126	1,460	1,471	1,461	1,431	1,434
JUL2	1998	368	365	371	377	377	927	932	925	933	946	1,212	1,218	1,209	1,220	1,232
JUL3	1998	358	356	362	368	368	1,073	1,092	1,071	939	1,064	1,378	1,399	1,376	1,224	1,366
JUL4	1998	353	352	356	363	364	919	816	922	765	748	1,192	1,073	1,196	1,010	991
AUG1	1998	349	348	351	358	359	667	674	668	673	695	894	902	895	901	927
AUG2	1998	351	350	352	358	359	782	658	750	700	666	1,033	883	994	931	891
AUG3	1998	358	358	359	363	364	834	825	817	807	817	1,098	1,089	1,077	1,064	1,075
AUG4	1998	366	366	367	370	371	780	779	781	777	786	1,031	1,031	1,032	1,026	1,036
SEP1	1998	375	374	376	377	378	724	715	724	723	719	970	961	971	967	963
SEP2	1998	383	382	384	384	385	1,002	969	1,002	918	969	1,296	1,260	1,297	1,200	1,257
SEP3	1998	388	386	389	389	391	1,079	1,075	992	981	1,053	1,385	1,382	1,287	1,272	1,354
SEP4	1998	391	390	393	393	394	1,122	1,131	1,122	1,122	1,127	1,433	1,443	1,434	1,433	1,439
OCT1	1999	396	395	397	397	398	1,159	1,159	1,157	1,109	1,143	1,472	1,472	1,470	1,415	1,454
OCT2	1999	399	399	401	400	401	1,101	1,156	1,151	1,089	1,141	1,407	1,470	1,464	1,393	1,452
OCT3	1999	403	403	405	403	404	1,115	1,120	1,121	1,071	1,107	1,423	1,428	1,430	1,373	1,413
OCT4	1999	406	405	407	406	406	1,067	1,066	1,067	1,055	1,055	1,366	1,366	1,368	1,353	1,352
NOV1	1999	407	407	409	407	408	986	986	987	905	880	1,271	1,271	1,272	1,176	1,147
NOV2	1999	409	408	410	409	409	1,020	973	1,022	937	938	1,312	1,258	1,314	1,216	1,217
NOV3	1999	413	413	414	412	413	1,038	1,038	1,039	1,022	1,022	1,333	1,333	1,334	1,313	1,313
NOV4	1999	417	417	418	416	416	1,040	1,075	1,040	1,024	1,056	1,336	1,376	1,336	1,316	1,353
DEC1	1999	423	423	424	421	422	1,068	1,070	1,069	1,051	1,052	1,368	1,370	1,369	1,347	1,349
DEC2	1999	430	430	431	427	428	1,064	1,065	1,064	1,047	1,048	1,363	1,365	1,363	1,343	1,344
DEC3	1999	432	432	434	430	430	1,074	1,076	1,075	1,056	1,057	1,375	1,377	1,376	1,353	1,355
DEC4	1999	438	439	440	434	434	1,058	1,059	1,058	1,040	1,042	1,356	1,358	1,357	1,335	1,337
JAN1	1999	442	442	443	437	438	993	994	993	980	981	1,283	1,284	1,283	1,267	1,269
JAN2	1999	442	443	444	441	442	1,022	1,022	1,022	860	871	1,315	1,315	1,316	1,127	1,141
JAN3	1999	445	445	446	444	445	1,101	1,101	1,102	917	917	1,405	1,405	1,405	1,194	1,194
JAN4	1999	444	444	446	444	445	1,075	1,075	1,075	890	890	1,375	1,375	1,376	1,162	1,162
FEB1	1999	444	444	445	445	445	1,083	1,083	1,083	903	903	1,385	1,385	1,385	1,178	1,178
FEB2	1999	447	448	449	449	450	1,101	1,103	1,101	877	878	1,405	1,408	1,406	1,147	1,148
FEB3	1999	455	454	456	457	457	879	1,090	1,089	870	871	1,152	1,393	1,392	1,139	1,140
FEB4	1999	463	460	462	463	464	879	892	878	885	886	1,151	1,167	1,151	1,157	1,158
MAR1	1999	464	462	464	466	466	909	910	910	906	907	1,189	1,189	1,189	1,184	1,185
MAR2	1999	465	463	465	467	467	967	973	967	979	986	1,255	1,263	1,255	1,268	1,276
MAR3	1999	466	465	467	468	469	1,126	1,163	1,129	1,109	1,138	1,434	1,476	1,438	1,414	1,447
MAR4	1999	467	465	467	469	469	1,105	1,102	1,084	1,059	1,093	1,412	1,409	1,389	1,359	1,396
APR1	1999	468	466	468	469	469	1,169	1,233	1,173	990	1,031	1,481	1,553	1,486	1,277	1,324
APR2	1999	467	466	468	468	469	717	724	717	730	739	960	970	960	971	982
APR3	1999	464	463	464	464	465	870	889	866	861	882	1,136	1,159	1,132	1,125	1,150
APR4	1999	461	460	461	461	461	512	511	512	511	511	576	577	576	576	579
MAY1	1999	430	432	432	436	436	476	477	477	482	482	367	371	368	398	398
MAY2	1999	437	440	439	430	431	548	547	548	547	544	628	621	626	630	624
MAY3	1999	454	456	456	438	438	604	605	602	594	592	746	747	739	734	728

NA = no action, PA = proposed action, CE = cumulative effects

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
MAY4	1999	454	456	455	440	440	555	556	555	537	536	640	640	638	606	601
JUN1	1999	445	445	446	430	430	588	581	589	561	558	729	714	729	679	672
JUN2	1999	424	422	426	413	413	541	532	551	530	528	643	622	665	626	619
JUN3	1999	357	354	361	363	363	445	441	449	458	456	496	487	499	519	513
JUN4	1999	317	315	319	329	328	402	399	404	416	412	433	426	436	456	439
JUL1	1999	291	289	293	303	301	528	535	529	537	544	725	733	726	736	744
JUL2	1999	293	291	294	302	300	801	816	801	814	830	1,061	1,078	1,062	1,077	1,094
JUL3	1999	295	294	296	302	300	640	616	652	657	621	849	821	865	872	827
JUL4	1999	296	294	297	301	300	894	912	895	903	929	1,167	1,187	1,168	1,179	1,206
AUG1	1999	334	332	335	331	330	530	523	533	504	522	661	652	666	613	650
AUG2	1999	357	356	358	351	350	594	583	589	576	580	760	744	752	735	742
AUG3	1999	347	345	348	344	343	772	909	903	702	705	1,014	1,176	1,169	927	931
AUG4	1999	345	341	345	343	341	682	1,099	691	702	690	913	1,399	924	934	919
SEP1	1999	345	341	346	343	342	1,046	1,060	993	970	1,061	1,342	1,359	1,283	1,254	1,358
SEP2	1999	352	348	352	349	347	1,045	1,076	1,045	1,045	1,076	1,341	1,377	1,341	1,341	1,376
SEP3	1999	356	352	357	352	349	933	952	963	1,029	960	1,212	1,234	1,246	1,320	1,241
SEP4	1999	357	353	357	354	352	960	1,013	1,011	1,009	1,032	1,244	1,305	1,302	1,298	1,324
OCT1	2000	360	356	361	358	356	1,037	1,040	1,037	1,012	1,039	1,331	1,334	1,331	1,301	1,333
OCT2	2000	364	360	364	361	359	1,039	1,058	1,025	1,044	1,039	1,331	1,353	1,315	1,336	1,330
OCT3	2000	367	363	368	365	362	904	921	902	934	935	1,179	1,198	1,176	1,212	1,213
OCT4	2000	370	366	370	367	365	900	938	938	937	946	1,176	1,219	1,219	1,216	1,226
NOV1	2000	373	369	373	370	368	966	931	931	930	932	1,250	1,210	1,210	1,208	1,210
NOV2	2000	375	372	376	373	371	931	931	932	933	933	1,210	1,210	1,211	1,211	1,212
NOV3	2000	378	374	378	375	373	891	891	891	892	893	1,163	1,162	1,163	1,163	1,163
NOV4	2000	386	383	386	383	381	836	772	836	838	775	1,098	1,022	1,098	1,099	1,025
DEC1	2000	390	387	391	388	386	817	816	817	820	820	1,077	1,076	1,078	1,080	1,079
DEC2	2000	392	389	393	390	388	894	893	894	895	896	1,167	1,167	1,167	1,168	1,168
DEC3	2000	395	392	396	393	391	876	875	876	878	878	1,146	1,146	1,147	1,148	1,148
DEC4	2000	400	397	400	397	395	813	812	813	817	816	1,073	1,072	1,073	1,076	1,076
JAN1	2000	414	411	414	408	406	824	823	824	826	826	1,087	1,086	1,087	1,089	1,088
JAN2	2000	430	427	430	421	420	849	847	849	849	848	1,116	1,115	1,117	1,116	1,115
JAN3	2000	444	442	445	433	431	841	840	841	840	839	1,106	1,105	1,106	1,103	1,102
JAN4	2000	456	455	457	444	442	832	831	833	830	829	1,094	1,093	1,094	1,090	1,089
FEB1	2000	464	463	465	451	449	836	836	837	834	834	1,098	1,098	1,099	1,095	1,094
FEB2	2000	467	465	467	453	451	864	864	864	861	861	1,131	1,132	1,132	1,127	1,128
FEB3	2000	468	467	469	450	449	851	852	852	847	847	1,117	1,117	1,117	1,111	1,111
FEB4	2000	458	456	458	452	450	857	857	858	858	858	1,123	1,123	1,124	1,123	1,123
MAR1	2000	461	458	461	459	457	842	843	842	847	849	1,105	1,107	1,105	1,109	1,112
MAR2	2000	469	467	469	467	465	942	960	942	941	959	1,221	1,242	1,221	1,219	1,240
MAR3	2000	473	470	473	470	469	775	784	774	771	782	1,017	1,030	1,016	1,011	1,025
MAR4	2000	472	469	472	470	468	808	818	806	804	816	1,061	1,074	1,060	1,055	1,070
APR1	2000	468	466	468	467	465	586	578	581	639	635	731	718	720	828	823
APR2	2000	461	458	461	460	459	606	599	603	631	637	781	771	775	820	829
APR3	2000	458	456	458	458	457	839	847	850	842	844	1,100	1,111	1,113	1,103	1,104
APR4	2000	456	454	456	457	455	821	814	821	819	816	1,081	1,073	1,080	1,078	1,073
MAY1	2000	450	447	450	451	450	854	836	826	829	806	1,122	1,103	1,089	1,089	1,063
MAY2	2000	443	441	443	446	444	712	730	746	720	728	943	969	987	950	962
MAY3	2000	436	434	436	440	438	955	932	929	850	853	1,243	1,217	1,214	1,118	1,122
MAY4	2000	413	407	412	415	414	551	515	546	541	537	740	682	733	711	704
JUN1	2000	377	367	376	381	381	481	460	473	497	491	652	616	638	665	655
JUN2	2000	358	349	357	366	366	1,010	1,004	935	961	1,028	1,311	1,304	1,228	1,254	1,329
JUN3	2000	361	353	360	368	366	574	578	585	654	616	804	809	817	896	849
JUN4	2000	366	359	365	371	369	681	685	676	698	703	920	925	915	936	943
JUL1	2000	368	363	368	372	371	844	788	765	795	819	1,121	1,058	1,029	1,060	1,089
JUL2	2000	372	367	372	375	373	679	664	668	701	696	927	910	914	947	942
JUL3	2000	374	370	374	376	375	615	618	617	629	634	833	837	836	844	852
JUL4	2000	376	372	376	378	376	1,018	945	898	911	964	1,319	1,237	1,184	1,195	1,257
AUG1	2000	377	374	377	379	378	1,064	1,008	1,003	1,004	1,012	1,369	1,308	1,302	1,303	1,312
AUG2	2000	382	379	382	383	382	577	557	571	585	560	800	776	792	810	779
AUG3	2000	390	387	391	390	389	679	653	655	668	664	914	882	884	894	892
AUG4	2000	397	394	398	396	395	829	800	766	793	794	1,089	1,053	1,012	1,042	1,045
SEP1	2000	404	402	405	403	402	1,187	1,195	1,149	1,145	1,187	1,504	1,513	1,461	1,455	1,504
SEP2	2000	413	409	413	410	409	1,138	988	937	1,112	1,119	1,452	1,285	1,226	1,421	1,428
SEP3	2000	417	414	418	415	413	1,212	1,223	1,213	1,198	1,221	1,536	1,547	1,536	1,519	1,546
SEP4	2000	421	418	422	418	417	1,044	1,041	1,043	1,119	1,125	1,344	1,341	1,343	1,427	1,434
OCT1	2001	425	422	426	422	421	1,217	1,226	1,218	1,198	1,206	1,541	1,550	1,541	1,518	1,527
OCT2	2001	429	426	430	426	424	1,142	1,146	1,142	1,128	1,132	1,455	1,459	1,455	1,439	1,443
OCT3	2001	432	429	433	429	427	1,124	1,128	1,124	1,112	1,115	1,435	1,439	1,435	1,420	1,424
OCT4	2001	434	432	435	432	429	1,033	1,036	1,033	1,024	1,027	1,329	1,332	1,329	1,318	1,321
NOV1	2001	436	434	437	433	431	1,094	1,097	1,094	1,055	1,077	1,397	1,400	1,398	1,353	1,377
NOV2	2001	438	436	439	435	433	1,096	1,097	1,095	1,070	1,077	1,399	1,400	1,398	1,368	1,377
NOV3	2001	440	438	441	437	435	1,035	1,035	1,036	1,038	1,039	1,333	1,332	1,333	1,334	1,336
NOV4	2001	441	440	443	439	437	1,032	1,048	1,032	1,026	1,035	1,329	1,347	1,329	1,321	1,332
DEC1	2001	443	442	445	441	439	1,105	1,106	1,105	1,085	1,086	1,412	1,414	1,412	1,388	1,389
DEC2	2001	447	445	448	444	442	1,109	1,111	1,109	1,088	1,089	1,416	1,418	1,417	1,391	1,392
DEC3	2001	452	450	453	449	447	1,097	1,098	1,097	1,077	1,078	1,402	1,404	1,403	1,379	1,380
DEC4	2001	454	453	456	451	449	1,057	1,058	1,057	1,040	1,042	1,357	1,358	1,357	1,337	1,338

NA = no action, PA = proposed action, CE = cumulative effects

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
JAN1	2001	456	456	458	454	452	1,059	1,060	1,059	1,043	1,044	1,358	1,360	1,359	1,339	1,340
JAN2	2001	462	464	465	461	460	1,056	1,057	1,057	1,041	1,041	1,355	1,356	1,356	1,337	1,336
JAN3	2001	465	469	469	465	464	1,073	1,073	1,073	1,055	1,055	1,373	1,374	1,374	1,353	1,352
JAN4	2001	475	481	481	477	476	1,067	1,069	1,069	1,050	1,050	1,367	1,369	1,369	1,347	1,347
FEB1	2001	484	491	490	486	486	1,073	1,075	1,075	1,055	1,055	1,374	1,375	1,375	1,351	1,351
FEB2	2001	485	492	491	487	487	1,036	1,040	1,038	1,022	1,023	1,332	1,336	1,334	1,314	1,316
FEB3	2001	483	489	488	485	485	1,067	1,070	1,068	1,050	1,051	1,366	1,370	1,368	1,346	1,348
FEB4	2001	480	485	485	482	481	1,030	1,033	1,031	1,016	1,017	1,325	1,328	1,326	1,308	1,309
MAR1	2001	477	480	481	478	477	920	922	922	916	916	1,199	1,201	1,201	1,193	1,194
MAR2	2001	472	473	476	472	470	1,110	1,124	1,111	1,089	1,101	1,413	1,429	1,414	1,389	1,402
MAR3	2001	466	464	467	464	462	1,219	1,267	1,221	1,154	949	1,537	1,591	1,539	1,463	1,229
MAR4	2001	465	464	467	463	461	999	1,008	1,069	900	909	1,288	1,298	1,367	1,172	1,182
APR1	2001	464	463	465	462	460	909	893	931	865	890	1,187	1,170	1,213	1,135	1,166
APR2	2001	464	463	466	463	460	806	787	819	810	787	1,064	1,043	1,081	1,068	1,041
APR3	2001	464	462	465	462	460	765	747	773	774	750	1,019	999	1,029	1,029	1,000
APR4	2001	464	463	465	463	461	765	763	760	763	773	1,021	1,020	1,015	1,017	1,029
MAY1	2001	464	463	465	463	461	861	887	881	852	873	1,122	1,155	1,146	1,112	1,136
MAY2	2001	453	446	450	441	435	1,146	1,042	1,038	918	833	1,457	1,341	1,336	1,196	1,098
MAY3	2001	408	384	396	376	366	512	481	500	476	462	641	594	627	581	561
MAY4	2001	351	338	344	328	327	425	402	413	405	403	539	494	515	497	496
JUN1	2001	372	373	374	369	370	448	448	451	456	454	559	558	565	573	565
JUN2	2001	336	323	327	338	335	474	462	470	504	503	659	647	654	696	696
JUN3	2001	334	331	332	342	342	587	584	586	681	688	813	810	811	924	932
JUN4	2001	347	346	346	355	352	467	471	471	500	497	660	667	667	697	692
JUL1	2001	358	360	360	364	361	543	545	545	586	588	766	769	769	811	815
JUL2	2001	367	369	369	370	369	603	594	590	606	606	809	798	791	808	809
JUL3	2001	369	370	370	371	370	938	943	937	958	963	1,230	1,236	1,230	1,249	1,255
JUL4	2001	368	368	369	369	369	1,217	1,147	1,136	1,062	1,068	1,538	1,460	1,448	1,363	1,370
AUG1	2001	369	369	370	371	369	1,257	1,183	1,173	1,157	1,171	1,582	1,501	1,489	1,468	1,484
AUG2	2001	376	380	380	378	377	605	587	592	669	645	835	811	815	907	879
AUG3	2001	387	391	394	391	393	651	662	696	801	806	896	909	948	1,068	1,075
AUG4	2001	397	401	405	403	404	695	697	722	748	758	945	948	977	1,003	1,015
SEP1	2001	408	413	414	411	412	1,125	1,109	1,062	1,059	1,123	1,433	1,415	1,362	1,356	1,428
SEP2	2001	418	423	424	421	421	1,202	1,216	1,195	1,145	1,164	1,522	1,538	1,514	1,456	1,477
SEP3	2001	424	431	431	428	428	1,121	1,129	1,123	1,087	1,093	1,430	1,439	1,431	1,389	1,396
SEP4	2001	429	434	435	431	431	1,230	1,264	1,250	1,181	1,200	1,554	1,592	1,577	1,497	1,519
OCT1	2002	435	441	442	438	438	1,387	1,403	1,389	1,285	1,360	1,729	1,747	1,732	1,614	1,698
OCT2	2002	442	449	449	446	446	1,163	1,246	1,236	1,133	1,226	1,479	1,572	1,561	1,444	1,549
OCT3	2002	448	454	455	452	451	1,261	1,270	1,263	1,240	1,246	1,589	1,599	1,591	1,565	1,572
OCT4	2002	452	458	459	456	455	1,212	1,217	1,213	1,162	1,196	1,533	1,539	1,534	1,475	1,514
NOV1	2002	454	460	462	458	457	1,276	1,282	1,277	1,225	1,240	1,603	1,610	1,603	1,544	1,562
NOV2	2002	456	462	463	460	459	1,203	1,206	1,200	1,152	1,172	1,520	1,523	1,517	1,462	1,485
NOV3	2002	459	464	465	462	462	1,143	1,144	1,145	1,131	1,130	1,453	1,455	1,455	1,438	1,438
NOV4	2002	462	468	469	466	465	1,102	1,124	1,104	1,084	1,101	1,408	1,432	1,410	1,386	1,405
DEC1	2002	464	470	471	468	467	1,188	1,192	1,189	1,156	1,158	1,504	1,509	1,506	1,468	1,470
DEC2	2002	473	481	481	478	478	1,181	1,186	1,183	1,153	1,155	1,498	1,503	1,500	1,465	1,467
DEC3	2002	483	495	493	489	490	1,178	1,184	1,181	1,151	1,153	1,495	1,500	1,497	1,463	1,465
DEC4	2002	497	513	510	506	507	1,187	1,194	1,191	1,159	1,162	1,504	1,512	1,508	1,472	1,475
JAN1	2002	517	571	553	573	577	1,176	1,190	1,184	1,161	1,164	1,492	1,507	1,501	1,473	1,477
JAN2	2002	520	547	547	545	540	1,157	1,162	1,162	1,137	1,136	1,470	1,476	1,476	1,446	1,445
JAN3	2002	514	524	526	522	519	1,067	1,069	1,070	1,056	1,055	1,369	1,372	1,373	1,355	1,354
JAN4	2002	509	514	516	512	510	1,053	1,055	1,056	1,042	1,042	1,353	1,355	1,356	1,339	1,339
FEB1	2002	506	512	513	510	523	1,050	1,052	1,053	1,038	1,042	1,350	1,352	1,352	1,335	1,339
FEB2	2002	506	514	513	513	514	1,086	1,091	1,088	1,072	1,074	1,391	1,396	1,393	1,373	1,376
FEB3	2002	509	524	520	525	530	1,004	1,011	1,008	1,000	1,002	1,297	1,304	1,301	1,290	1,293
FEB4	2002	507	514	518	517	502	1,030	1,034	1,033	1,021	1,018	1,326	1,330	1,330	1,314	1,312
MAR1	2002	501	500	516	516	493	1,036	1,037	1,041	1,029	1,024	1,333	1,335	1,338	1,324	1,318
MAR2	2002	499	503	514	511	501	1,067	1,080	1,071	1,055	1,064	1,369	1,383	1,373	1,354	1,363
MAR3	2002	496	498	511	508	497	1,195	1,247	1,204	1,109	1,057	1,513	1,570	1,522	1,414	1,356
MAR4	2002	493	494	507	504	492	1,237	1,292	1,246	1,205	1,131	1,559	1,621	1,569	1,522	1,439
APR1	2002	490	491	504	500	490	1,185	1,181	1,150	1,140	1,055	1,502	1,499	1,464	1,452	1,356
APR2	2002	490	491	503	501	490	1,166	1,096	1,161	1,115	1,073	1,483	1,405	1,477	1,423	1,376
APR3	2002	491	493	506	508	490	1,229	1,375	1,228	1,206	1,286	1,555	1,717	1,553	1,528	1,617
APR4	2002	492	495	507	510	494	1,227	1,344	1,292	1,212	1,316	1,553	1,683	1,624	1,534	1,651
MAY1	2002	493	492	505	504	492	983	933	991	993	950	1,278	1,224	1,288	1,287	1,240
MAY2	2002	491	491	501	500	491	1,181	1,073	1,185	1,108	1,137	1,502	1,381	1,506	1,417	1,450
MAY3	2002	483	462	478	465	456	1,372	1,184	1,369	1,239	1,238	1,713	1,504	1,710	1,564	1,562
MAY4	2002	479	479	486	486	479	1,177	1,176	1,180	899	902	1,496	1,494	1,500	1,179	1,182
JUN1	2002	453	388	416	383	343	1,369	760	1,451	976	845	1,711	1,028	1,802	1,271	1,124
JUN2	2002	424	413	405	409	402	768	719	786	864	793	1,035	979	1,057	1,144	1,062
JUN3	2002	437	461	453	468	467	1,148	1,069	1,153	1,422	1,143	1,465	1,377	1,471	1,768	1,457
JUN4	2002	455	477	478	482	479	1,012	979	1,022	1,212	1,098	1,315	1,276	1,325	1,536	1,408
JUL1	2002	449	399	422	394	393	892	824	876	850	811	1,169	1,093	1,153	1,121	1,075
JUL2	2002	417	397	394	397	402	909	837	899	894	848	1,197	1,117	1,186	1,177	1,125
JUL3	2002	440	494	473	503	511	1,251	1,281	1,268	1,253	1,259	1,580	1,613	1,599	1,580	1,587
JUL4	2002	473	510	507	514	512	1,390	1,429	1,389	1,301	1,253	1,734	1,778	1,733	1,633	1,579
AUG1	2002	490	530	522	535	533	1,335	1,371	1,347	1,274	1,291	1,673	1,713	1,686	1,603	1,622

NA = no action, PA = proposed action, CE = cumulative effects

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	**Water Year**	**1 - Existing**	**2 - NA**	**3 - PA**	**4 - PA CE**	**5 - NA CE**	**1 - Existing**	**2 - NA**	**3 - PA**	**4 - PA CE**	**5 - NA CE**	**1 - Existing**	**2 - NA**	**3 - PA**	**4 - PA CE**	**5 - NA CE**
AUG2	2002	496	521	527	533	517	1,354	1,384	1,367	1,288	1,380	1,695	1,728	1,709	1,619	1,724
AUG3	2002	502	552	543	559	562	1,433	1,477	1,450	1,454	1,478	1,782	1,830	1,801	1,805	1,831
AUG4	2002	519	567	559	571	573	1,304	1,341	1,320	1,323	1,341	1,638	1,679	1,655	1,659	1,679
SEP1	2002	525	570	564	573	573	1,410	1,450	1,426	1,427	1,448	1,756	1,800	1,774	1,774	1,798
SEP2	2002	526	558	558	560	558	1,264	1,281	1,272	1,270	1,279	1,590	1,609	1,599	1,598	1,607
SEP3	2002	530	561	559	564	563	1,173	1,194	1,182	1,183	1,194	1,492	1,515	1,502	1,503	1,515
SEP4	2002	536	558	554	563	562	1,236	1,257	1,243	1,245	1,257	1,563	1,586	1,570	1,572	1,586
85th Percentile		**517**	**522**	**526**	**535**	**533**	**1,116**	**1,126**	**1,118**	**1,088**	**1,093**	**1,426**	**1,435**	**1,427**	**1,390**	**1,398**

NA = no action, PA = proposed action, CE = cumulative effects

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
OCT1	1982	1,087	965	1,052	1,003	975	1,360	1,329	1,375	1,325	1,312
OCT2	1982	1,220	1,009	1,179	1,033	1,000	1,393	1,366	1,389	1,338	1,329
OCT3	1982	1,194	1,028	1,170	1,045	1,013	1,203	1,185	1,196	1,202	1,189
OCT4	1982	1,220	1,050	1,205	1,058	1,026	1,288	1,254	1,285	1,262	1,254
NOV1	1982	1,148	1,055	1,144	1,056	1,029	1,224	1,222	1,232	1,219	1,217
NOV2	1982	1,131	1,065	1,130	1,053	1,030	1,264	1,271	1,265	1,224	1,223
NOV3	1982	1,208	1,091	1,209	1,068	1,043	1,482	1,499	1,487	1,428	1,430
NOV4	1982	1,239	1,119	1,240	1,080	1,055	1,477	1,535	1,479	1,421	1,469
DEC1	1982	1,245	1,138	1,247	1,089	1,063	1,451	1,468	1,455	1,406	1,426
DEC2	1982	1,255	1,155	1,257	1,098	1,070	1,472	1,484	1,473	1,447	1,449
DEC3	1982	1,254	1,166	1,256	1,105	1,077	1,420	1,425	1,420	1,400	1,401
DEC4	1982	1,254	1,174	1,255	1,112	1,083	1,414	1,415	1,414	1,394	1,394
JAN1	1982	1,237	1,171	1,239	1,112	1,083	1,451	1,450	1,452	1,430	1,431
JAN2	1982	1,221	1,167	1,223	1,112	1,083	1,415	1,414	1,414	1,395	1,395
JAN3	1982	1,201	1,158	1,203	1,112	1,083	1,329	1,331	1,344	1,330	1,338
JAN4	1982	1,187	1,152	1,189	1,112	1,083	1,345	1,338	1,345	1,333	1,332
FEB1	1982	1,205	1,168	1,207	1,127	1,097	1,360	1,362	1,359	1,341	1,341
FEB2	1982	1,228	1,188	1,229	1,143	1,111	1,439	1,445	1,439	1,415	1,416
FEB3	1982	1,252	1,210	1,255	1,159	1,126	1,486	1,486	1,493	1,453	1,456
FEB4	1982	1,273	1,228	1,275	1,175	1,141	1,464	1,466	1,462	1,425	1,424
MAR1	1982	1,289	1,246	1,291	1,193	1,158	1,396	1,410	1,400	1,370	1,372
MAR2	1982	1,247	1,243	1,250	1,199	1,173	1,498	1,522	1,501	1,453	1,465
MAR3	1982	1,266	1,262	1,268	1,213	1,185	1,405	1,413	1,400	1,264	1,241
MAR4	1982	1,283	1,280	1,285	1,226	1,197	1,442	1,455	1,437	1,321	1,284
APR1	1982	1,304	1,294	1,306	1,242	1,212	1,384	1,359	1,380	1,251	1,229
APR2	1982	1,313	1,300	1,306	1,258	1,227	1,325	1,205	1,239	1,199	1,187
APR3	1982	1,306	1,302	1,302	1,272	1,237	1,132	1,139	1,120	1,139	1,133
APR4	1982	1,225	1,295	1,251	1,285	1,239	1,052	1,047	1,069	1,069	1,132
MAY1	1982	1,134	1,230	1,163	1,274	1,233	993	1,068	1,042	958	1,062
MAY2	1982	1,084	1,189	1,105	1,214	1,182	983	1,009	973	982	948
MAY3	1982	1,114	1,212	1,138	1,221	1,205	1,317	1,309	1,330	1,253	1,293
MAY4	1982	1,116	1,214	1,137	1,203	1,190	893	968	931	911	884
JUN1	1982	917	1,035	871	1,092	1,099	681	719	672	697	685
JUN2	1982	832	961	766	1,047	1,063	607	619	597	627	624
JUN3	1982	667	840	659	931	989	503	556	653	543	539
JUN4	1982	564	754	618	824	914	462	491	642	463	452
JUL1	1982	519	701	539	777	867	535	541	539	562	556
JUL2	1982	503	678	518	749	809	562	570	565	593	596
JUL3	1982	508	667	519	742	791	611	594	611	658	656
JUL4	1982	498	643	530	724	773	499	496	562	487	474
AUG1	1982	553	666	576	738	783	893	907	896	907	912
AUG2	1982	600	668	619	746	790	815	744	833	830	833
AUG3	1982	604	666	616	741	789	684	689	672	686	679
AUG4	1982	641	675	649	749	796	840	821	839	877	880
SEP1	1982	676	701	683	771	812	1,143	1,123	1,123	1,123	1,138
SEP2	1982	680	704	687	772	813	810	814	810	833	836
SEP3	1982	675	703	683	767	813	781	784	776	807	800
SEP4	1982	697	719	702	776	822	950	961	939	942	950
OCT1	1983	706	730	710	773	819	891	929	888	903	922
OCT2	1983	719	741	725	782	828	960	964	983	979	985
OCT3	1983	742	760	749	799	840	1,132	1,131	1,135	1,130	1,142
OCT4	1983	763	777	770	819	853	1,278	1,275	1,280	1,265	1,270
NOV1	1983	781	792	788	825	858	1,375	1,371	1,373	1,352	1,354
NOV2	1983	798	805	805	837	867	1,315	1,312	1,316	1,301	1,305
NOV3	1983	818	820	825	844	873	1,325	1,323	1,330	1,318	1,320
NOV4	1983	838	840	844	851	879	1,353	1,370	1,358	1,343	1,371
DEC1	1983	860	859	866	858	886	1,409	1,404	1,413	1,389	1,410
DEC2	1983	885	879	890	866	892	1,472	1,461	1,477	1,445	1,448
DEC3	1983	906	897	911	873	899	1,466	1,451	1,460	1,433	1,431
DEC4	1983	924	912	928	879	904	1,470	1,467	1,464	1,438	1,439
JAN1	1983	933	920	936	879	904	1,415	1,416	1,415	1,394	1,395
JAN2	1983	942	927	944	879	904	1,432	1,433	1,433	1,411	1,411
JAN3	1983	948	933	949	879	904	1,379	1,380	1,380	1,365	1,366
JAN4	1983	953	937	954	879	904	1,383	1,384	1,384	1,370	1,371
FEB1	1983	973	956	974	894	917	1,383	1,384	1,384	1,370	1,371
FEB2	1983	991	973	993	908	929	1,387	1,389	1,388	1,375	1,376
FEB3	1983	1,008	989	1,010	921	941	1,363	1,364	1,365	1,354	1,354
FEB4	1983	1,021	1,003	1,025	934	953	1,311	1,342	1,343	1,339	1,338
MAR1	1983	1,037	1,019	1,041	950	967	1,314	1,335	1,335	1,338	1,338
MAR2	1983	1,052	1,051	1,056	993	1,002	1,339	1,379	1,341	1,361	1,368
MAR3	1983	1,026	1,041	1,028	1,003	1,012	990	997	995	1,114	1,129
MAR4	1983	1,015	1,042	1,019	1,013	1,021	1,004	994	1,011	1,088	1,122
APR1	1983	1,012	1,046	1,017	1,020	1,028	997	986	1,019	1,051	1,038
APR2	1983	1,002	1,047	1,008	1,026	1,037	921	908	951	1,008	992
APR3	1983	1,001	1,051	1,009	1,022	1,041	957	937	983	970	948
APR4	1983	1,003	1,056	1,013	1,025	1,046	976	954	990	971	956
MAY1	1983	1,008	1,060	1,019	1,029	1,050	950	938	992	957	942

NA = no action, PA = proposed action, CE = cumulative effects

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
MAY2	1983	1,005	1,063	1,014	1,021	1,054	878	862	912	895	867
MAY3	1983	1,003	1,063	1,012	1,016	1,053	975	971	995	987	969
MAY4	1983	977	1,037	983	976	1,039	900	871	859	899	882
JUN1	1983	931	997	923	923	1,017	766	734	763	685	672
JUN2	1983	883	954	860	869	992	715	692	710	639	622
JUN3	1983	821	892	774	806	946	547	513	527	445	420
JUN4	1983	746	819	669	744	899	313	272	295	319	306
JUL1	1983	678	752	592	711	857	276	248	249	280	260
JUL2	1983	641	708	552	689	848	409	402	400	417	401
JUL3	1983	640	704	557	694	856	695	696	684	701	695
JUL4	1983	646	708	570	702	865	773	782	771	788	785
AUG1	1983	654	717	578	705	874	744	755	743	751	756
AUG2	1983	660	725	587	710	881	732	766	746	761	770
AUG3	1983	666	733	598	719	892	768	840	816	840	849
AUG4	1983	673	744	612	731	904	831	971	931	967	984
SEP1	1983	683	753	623	740	912	913	933	911	921	943
SEP2	1983	692	763	635	752	925	977	994	973	1,109	1,138
SEP3	1983	701	772	643	762	936	1,393	1,444	1,396	1,403	1,440
SEP4	1983	710	782	651	773	949	1,466	1,483	1,470	1,478	1,491
OCT1	1984	714	785	658	775	941	802	835	784	862	902
OCT2	1984	725	794	671	784	946	990	997	1,025	1,003	1,046
OCT3	1984	736	806	683	796	958	1,203	1,238	1,203	1,218	1,270
OCT4	1984	745	815	692	805	967	1,178	1,190	1,175	1,189	1,199
NOV1	1984	750	820	697	810	972	1,098	1,099	1,096	1,100	1,111
NOV2	1984	756	826	703	815	978	1,152	1,153	1,150	1,196	1,154
NOV3	1984	763	834	712	821	983	1,228	1,296	1,296	1,291	1,291
NOV4	1984	768	847	722	827	990	1,091	1,419	1,370	1,357	1,424
DEC1	1984	771	856	726	832	995	983	1,345	1,008	1,319	1,332
DEC2	1984	774	861	729	838	1,001	987	1,338	987	1,324	1,324
DEC3	1984	778	866	733	844	1,007	1,036	1,346	1,037	1,334	1,335
DEC4	1984	781	871	735	848	1,011	930	1,330	932	1,318	1,319
JAN1	1984	781	871	735	848	1,011	950	953	952	1,293	1,294
JAN2	1984	781	871	735	848	1,011	1,025	1,027	1,026	1,264	1,333
JAN3	1984	781	871	735	848	1,011	1,125	1,127	1,127	1,142	1,372
JAN4	1984	781	871	735	848	1,011	994	995	995	1,009	1,289
FEB1	1984	788	879	743	857	1,020	1,072	1,072	1,073	1,086	1,084
FEB2	1984	796	888	751	867	1,030	1,119	1,119	1,120	1,131	1,131
FEB3	1984	804	896	759	877	1,040	1,150	1,150	1,151	1,163	1,162
FEB4	1984	813	905	767	886	1,049	1,146	1,146	1,147	1,157	1,156
MAR1	1984	822	915	777	897	1,060	1,089	1,089	1,090	1,107	1,106
MAR2	1984	836	919	793	907	1,037	1,153	1,157	1,154	1,169	1,172
MAR3	1984	827	907	794	912	1,042	805	805	799	891	892
MAR4	1984	825	905	795	914	1,041	775	778	774	835	840
APR1	1984	826	904	797	921	1,048	799	812	797	924	937
APR2	1984	826	903	798	926	1,052	723	721	718	783	797
APR3	1984	828	906	802	926	1,043	847	837	851	862	850
APR4	1984	835	911	810	932	1,046	956	941	953	958	945
MAY1	1984	830	906	806	942	1,042	642	640	644	689	697
MAY2	1984	833	904	812	938	1,018	864	888	858	863	907
MAY3	1984	813	881	794	900	980	801	795	795	765	745
MAY4	1984	773	845	756	851	942	554	546	552	493	504
JUN1	1984	725	801	711	802	905	513	552	522	499	497
JUN2	1984	681	758	669	765	873	530	525	529	603	599
JUN3	1984	646	723	635	749	867	419	416	419	429	426
JUN4	1984	614	691	605	732	860	370	357	371	363	368
JUL1	1984	593	661	585	714	852	342	346	342	349	345
JUL2	1984	588	649	580	696	843	380	387	381	375	379
JUL3	1984	589	652	581	692	845	481	481	481	485	484
JUL4	1984	593	658	586	693	851	573	573	573	579	580
AUG1	1984	593	660	586	687	847	547	548	547	559	563
AUG2	1984	597	663	590	689	845	647	653	646	663	673
AUG3	1984	597	666	591	685	844	469	469	468	467	468
AUG4	1984	597	667	590	679	840	542	544	541	543	547
SEP1	1984	599	669	593	677	835	705	710	704	717	726
SEP2	1984	607	676	601	684	845	820	827	820	841	855
SEP3	1984	613	684	607	693	855	896	899	897	993	1,016
SEP4	1984	620	692	614	701	865	1,021	1,021	1,021	1,022	1,045
OCT1	1985	632	703	626	713	868	973	978	975	1,020	981
OCT2	1985	639	708	633	718	869	860	864	859	866	886
OCT3	1985	640	704	634	721	870	701	703	700	770	775
OCT4	1985	644	707	638	725	873	753	755	753	768	773
NOV1	1985	647	710	641	727	876	827	825	823	824	830
NOV2	1985	651	714	645	731	881	964	966	964	883	890
NOV3	1985	655	717	649	734	884	946	967	965	894	894
NOV4	1985	659	720	653	737	887	974	923	974	982	947
DEC1	1985	663	723	657	741	891	967	969	967	975	979
DEC2	1985	666	726	661	744	894	942	942	942	950	950

NA = no action, PA = proposed action, CE = cumulative effects

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
DEC3	1985	670	729	665	747	898	967	967	967	975	976
DEC4	1985	673	732	668	750	901	974	974	974	980	981
JAN1	1985	673	732	668	750	901	1,007	1,007	1,007	1,012	1,012
JAN2	1985	673	732	668	750	901	989	989	989	996	996
JAN3	1985	673	732	668	750	901	983	983	983	983	982
JAN4	1985	673	732	668	750	901	924	924	924	926	925
FEB1	1985	679	738	674	757	908	952	951	951	954	953
FEB2	1985	685	744	680	763	914	900	900	900	901	901
FEB3	1985	690	750	685	769	921	872	872	872	872	873
FEB4	1985	696	756	691	775	928	931	931	931	930	930
MAR1	1985	704	763	698	784	936	990	990	990	987	987
MAR2	1985	714	771	709	790	918	1,014	1,015	1,013	1,009	1,011
MAR3	1985	721	777	715	796	925	903	936	929	924	943
MAR4	1985	727	782	721	802	930	910	915	909	910	917
APR1	1985	733	789	728	808	936	837	841	835	834	842
APR2	1985	739	794	733	813	939	778	776	775	773	777
APR3	1985	746	799	740	820	940	880	876	877	886	888
APR4	1985	753	805	747	828	942	906	916	909	920	921
MAY1	1985	753	805	747	826	935	680	690	679	711	715
MAY2	1985	753	806	748	820	928	677	683	676	686	692
MAY3	1985	756	809	751	822	929	691	698	690	693	701
MAY4	1985	761	813	756	829	935	629	621	628	584	586
JUN1	1985	747	799	744	816	920	567	504	567	526	529
JUN2	1985	709	773	712	788	888	353	345	351	373	375
JUN3	1985	678	751	684	755	849	391	381	391	426	393
JUN4	1985	646	728	655	717	814	448	443	451	464	458
JUL1	1985	632	716	644	699	794	579	578	599	627	624
JUL2	1985	639	722	650	699	793	577	576	585	626	633
JUL3	1985	637	718	649	703	794	509	507	511	507	519
JUL4	1985	639	719	650	707	797	523	523	526	525	527
AUG1	1985	650	728	661	715	804	791	795	783	788	802
AUG2	1985	664	740	675	729	817	861	861	868	874	878
AUG3	1985	681	757	692	746	839	1,196	1,223	1,192	1,268	1,316
AUG4	1985	697	771	708	759	853	1,280	1,238	1,234	1,281	1,284
SEP1	1985	714	786	725	772	866	1,447	1,434	1,423	1,406	1,422
SEP2	1985	730	799	742	787	878	996	1,041	1,034	1,083	1,059
SEP3	1985	745	812	757	799	889	1,341	1,348	1,338	1,339	1,346
SEP4	1985	758	825	770	810	901	1,124	1,341	1,138	1,375	1,382
OCT1	1986	770	834	782	827	912	1,038	1,022	1,040	1,188	1,135
OCT2	1986	763	824	771	834	917	917	901	902	983	967
OCT3	1986	731	798	735	843	926	784	774	774	988	998
OCT4	1986	713	782	715	852	934	790	781	781	958	971
NOV1	1986	721	789	723	864	943	1,320	1,331	1,316	1,310	1,341
NOV2	1986	730	796	732	869	945	1,361	1,363	1,361	1,116	1,054
NOV3	1986	739	804	741	873	949	1,321	1,321	1,321	911	911
NOV4	1986	744	807	747	877	952	1,095	1,039	1,150	940	904
DEC1	1986	746	808	749	881	956	903	903	903	914	914
DEC2	1986	748	809	751	884	959	916	917	917	931	932
DEC3	1986	750	810	753	888	962	925	925	925	938	939
DEC4	1986	751	811	754	892	965	894	894	894	907	907
JAN1	1986	751	810	754	892	965	980	980	980	989	990
JAN2	1986	752	809	755	892	965	1,044	1,044	1,044	1,052	1,053
JAN3	1986	752	809	755	892	965	1,049	1,049	1,050	1,063	1,063
JAN4	1986	752	809	755	892	965	1,022	1,022	1,023	1,039	1,039
FEB1	1986	759	815	762	900	973	1,007	1,007	1,007	1,026	1,026
FEB2	1986	766	821	769	908	980	985	986	986	1,003	1,004
FEB3	1986	773	828	775	917	988	1,003	1,004	1,004	1,016	1,018
FEB4	1986	780	835	783	926	996	1,084	1,090	1,084	1,098	1,104
MAR1	1986	789	843	792	937	1,006	1,080	1,089	1,080	1,074	1,083
MAR2	1986	795	849	798	924	989	1,033	1,045	1,033	1,031	1,043
MAR3	1986	802	855	805	932	996	953	988	964	1,014	1,042
MAR4	1986	809	862	812	938	1,002	1,024	1,041	1,023	1,022	1,049
APR1	1986	817	869	819	945	1,008	958	959	955	960	965
APR2	1986	826	877	828	952	1,013	1,013	1,007	1,014	1,017	1,015
APR3	1986	834	884	836	962	1,017	1,010	1,003	1,012	1,005	1,012
APR4	1986	840	890	842	971	1,017	960	947	963	968	991
MAY1	1986	850	899	852	974	1,034	896	922	898	960	995
MAY2	1986	859	907	861	978	1,035	883	909	886	958	1,001
MAY3	1986	867	914	868	987	1,043	868	885	869	913	910
MAY4	1986	871	918	873	995	1,050	788	733	791	753	762
JUN1	1986	796	862	800	910	970	587	565	581	556	553
JUN2	1986	713	806	723	830	903	502	498	501	516	514
JUN3	1986	651	759	663	768	829	445	448	444	468	443
JUN4	1986	598	714	611	714	784	398	409	396	398	398
JUL1	1986	555	671	568	695	779	407	400	408	409	403
JUL2	1986	533	645	546	684	775	444	439	443	449	441
JUL3	1986	528	636	540	685	781	512	509	512	515	511

NA = no action, PA = proposed action, CE = cumulative effects

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
JUL4	1986	535	641	546	694	790	621	628	622	647	624
AUG1	1986	553	655	567	710	805	1,033	1,002	1,150	1,203	1,253
AUG2	1986	567	668	581	733	819	966	1,001	992	1,192	1,073
AUG3	1986	587	684	600	753	835	1,056	1,059	1,055	1,094	1,115
AUG4	1986	606	695	618	765	841	958	936	959	947	934
SEP1	1986	612	694	622	776	853	806	806	807	908	917
SEP2	1986	609	688	617	789	865	747	747	735	942	959
SEP3	1986	617	693	624	800	876	874	869	874	1,036	1,058
SEP4	1986	625	704	632	812	887	1,516	1,606	1,516	1,513	1,731
OCT1	1987	637	716	644	836	901	1,155	1,195	1,158	1,217	1,151
OCT2	1987	651	729	657	851	906	1,214	1,245	1,217	1,133	1,001
OCT3	1987	666	742	671	856	910	1,116	1,156	1,119	979	989
OCT4	1987	675	751	679	860	919	1,045	1,053	997	959	970
NOV1	1987	680	754	683	860	921	918	913	911	903	911
NOV2	1987	685	758	688	863	924	942	987	1,018	933	940
NOV3	1987	687	760	691	867	927	862	862	880	870	870
NOV4	1987	692	762	695	871	931	991	922	992	1,003	942
DEC1	1987	696	764	699	875	934	937	938	938	949	949
DEC2	1987	700	767	703	880	938	982	982	982	995	995
DEC3	1987	704	769	706	884	942	929	930	929	942	943
DEC4	1987	707	772	709	888	945	973	974	974	987	987
JAN1	1987	708	771	710	888	945	983	983	983	994	994
JAN2	1987	709	771	711	888	945	1,048	1,049	1,048	1,049	1,049
JAN3	1987	711	771	713	888	945	1,052	1,053	1,052	1,065	1,066
JAN4	1987	713	772	714	888	945	1,059	1,060	1,059	1,061	1,062
FEB1	1987	721	779	722	897	953	1,021	1,024	1,022	1,028	1,029
FEB2	1987	729	786	730	906	961	1,028	1,033	1,028	1,037	1,041
FEB3	1987	737	793	737	914	969	993	999	993	1,002	1,007
FEB4	1987	744	799	744	923	977	986	992	986	996	1,001
MAR1	1987	755	808	754	935	987	1,075	1,080	1,075	1,077	1,082
MAR2	1987	760	807	759	925	976	970	976	970	976	982
MAR3	1987	768	814	767	932	983	973	996	982	984	996
MAR4	1987	775	820	773	939	989	976	985	976	986	994
APR1	1987	784	828	782	948	998	976	975	973	975	978
APR2	1987	790	834	788	957	1,003	830	830	829	825	832
APR3	1987	793	836	791	961	1,002	654	654	653	651	656
APR4	1987	787	832	786	959	979	688	697	688	683	713
MAY1	1987	778	827	779	923	955	624	631	624	628	633
MAY2	1987	768	819	770	900	935	589	588	590	545	540
MAY3	1987	771	823	773	904	939	496	493	503	478	466
MAY4	1987	775	826	777	911	953	586	542	593	602	597
JUN1	1987	749	807	756	888	949	486	483	489	524	534
JUN2	1987	716	781	726	853	879	380	379	382	411	392
JUN3	1987	674	751	688	788	830	474	477	476	479	476
JUN4	1987	650	733	665	750	799	553	554	555	577	570
JUL1	1987	642	724	656	729	780	615	605	609	633	628
JUL2	1987	655	734	669	736	792	741	757	741	803	768
JUL3	1987	675	751	688	755	808	961	939	890	994	993
JUL4	1987	693	768	706	771	823	1,072	1,070	986	988	1,088
AUG1	1987	714	786	727	788	839	1,155	1,161	1,130	1,133	1,164
AUG2	1987	731	800	745	800	848	807	834	848	890	860
AUG3	1987	761	826	775	818	864	1,721	1,721	1,690	1,773	1,793
AUG4	1987	778	838	792	829	872	946	916	951	971	957
SEP1	1987	798	855	813	846	884	1,082	1,116	1,083	1,117	1,104
SEP2	1987	819	870	833	860	895	1,051	1,028	1,022	1,049	1,051
SEP3	1987	839	885	853	874	907	1,073	1,061	1,057	1,070	1,072
SEP4	1987	859	901	874	889	920	1,101	1,105	1,101	1,101	1,105
OCT1	1988	882	921	902	905	934	1,265	1,432	1,422	1,412	1,422
OCT2	1988	903	937	922	924	949	1,221	1,270	1,221	1,418	1,436
OCT3	1988	920	949	938	936	959	1,121	1,125	1,122	1,157	1,161
OCT4	1988	933	958	951	947	968	1,062	1,066	1,064	1,096	1,099
NOV1	1988	937	962	955	953	973	1,036	1,039	1,037	1,058	1,060
NOV2	1988	941	966	959	960	978	1,000	1,002	1,001	1,020	1,021
NOV3	1988	939	965	956	965	982	1,003	1,004	1,004	1,016	1,016
NOV4	1988	942	964	958	971	986	1,085	990	1,085	1,098	1,003
DEC1	1988	935	961	951	975	990	942	943	942	959	959
DEC2	1988	929	957	944	980	994	935	936	935	952	953
DEC3	1988	925	955	939	985	999	962	963	962	976	976
DEC4	1988	923	954	937	990	1,002	986	987	986	1,004	1,004
JAN1	1988	914	947	927	990	1,002	997	998	997	1,016	1,016
JAN2	1988	904	940	917	990	1,002	958	958	958	974	974
JAN3	1988	895	933	907	990	1,002	951	952	952	966	966
JAN4	1988	888	928	901	990	1,002	973	974	974	981	981
FEB1	1988	896	933	908	1,000	1,011	1,019	1,020	1,020	1,029	1,029
FEB2	1988	903	939	914	1,011	1,020	1,019	1,021	1,020	1,029	1,029
FEB3	1988	910	944	921	1,022	1,029	1,015	1,017	1,016	1,026	1,026
FEB4	1988	916	949	927	1,032	1,037	1,018	1,019	1,019	1,030	1,030

NA = no action, PA = proposed action, CE = cumulative effects

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
MAR1	1988	924	955	934	1,045	1,048	1,007	1,008	1,007	1,019	1,020
MAR2	1988	889	924	895	997	1,026	1,103	1,108	1,103	1,117	1,122
MAR3	1988	898	931	903	1,007	1,036	1,087	1,062	1,054	1,101	1,122
MAR4	1988	906	938	910	1,015	1,044	1,079	1,102	1,076	1,082	1,107
APR1	1988	917	949	920	1,027	1,056	1,123	1,140	1,117	1,120	1,142
APR2	1988	926	956	928	1,036	1,064	1,012	1,010	1,008	1,014	1,016
APR3	1988	934	962	935	1,046	1,069	1,014	1,021	1,010	1,015	1,033
APR4	1988	944	971	944	1,058	1,077	1,094	1,127	1,099	1,108	1,162
MAY1	1988	961	987	959	1,076	1,091	1,232	1,202	1,204	1,208	1,229
MAY2	1988	975	1,000	973	1,085	1,101	1,076	1,071	1,061	1,143	1,143
MAY3	1988	971	997	970	1,087	1,108	865	876	864	903	878
MAY4	1988	980	1,006	978	1,098	1,117	999	1,017	993	1,054	1,040
JUN1	1988	976	1,004	974	1,096	1,116	904	779	886	830	803
JUN2	1988	914	962	914	1,112	1,131	708	606	609	729	711
JUN3	1988	916	965	918	1,118	1,138	776	772	799	919	914
JUN4	1988	888	948	898	1,083	1,116	631	627	644	716	717
JUL1	1988	894	954	904	1,102	1,102	622	624	629	710	711
JUL2	1988	904	962	913	1,061	1,075	713	709	711	766	766
JUL3	1988	934	984	941	1,056	1,077	802	775	789	914	905
JUL4	1988	966	1,007	970	1,043	1,076	689	685	708	752	751
AUG1	1988	985	1,022	988	994	1,057	768	772	769	794	799
AUG2	1988	1,018	1,046	1,021	1,022	1,070	1,110	1,076	1,048	1,131	1,089
AUG3	1988	1,049	1,068	1,051	974	1,051	796	813	793	834	841
AUG4	1988	1,082	1,092	1,084	922	1,028	852	871	849	877	887
SEP1	1988	1,120	1,121	1,121	1,035	1,079	1,505	1,545	1,481	1,458	1,468
SEP2	1988	1,154	1,146	1,155	1,035	1,081	1,138	1,157	1,132	1,147	1,154
SEP3	1988	1,190	1,170	1,190	1,041	1,086	1,173	1,171	1,167	1,168	1,175
SEP4	1988	1,232	1,199	1,231	1,092	1,117	1,483	1,495	1,483	1,455	1,464
OCT1	1989	1,260	1,223	1,259	1,117	1,132	1,429	1,451	1,433	1,349	1,348
OCT2	1989	1,278	1,238	1,277	1,112	1,133	1,283	1,278	1,285	1,234	1,248
OCT3	1989	1,297	1,255	1,296	1,113	1,135	1,313	1,307	1,314	1,255	1,265
OCT4	1989	1,324	1,274	1,323	1,131	1,148	1,446	1,446	1,446	1,418	1,417
NOV1	1989	1,335	1,284	1,334	1,127	1,147	1,451	1,439	1,451	1,294	1,312
NOV2	1989	1,335	1,289	1,334	1,118	1,140	1,297	1,293	1,298	1,230	1,233
NOV3	1989	1,324	1,289	1,324	1,120	1,141	1,368	1,368	1,368	1,345	1,345
NOV4	1989	1,315	1,292	1,316	1,122	1,144	1,364	1,410	1,365	1,342	1,366
DEC1	1989	1,312	1,295	1,313	1,129	1,151	1,440	1,443	1,440	1,420	1,421
DEC2	1989	1,312	1,298	1,312	1,137	1,158	1,454	1,456	1,454	1,431	1,432
DEC3	1989	1,313	1,302	1,314	1,145	1,164	1,471	1,473	1,471	1,446	1,447
DEC4	1989	1,313	1,304	1,314	1,152	1,170	1,460	1,463	1,460	1,438	1,439
JAN1	1989	1,299	1,296	1,300	1,152	1,170	1,449	1,452	1,449	1,429	1,431
JAN2	1989	1,287	1,289	1,288	1,152	1,170	1,444	1,445	1,445	1,425	1,425
JAN3	1989	1,271	1,278	1,272	1,152	1,170	1,362	1,362	1,362	1,350	1,350
JAN4	1989	1,253	1,267	1,255	1,152	1,170	1,257	1,258	1,258	1,252	1,252
FEB1	1989	1,253	1,268	1,255	1,164	1,181	1,190	1,191	1,191	1,193	1,193
FEB2	1989	1,249	1,267	1,252	1,176	1,191	1,131	1,133	1,133	1,136	1,136
FEB3	1989	1,245	1,266	1,247	1,187	1,201	1,110	1,112	1,113	1,111	1,111
FEB4	1989	1,242	1,266	1,245	1,199	1,211	1,133	1,135	1,135	1,132	1,132
MAR1	1989	1,238	1,265	1,241	1,212	1,223	1,087	1,090	1,089	1,090	1,091
MAR2	1989	1,064	1,112	1,067	1,151	1,172	1,120	1,124	1,121	1,122	1,126
MAR3	1989	1,075	1,124	1,080	1,157	1,178	1,182	1,238	1,199	989	991
MAR4	1989	1,077	1,126	1,082	1,161	1,182	1,026	1,028	1,019	1,027	1,034
APR1	1989	1,081	1,129	1,085	1,167	1,187	989	994	981	995	1,007
APR2	1989	1,086	1,133	1,090	1,179	1,190	995	1,014	1,005	1,010	1,021
APR3	1989	1,088	1,135	1,093	1,190	1,180	978	1,004	966	968	1,044
APR4	1989	1,093	1,138	1,097	1,184	1,172	1,047	1,047	1,037	1,066	1,073
MAY1	1989	1,108	1,151	1,112	1,192	1,173	1,121	1,107	1,099	1,121	1,133
MAY2	1989	1,118	1,159	1,122	1,194	1,183	1,037	1,087	1,079	1,076	1,068
MAY3	1989	1,102	1,142	1,107	1,201	1,191	1,019	799	1,040	974	956
MAY4	1989	1,101	1,145	1,107	1,214	1,202	919	844	881	1,064	991
JUN1	1989	1,088	1,145	1,096	1,226	1,213	745	750	777	850	856
JUN2	1989	1,074	1,143	1,081	1,236	1,224	776	783	775	881	887
JUN3	1989	1,076	1,149	1,082	1,256	1,207	690	700	688	824	819
JUN4	1989	1,078	1,154	1,083	1,230	1,184	708	727	707	743	760
JUL1	1989	1,072	1,156	1,077	1,166	1,149	671	688	669	710	723
JUL2	1989	1,002	1,119	1,005	1,122	1,122	615	625	615	743	757
JUL3	1989	1,061	1,157	1,065	1,118	1,121	771	765	779	797	808
JUL4	1989	1,125	1,196	1,130	1,114	1,120	681	694	681	745	744
AUG1	1989	1,187	1,231	1,193	1,087	1,100	756	751	757	771	759
AUG2	1989	1,259	1,267	1,266	1,054	1,075	821	802	822	828	816
AUG3	1989	1,351	1,309	1,360	1,073	1,088	1,082	1,079	1,092	1,197	1,173
AUG4	1989	1,470	1,356	1,482	1,093	1,098	1,215	1,245	1,230	1,232	1,176
SEP1	1989	1,606	1,399	1,624	1,113	1,110	1,283	1,275	1,282	1,271	1,228
SEP2	1989	1,809	1,429	1,807	1,131	1,124	1,373	1,328	1,373	1,271	1,243
SEP3	1989	1,817	1,473	1,813	1,171	1,160	1,636	1,682	1,637	1,569	1,581
SEP4	1989	1,804	1,509	1,819	1,204	1,191	1,668	1,593	1,714	1,405	1,401
OCT1	1990	1,819	1,550	1,828	1,242	1,225	1,818	1,768	1,818	1,584	1,595

NA = no action, PA = proposed action, CE = cumulative effects

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
OCT2	1990	1,630	1,536	1,636	1,238	1,225	1,389	1,387	1,391	1,307	1,331
OCT3	1990	1,543	1,529	1,547	1,239	1,230	1,437	1,422	1,438	1,355	1,363
OCT4	1990	1,495	1,523	1,497	1,243	1,234	1,438	1,421	1,439	1,370	1,356
NOV1	1990	1,376	1,493	1,378	1,236	1,227	1,365	1,353	1,366	1,335	1,317
NOV2	1990	1,317	1,469	1,321	1,241	1,228	1,376	1,384	1,385	1,341	1,326
NOV3	1990	1,287	1,453	1,290	1,249	1,235	1,395	1,395	1,396	1,384	1,384
NOV4	1990	1,270	1,440	1,273	1,256	1,243	1,382	1,410	1,383	1,373	1,389
DEC1	1990	1,264	1,427	1,267	1,264	1,250	1,427	1,430	1,427	1,408	1,410
DEC2	1990	1,265	1,417	1,267	1,272	1,257	1,443	1,446	1,444	1,421	1,423
DEC3	1990	1,286	1,419	1,288	1,281	1,265	1,573	1,577	1,574	1,534	1,536
DEC4	1990	1,267	1,404	1,269	1,287	1,271	1,300	1,304	1,302	1,295	1,297
JAN1	1990	1,253	1,386	1,255	1,287	1,271	1,479	1,483	1,480	1,456	1,458
JAN2	1990	1,243	1,371	1,245	1,287	1,271	1,484	1,487	1,486	1,461	1,462
JAN3	1990	1,228	1,354	1,230	1,287	1,271	1,407	1,413	1,410	1,394	1,396
JAN4	1990	1,214	1,339	1,216	1,287	1,271	1,366	1,371	1,369	1,356	1,358
FEB1	1990	1,219	1,340	1,222	1,300	1,284	1,297	1,303	1,301	1,293	1,296
FEB2	1990	1,224	1,341	1,226	1,314	1,296	1,280	1,290	1,285	1,277	1,282
FEB3	1990	1,222	1,339	1,225	1,326	1,308	1,201	1,213	1,207	1,203	1,209
FEB4	1990	1,223	1,338	1,226	1,339	1,320	1,231	1,240	1,235	1,229	1,234
MAR1	1990	1,221	1,335	1,224	1,353	1,334	1,141	1,144	1,142	1,133	1,136
MAR2	1990	1,085	1,178	1,086	1,287	1,279	1,210	1,223	1,210	1,202	1,215
MAR3	1990	1,107	1,197	1,107	1,303	1,292	1,373	1,423	1,357	1,377	1,346
MAR4	1990	1,124	1,213	1,125	1,316	1,303	1,351	1,403	1,339	1,339	1,296
APR1	1990	1,142	1,230	1,142	1,332	1,315	1,253	1,319	1,247	1,200	1,165
APR2	1990	1,162	1,244	1,163	1,349	1,324	1,308	1,304	1,302	1,259	1,213
APR3	1990	1,179	1,250	1,181	1,364	1,327	1,285	1,168	1,307	1,171	1,176
APR4	1990	1,189	1,255	1,187	1,379	1,338	1,245	1,190	1,170	1,176	1,201
MAY1	1990	1,169	1,242	1,168	1,388	1,322	945	972	951	952	980
MAY2	1990	1,181	1,252	1,181	1,398	1,349	1,075	1,110	1,063	1,068	1,133
MAY3	1990	1,207	1,271	1,206	1,393	1,368	1,315	1,295	1,314	1,302	1,394
MAY4	1990	1,166	1,238	1,171	1,380	1,363	978	878	1,006	972	954
JUN1	1990	1,097	1,216	1,100	1,383	1,367	786	760	784	862	855
JUN2	1990	681	966	671	1,206	1,207	472	438	456	510	478
JUN3	1990	692	965	683	1,216	1,218	612	613	610	723	726
JUN4	1990	716	970	709	1,233	1,188	678	687	683	794	765
JUL1	1990	749	977	743	1,209	1,157	736	743	740	748	752
JUL2	1990	772	979	767	1,164	1,127	716	718	718	737	736
JUL3	1990	816	995	812	1,137	1,121	686	687	689	703	692
JUL4	1990	908	1,025	904	1,131	1,118	785	781	790	792	780
AUG1	1990	1,004	1,047	1,001	1,122	1,111	953	923	956	950	920
AUG2	1990	1,253	1,085	1,216	1,137	1,127	1,386	1,259	1,257	1,211	1,220
AUG3	1990	1,132	1,080	1,122	1,116	1,109	859	840	882	887	876
AUG4	1990	1,157	1,088	1,153	1,116	1,106	1,041	992	1,046	1,091	1,041
SEP1	1990	1,193	1,100	1,195	1,124	1,111	1,168	1,123	1,176	1,232	1,176
SEP2	1990	1,329	1,132	1,333	1,150	1,128	1,394	1,318	1,400	1,412	1,330
SEP3	1990	1,492	1,184	1,498	1,177	1,155	1,587	1,610	1,592	1,574	1,547
SEP4	1990	1,451	1,198	1,475	1,188	1,167	1,275	1,242	1,332	1,310	1,250
OCT1	1991	1,299	1,196	1,315	1,183	1,163	1,173	1,183	1,179	1,205	1,192
OCT2	1991	1,228	1,194	1,240	1,197	1,165	1,181	1,192	1,187	1,154	1,195
OCT3	1991	1,148	1,181	1,157	1,196	1,165	1,093	1,108	1,099	1,115	1,106
OCT4	1991	1,096	1,168	1,104	1,194	1,169	1,074	1,088	1,078	1,095	1,084
NOV1	1991	1,001	1,137	1,006	1,186	1,170	1,036	1,050	1,039	1,062	1,052
NOV2	1991	944	1,105	949	1,181	1,176	1,013	1,024	1,016	1,029	1,026
NOV3	1991	1,031	1,114	1,035	1,188	1,182	1,332	1,335	1,334	1,321	1,322
NOV4	1991	1,089	1,130	1,092	1,196	1,189	1,399	1,391	1,401	1,381	1,378
DEC1	1991	1,166	1,160	1,169	1,204	1,197	1,582	1,586	1,584	1,539	1,541
DEC2	1991	1,212	1,185	1,215	1,212	1,204	1,581	1,586	1,583	1,542	1,544
DEC3	1991	1,254	1,211	1,256	1,221	1,212	1,645	1,651	1,648	1,595	1,597
DEC4	1991	1,257	1,217	1,260	1,227	1,218	1,461	1,469	1,464	1,440	1,443
JAN1	1991	1,207	1,194	1,213	1,227	1,218	1,173	1,220	1,196	1,202	1,256
JAN2	1991	1,180	1,182	1,188	1,227	1,218	1,266	1,338	1,303	1,310	1,353
JAN3	1991	1,162	1,175	1,174	1,227	1,218	1,305	1,377	1,346	1,352	1,383
JAN4	1991	1,149	1,168	1,162	1,227	1,218	1,307	1,348	1,334	1,333	1,339
FEB1	1991	1,165	1,183	1,178	1,242	1,232	1,373	1,403	1,389	1,380	1,401
FEB2	1991	1,176	1,195	1,189	1,256	1,245	1,325	1,356	1,340	1,337	1,360
FEB3	1991	1,187	1,205	1,200	1,270	1,258	1,343	1,354	1,355	1,348	1,333
FEB4	1991	1,202	1,219	1,216	1,285	1,272	1,412	1,410	1,430	1,411	1,376
MAR1	1991	1,219	1,234	1,233	1,302	1,288	1,413	1,409	1,423	1,401	1,385
MAR2	1991	1,210	1,244	1,230	1,291	1,285	1,486	1,536	1,514	1,482	1,501
MAR3	1991	1,226	1,264	1,247	1,302	1,295	1,319	1,342	1,332	1,242	1,193
MAR4	1991	1,240	1,282	1,262	1,311	1,303	1,335	1,376	1,352	1,239	1,176
APR1	1991	1,260	1,286	1,270	1,324	1,315	1,345	1,172	1,290	1,225	1,157
APR2	1991	1,261	1,291	1,273	1,340	1,326	1,199	1,169	1,229	1,193	1,166
APR3	1991	1,267	1,299	1,278	1,355	1,335	1,253	1,281	1,247	1,240	1,277
APR4	1991	1,278	1,313	1,289	1,371	1,345	1,347	1,392	1,348	1,337	1,387
MAY1	1991	1,288	1,323	1,302	1,391	1,358	1,107	1,136	1,210	1,151	1,144
MAY2	1991	1,301	1,336	1,314	1,383	1,381	1,155	1,272	1,234	1,245	1,305

NA = no action, PA = proposed action, CE = cumulative effects

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
MAY3	1991	1,322	1,345	1,332	1,399	1,409	1,372	1,284	1,348	1,286	1,213
MAY4	1991	1,302	1,330	1,278	1,406	1,435	917	727	787	832	809
JUN1	1991	1,257	1,316	1,229	1,419	1,447	780	738	752	836	834
JUN2	1991	878	1,142	859	1,435	1,462	512	507	500	575	590
JUN3	1991	837	1,112	820	1,423	1,470	607	592	601	691	704
JUN4	1991	847	1,112	832	1,442	1,487	650	654	652	799	818
JUL1	1991	857	1,109	846	1,374	1,340	679	696	691	788	761
JUL2	1991	875	1,111	868	1,262	1,179	735	755	746	778	781
JUL3	1991	993	1,163	985	1,236	1,141	799	811	805	838	835
JUL4	1991	1,159	1,218	1,150	1,217	1,134	763	769	765	779	766
AUG1	1991	1,338	1,257	1,328	1,150	1,095	876	849	873	846	824
AUG2	1991	1,139	1,215	1,127	1,076	1,041	828	782	816	795	753
AUG3	1991	1,094	1,199	1,087	1,044	1,020	896	878	896	920	901
AUG4	1991	1,153	1,203	1,154	1,044	1,022	1,066	1,058	1,075	1,093	1,061
SEP1	1991	1,141	1,196	1,148	1,041	1,022	1,071	1,078	1,080	1,105	1,090
SEP2	1991	1,200	1,208	1,209	1,062	1,038	1,197	1,198	1,206	1,229	1,187
SEP3	1991	1,286	1,240	1,293	1,092	1,062	1,306	1,334	1,310	1,294	1,245
SEP4	1991	1,579	1,368	1,586	1,156	1,123	1,762	1,968	1,765	1,663	1,685
OCT1	1992	1,581	1,412	1,581	1,188	1,157	1,587	1,591	1,579	1,443	1,451
OCT2	1992	1,515	1,414	1,517	1,194	1,168	1,460	1,439	1,464	1,368	1,376
OCT3	1992	1,508	1,427	1,509	1,204	1,181	1,513	1,492	1,513	1,400	1,407
OCT4	1992	1,576	1,463	1,559	1,218	1,198	1,655	1,630	1,621	1,481	1,483
NOV1	1992	1,322	1,392	1,319	1,197	1,181	1,201	1,211	1,213	1,168	1,185
NOV2	1992	1,268	1,359	1,266	1,188	1,176	1,344	1,350	1,345	1,284	1,289
NOV3	1992	1,220	1,330	1,220	1,190	1,177	1,308	1,313	1,309	1,296	1,305
NOV4	1992	1,206	1,314	1,208	1,197	1,184	1,330	1,361	1,337	1,325	1,340
DEC1	1992	1,229	1,315	1,232	1,205	1,191	1,479	1,494	1,485	1,456	1,471
DEC2	1992	1,259	1,325	1,263	1,213	1,199	1,564	1,575	1,568	1,530	1,537
DEC3	1992	1,279	1,333	1,282	1,221	1,207	1,558	1,568	1,562	1,526	1,531
DEC4	1992	1,277	1,327	1,281	1,228	1,213	1,442	1,445	1,447	1,426	1,420
JAN1	1992	1,240	1,296	1,245	1,228	1,213	1,308	1,310	1,321	1,312	1,300
JAN2	1992	1,205	1,266	1,211	1,228	1,213	1,246	1,252	1,260	1,257	1,250
JAN3	1992	1,179	1,240	1,185	1,228	1,213	1,247	1,248	1,258	1,250	1,240
JAN4	1992	1,158	1,220	1,165	1,228	1,213	1,233	1,235	1,242	1,236	1,229
FEB1	1992	1,160	1,220	1,166	1,241	1,225	1,209	1,210	1,217	1,211	1,205
FEB2	1992	1,163	1,221	1,170	1,253	1,237	1,226	1,231	1,237	1,230	1,227
FEB3	1992	1,166	1,222	1,173	1,266	1,249	1,227	1,230	1,234	1,228	1,227
FEB4	1992	1,172	1,227	1,179	1,279	1,262	1,272	1,274	1,277	1,266	1,265
MAR1	1992	1,181	1,233	1,187	1,294	1,277	1,276	1,277	1,279	1,265	1,265
MAR2	1992	1,174	1,210	1,178	1,270	1,261	1,449	1,468	1,450	1,420	1,437
MAR3	1992	1,191	1,227	1,194	1,283	1,272	1,377	1,415	1,367	1,247	1,204
MAR4	1992	1,204	1,241	1,206	1,294	1,280	1,351	1,390	1,342	1,218	1,163
APR1	1992	1,209	1,242	1,212	1,308	1,290	1,175	1,049	1,191	1,102	1,047
APR2	1992	1,216	1,248	1,220	1,324	1,300	1,184	1,143	1,213	1,202	1,155
APR3	1992	1,215	1,248	1,217	1,336	1,309	986	994	986	1,003	1,003
APR4	1992	1,214	1,249	1,216	1,349	1,320	1,024	1,054	1,011	1,045	1,069
MAY1	1992	1,222	1,255	1,223	1,329	1,347	1,105	1,095	1,082	1,060	1,096
MAY2	1992	1,225	1,257	1,226	1,339	1,375	1,083	1,051	1,082	1,060	1,039
MAY3	1992	1,218	1,246	1,217	1,342	1,405	1,013	849	996	897	881
MAY4	1992	1,175	1,232	1,171	1,350	1,412	732	701	712	799	813
JUN1	1992	1,184	1,236	1,178	1,372	1,434	843	830	836	961	972
JUN2	1992	1,014	1,160	1,004	1,340	1,402	633	605	613	708	708
JUN3	1992	1,015	1,157	1,003	1,358	1,444	705	701	692	831	840
JUN4	1992	926	1,108	915	1,326	1,410	617	613	611	708	711
JUL1	1992	928	1,103	920	1,255	1,104	709	719	715	778	729
JUL2	1992	928	1,097	922	1,142	939	692	708	698	719	724
JUL3	1992	1,055	1,155	1,048	1,125	942	821	820	826	847	834
JUL4	1992	1,235	1,221	1,227	1,117	947	808	814	810	854	836
AUG1	1992	1,545	1,293	1,536	1,085	936	801	786	803	809	801
AUG2	1992	1,383	1,270	1,376	1,055	925	1,001	941	999	983	932
AUG3	1992	1,172	1,228	1,168	1,019	911	886	880	885	882	893
AUG4	1992	709	997	710	979	936	603	628	607	666	694
SEP1	1992	789	985	807	961	941	865	878	876	950	926
SEP2	1992	841	977	850	944	924	881	904	879	948	930
SEP3	1992	929	993	931	947	924	1,005	1,029	1,000	1,065	1,043
SEP4	1992	1,130	1,068	1,138	984	970	1,272	1,301	1,283	1,279	1,278
OCT1	1993	1,258	1,156	1,268	1,034	1,024	1,398	1,428	1,409	1,397	1,371
OCT2	1993	1,417	1,290	1,425	1,080	1,081	1,587	1,626	1,591	1,470	1,476
OCT3	1993	1,423	1,337	1,430	1,101	1,104	1,449	1,457	1,454	1,365	1,371
OCT4	1993	1,354	1,320	1,360	1,104	1,111	1,304	1,308	1,309	1,259	1,264
NOV1	1993	1,205	1,245	1,213	1,093	1,104	1,208	1,234	1,219	1,199	1,227
NOV2	1993	1,096	1,181	1,116	1,080	1,092	1,119	1,177	1,152	1,152	1,190
NOV3	1993	1,092	1,160	1,108	1,077	1,087	1,246	1,258	1,257	1,239	1,242
NOV4	1993	1,116	1,184	1,128	1,079	1,087	1,332	1,400	1,335	1,304	1,305
DEC1	1993	1,147	1,199	1,157	1,087	1,094	1,421	1,423	1,422	1,390	1,381
DEC2	1993	1,182	1,224	1,190	1,095	1,105	1,499	1,501	1,500	1,468	1,444
DEC3	1993	1,217	1,253	1,224	1,103	1,114	1,568	1,571	1,569	1,527	1,528

NA = no action, PA = proposed action, CE = cumulative effects

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
DEC4	1993	1,219	1,250	1,225	1,109	1,120	1,412	1,412	1,412	1,381	1,376
JAN1	1993	1,184	1,210	1,189	1,109	1,120	1,262	1,262	1,262	1,250	1,249
JAN2	1993	1,152	1,176	1,157	1,109	1,120	1,207	1,225	1,214	1,214	1,241
JAN3	1993	1,137	1,161	1,143	1,109	1,120	1,318	1,348	1,330	1,323	1,354
JAN4	1993	1,127	1,152	1,133	1,109	1,120	1,309	1,355	1,329	1,327	1,362
FEB1	1993	1,137	1,165	1,146	1,123	1,134	1,289	1,339	1,312	1,312	1,350
FEB2	1993	1,148	1,178	1,157	1,136	1,147	1,312	1,350	1,331	1,324	1,349
FEB3	1993	1,157	1,186	1,166	1,150	1,160	1,301	1,315	1,310	1,297	1,292
FEB4	1993	1,165	1,192	1,174	1,163	1,173	1,311	1,309	1,313	1,293	1,274
MAR1	1993	1,176	1,201	1,185	1,178	1,188	1,304	1,306	1,310	1,287	1,287
MAR2	1993	1,125	1,210	1,131	1,163	1,186	1,360	1,431	1,362	1,336	1,372
MAR3	1993	1,129	1,207	1,134	1,165	1,186	1,138	1,212	1,145	1,074	1,042
MAR4	1993	1,145	1,221	1,149	1,176	1,196	1,323	1,364	1,318	1,256	1,213
APR1	1993	1,157	1,226	1,159	1,188	1,208	1,225	1,153	1,215	1,170	1,137
APR2	1993	1,159	1,226	1,162	1,202	1,222	1,095	1,067	1,113	1,092	1,059
APR3	1993	1,161	1,226	1,163	1,215	1,229	1,088	1,062	1,067	1,062	1,058
APR4	1993	1,161	1,226	1,164	1,228	1,238	1,049	1,043	1,055	1,050	1,039
MAY1	1993	1,168	1,232	1,172	1,244	1,242	985	995	1,005	998	987
MAY2	1993	1,174	1,234	1,177	1,260	1,268	970	1,031	997	935	1,043
MAY3	1993	1,095	1,140	1,093	1,210	1,295	827	800	824	710	676
MAY4	1993	803	818	760	1,065	1,158	573	508	540	513	491
JUN1	1993	586	647	560	935	1,021	552	519	535	556	535
JUN2	1993	600	649	575	943	1,033	622	595	604	674	664
JUN3	1993	492	553	473	840	929	424	397	410	447	439
JUN4	1993	435	505	426	768	829	427	432	430	487	445
JUL1	1993	453	513	444	759	794	521	515	518	544	544
JUL2	1993	462	515	455	754	793	543	548	546	549	549
JUL3	1993	485	528	480	770	808	616	619	618	613	618
JUL4	1993	515	543	509	784	821	771	785	774	809	826
AUG1	1993	552	561	546	798	835	876	897	885	927	951
AUG2	1993	595	579	588	807	846	757	774	772	808	826
AUG3	1993	651	598	642	816	854	801	817	819	857	883
AUG4	1993	720	619	710	832	866	914	906	931	931	972
SEP1	1993	831	644	817	858	885	1,242	1,203	1,249	1,254	1,230
SEP2	1993	949	671	934	868	895	968	950	978	994	995
SEP3	1993	1,081	715	1,071	887	911	1,190	1,141	1,197	1,186	1,175
SEP4	1993	1,272	776	1,263	912	932	1,388	1,337	1,394	1,336	1,347
OCT1	1994	1,220	815	1,222	926	946	1,214	1,196	1,224	1,209	1,226
OCT2	1994	1,268	863	1,271	945	963	1,352	1,319	1,359	1,320	1,329
OCT3	1994	1,233	894	1,238	959	975	1,231	1,213	1,236	1,209	1,212
OCT4	1994	1,191	914	1,198	969	984	1,181	1,166	1,187	1,159	1,164
NOV1	1994	1,109	925	1,118	975	989	1,175	1,171	1,180	1,162	1,162
NOV2	1994	1,085	938	1,092	981	995	1,208	1,202	1,211	1,189	1,190
NOV3	1994	1,134	961	1,138	988	1,001	1,369	1,371	1,370	1,355	1,357
NOV4	1994	1,160	987	1,163	996	1,008	1,384	1,418	1,388	1,363	1,396
DEC1	1994	1,192	1,015	1,195	1,003	1,015	1,472	1,480	1,475	1,450	1,456
DEC2	1994	1,208	1,038	1,210	1,011	1,022	1,454	1,459	1,456	1,431	1,435
DEC3	1994	1,221	1,059	1,223	1,019	1,029	1,466	1,470	1,468	1,445	1,445
DEC4	1994	1,212	1,068	1,215	1,025	1,035	1,330	1,358	1,342	1,337	1,370
JAN1	1994	1,211	1,079	1,216	1,025	1,035	1,530	1,549	1,539	1,509	1,520
JAN2	1994	1,217	1,092	1,221	1,025	1,035	1,579	1,591	1,585	1,548	1,557
JAN3	1994	1,213	1,099	1,218	1,025	1,035	1,503	1,517	1,510	1,480	1,490
JAN4	1994	1,203	1,099	1,208	1,025	1,035	1,397	1,415	1,407	1,390	1,401
FEB1	1994	1,217	1,118	1,222	1,040	1,048	1,388	1,401	1,396	1,376	1,380
FEB2	1994	1,228	1,134	1,233	1,054	1,062	1,380	1,387	1,385	1,365	1,366
FEB3	1994	1,233	1,145	1,238	1,067	1,074	1,322	1,324	1,325	1,313	1,310
FEB4	1994	1,239	1,155	1,244	1,081	1,086	1,341	1,348	1,345	1,333	1,334
MAR1	1994	1,244	1,167	1,249	1,096	1,101	1,316	1,325	1,321	1,313	1,317
MAR2	1994	1,159	1,140	1,163	1,102	1,108	1,362	1,376	1,365	1,351	1,361
MAR3	1994	1,174	1,158	1,179	1,113	1,120	1,305	1,295	1,302	1,214	1,202
MAR4	1994	1,188	1,169	1,193	1,123	1,129	1,333	1,304	1,331	1,209	1,179
APR1	1994	1,191	1,175	1,195	1,137	1,141	1,147	1,102	1,127	1,116	1,108
APR2	1994	1,189	1,178	1,193	1,146	1,152	1,045	1,021	1,044	1,041	1,026
APR3	1994	1,185	1,179	1,190	1,158	1,159	1,010	1,008	987	996	1,017
APR4	1994	1,178	1,178	1,184	1,148	1,167	915	934	939	941	929
MAY1	1994	1,143	1,156	1,149	1,127	1,171	893	891	917	912	889
MAY2	1994	984	1,035	983	1,036	1,141	652	658	662	658	652
MAY3	1994	852	934	834	938	1,096	673	658	677	602	553
MAY4	1994	746	845	702	861	1,062	630	598	611	560	551
JUN1	1994	642	760	582	800	1,044	476	442	444	442	450
JUN2	1994	547	695	514	750	995	499	500	495	530	540
JUN3	1994	548	690	519	752	989	543	545	542	597	607
JUN4	1994	559	698	532	755	952	584	597	584	631	620
JUL1	1994	582	714	559	764	940	782	824	793	846	884
JUL2	1994	631	745	606	793	961	1,110	1,130	1,037	1,121	1,208
JUL3	1994	665	773	641	827	985	1,270	1,275	1,247	1,295	1,306
JUL4	1994	699	797	676	850	1,003	1,134	1,159	1,140	1,167	1,182

NA = no action, PA = proposed action, CE = cumulative effects

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
AUG1	1994	744	829	724	884	1,024	1,458	1,516	1,457	1,412	1,513
AUG2	1994	791	861	776	909	1,045	1,400	1,467	1,400	1,398	1,518
AUG3	1994	834	886	825	922	1,053	924	918	935	996	1,020
AUG4	1994	902	913	894	938	1,065	1,054	1,046	1,058	1,069	1,130
SEP1	1994	979	938	974	954	1,073	1,103	1,095	1,106	1,126	1,112
SEP2	1994	1,089	964	1,089	965	1,079	1,024	1,009	1,029	1,050	1,075
SEP3	1994	1,188	984	1,201	972	1,081	1,056	1,036	1,061	1,060	1,060
SEP4	1994	1,231	1,008	1,246	988	1,089	1,216	1,214	1,223	1,205	1,220
OCT1	1995	1,211	1,026	1,218	997	1,099	1,217	1,216	1,220	1,187	1,215
OCT2	1995	1,186	1,040	1,189	1,007	1,105	1,194	1,183	1,195	1,169	1,184
OCT3	1995	1,142	1,047	1,140	1,014	1,109	1,127	1,116	1,125	1,115	1,118
OCT4	1995	1,119	1,054	1,115	1,020	1,112	1,131	1,123	1,129	1,121	1,128
NOV1	1995	1,054	1,051	1,046	1,018	1,113	1,122	1,118	1,119	1,133	1,144
NOV2	1995	1,051	1,054	1,046	1,023	1,119	1,197	1,198	1,196	1,178	1,183
NOV3	1995	1,105	1,066	1,107	1,030	1,126	1,358	1,363	1,361	1,333	1,338
NOV4	1995	1,106	1,074	1,110	1,037	1,132	1,268	1,298	1,275	1,257	1,288
DEC1	1995	1,076	1,071	1,079	1,043	1,137	1,162	1,174	1,168	1,162	1,172
DEC2	1995	1,049	1,067	1,052	1,049	1,142	1,107	1,120	1,115	1,111	1,122
DEC3	1995	1,049	1,069	1,052	1,055	1,148	1,227	1,236	1,232	1,219	1,226
DEC4	1995	1,077	1,082	1,081	1,062	1,154	1,450	1,459	1,454	1,426	1,435
JAN1	1995	1,086	1,086	1,090	1,062	1,154	1,459	1,468	1,463	1,437	1,444
JAN2	1995	1,095	1,090	1,099	1,062	1,154	1,466	1,475	1,471	1,443	1,451
JAN3	1995	1,103	1,095	1,107	1,062	1,154	1,483	1,498	1,490	1,463	1,479
JAN4	1995	1,107	1,098	1,112	1,062	1,154	1,468	1,488	1,479	1,446	1,463
FEB1	1995	1,139	1,122	1,145	1,078	1,168	1,509	1,532	1,521	1,477	1,496
FEB2	1995	1,168	1,145	1,175	1,094	1,182	1,527	1,542	1,536	1,484	1,492
FEB3	1995	1,185	1,161	1,192	1,108	1,194	1,420	1,431	1,427	1,393	1,399
FEB4	1995	1,196	1,174	1,203	1,122	1,207	1,356	1,381	1,369	1,351	1,378
MAR1	1995	1,204	1,186	1,212	1,138	1,221	1,287	1,308	1,308	1,300	1,308
MAR2	1995	1,097	1,120	1,107	1,122	1,195	1,278	1,288	1,292	1,285	1,292
MAR3	1995	1,116	1,138	1,126	1,132	1,203	1,213	1,223	1,219	1,212	1,211
MAR4	1995	1,125	1,149	1,138	1,135	1,204	1,199	1,229	1,221	1,180	1,170
APR1	1995	1,134	1,158	1,147	1,146	1,213	1,176	1,171	1,183	1,188	1,180
APR2	1995	1,141	1,166	1,153	1,161	1,215	1,151	1,138	1,151	1,138	1,122
APR3	1995	1,141	1,168	1,150	1,173	1,224	1,048	1,048	1,043	1,042	1,037
APR4	1995	1,138	1,168	1,146	1,184	1,229	973	973	968	968	968
MAY1	1995	1,140	1,173	1,147	1,199	1,237	930	940	937	934	933
MAY2	1995	1,128	1,170	1,134	1,208	1,240	1,016	1,032	1,020	1,013	1,024
MAY3	1995	972	1,051	967	1,116	1,193	634	604	632	608	574
MAY4	1995	870	965	855	1,020	1,179	598	558	584	597	578
JUN1	1995	792	894	774	932	1,136	585	587	584	544	533
JUN2	1995	710	813	685	857	1,095	485	463	477	415	408
JUN3	1995	608	712	570	779	1,035	327	279	306	273	312
JUN4	1995	514	640	471	717	979	322	298	301	317	314
JUL1	1995	458	584	431	667	928	310	330	316	330	313
JUL2	1995	414	523	388	635	874	246	233	235	235	239
JUL3	1995	424	535	398	646	885	235	231	240	270	267
JUL4	1995	411	509	391	632	872	414	421	420	430	431
AUG1	1995	410	497	395	623	866	511	518	515	534	535
AUG2	1995	424	511	409	636	882	1,009	1,046	1,012	1,033	1,068
AUG3	1995	453	537	441	652	896	1,048	1,036	1,057	1,050	1,054
AUG4	1995	469	543	460	655	892	719	721	711	715	730
SEP1	1995	477	559	477	667	905	1,309	1,327	1,311	1,312	1,339
SEP2	1995	485	585	487	679	920	1,415	1,506	1,417	1,415	1,522
SEP3	1995	493	597	494	690	932	1,426	1,483	1,428	1,425	1,479
SEP4	1995	500	609	502	701	945	1,332	1,346	1,335	1,332	1,343
OCT1	1996	514	621	517	721	954	1,087	1,107	1,091	1,107	1,151
OCT2	1996	529	635	532	742	962	1,039	1,069	1,043	1,078	1,137
OCT3	1996	548	651	552	766	975	1,204	1,228	1,208	1,215	1,255
OCT4	1996	563	664	567	776	984	998	1,044	1,001	1,047	1,103
NOV1	1996	582	679	587	802	995	1,416	1,417	1,418	1,365	1,373
NOV2	1996	596	693	604	818	1,001	1,146	1,289	1,289	1,250	1,266
NOV3	1996	604	710	629	824	1,007	938	1,353	1,351	1,324	1,332
NOV4	1996	616	730	650	831	1,012	1,028	1,305	1,288	1,270	1,346
DEC1	1996	625	744	665	837	1,018	969	1,216	1,126	1,202	1,208
DEC2	1996	636	758	674	843	1,023	1,007	1,244	1,022	1,228	1,227
DEC3	1996	646	774	684	849	1,029	1,033	1,340	1,049	1,311	1,319
DEC4	1996	656	787	694	855	1,034	1,068	1,324	1,081	1,322	1,327
JAN1	1996	660	787	697	855	1,034	1,012	1,024	1,020	1,320	1,322
JAN2	1996	664	786	699	855	1,034	1,012	1,020	1,018	1,318	1,319
JAN3	1996	668	786	703	855	1,034	1,051	1,057	1,056	1,297	1,299
JAN4	1996	671	786	705	855	1,034	1,038	1,043	1,042	1,154	1,157
FEB1	1996	684	796	718	866	1,044	1,035	1,039	1,039	1,073	1,077
FEB2	1996	697	805	730	876	1,053	1,049	1,053	1,053	1,070	1,075
FEB3	1996	708	814	741	887	1,063	1,033	1,037	1,037	1,158	1,162
FEB4	1996	716	820	749	896	1,071	969	972	973	966	971
MAR1	1996	727	829	760	907	1,081	1,016	1,019	1,020	1,011	1,015

NA = no action, PA = proposed action, CE = cumulative effects

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	**Water Year**	**1 - Existing**	**2 - NA**	**3 - PA**	**4 - PA CE**	**5 - NA CE**	**1 - Existing**	**2 - NA**	**3 - PA**	**4 - PA CE**	**5 - NA CE**
MAR2	1996	776	855	801	915	1,111	1,157	1,163	1,159	1,170	1,469
MAR3	1996	786	864	812	929	1,124	1,090	1,093	1,093	1,388	1,390
MAR4	1996	795	872	821	938	1,132	1,069	1,072	1,072	1,077	1,080
APR1	1996	806	882	831	949	1,142	947	950	951	946	951
APR2	1996	816	891	841	959	1,152	904	907	907	918	929
APR3	1996	825	900	851	975	1,156	972	1,023	980	1,135	1,214
APR4	1996	834	908	859	984	1,154	947	1,054	967	1,091	1,105
MAY1	1996	847	920	872	995	1,154	920	994	943	1,054	1,098
MAY2	1996	851	927	876	1,001	1,159	838	926	849	888	934
MAY3	1996	734	847	759	884	1,043	638	662	651	588	600
MAY4	1996	650	779	676	817	978	614	617	639	621	626
JUN1	1996	572	729	591	779	946	562	599	569	665	697
JUN2	1996	488	660	505	713	885	457	459	456	528	526
JUN3	1996	450	614	464	693	876	447	449	447	477	463
JUN4	1996	432	582	443	674	867	466	463	467	482	471
JUL1	1996	455	589	464	680	871	728	731	718	726	728
JUL2	1996	484	594	491	684	873	685	680	683	692	684
JUL3	1996	500	610	507	708	892	1,018	1,126	1,003	1,246	1,449
JUL4	1996	513	621	519	717	894	752	759	767	774	781
AUG1	1996	533	640	540	732	911	1,554	1,649	1,554	1,539	1,596
AUG2	1996	546	652	552	747	927	747	748	751	741	734
AUG3	1996	565	666	571	763	933	905	907	914	897	917
AUG4	1996	602	687	608	778	945	1,038	1,030	1,035	1,036	1,044
SEP1	1996	628	699	632	794	955	830	863	840	1,055	1,063
SEP2	1996	644	712	648	812	968	1,096	1,083	1,086	1,119	1,129
SEP3	1996	657	725	661	831	982	1,232	1,224	1,219	1,228	1,229
SEP4	1996	672	738	676	844	995	1,350	1,356	1,350	1,371	1,376
OCT1	1997	694	755	698	856	1,006	1,437	1,437	1,437	1,416	1,416
OCT2	1997	715	773	719	868	1,018	1,438	1,438	1,438	1,454	1,453
OCT3	1997	738	791	742	880	1,030	1,520	1,521	1,521	1,493	1,492
OCT4	1997	768	811	772	891	1,029	1,062	1,083	1,064	1,079	1,130
NOV1	1997	782	822	786	900	1,035	1,224	1,237	1,229	1,244	1,260
NOV2	1997	797	833	801	910	1,042	1,359	1,363	1,363	1,329	1,338
NOV3	1997	814	846	818	917	1,048	1,379	1,379	1,379	1,357	1,357
NOV4	1997	830	859	834	924	1,054	1,365	1,377	1,365	1,345	1,406
DEC1	1997	848	872	851	931	1,060	1,398	1,399	1,398	1,373	1,374
DEC2	1997	863	884	866	938	1,065	1,382	1,384	1,382	1,361	1,363
DEC3	1997	878	895	881	945	1,071	1,378	1,380	1,379	1,359	1,360
DEC4	1997	891	905	894	951	1,076	1,401	1,402	1,401	1,379	1,380
JAN1	1997	898	910	901	951	1,076	1,394	1,396	1,395	1,376	1,377
JAN2	1997	904	914	906	951	1,076	1,367	1,368	1,368	1,351	1,352
JAN3	1997	907	918	908	951	1,076	1,293	1,343	1,238	1,394	1,394
JAN4	1997	905	916	906	951	1,076	1,107	1,108	1,108	1,301	1,302
FEB1	1997	916	926	917	963	1,088	1,184	1,185	1,185	1,190	1,325
FEB2	1997	929	937	929	975	1,099	1,251	1,251	1,252	1,257	1,332
FEB3	1997	940	946	940	987	1,110	1,164	1,164	1,164	1,170	1,396
FEB4	1997	951	955	952	998	1,122	1,225	1,226	1,225	1,231	1,382
MAR1	1997	964	965	965	1,011	1,133	1,179	1,180	1,179	1,164	1,164
MAR2	1997	961	967	962	1,002	1,116	1,146	1,151	1,147	1,158	1,162
MAR3	1997	967	973	967	1,008	1,121	1,024	1,032	1,024	1,023	1,035
MAR4	1997	969	976	970	1,003	1,110	935	936	935	937	959
APR1	1997	973	980	974	1,004	1,109	906	911	903	932	921
APR2	1997	979	984	978	1,015	1,110	1,026	986	982	981	993
APR3	1997	982	989	982	1,025	1,105	932	950	956	922	974
APR4	1997	977	990	978	1,018	1,093	1,022	1,047	1,034	1,016	1,049
MAY1	1997	987	1,000	989	1,023	1,091	1,043	1,055	1,057	1,054	1,059
MAY2	1997	995	1,008	997	1,021	1,099	983	994	952	952	979
MAY3	1997	943	975	950	975	1,058	817	813	819	733	737
MAY4	1997	864	921	878	929	1,018	744	664	748	684	686
JUN1	1997	728	857	764	879	982	539	538	566	555	555
JUN2	1997	624	803	648	837	952	295	330	300	359	362
JUN3	1997	567	766	585	794	915	305	306	304	323	306
JUN4	1997	520	727	534	747	877	425	437	427	438	433
JUL1	1997	505	697	516	717	849	565	584	566	584	579
JUL2	1997	522	704	533	729	858	703	714	703	702	706
JUL3	1997	542	724	553	748	876	798	812	798	792	797
JUL4	1997	570	744	579	765	892	962	952	940	941	971
AUG1	1997	583	738	592	776	902	717	718	724	729	722
AUG2	1997	589	732	597	781	904	656	660	657	660	664
AUG3	1997	609	736	616	784	903	818	829	820	831	839
AUG4	1997	625	753	632	797	913	930	949	932	944	966
SEP1	1997	642	769	649	805	917	872	880	874	890	915
SEP2	1997	666	788	673	827	934	1,106	1,131	1,108	1,118	1,159
SEP3	1997	691	805	697	841	945	1,041	1,061	1,048	1,049	1,093
SEP4	1997	721	816	725	840	941	899	913	903	918	946
OCT1	1998	853	872	849	874	969	1,416	1,441	1,413	1,376	1,441
OCT2	1998	1,019	935	1,010	914	995	1,353	1,312	1,351	1,284	1,310

NA = no action, PA = proposed action, CE = cumulative effects

Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
OCT3	1998	913	915	915	923	1,002	1,084	1,084	1,085	1,102	1,115
OCT4	1998	869	889	872	924	999	1,055	1,055	1,056	1,047	1,058
NOV1	1998	878	897	881	925	998	1,088	1,131	1,089	1,052	1,039
NOV2	1998	883	900	885	929	1,002	1,052	1,066	1,054	1,048	1,049
NOV3	1998	886	902	888	935	1,006	1,058	1,059	1,060	1,053	1,054
NOV4	1998	891	908	893	940	1,011	1,081	1,109	1,082	1,075	1,116
DEC1	1998	888	905	890	945	1,016	1,017	1,023	1,019	1,014	1,020
DEC2	1998	888	904	890	951	1,021	1,057	1,058	1,058	1,053	1,054
DEC3	1998	911	925	913	957	1,027	1,338	1,339	1,339	1,318	1,319
DEC4	1998	911	924	930	963	1,033	1,066	1,060	1,343	1,321	1,323
JAN1	1998	901	914	919	963	1,033	1,042	1,043	1,043	1,330	1,331
JAN2	1998	897	909	913	963	1,033	1,101	1,102	1,102	1,172	1,173
JAN3	1998	891	903	907	963	1,033	1,074	1,074	1,075	1,071	1,146
JAN4	1998	889	900	904	963	1,033	1,119	1,119	1,120	1,118	1,197
FEB1	1998	900	910	914	974	1,043	1,098	1,098	1,099	1,099	1,098
FEB2	1998	910	920	923	985	1,053	1,096	1,097	1,097	1,098	1,098
FEB3	1998	918	928	931	996	1,063	1,080	1,081	1,081	1,080	1,080
FEB4	1998	929	938	941	1,007	1,073	1,133	1,134	1,134	1,134	1,134
MAR1	1998	942	951	954	1,021	1,086	1,172	1,173	1,173	1,178	1,179
MAR2	1998	947	955	956	1,023	1,084	1,190	1,196	1,191	1,196	1,201
MAR3	1998	882	885	892	1,027	1,087	792	802	793	871	869
MAR4	1998	882	885	892	1,016	1,089	746	750	752	823	819
APR1	1998	886	889	896	1,020	1,100	816	816	822	906	904
APR2	1998	888	891	898	1,023	1,105	768	746	768	828	823
APR3	1998	863	840	871	1,026	1,107	772	748	772	818	824
APR4	1998	868	842	877	1,019	1,100	649	657	652	704	705
MAY1	1998	844	801	852	1,002	1,084	682	674	686	723	730
MAY2	1998	851	809	859	1,010	1,089	758	774	760	837	849
MAY3	1998	866	823	873	1,004	1,098	1,066	1,057	1,052	1,023	1,103
MAY4	1998	843	818	848	944	1,041	891	885	892	911	926
JUN1	1998	808	799	815	885	967	833	814	847	801	788
JUN2	1998	857	843	865	933	1,006	1,522	1,564	1,523	1,494	1,494
JUN3	1998	900	883	909	974	1,044	1,650	1,703	1,651	1,578	1,630
JUN4	1998	938	915	946	1,006	1,073	1,507	1,493	1,492	1,468	1,473
JUL1	1998	980	953	987	1,040	1,103	1,458	1,453	1,445	1,418	1,422
JUL2	1998	1,009	980	1,017	1,066	1,123	1,212	1,215	1,207	1,219	1,231
JUL3	1998	1,040	1,009	1,048	1,089	1,147	1,327	1,314	1,305	1,212	1,320
JUL4	1998	1,046	1,008	1,052	1,104	1,159	1,156	1,061	1,157	1,012	1,004
AUG1	1998	927	928	887	1,085	1,145	894	902	895	901	927
AUG2	1998	915	901	872	1,067	1,123	984	886	961	959	930
AUG3	1998	935	919	893	1,079	1,121	1,072	1,057	1,053	1,066	1,082
AUG4	1998	951	933	911	1,084	1,120	1,021	1,017	1,016	1,033	1,049
SEP1	1998	976	951	936	1,079	1,114	971	960	968	977	980
SEP2	1998	1,009	972	971	1,095	1,125	1,260	1,223	1,256	1,198	1,241
SEP3	1998	1,046	991	1,009	1,107	1,138	1,303	1,274	1,244	1,250	1,295
SEP4	1998	1,109	1,022	1,071	1,127	1,157	1,433	1,443	1,434	1,433	1,439
OCT1	1999	1,157	1,052	1,122	1,142	1,172	1,429	1,415	1,423	1,390	1,414
OCT2	1999	1,189	1,081	1,166	1,158	1,187	1,399	1,420	1,427	1,383	1,416
OCT3	1999	1,201	1,108	1,187	1,172	1,200	1,402	1,394	1,403	1,373	1,388
OCT4	1999	1,201	1,123	1,190	1,184	1,212	1,366	1,366	1,368	1,353	1,352
NOV1	1999	1,195	1,125	1,184	1,173	1,201	1,224	1,182	1,218	1,175	1,163
NOV2	1999	1,190	1,127	1,181	1,168	1,195	1,280	1,232	1,279	1,209	1,214
NOV3	1999	1,188	1,132	1,180	1,175	1,201	1,333	1,333	1,334	1,313	1,313
NOV4	1999	1,187	1,140	1,181	1,182	1,208	1,336	1,361	1,336	1,316	1,344
DEC1	1999	1,188	1,146	1,182	1,189	1,215	1,368	1,370	1,369	1,347	1,349
DEC2	1999	1,187	1,151	1,183	1,196	1,222	1,363	1,364	1,363	1,343	1,344
DEC3	1999	1,189	1,157	1,184	1,203	1,229	1,375	1,377	1,376	1,353	1,355
DEC4	1999	1,189	1,161	1,185	1,210	1,235	1,356	1,358	1,357	1,335	1,337
JAN1	1999	1,169	1,151	1,164	1,210	1,235	1,283	1,284	1,283	1,267	1,269
JAN2	1999	1,155	1,145	1,150	1,210	1,235	1,315	1,315	1,316	1,127	1,141
JAN3	1999	1,150	1,143	1,146	1,210	1,235	1,405	1,405	1,405	1,194	1,194
JAN4	1999	1,145	1,140	1,141	1,210	1,235	1,375	1,375	1,376	1,162	1,162
FEB1	1999	1,163	1,155	1,159	1,222	1,247	1,385	1,385	1,385	1,178	1,178
FEB2	1999	1,180	1,170	1,177	1,234	1,258	1,405	1,407	1,406	1,147	1,148
FEB3	1999	1,179	1,184	1,192	1,245	1,270	1,152	1,393	1,392	1,139	1,141
FEB4	1999	1,179	1,187	1,190	1,257	1,281	1,151	1,167	1,150	1,156	1,158
MAR1	1999	1,182	1,192	1,193	1,271	1,295	1,189	1,189	1,189	1,184	1,186
MAR2	1999	1,102	1,130	1,107	1,240	1,263	1,255	1,261	1,255	1,268	1,276
MAR3	1999	1,119	1,146	1,124	1,252	1,275	1,383	1,377	1,355	1,368	1,393
MAR4	1999	1,132	1,157	1,137	1,254	1,279	1,171	1,192	1,190	1,277	1,295
APR1	1999	1,152	1,177	1,156	1,252	1,278	1,265	1,252	1,251	1,264	1,297
APR2	1999	1,149	1,177	1,153	1,227	1,255	1,028	1,027	1,009	1,019	1,006
APR3	1999	1,153	1,184	1,157	1,238	1,257	1,136	1,163	1,132	1,125	1,164
APR4	1999	1,082	1,136	1,090	1,225	1,235	581	581	582	582	584
MAY1	1999	1,078	1,134	1,086	1,235	1,242	367	378	368	398	405
MAY2	1999	940	1,040	952	1,167	1,180	641	629	635	650	637
MAY3	1999	870	983	894	1,072	1,095	762	780	754	776	759

NA = no action, PA = proposed action, CE = cumulative effects

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
MAY4	1999	813	930	838	992	1,026	671	691	671	638	625
JUN1	1999	767	878	792	929	970	740	754	748	708	695
JUN2	1999	708	809	736	873	920	652	631	681	649	639
JUN3	1999	644	749	660	819	874	501	488	505	543	534
JUN4	1999	595	701	606	769	867	439	428	441	480	442
JUL1	1999	593	689	601	762	871	725	733	726	736	744
JUL2	1999	626	714	635	782	888	1,061	1,078	1,062	1,077	1,094
JUL3	1999	641	712	651	787	883	829	813	844	863	832
JUL4	1999	659	733	669	805	900	1,167	1,187	1,168	1,179	1,206
AUG1	1999	655	713	664	782	876	660	656	666	624	667
AUG2	1999	659	713	667	772	862	751	742	746	738	750
AUG3	1999	681	728	699	780	866	961	1,176	1,114	909	925
AUG4	1999	693	741	710	791	874	901	1,359	904	921	917
SEP1	1999	708	754	725	812	893	1,305	1,298	1,243	1,233	1,315
SEP2	1999	725	769	742	827	909	1,341	1,351	1,325	1,341	1,374
SEP3	1999	737	780	754	845	922	1,180	1,190	1,206	1,303	1,212
SEP4	1999	751	792	769	861	937	1,208	1,178	1,213	1,259	1,247
OCT1	2000	778	813	796	876	953	1,234	1,216	1,222	1,268	1,277
OCT2	2000	807	836	824	892	965	1,278	1,273	1,270	1,315	1,305
OCT3	2000	822	849	840	906	974	1,105	1,085	1,142	1,128	1,151
OCT4	2000	836	861	855	918	981	1,122	1,105	1,125	1,141	1,160
NOV1	2000	845	868	863	925	985	1,210	1,176	1,176	1,180	1,188
NOV2	2000	853	876	871	932	990	1,177	1,179	1,180	1,185	1,191
NOV3	2000	860	882	878	938	995	1,163	1,162	1,163	1,163	1,163
NOV4	2000	865	884	883	943	999	1,098	1,020	1,098	1,099	1,025
DEC1	2000	869	887	887	948	1,003	1,077	1,076	1,077	1,080	1,079
DEC2	2000	876	893	893	954	1,008	1,167	1,166	1,167	1,168	1,168
DEC3	2000	881	898	898	959	1,013	1,146	1,146	1,147	1,147	1,147
DEC4	2000	884	900	901	964	1,016	1,073	1,072	1,073	1,076	1,076
JAN1	2000	884	898	898	964	1,016	1,087	1,086	1,087	1,089	1,088
JAN2	2000	884	897	897	964	1,016	1,116	1,115	1,117	1,116	1,115
JAN3	2000	884	895	895	964	1,016	1,106	1,105	1,106	1,103	1,102
JAN4	2000	884	894	894	964	1,016	1,094	1,093	1,094	1,090	1,089
FEB1	2000	894	902	904	974	1,025	1,098	1,098	1,099	1,095	1,094
FEB2	2000	905	910	914	985	1,034	1,131	1,131	1,132	1,127	1,127
FEB3	2000	915	918	924	996	1,043	1,117	1,116	1,117	1,111	1,111
FEB4	2000	925	926	934	1,006	1,052	1,123	1,123	1,124	1,123	1,123
MAR1	2000	937	934	946	1,018	1,062	1,105	1,106	1,105	1,109	1,112
MAR2	2000	950	948	957	1,015	1,062	1,221	1,242	1,221	1,219	1,240
MAR3	2000	956	954	963	1,021	1,067	1,010	1,026	1,014	1,012	1,027
MAR4	2000	963	961	970	1,027	1,073	1,046	1,068	1,055	1,054	1,070
APR1	2000	937	956	946	1,030	1,076	747	723	726	833	830
APR2	2000	921	943	929	1,024	1,077	797	795	788	838	865
APR3	2000	932	951	939	1,036	1,078	1,100	1,084	1,113	1,102	1,100
APR4	2000	941	959	948	1,042	1,077	1,061	1,048	1,067	1,073	1,074
MAY1	2000	955	971	960	1,046	1,088	1,047	1,040	1,033	1,071	1,069
MAY2	2000	958	976	965	1,038	1,091	946	972	980	965	985
MAY3	2000	975	991	981	1,053	1,104	1,138	1,120	1,122	1,107	1,119
MAY4	2000	893	923	906	979	1,039	829	742	821	769	760
JUN1	2000	764	841	797	894	967	675	631	661	697	686
JUN2	2000	808	873	828	922	993	1,311	1,292	1,207	1,236	1,320
JUN3	2000	819	884	839	927	995	804	812	818	902	854
JUN4	2000	837	898	855	934	1,001	920	925	913	936	945
JUL1	2000	867	920	877	948	1,012	1,117	1,056	1,029	1,060	1,089
JUL2	2000	886	936	895	954	1,016	927	910	914	947	942
JUL3	2000	912	957	918	962	1,022	838	847	844	852	866
JUL4	2000	945	984	947	982	1,041	1,317	1,236	1,183	1,195	1,257
AUG1	2000	981	1,013	978	1,005	1,062	1,369	1,308	1,302	1,303	1,312
AUG2	2000	1,013	1,035	1,003	1,029	1,083	801	777	793	810	779
AUG3	2000	1,045	1,059	1,030	1,033	1,087	931	904	902	911	916
AUG4	2000	1,082	1,085	1,061	1,044	1,096	1,088	1,058	1,015	1,042	1,052
SEP1	2000	1,132	1,114	1,094	1,070	1,116	1,442	1,432	1,418	1,388	1,425
SEP2	2000	1,188	1,142	1,126	1,093	1,134	1,279	1,235	1,209	1,201	1,226
SEP3	2000	1,293	1,172	1,159	1,118	1,153	1,536	1,547	1,536	1,519	1,546
SEP4	2000	1,414	1,200	1,191	1,137	1,169	1,364	1,302	1,300	1,283	1,301
OCT1	2001	1,479	1,228	1,223	1,157	1,184	1,541	1,550	1,541	1,518	1,527
OCT2	2001	1,468	1,247	1,245	1,174	1,198	1,455	1,459	1,455	1,439	1,443
OCT3	2001	1,458	1,264	1,263	1,190	1,212	1,435	1,439	1,435	1,420	1,424
OCT4	2001	1,434	1,273	1,271	1,204	1,224	1,329	1,332	1,329	1,318	1,321
NOV1	2001	1,403	1,275	1,272	1,211	1,229	1,398	1,389	1,386	1,347	1,364
NOV2	2001	1,378	1,277	1,273	1,210	1,230	1,395	1,378	1,376	1,340	1,350
NOV3	2001	1,344	1,276	1,271	1,217	1,236	1,333	1,332	1,333	1,334	1,336
NOV4	2001	1,319	1,276	1,268	1,224	1,242	1,329	1,345	1,329	1,321	1,329
DEC1	2001	1,306	1,277	1,269	1,232	1,248	1,412	1,413	1,412	1,388	1,389
DEC2	2001	1,297	1,279	1,270	1,239	1,255	1,416	1,418	1,417	1,391	1,392
DEC3	2001	1,289	1,280	1,271	1,247	1,261	1,402	1,404	1,403	1,379	1,380
DEC4	2001	1,280	1,279	1,270	1,253	1,266	1,357	1,358	1,357	1,337	1,338

NA = no action, PA = proposed action, CE = cumulative effects

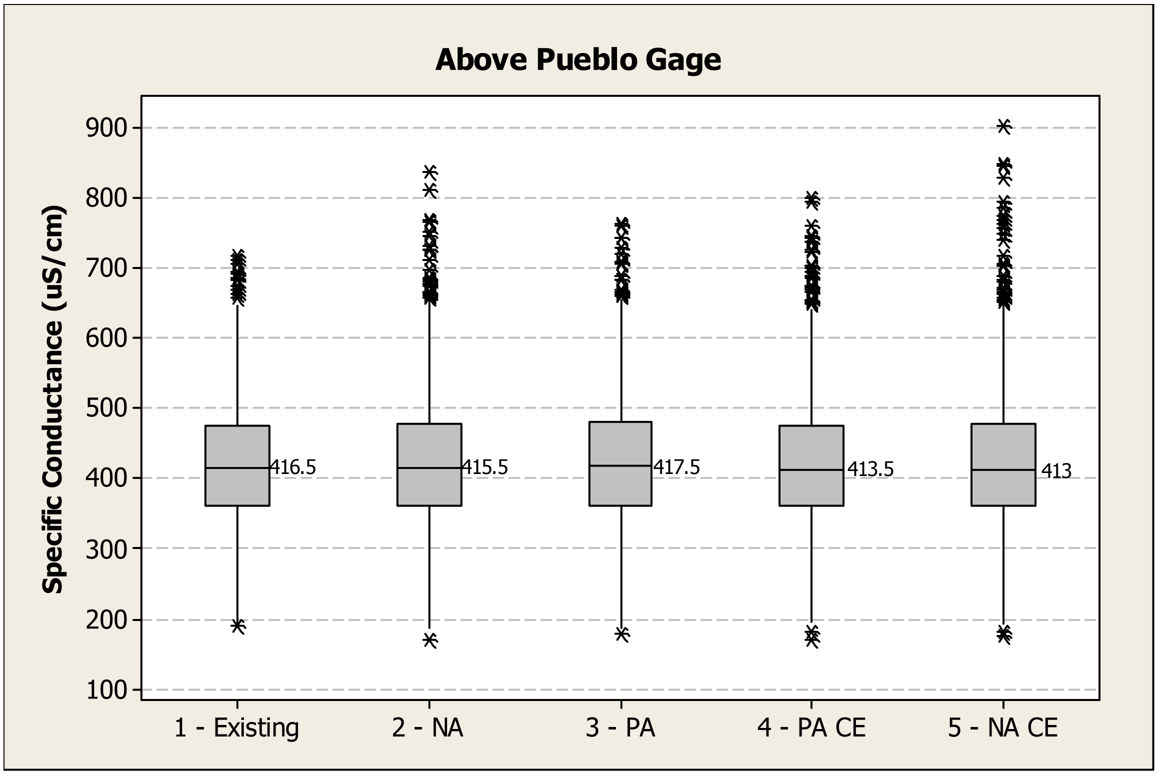
		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
JAN1	2001	1,257	1,269	1,258	1,253	1,266	1,358	1,360	1,359	1,339	1,340
JAN2	2001	1,238	1,260	1,248	1,253	1,266	1,355	1,356	1,356	1,337	1,336
JAN3	2001	1,224	1,252	1,239	1,253	1,266	1,373	1,374	1,374	1,353	1,352
JAN4	2001	1,213	1,245	1,232	1,253	1,266	1,367	1,369	1,369	1,347	1,347
FEB1	2001	1,225	1,255	1,243	1,267	1,278	1,374	1,375	1,375	1,351	1,351
FEB2	2001	1,233	1,263	1,252	1,281	1,290	1,332	1,336	1,334	1,314	1,316
FEB3	2001	1,242	1,272	1,261	1,294	1,302	1,366	1,370	1,368	1,346	1,347
FEB4	2001	1,247	1,278	1,267	1,307	1,313	1,325	1,328	1,326	1,308	1,309
MAR1	2001	1,246	1,281	1,270	1,321	1,326	1,199	1,202	1,201	1,193	1,194
MAR2	2001	1,188	1,235	1,214	1,286	1,300	1,413	1,428	1,414	1,389	1,401
MAR3	2001	1,205	1,251	1,229	1,300	1,308	1,298	1,322	1,309	1,398	1,232
MAR4	2001	1,212	1,257	1,237	1,306	1,314	1,266	1,285	1,308	1,179	1,189
APR1	2001	1,220	1,264	1,245	1,313	1,322	1,190	1,179	1,225	1,148	1,180
APR2	2001	1,223	1,266	1,249	1,327	1,328	1,064	1,053	1,089	1,068	1,054
APR3	2001	1,225	1,268	1,251	1,338	1,331	1,019	1,015	1,029	1,029	1,020
APR4	2001	1,227	1,269	1,253	1,349	1,321	1,037	1,101	1,016	1,017	1,123
MAY1	2001	1,235	1,277	1,261	1,352	1,314	1,135	1,194	1,168	1,132	1,194
MAY2	2001	1,253	1,292	1,276	1,365	1,325	1,274	1,300	1,288	1,272	1,169
MAY3	2001	1,092	1,157	1,128	1,221	1,215	814	748	813	673	623
MAY4	2001	892	1,017	958	1,108	1,140	651	549	590	567	560
JUN1	2001	653	886	799	1,039	1,068	578	617	615	646	635
JUN2	2001	622	847	763	1,007	1,049	652	675	672	779	773
JUN3	2001	648	858	776	1,024	1,063	793	813	807	956	969
JUN4	2001	665	865	784	1,021	1,062	660	676	677	722	700
JUL1	2001	692	876	795	1,009	1,056	764	775	772	826	840
JUL2	2001	707	872	792	982	1,039	802	803	791	821	829
JUL3	2001	760	903	825	1,010	1,060	1,230	1,236	1,229	1,249	1,255
JUL4	2001	809	930	853	1,040	1,082	1,538	1,439	1,425	1,360	1,370
AUG1	2001	871	961	886	1,074	1,108	1,582	1,480	1,466	1,453	1,470
AUG2	2001	925	985	916	1,075	1,110	846	825	822	943	931
AUG3	2001	1,028	1,014	952	1,094	1,127	906	923	949	1,079	1,100
AUG4	2001	1,183	1,044	995	1,096	1,133	966	962	980	1,027	1,054
SEP1	2001	1,349	1,079	1,048	1,118	1,153	1,425	1,383	1,335	1,314	1,370
SEP2	2001	1,473	1,124	1,116	1,147	1,175	1,522	1,538	1,514	1,456	1,477
SEP3	2001	1,499	1,154	1,157	1,165	1,188	1,430	1,439	1,431	1,389	1,396
SEP4	2001	1,543	1,189	1,205	1,188	1,207	1,548	1,342	1,351	1,319	1,326
OCT1	2002	1,625	1,235	1,273	1,216	1,228	1,729	1,747	1,732	1,614	1,698
OCT2	2002	1,579	1,262	1,305	1,227	1,243	1,491	1,482	1,492	1,421	1,461
OCT3	2002	1,583	1,290	1,340	1,246	1,258	1,589	1,599	1,591	1,565	1,572
OCT4	2002	1,573	1,309	1,358	1,260	1,270	1,541	1,491	1,498	1,447	1,463
NOV1	2002	1,547	1,322	1,369	1,269	1,278	1,597	1,580	1,580	1,518	1,533
NOV2	2002	1,512	1,328	1,369	1,270	1,281	1,518	1,475	1,481	1,415	1,434
NOV3	2002	1,463	1,330	1,363	1,278	1,288	1,453	1,455	1,455	1,438	1,438
NOV4	2002	1,424	1,330	1,354	1,285	1,295	1,408	1,429	1,410	1,386	1,402
DEC1	2002	1,405	1,333	1,353	1,293	1,301	1,504	1,508	1,506	1,468	1,470
DEC2	2002	1,391	1,336	1,352	1,301	1,308	1,498	1,502	1,500	1,465	1,467
DEC3	2002	1,381	1,338	1,351	1,309	1,315	1,495	1,500	1,497	1,463	1,465
DEC4	2002	1,375	1,341	1,352	1,316	1,321	1,504	1,511	1,508	1,472	1,474
JAN1	2002	1,352	1,333	1,338	1,316	1,321	1,492	1,507	1,501	1,473	1,476
JAN2	2002	1,331	1,324	1,325	1,316	1,321	1,470	1,476	1,476	1,446	1,445
JAN3	2002	1,306	1,311	1,308	1,316	1,321	1,369	1,372	1,373	1,355	1,354
JAN4	2002	1,287	1,300	1,294	1,316	1,321	1,353	1,355	1,356	1,339	1,339
FEB1	2002	1,292	1,308	1,300	1,330	1,333	1,350	1,352	1,352	1,335	1,339
FEB2	2002	1,300	1,317	1,308	1,345	1,345	1,391	1,395	1,393	1,373	1,375
FEB3	2002	1,301	1,321	1,311	1,358	1,357	1,297	1,305	1,301	1,290	1,295
FEB4	2002	1,303	1,326	1,314	1,372	1,368	1,326	1,330	1,330	1,314	1,313
MAR1	2002	1,308	1,333	1,321	1,388	1,382	1,333	1,335	1,338	1,324	1,318
MAR2	2002	1,201	1,247	1,223	1,339	1,347	1,369	1,382	1,373	1,354	1,363
MAR3	2002	1,218	1,263	1,238	1,351	1,357	1,387	1,412	1,377	1,394	1,356
MAR4	2002	1,234	1,278	1,253	1,363	1,366	1,439	1,456	1,419	1,448	1,427
APR1	2002	1,254	1,294	1,270	1,375	1,374	1,296	1,321	1,319	1,395	1,363
APR2	2002	1,272	1,307	1,287	1,382	1,374	1,302	1,333	1,328	1,394	1,375
APR3	2002	1,292	1,328	1,305	1,401	1,387	1,507	1,525	1,484	1,528	1,510
APR4	2002	1,311	1,348	1,325	1,420	1,404	1,553	1,596	1,572	1,534	1,589
MAY1	2002	1,328	1,361	1,342	1,416	1,405	1,319	1,325	1,333	1,394	1,360
MAY2	2002	1,352	1,379	1,365	1,422	1,414	1,364	1,380	1,377	1,421	1,417
MAY3	2002	1,383	1,401	1,396	1,447	1,436	1,403	1,417	1,414	1,487	1,474
MAY4	2002	1,400	1,419	1,411	1,432	1,442	1,419	1,435	1,428	1,264	1,276
JUN1	2002	1,468	1,431	1,477	1,435	1,440	1,506	1,096	1,514	1,350	1,259
JUN2	2002	1,478	1,441	1,491	1,428	1,434	1,054	1,016	1,078	1,218	1,144
JUN3	2002	1,567	1,470	1,581	1,469	1,450	1,476	1,397	1,483	1,631	1,453
JUN4	2002	1,619	1,494	1,634	1,490	1,463	1,360	1,329	1,372	1,501	1,441
JUL1	2002	1,624	1,506	1,633	1,468	1,450	1,215	1,159	1,204	1,147	1,105
JUL2	2002	1,633	1,520	1,638	1,455	1,442	1,248	1,166	1,240	1,177	1,132
JUL3	2002	1,903	1,591	1,913	1,490	1,472	1,686	1,605	1,701	1,541	1,534
JUL4	2002	2,336	1,664	2,363	1,524	1,498	1,863	1,749	1,874	1,609	1,579
AUG1	2002	2,396	1,716	2,427	1,543	1,518	1,673	1,713	1,686	1,603	1,622

NA = no action, PA = proposed action, CE = cumulative effects

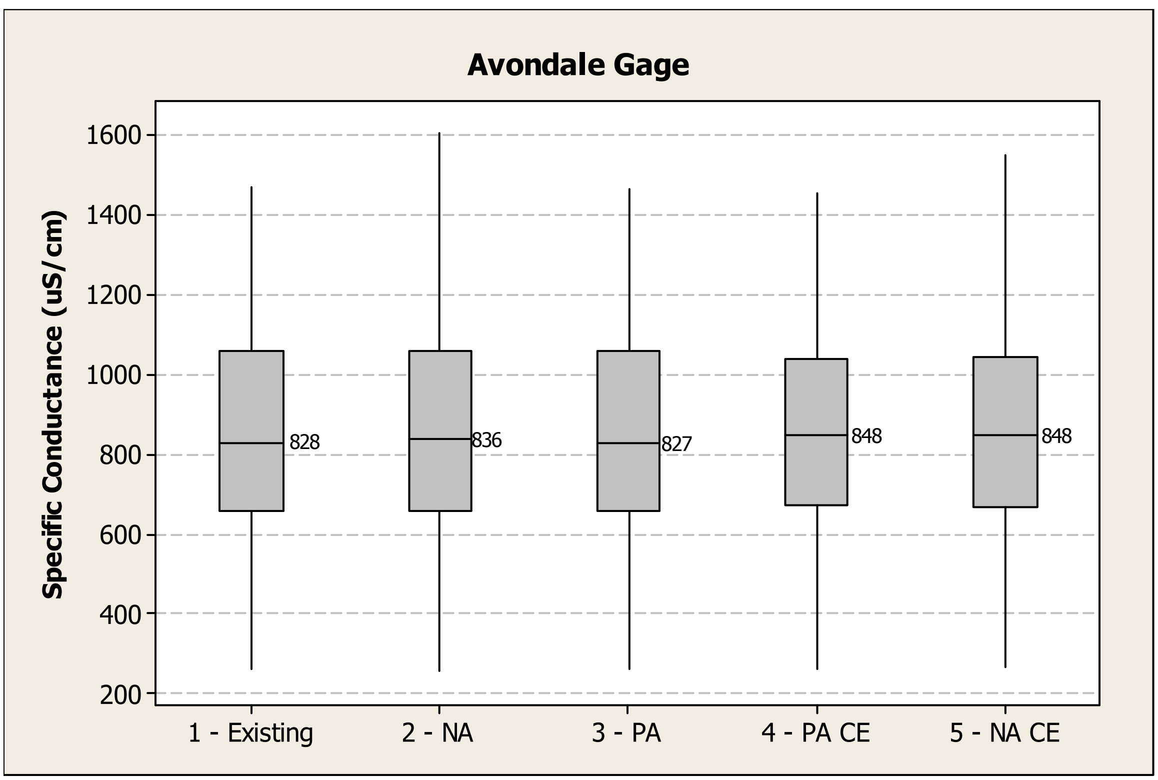
Salinity Modeling Results - Quarter Monthly Concentration (uS/cm)

		Lakes Henry and Meredith					Downstream of Henry/Meredith Return Flow				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
AUG2	2002	2,315	1,760	2,337	1,559	1,550	1,695	1,728	1,709	1,619	1,724
AUG3	2002	2,301	1,810	2,324	1,597	1,584	1,782	1,830	1,801	1,805	1,831
AUG4	2002	2,259	1,839	2,280	1,628	1,611	1,638	1,679	1,655	1,659	1,679
SEP1	2002	2,211	1,868	2,230	1,660	1,638	1,756	1,800	1,774	1,774	1,798
SEP2	2002	2,149	1,880	2,165	1,688	1,662	1,590	1,609	1,599	1,598	1,607
SEP3	2002	2,096	1,885	2,110	1,710	1,682	1,492	1,515	1,502	1,503	1,515
SEP4	2002	2,067	1,895	2,079	1,734	1,703	1,563	1,586	1,570	1,572	1,586
85th Percentile		**1,247**	**1,260**	**1,249**	**1,241**	**1,238**	**1,399**	**1,410**	**1,400**	**1,377**	**1,382**

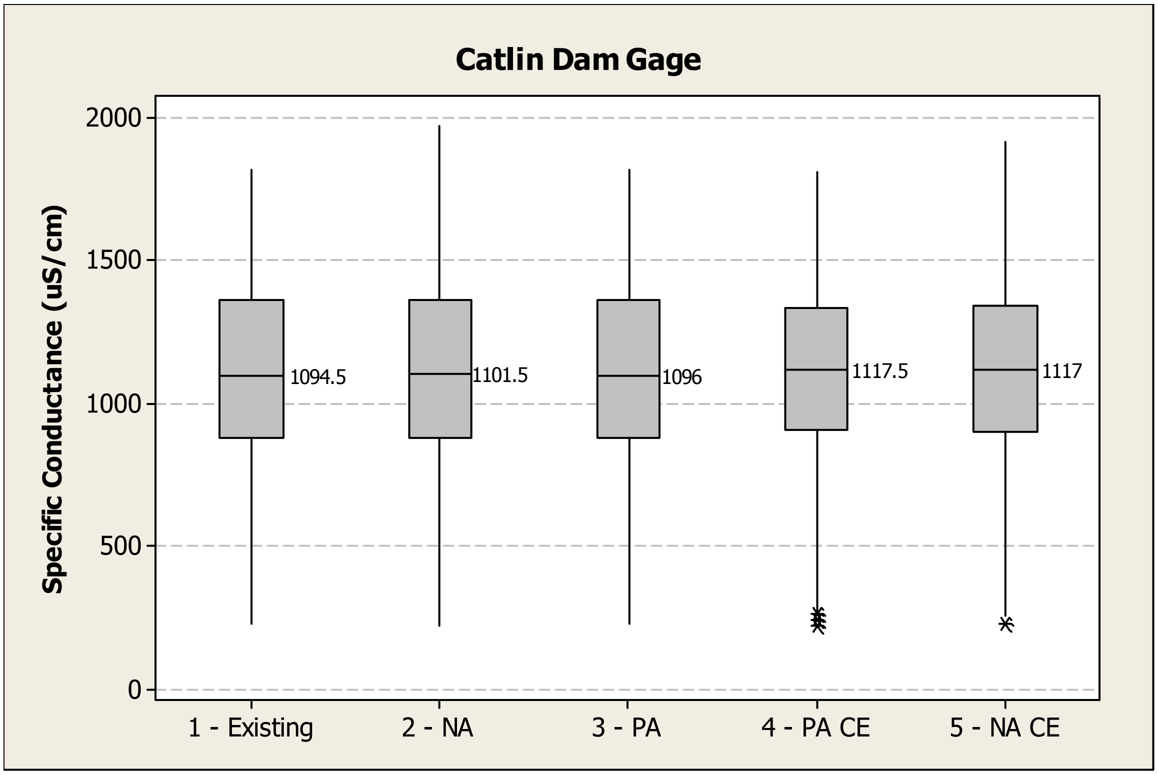
NA = no action, PA = proposed action, CE = cumulative effects

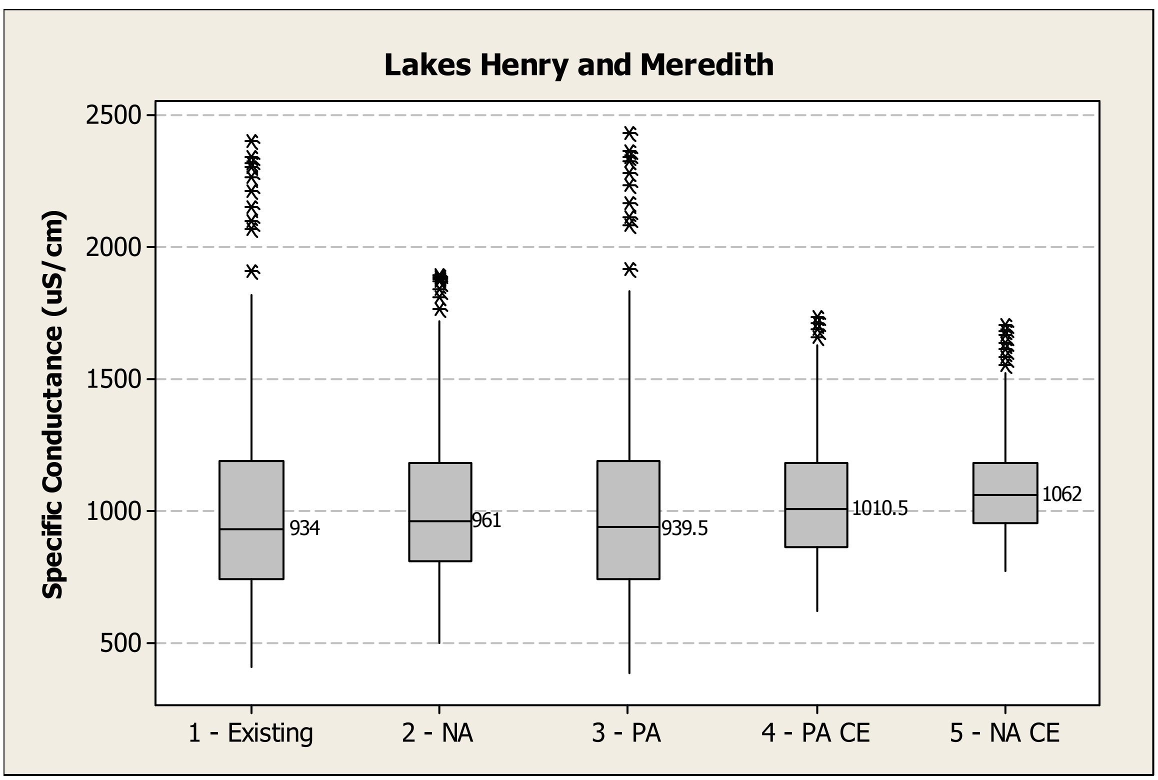


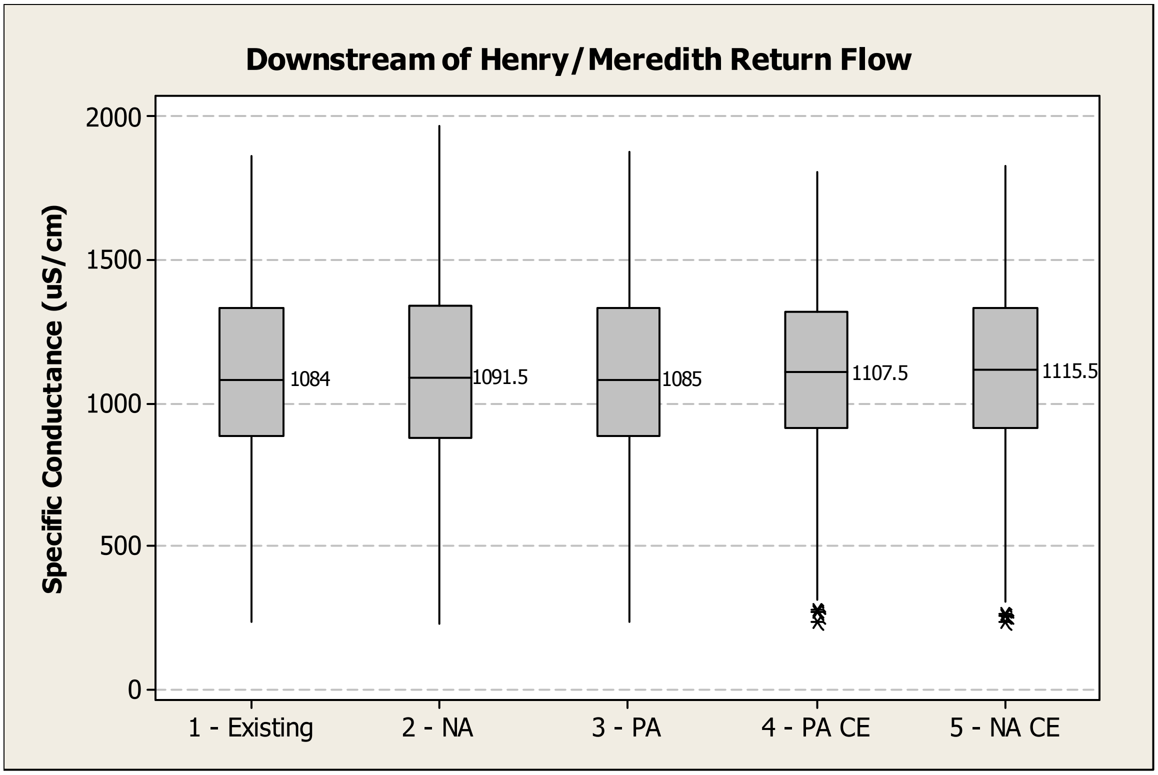
Above Pueblo Gage
Specific Conductance (uS/cm)
900
800
700
600
500
400
300
200
100
416.5
415.5
417.5
413.5
413
1 - Existing
2 - NA
3 - PA
4 - PA CE
5 - NA CE



Avondale Gage
Specific Conductance (uS/cm)
1600
1400
1200
1000
800
600
400
200
828
836
827
848
848
1 - Existing
2 - NA
3 - PA
4 - PA CE
5 - NA CE


Catlin Dam Gage
Specific Conductance (uS/cm)
2000
1500
1000
500
0
1094.5
1101.5
1096
1117.5
1117
1 - Existing
2 - NA
3 - PA
4 - PA CE
5 - NA CE


Lakes Henry and Meredith
Specific Conductance (uS/cm)
2500
2000
1500
1000
500
934
961
939.5
1010.5
1062
1 - Existing
2 - NA
3 - PA
4 - PA CE
5 - NA CE


Downstream of Henry/Meredith Return Flow
Specific Conductance (uS/cm)
2000
1500
1000
500
0
1084
1091.5
1085
1107.5
1115.5
1 - Existing
2 - NA
3 - PA
4 - PA CE
5 - NA CE

APPENDIX D –SELENIUM MODEL RESULTS

Selenium Model - Quarter Monthly Concentration (ug/L)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
OCT1	1982	3.5	3.5	3.6	3.6	3.5	17.4	17.4	17.5	16.7	17.2	13.0	13.0	13.0	12.7	12.9
OCT2	1982	3.7	3.7	3.7	3.4	3.2	16.8	16.9	16.9	16.4	16.3	13.1	13.1	13.1	12.9	12.8
OCT3	1982	3.4	3.3	3.4	3.1	3.0	13.0	13.0	12.9	14.3	14.3	11.7	11.7	11.7	12.3	12.2
OCT4	1982	3.4	3.0	3.3	3.2	3.1	14.6	14.3	14.6	14.7	14.7	12.7	12.6	12.7	12.8	12.7
NOV1	1982	3.7	3.7	3.8	3.7	3.7	13.5	13.6	13.6	13.7	13.8	12.6	12.7	12.7	12.7	12.7
NOV2	1982	3.7	4.0	3.7	3.6	3.6	14.3	14.5	14.3	13.4	13.4	13.3	13.4	13.3	12.9	12.9
NOV3	1982	3.9	4.5	4.1	3.9	4.0	18.0	18.4	18.1	17.1	17.1	15.4	15.6	15.5	15.0	15.0
NOV4	1982	4.0	4.7	4.1	3.9	3.9	18.0	19.7	18.0	17.0	18.4	15.8	16.5	15.8	15.3	16.0
DEC1	1982	4.2	4.8	4.4	4.3	4.4	17.5	17.8	17.5	16.7	17.1	16.0	16.2	16.0	15.6	15.8
DEC2	1982	4.2	4.6	4.2	4.1	4.1	17.9	18.1	17.9	17.4	17.5	16.5	16.6	16.5	16.3	16.3
DEC3	1982	4.1	4.3	4.1	4.0	4.0	16.9	17.0	16.9	16.6	16.6	16.4	16.4	16.4	16.2	16.2
DEC4	1982	4.0	3.9	4.0	3.9	3.9	16.8	16.8	16.8	16.5	16.5	16.6	16.6	16.6	16.4	16.4
JAN1	1982	3.9	3.8	4.0	3.9	3.9	17.5	17.5	17.5	17.1	17.1	17.3	17.3	17.3	17.1	17.1
JAN2	1982	3.9	3.8	3.9	3.8	3.8	16.8	16.8	16.8	16.5	16.5	17.2	17.1	17.2	17.0	17.0
JAN3	1982	4.9	4.9	5.5	5.4	5.7	15.3	15.3	15.6	15.3	15.5	16.5	16.5	16.6	16.5	16.5
JAN4	1982	4.9	4.6	4.9	4.9	4.9	15.5	15.4	15.6	15.4	15.4	16.7	16.7	16.7	16.6	16.6
FEB1	1982	4.4	4.5	4.4	4.4	4.4	15.8	15.8	15.8	15.5	15.5	16.9	17.0	16.9	16.7	16.7
FEB2	1982	4.3	4.5	4.3	4.3	4.3	17.3	17.4	17.3	16.9	16.9	17.7	17.8	17.7	17.5	17.5
FEB3	1982	5.3	5.3	5.7	5.7	5.8	18.2	18.2	18.3	17.6	17.7	18.1	18.1	18.2	17.8	17.8
FEB4	1982	4.8	4.8	4.7	4.8	4.7	17.8	17.8	17.7	17.1	17.1	17.8	17.8	17.7	17.4	17.4
MAR1	1982	4.2	4.6	4.3	4.3	4.3	16.5	16.8	16.6	16.1	16.1	16.9	17.1	17.0	16.7	16.7
MAR2	1982	3.9	4.3	4.1	4.2	4.2	18.4	18.8	18.4	17.6	17.8	17.7	17.9	17.7	17.3	17.4
MAR3	1982	3.7	3.9	3.7	4.0	4.0	20.4	21.6	20.3	14.3	13.8	18.4	19.1	18.4	15.3	15.0
MAR4	1982	3.6	3.7	3.7	4.1	4.0	20.3	21.5	20.3	15.5	14.5	18.1	18.7	18.1	15.6	15.1
APR1	1982	3.4	3.6	3.5	4.1	4.1	20.4	17.1	20.3	13.9	13.5	17.7	16.0	17.6	14.4	14.2
APR2	1982	3.6	3.7	3.2	4.1	4.2	15.8	12.7	12.9	12.8	12.8	15.1	13.5	13.6	13.5	13.5
APR3	1982	3.6	3.7	3.6	4.2	4.3	11.1	11.2	11.3	11.9	11.7	12.4	12.5	12.5	12.8	12.7
APR4	1982	3.6	3.6	3.8	3.6	4.1	9.4	9.6	9.8	10.7	11.4	11.2	11.3	11.4	11.9	12.2
MAY1	1982	3.1	2.9	3.1	2.4	2.1	8.4	8.1	8.6	7.8	8.5	10.3	10.2	10.5	10.1	10.4
MAY2	1982	3.0	3.0	2.8	2.0	1.9	9.0	8.9	8.7	8.0	7.5	10.3	10.3	10.2	9.9	9.6
MAY3	1982	2.9	2.9	2.9	2.6	2.7	15.9	15.6	16.8	14.0	15.1	13.3	13.2	13.7	12.5	13.0
MAY4	1982	1.7	2.0	1.4	1.3	1.3	7.3	7.9	7.4	7.2	6.7	9.1	9.4	9.1	9.0	8.8
JUN1	1982	1.1	1.6	1.1	1.1	1.2	4.2	4.9	4.1	4.2	4.2	6.9	7.2	6.8	6.9	6.8
JUN2	1982	0.9	1.3	0.9	0.9	0.9	2.7	3.3	2.6	2.8	2.8	6.2	6.4	6.1	6.2	6.2
JUN3	1982	0.8	1.1	2.2	0.7	0.8	1.9	2.6	5.0	1.9	2.1	5.3	5.6	6.7	5.4	5.4
JUN4	1982	0.8	1.1	2.5	0.7	0.7	1.2	2.1	5.1	1.2	1.1	4.8	5.0	6.5	4.6	4.6
JUL1	1982	1.0	1.0	1.1	0.9	0.9	1.9	1.9	2.1	2.0	1.8	5.5	5.4	5.5	5.5	5.4
JUL2	1982	1.1	1.1	1.1	1.2	1.2	2.1	2.0	2.1	2.6	2.7	5.7	5.6	5.7	5.8	5.9
JUL3	1982	1.4	1.1	1.4	1.2	1.2	2.9	2.1	2.8	3.3	3.2	6.1	5.7	6.0	6.2	6.2
JUL4	1982	1.3	1.1	2.0	1.1	1.0	3.1	2.8	4.4	2.6	2.5	5.0	4.9	5.5	4.8	4.7
AUG1	1982	1.2	1.2	1.2	1.3	1.3	8.2	8.4	8.3	8.3	8.3	8.2	8.2	8.2	8.2	8.2
AUG2	1982	3.0	2.0	3.3	3.1	3.1	7.3	5.8	7.7	7.4	7.4	7.6	7.0	7.7	7.6	7.6
AUG3	1982	1.7	1.9	1.6	1.7	1.7	5.4	5.5	5.2	5.4	5.3	6.5	6.5	6.4	6.5	6.4
AUG4	1982	2.8	2.4	2.9	3.1	3.1	7.7	7.1	7.7	8.2	8.1	7.9	7.6	7.9	8.1	8.0
SEP1	1982	2.2	2.2	2.0	2.0	1.9	12.9	12.7	12.5	12.4	12.7	10.4	10.3	10.2	10.1	10.3
SEP2	1982	1.9	2.1	1.9	2.1	2.1	6.9	7.0	6.9	7.2	7.2	7.8	7.8	7.8	7.9	7.9
SEP3	1982	1.9	2.1	1.9	2.1	2.0	6.4	6.4	6.3	6.7	6.5	7.7	7.7	7.6	7.8	7.7
SEP4	1982	1.6	1.8	1.5	1.6	1.6	8.7	8.9	8.5	8.5	8.7	9.1	9.1	9.0	9.0	9.0
OCT1	1983	1.7	2.2	1.7	1.7	1.7	8.3	9.1	8.2	8.3	8.5	9.1	9.4	9.1	9.1	9.2
OCT2	1983	1.9	1.9	1.9	1.9	1.9	9.6	9.4	10.2	9.8	9.9	9.9	9.8	10.2	10.0	10.1
OCT3	1983	2.2	2.1	2.3	2.2	2.2	12.7	12.7	12.8	12.4	12.9	11.6	11.6	11.6	11.4	11.6
OCT4	1983	2.3	2.1	2.4	2.2	2.2	15.8	15.7	15.9	15.5	15.6	13.2	13.2	13.2	13.1	13.1
NOV1	1983	2.3	2.1	2.3	2.2	2.2	16.2	16.1	16.2	15.9	16.0	13.9	13.8	13.9	13.7	13.8
NOV2	1983	2.4	2.2	2.4	2.3	2.3	15.8	15.7	15.8	15.6	15.6	14.0	14.0	14.0	13.9	13.9
NOV3	1983	2.6	2.5	2.7	2.6	2.7	15.2	15.2	15.3	15.1	15.2	14.1	14.1	14.1	14.0	14.1
NOV4	1983	3.2	2.8	3.5	3.4	3.4	15.7	18.6	15.8	15.6	19.0	14.7	16.0	14.7	14.6	16.2
DEC1	1983	3.8	3.5	4.1	4.0	4.1	16.8	16.7	16.8	16.4	16.9	15.6	15.6	15.7	15.4	15.7
DEC2	1983	4.5	3.8	4.8	4.7	4.8	17.9	17.7	18.0	17.4	17.5	16.5	16.4	16.6	16.3	16.3
DEC3	1983	3.9	3.0	3.6	3.7	3.5	17.8	17.5	17.7	17.2	17.2	16.8	16.7	16.7	16.5	16.5
DEC4	1983	3.1	3.0	2.9	3.1	3.0	17.9	17.8	17.8	17.3	17.3	17.1	17.1	17.1	16.8	16.8
JAN1	1983	2.9	2.9	2.9	3.0	3.0	16.9	16.9	16.9	16.5	16.5	17.0	17.0	17.0	16.8	16.8
JAN2	1983	2.8	2.9	2.9	3.0	3.0	17.2	17.2	17.2	16.8	16.8	17.3	17.3	17.3	17.1	17.1
JAN3	1983	2.9	2.9	2.9	3.1	3.2	16.2	16.2	16.2	16.0	16.0	17.0	17.0	17.0	16.8	16.8
JAN4	1983	2.9	2.9	3.0	3.2	3.2	16.3	16.3	16.3	16.1	16.1	17.1	17.1	17.1	17.0	17.0
FEB1	1983	2.9	3.0	3.0	3.3	3.3	16.3	16.3	16.3	16.1	16.1	17.2	17.2	17.2	17.0	17.0
FEB2	1983	2.9	3.0	3.0	3.3	3.4	16.3	16.4	16.4	16.2	16.2	17.2	17.2	17.2	17.1	17.1
FEB3	1983	2.9	3.0	3.0	3.3	3.4	15.9	16.0	15.9	15.8	15.8	16.9	16.9	16.9	16.8	16.8
FEB4	1983	3.0	3.0	3.0	3.5	3.5	14.9	15.6	15.5	15.5	15.5	16.2	16.6	16.6	16.5	16.6
MAR1	1983	3.0	3.1	3.1	3.5	3.5	15.0	15.5	15.4	15.5	15.5	16.1	16.3	16.3	16.3	16.4
MAR2	1983	3.1	3.1	3.1	3.6	3.6	15.5	16.3	15.5	15.9	16.1	16.2	16.6	16.2	16.4	16.5
MAR3	1983	3.1	3.1	3.1	3.6	3.6	9.2	9.3	9.3	12.7	12.3	12.3	12.3	12.3	14.3	14.1
MAR4	1983	3.1	3.1	3.1	3.5	3.5	9.6	9.5	9.7	12.3	11.8	12.3	12.3	12.4	13.9	13.6
APR1	1983	3.0	3.1	3.1	3.5	3.4	9.5	9.4	10.0	10.7	10.3	12.0	11.9	12.2	12.6	12.4
APR2	1983	3.0	3.0	3.1	3.4	3.4	8.3	8.2	8.5	9.8	9.6	10.9	10.9	11.1	11.8	11.7
APR3	1983	3.0	3.0	3.0	3.3	3.3	9.0	8.7	9.3	9.2	8.9	11.1	10.9	11.3	11.2	11.0
APR4	1983	2.9	2.9	3.0	3.2	3.1	9.3	8.9	9.5	9.3	9.0	11.0	10.8	11.1	10.9	10.8
MAY1	1983	2.8	2.8	2.9	3.1	3.0	8.9	8.6	9.5	9.0	8.8	10.4	10.3	10.7	10.5	10.3
MAY2	1983	2.8	2.8	2.9	3.0	2.9	7.8	7.6	8.1	8.0	7.7	9.5	9.4	9.7	9.6	9.5
MAY3	1983	2.8	2.8	2.9	3.0	2.9	9.4	9.2	9.7	9.6	9.2	10.1	10.1	10.3	10.2	10.1
MAY4	1983	2.7	2.6	2.8	2.8	2.7	7.9	7.4	7.5	8.0	7.7	9.1	8.8	8.8	9.1	8.9
JUN1	1983	2.4	2.1	2.4	2.1	2.0	5.8	5.2	5.7	5.0	4.8	7.5	7.2	7.5	7.0	6.9
JUN2	1983	2.1	1.8	2.1	1.7	1.7	5.3	4.8	5.3	4.5	4.3	7.0	6.7	7.0	6.5	6.4
JUN3	1983	1.5	1.2	1.4	1.1	1.0	2.8	1.9	2.5	1.7	1.3	5.3	4.8	5.1	4.6	4.4
JUN4	1983	0.9	0.6	0.8	0.6	0.6	1.0	0.3	0.8	0.5	0.4	3.6	3.2	3.5	3.4	3.3
JUL1	1983	0.7	0.7	0.7	0.7	0.7	0.2	0.0	0.1	0.2	0.0	3.1	2.9	3.0	3.1	3.0
JUL2	1983	0.8	0.7	0.8	0.8	0.7	1.0	0.8	0.9	0.9	0.8	4.3	4.3	4.3	4.3	4.3
JUL3	1983	0.8	0.8	0.8	0.8	0.8	4.3	4.3	4.1	4.3	4.2	6.6	6.6	6.6	6.7	6.6
JUL4	1983	0.9	0.9	0.9	0.9	0.9	5.9	6.0	6.0	6.2	6.0	7.2	7.2	7.2	7.3	7.2
AUG1	1983	0.9	0.9	0.9	0.9	0.9	5.2	5.4	5.2	5.3	5.4	6.9	7.0	6.9	7.0	7.0
AUG2	1983	0.9	0.9	0.9	0.9	0.9	5.0	5.5	5.3	5.4	5.5	6.8	7.1	7.0	7.1	7.1
AUG3	1983	1.0	1.0	0.9	1.0	1.0	5.6	6.8	6.5	6.7	6.9	7.2	7.7	7.6	7.7	7.7
AUG4	1983	1.1	1.1	1.1	1.1	1.1	6.8	9.2	8.8	8.9	9.2	7.7	8.7	8.6	8.6	8.7
SEP1	1983	1.2	1.3	1.2	1.3	1.3	8.0	8.4	8.0	8.1	8.4	8.4	8.5	8.4	8.5	8.6

NA = no action, PA = proposed action, CE = cumulative effects

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
SEP2	1983	1.3	1.4	1.4	1.5	1.5	8.8	9.2	8.9	11.5	11.9	8.9	9.1	9.0	10.0	10.2
SEP3	1983	1.5	1.6	1.5	1.6	1.6	16.3	17.8	16.4	16.5	17.5	12.1	12.6	12.1	12.1	12.5
SEP4	1983	1.6	1.7	1.6	1.8	1.8	17.7	18.4	17.7	17.9	18.4	12.8	13.0	12.8	12.9	13.1
OCT1	1984	1.6	1.8	1.7	1.8	1.8	7.8	8.3	7.6	8.1	7.1	9.0	9.2	8.9	9.1	8.7
OCT2	1984	1.6	1.8	1.7	1.8	1.8	10.3	10.6	10.3	9.7	10.8	10.3	10.5	10.3	10.0	10.5
OCT3	1984	1.6	1.8	1.6	1.9	1.9	13.6	15.2	13.7	13.8	15.9	12.0	12.7	12.0	12.1	13.0
OCT4	1984	1.6	1.7	1.6	1.9	1.9	12.9	13.1	12.9	13.0	13.1	12.0	12.1	12.0	12.0	12.1
NOV1	1984	1.6	1.6	1.6	1.6	1.7	11.3	11.3	11.3	11.3	11.4	11.7	11.6	11.6	11.6	11.7
NOV2	1984	1.6	1.6	1.7	1.7	1.6	12.3	12.2	12.3	14.0	12.2	12.4	12.4	12.4	13.2	12.4
NOV3	1984	1.7	1.7	1.7	1.7	1.7	13.4	14.7	14.6	14.6	14.6	13.3	13.9	13.9	13.8	13.8
NOV4	1984	1.7	1.7	1.7	1.7	1.7	10.9	20.9	16.0	15.8	20.1	12.3	17.1	14.8	14.7	16.7
DEC1	1984	1.7	1.7	1.8	1.8	1.7	9.1	15.8	9.5	15.1	15.5	11.7	15.2	11.9	14.8	15.0
DEC2	1984	1.8	1.7	1.8	1.8	1.8	9.1	15.4	9.1	15.2	15.2	12.0	15.3	12.0	15.2	15.2
DEC3	1984	1.8	1.8	1.8	1.8	1.8	10.0	15.6	10.0	15.4	15.4	12.7	15.7	12.7	15.6	15.6
DEC4	1984	1.9	1.9	1.9	1.9	1.9	8.1	15.3	8.2	15.1	15.1	11.9	15.8	11.9	15.7	15.7
JAN1	1984	2.0	2.0	2.0	2.0	2.0	8.6	8.6	8.6	14.7	14.7	12.3	12.3	12.3	15.8	15.8
JAN2	1984	2.1	2.1	2.1	2.1	2.0	9.8	9.9	9.9	14.1	15.4	13.2	13.3	13.3	15.7	16.4
JAN3	1984	2.1	2.1	2.1	2.1	2.1	11.6	11.6	11.6	11.9	16.1	14.4	14.4	14.4	14.6	16.9
JAN4	1984	2.1	2.2	2.2	2.2	2.1	9.3	9.3	9.3	9.6	14.6	13.1	13.1	13.1	13.3	16.2
FEB1	1984	2.2	2.2	2.2	2.2	2.2	10.7	10.7	10.7	10.9	10.9	14.0	14.0	14.0	14.1	14.1
FEB2	1984	2.2	2.2	2.2	2.2	2.2	11.5	11.5	11.5	11.7	11.7	14.5	14.5	14.5	14.6	14.6
FEB3	1984	2.2	2.2	2.2	2.2	2.2	12.0	12.1	12.1	12.3	12.3	14.7	14.7	14.7	14.8	14.8
FEB4	1984	2.2	2.2	2.2	2.2	2.2	12.0	12.0	12.0	12.2	12.2	14.6	14.6	14.6	14.7	14.7
MAR1	1984	2.3	2.3	2.3	2.3	2.3	11.0	11.0	11.0	11.3	11.3	13.8	13.8	13.8	14.0	14.0
MAR2	1984	2.3	2.3	2.3	2.3	2.3	12.1	12.2	12.1	12.4	12.5	14.3	14.4	14.3	14.5	14.5
MAR3	1984	2.3	2.3	2.3	2.3	2.3	6.4	6.4	6.4	7.7	7.7	10.5	10.5	10.5	11.4	11.4
MAR4	1984	2.2	2.2	2.2	2.3	2.3	6.0	6.0	6.0	6.9	6.9	10.0	10.0	10.0	10.7	10.7
APR1	1984	2.1	2.1	2.2	2.2	2.2	6.3	6.4	6.3	8.2	8.3	10.0	10.1	10.0	11.3	11.3
APR2	1984	2.1	2.1	2.1	2.2	2.2	5.4	5.4	5.4	6.2	6.4	9.0	9.0	9.0	9.6	9.7
APR3	1984	2.1	2.1	2.1	2.2	2.2	7.2	7.0	7.3	7.4	7.1	10.0	9.9	10.1	10.1	10.0
APR4	1984	2.1	2.1	2.1	2.2	2.2	9.0	8.7	9.0	9.0	8.7	10.9	10.7	10.8	10.8	10.7
MAY1	1984	2.1	2.1	2.1	2.2	2.2	4.7	4.7	4.7	5.2	5.3	7.6	7.5	7.6	8.0	8.0
MAY2	1984	2.0	2.1	2.0	2.1	2.1	7.5	7.7	7.4	7.4	7.7	9.4	9.6	9.4	9.4	9.6
MAY3	1984	1.8	1.8	1.8	1.9	2.0	6.3	5.8	6.3	5.7	5.4	8.6	8.3	8.6	8.1	8.0
MAY4	1984	1.6	1.6	1.6	1.7	1.7	2.7	2.6	2.7	2.6	2.7	5.8	5.7	5.9	5.5	5.6
JUN1	1984	1.4	1.3	1.4	1.4	1.4	2.0	2.3	2.1	2.2	2.2	5.4	5.7	5.5	5.4	5.4
JUN2	1984	1.3	1.3	1.3	1.3	1.3	2.1	2.0	2.1	2.8	2.7	5.7	5.7	5.7	6.2	6.1
JUN3	1984	1.2	1.1	1.2	1.2	1.2	1.1	1.1	1.1	1.2	1.2	4.6	4.6	4.6	4.7	4.7
JUN4	1984	1.1	1.0	1.1	1.1	1.1	0.6	0.5	0.6	0.6	0.6	4.1	4.0	4.1	4.0	4.1
JUL1	1984	0.9	0.9	0.9	0.9	0.9	0.4	0.3	0.4	0.4	0.4	3.8	3.8	3.8	3.8	3.8
JUL2	1984	0.8	0.8	0.8	0.8	0.8	0.1	0.1	0.1	0.0	0.0	4.1	4.1	4.1	4.0	4.1
JUL3	1984	0.8	0.8	0.8	0.8	0.8	1.0	1.0	1.0	0.9	0.9	4.9	4.9	4.9	4.9	4.9
JUL4	1984	0.9	0.8	0.9	0.9	0.9	2.9	2.9	2.9	3.0	3.0	5.6	5.6	5.6	5.7	5.7
AUG1	1984	0.9	0.9	0.9	0.9	0.9	2.2	2.3	2.2	2.3	2.3	5.4	5.4	5.4	5.4	5.4
AUG2	1984	0.9	0.9	0.9	0.9	0.9	3.4	3.4	3.4	3.6	3.5	6.2	6.2	6.2	6.3	6.3
AUG3	1984	1.2	1.2	1.2	1.1	1.2	2.6	2.6	2.6	2.5	2.5	4.8	4.8	4.8	4.7	4.7
AUG4	1984	1.3	1.4	1.3	1.3	1.3	3.0	3.1	3.0	3.0	3.0	5.4	5.4	5.4	5.4	5.4
SEP1	1984	1.4	1.4	1.4	1.4	1.4	4.9	4.8	4.9	4.9	4.9	6.9	6.9	6.9	6.9	6.9
SEP2	1984	1.4	1.5	1.5	1.4	1.4	6.2	6.3	6.2	6.5	6.8	7.8	7.8	7.8	7.9	8.0
SEP3	1984	1.4	1.4	1.4	1.4	1.4	7.4	7.4	7.4	9.1	9.5	8.5	8.5	8.5	9.2	9.4
SEP4	1984	1.4	1.4	1.4	1.4	1.4	9.6	9.6	9.6	9.6	10.0	9.6	9.6	9.6	9.6	9.8
OCT1	1985	1.5	1.5	1.5	1.5	1.5	11.6	11.9	11.7	11.4	9.9	10.6	10.7	10.6	10.4	9.8
OCT2	1985	1.5	1.5	1.5	1.5	1.5	7.6	7.6	7.6	7.6	7.8	8.9	8.9	8.9	8.9	9.0
OCT3	1985	1.5	1.5	1.5	1.5	1.5	5.1	5.1	5.1	6.1	6.1	7.6	7.6	7.6	8.2	8.2
OCT4	1985	1.5	1.5	1.5	1.5	1.5	5.9	5.9	5.9	6.1	6.1	8.3	8.3	8.3	8.4	8.4
NOV1	1985	1.6	1.6	1.6	1.6	1.6	7.1	6.9	6.9	6.9	6.9	9.3	9.2	9.2	9.2	9.2
NOV2	1985	1.7	1.7	1.7	1.6	1.6	9.2	9.2	9.2	7.7	7.8	10.8	10.8	10.8	10.0	10.0
NOV3	1985	1.8	1.8	1.8	1.7	1.7	8.6	9.0	8.9	7.8	7.8	10.8	11.0	11.0	10.3	10.3
NOV4	1985	1.8	1.8	1.8	1.8	1.8	9.0	8.5	9.0	9.2	8.7	11.3	11.0	11.3	11.4	11.1
DEC1	1985	1.9	1.9	1.9	1.9	1.9	8.9	9.0	8.9	9.1	9.2	11.6	11.6	11.6	11.7	11.7
DEC2	1985	2.0	2.0	2.0	2.0	2.0	8.5	8.5	8.5	8.6	8.6	11.6	11.6	11.6	11.7	11.7
DEC3	1985	2.0	2.0	2.0	2.0	2.0	8.9	8.9	8.9	9.0	9.1	12.0	12.0	12.0	12.1	12.1
DEC4	1985	2.0	2.0	2.0	2.0	2.0	9.0	9.0	9.0	9.2	9.2	12.3	12.3	12.3	12.4	12.4
JAN1	1985	2.1	2.1	2.1	2.1	2.1	9.6	9.6	9.6	9.7	9.7	12.9	12.9	12.9	13.0	13.0
JAN2	1985	2.1	2.1	2.1	2.1	2.1	9.3	9.3	9.3	9.4	9.4	12.9	12.9	12.9	13.0	13.0
JAN3	1985	2.1	2.1	2.1	2.1	2.1	9.2	9.1	9.1	9.2	9.2	12.9	12.9	12.9	12.9	12.9
JAN4	1985	2.2	2.2	2.2	2.1	2.1	8.2	8.2	8.2	8.2	8.2	12.4	12.4	12.4	12.4	12.4
FEB1	1985	2.2	2.2	2.2	2.1	2.1	8.6	8.6	8.6	8.7	8.6	12.7	12.7	12.7	12.7	12.7
FEB2	1985	2.2	2.2	2.2	2.2	2.2	7.8	7.8	7.8	7.9	7.9	12.1	12.1	12.1	12.1	12.1
FEB3	1985	2.3	2.3	2.3	2.3	2.3	7.4	7.4	7.4	7.5	7.5	11.8	11.8	11.8	11.8	11.8
FEB4	1985	2.4	2.4	2.4	2.3	2.3	8.4	8.4	8.4	8.4	8.4	12.3	12.3	12.3	12.3	12.3
MAR1	1985	2.4	2.4	2.4	2.4	2.3	9.3	9.3	9.3	9.3	9.3	12.8	12.8	12.8	12.8	12.8
MAR2	1985	2.4	2.4	2.4	2.3	2.3	9.7	9.8	9.7	9.7	9.7	12.9	12.9	12.9	12.8	12.9
MAR3	1985	2.4	2.4	2.4	2.3	2.3	8.4	8.5	8.4	8.4	8.5	11.9	12.0	11.9	11.9	12.0
MAR4	1985	2.4	2.4	2.4	2.3	2.3	8.1	8.2	8.1	8.1	8.2	11.5	11.5	11.5	11.5	11.5
APR1	1985	2.3	2.3	2.3	2.3	2.3	7.0	7.0	6.9	6.9	7.0	10.4	10.4	10.4	10.4	10.4
APR2	1985	2.3	2.3	2.3	2.3	2.3	6.2	6.1	6.2	6.1	6.1	9.6	9.6	9.6	9.5	9.5
APR3	1985	2.2	2.2	2.2	2.2	2.2	7.8	7.7	7.7	7.9	7.7	10.4	10.4	10.3	10.5	10.4
APR4	1985	2.2	2.2	2.2	2.2	2.2	8.4	8.5	8.4	8.6	8.5	10.4	10.5	10.4	10.5	10.5
MAY1	1985	2.2	2.2	2.2	2.2	2.2	5.4	5.5	5.4	5.7	5.8	7.9	7.9	7.9	8.1	8.1
MAY2	1985	1.9	1.9	1.9	2.0	2.0	5.2	5.2	5.2	5.3	5.3	7.7	7.7	7.7	7.7	7.7
MAY3	1985	1.8	1.8	1.8	1.8	1.8	5.3	5.3	5.3	5.3	5.3	7.6	7.6	7.6	7.6	7.6
MAY4	1985	1.7	1.7	1.7	1.7	1.7	4.1	3.9	4.1	3.8	3.8	6.7	6.6	6.7	6.4	6.4
JUN1	1985	1.5	1.5	1.5	1.5	1.5	2.9	2.6	2.8	2.7	2.7	5.8	5.5	5.8	5.6	5.6
JUN2	1985	1.3	1.3	1.3	1.3	1.3	1.4	1.3	1.4	1.5	1.5	4.0	4.0	4.0	4.1	4.2
JUN3	1985	1.2	1.1	1.2	1.2	1.2	1.1	1.0	1.1	1.3	1.2	4.3	4.3	4.3	4.5	4.4
JUN4	1985	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.1	1.4	1.3	4.8	4.7	4.8	4.9	4.9
JUL1	1985	1.1	1.1	1.1	1.1	1.1	2.1	2.0	2.4	3.0	2.9	5.8	5.8	6.0	6.2	6.1
JUL2	1985	1.1	1.1	1.1	1.1	1.1	2.3	2.2	2.3	3.0	3.2	5.7	5.7	5.8	6.1	6.2
JUL3	1985	1.1	1.0	1.1	1.1	1.1	2.7	2.6	2.7	2.7	2.8	5.1	5.1	5.1	5.1	5.2
JUL4	1985	1.0	1.0	1.0	1.0	1.0	3.0	3.0	3.0	3.0	3.1	5.2	5.2	5.2	5.2	5.2
AUG1	1985	1.0	1.0	1.0	1.0	1.0	6.3	6.3	6.2	6.2	6.3	7.3	7.3	7.3	7.3	7.3
AUG2	1985	1.1	1.1	1.1	1.1	1.1	7.1	7.1	7.2	7.3	7.4	7.8	7.8	7.8	7.9	7.9

NA = no action, PA = proposed action, CE = cumulative effects

Selenium Model - Quarter Monthly Concentration (ug/L)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
AUG3	1985	1.2	1.2	1.2	1.2	1.2	13.6	15.9	13.5	14.9	17.4	10.5	11.3	10.4	10.9	11.8
AUG4	1985	1.3	1.3	1.3	1.2	1.2	14.3	14.8	14.3	14.4	14.7	10.8	11.0	10.8	10.8	10.9
SEP1	1985	1.3	1.3	1.3	1.3	1.3	17.4	17.6	17.4	16.6	17.5	12.1	12.2	12.1	11.8	12.2
SEP2	1985	1.4	1.4	1.4	1.3	1.4	15.7	13.1	15.6	12.3	12.0	11.6	10.6	11.6	10.3	10.2
SEP3	1985	1.4	1.4	1.4	1.4	1.4	15.5	15.6	15.5	15.4	15.6	11.7	11.8	11.7	11.7	11.8
SEP4	1985	1.4	1.4	1.4	1.4	1.4	12.1	15.8	12.3	16.1	16.2	10.6	12.1	10.7	12.2	12.2
OCT1	1986	1.4	1.4	1.4	1.4	1.4	10.7	10.7	10.7	14.6	13.8	10.3	10.3	10.3	11.9	11.6
OCT2	1986	1.5	1.5	1.5	1.5	1.5	7.9	7.6	7.6	9.0	8.8	9.2	9.1	9.1	9.8	9.6
OCT3	1986	1.5	1.5	1.5	1.5	1.5	5.7	5.5	5.5	9.1	9.3	8.3	8.2	8.2	10.0	10.1
OCT4	1986	1.5	1.5	1.5	1.5	1.5	5.8	5.6	5.6	8.6	8.9	8.6	8.5	8.5	10.0	10.1
NOV1	1986	1.6	1.6	1.6	1.5	1.6	16.4	16.5	16.3	16.0	16.4	14.0	14.0	14.0	13.8	14.0
NOV2	1986	1.6	1.6	1.6	1.6	1.6	15.9	15.9	15.9	11.8	10.5	14.1	14.1	14.1	12.2	11.5
NOV3	1986	1.6	1.6	1.6	1.6	1.6	15.1	15.1	15.1	7.9	7.9	14.1	14.1	14.1	10.5	10.5
NOV4	1986	1.7	1.7	1.7	1.7	1.7	11.0	10.1	12.0	8.4	7.7	12.4	11.9	12.9	11.0	10.6
DEC1	1986	1.7	1.7	1.7	1.7	1.7	7.7	7.7	7.7	7.9	7.9	11.0	11.0	11.0	11.1	11.1
DEC2	1986	1.8	1.8	1.8	1.8	1.8	7.9	7.9	7.9	8.2	8.2	11.3	11.3	11.3	11.5	11.5
DEC3	1986	1.8	1.8	1.8	1.8	1.8	8.0	8.0	8.0	8.3	8.3	11.6	11.6	11.6	11.8	11.8
DEC4	1986	1.8	1.8	1.8	1.8	1.8	7.5	7.5	7.5	7.8	7.8	11.5	11.5	11.5	11.6	11.6
JAN1	1986	1.9	1.9	1.9	1.9	1.9	9.0	9.0	9.0	9.2	9.2	12.6	12.7	12.6	12.7	12.8
JAN2	1986	1.9	1.9	1.9	1.9	1.9	10.2	10.2	10.2	10.3	10.4	13.5	13.5	13.5	13.5	13.5
JAN3	1986	1.9	1.9	1.9	1.9	1.9	10.2	10.2	10.2	10.5	10.5	13.6	13.6	13.6	13.8	13.8
JAN4	1986	2.0	2.0	2.0	1.9	1.9	9.7	9.7	9.7	10.0	10.0	13.4	13.4	13.4	13.6	13.6
FEB1	1986	2.0	2.0	2.0	2.0	2.0	9.4	9.4	9.4	9.8	9.8	13.3	13.3	13.3	13.5	13.5
FEB2	1986	2.1	2.1	2.1	2.1	2.1	9.1	9.1	9.1	9.4	9.4	13.0	13.1	13.1	13.2	13.2
FEB3	1986	2.2	2.2	2.2	2.2	2.2	9.4	9.4	9.4	9.7	9.7	13.2	13.2	13.2	13.3	13.3
FEB4	1986	2.2	2.2	2.2	2.2	2.2	10.8	10.9	10.8	11.1	11.2	13.9	14.0	13.9	14.1	14.1
MAR1	1986	2.2	2.2	2.2	2.2	2.2	10.7	10.9	10.7	10.7	10.8	13.7	13.8	13.7	13.7	13.8
MAR2	1986	2.3	2.3	2.3	2.2	2.2	9.9	10.1	9.9	9.9	10.1	13.1	13.2	13.1	13.1	13.2
MAR3	1986	2.3	2.3	2.3	2.3	2.3	9.9	10.2	9.9	9.9	10.2	12.9	13.0	12.8	12.8	13.0
MAR4	1986	2.3	2.3	2.3	2.3	2.3	10.0	10.3	10.0	10.0	10.3	12.7	12.9	12.7	12.7	12.9
APR1	1986	2.3	2.3	2.3	2.3	2.3	8.8	8.7	8.7	8.7	8.7	11.7	11.7	11.7	11.6	11.6
APR2	1986	2.3	2.3	2.3	2.3	2.3	10.0	9.7	10.0	9.8	9.7	12.1	11.9	12.1	12.0	11.9
APR3	1986	2.3	2.3	2.3	2.3	2.3	9.6	9.8	9.5	9.5	9.5	11.6	11.7	11.6	11.6	11.6
APR4	1986	2.3	2.3	2.3	2.3	2.3	8.8	8.7	8.6	8.8	9.0	10.9	10.9	10.9	10.9	11.0
MAY1	1986	2.3	2.3	2.3	2.3	2.3	8.4	8.3	8.3	8.5	8.8	10.4	10.4	10.4	10.4	10.6
MAY2	1986	2.3	2.3	2.3	2.3	2.3	7.8	7.7	7.8	8.5	8.8	9.9	9.8	9.9	10.2	10.3
MAY3	1986	2.3	2.3	2.3	2.3	2.3	7.0	7.0	7.0	7.6	7.4	9.2	9.2	9.2	9.5	9.3
MAY4	1986	2.3	2.3	2.3	2.2	2.2	5.0	4.5	5.0	4.9	4.9	8.0	7.6	8.0	7.8	7.8
JUN1	1986	2.1	2.1	2.1	2.1	2.0	3.3	3.3	3.3	3.2	3.2	6.0	5.9	5.9	5.8	5.8
JUN2	1986	1.8	1.8	1.8	1.8	1.8	2.7	2.6	2.7	2.8	2.8	5.3	5.2	5.3	5.4	5.4
JUN3	1986	1.6	1.5	1.6	1.6	1.6	1.9	1.7	1.8	2.1	2.0	4.7	4.7	4.7	4.9	4.8
JUN4	1986	1.3	1.3	1.3	1.3	1.3	1.2	1.1	1.2	1.2	1.3	4.3	4.3	4.3	4.3	4.4
JUL1	1986	1.1	1.1	1.1	1.1	1.1	1.0	0.9	1.0	1.0	0.9	4.3	4.3	4.3	4.3	4.3
JUL2	1986	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.0	4.6	4.6	4.6	4.6	4.6
JUL3	1986	1.0	1.0	1.0	1.1	1.0	1.9	1.9	1.9	1.9	1.9	5.2	5.1	5.2	5.2	5.1
JUL4	1986	1.1	1.1	1.1	1.1	1.1	3.0	3.0	3.0	3.2	2.8	6.1	6.1	6.1	6.2	6.0
AUG1	1986	1.1	1.1	1.2	1.2	1.2	11.0	9.9	13.0	13.0	13.9	9.4	9.0	10.2	10.2	10.5
AUG2	1986	1.2	1.2	1.2	1.2	1.2	9.4	9.9	9.9	13.7	11.3	8.8	9.0	9.0	10.5	9.5
AUG3	1986	1.3	1.3	1.3	1.3	1.3	11.0	11.0	11.1	11.7	12.0	9.5	9.4	9.5	9.7	9.8
AUG4	1986	1.4	1.4	1.4	1.4	1.4	8.6	8.2	8.6	8.4	8.2	8.6	8.4	8.6	8.5	8.4
SEP1	1986	1.5	1.5	1.5	1.4	1.4	6.0	6.0	6.0	7.7	7.9	7.6	7.6	7.6	8.3	8.4
SEP2	1986	1.5	1.5	1.5	1.5	1.5	5.0	5.0	4.8	8.3	8.6	7.2	7.2	7.1	8.7	8.8
SEP3	1986	1.6	1.6	1.6	1.5	1.5	7.0	7.0	7.0	9.9	10.3	8.3	8.3	8.3	9.5	9.7
SEP4	1986	1.6	1.6	1.6	1.6	1.6	18.6	20.3	18.6	18.6	25.9	13.2	13.8	13.2	13.2	15.9
OCT1	1987	1.6	1.6	1.6	1.6	1.6	16.4	17.9	16.4	16.5	14.6	12.7	13.2	12.7	12.7	11.9
OCT2	1987	1.7	1.7	1.7	1.6	1.6	17.8	18.0	17.8	13.5	9.6	13.5	13.6	13.5	11.7	10.0
OCT3	1987	1.7	1.7	1.7	1.7	1.7	19.3	19.5	19.3	9.1	9.3	14.4	14.5	14.4	10.0	10.1
OCT4	1987	1.7	1.7	1.7	1.7	1.7	13.4	12.8	10.2	8.8	8.9	12.2	12.0	10.8	10.1	10.2
NOV1	1987	1.8	1.8	1.8	1.7	1.7	8.3	8.1	8.1	7.8	7.8	10.2	10.1	10.1	9.9	10.0
NOV2	1987	1.8	1.8	1.8	1.7	1.7	8.6	9.4	10.0	8.3	8.4	10.6	11.0	11.3	10.5	10.5
NOV3	1987	1.8	1.9	1.8	1.8	1.8	7.0	7.0	7.3	7.2	7.2	10.0	10.0	10.2	10.1	10.1
NOV4	1987	1.9	1.9	1.9	1.9	1.9	9.2	8.0	9.2	9.4	8.3	11.5	10.8	11.5	11.6	11.0
DEC1	1987	2.0	2.0	2.0	1.9	1.9	8.2	8.3	8.3	8.5	8.5	11.3	11.3	11.3	11.4	11.4
DEC2	1987	2.0	2.0	2.0	2.0	2.0	9.0	9.0	9.0	9.3	9.3	12.0	12.0	12.0	12.1	12.1
DEC3	1987	2.1	2.1	2.1	2.0	2.0	8.1	8.1	8.1	8.4	8.4	11.7	11.7	11.7	11.8	11.8
DEC4	1987	2.1	2.1	2.1	2.0	2.0	8.9	8.9	8.9	9.2	9.2	12.3	12.3	12.3	12.5	12.5
JAN1	1987	2.1	2.1	2.1	2.0	2.0	9.1	9.1	9.1	9.3	9.3	12.7	12.7	12.7	12.8	12.8
JAN2	1987	2.1	2.1	2.1	2.1	2.1	10.2	10.2	10.2	10.3	10.3	13.5	13.5	13.5	13.5	13.5
JAN3	1987	2.2	2.3	2.2	2.2	2.2	10.2	10.3	10.3	10.5	10.5	13.7	13.7	13.7	13.8	13.8
JAN4	1987	2.4	2.4	2.4	2.3	2.3	10.5	10.5	10.5	10.6	10.6	13.8	13.8	13.8	13.8	13.8
FEB1	1987	2.5	2.5	2.5	2.4	2.4	9.8	9.8	9.8	9.9	10.0	13.5	13.5	13.5	13.5	13.5
FEB2	1987	2.5	2.5	2.5	2.5	2.5	9.9	10.0	9.9	10.1	10.2	13.5	13.6	13.5	13.6	13.6
FEB3	1987	2.6	2.6	2.6	2.6	2.6	9.3	9.4	9.3	9.5	9.6	13.1	13.1	13.1	13.2	13.2
FEB4	1987	2.7	2.7	2.7	2.7	2.7	9.2	9.3	9.2	9.4	9.5	12.9	13.0	12.9	13.0	13.1
MAR1	1987	2.8	2.8	2.8	2.7	2.7	10.9	11.0	10.9	10.9	11.0	13.7	13.7	13.7	13.7	13.8
MAR2	1987	2.8	2.8	2.8	2.7	2.7	9.0	9.1	9.0	9.2	9.2	12.4	12.5	12.4	12.5	12.6
MAR3	1987	2.8	2.8	2.8	2.7	2.7	9.5	9.6	9.4	9.4	9.6	12.5	12.6	12.5	12.4	12.5
MAR4	1987	2.8	2.8	2.8	2.7	2.7	9.1	9.3	9.1	9.3	9.4	12.1	12.2	12.1	12.2	12.3
APR1	1987	2.8	2.8	2.8	2.7	2.7	9.2	9.2	9.1	9.1	9.1	11.8	11.8	11.8	11.8	11.8
APR2	1987	2.7	2.7	2.7	2.7	2.7	6.9	6.8	6.8	6.8	6.8	10.1	10.1	10.1	10.1	10.1
APR3	1987	2.7	2.7	2.7	2.6	2.6	4.7	4.7	4.7	4.7	4.7	8.1	8.1	8.1	8.1	8.1
APR4	1987	2.5	2.5	2.5	2.5	2.5	4.9	4.9	4.9	4.9	4.9	8.2	8.3	8.2	8.2	8.3
MAY1	1987	2.3	2.3	2.3	2.3	2.3	4.3	4.3	4.2	4.3	4.3	7.3	7.3	7.3	7.3	7.3
MAY2	1987	2.1	2.1	2.1	2.0	2.0	3.7	3.6	3.6	3.6	3.5	6.6	6.5	6.5	6.3	6.3
MAY3	1987	1.8	1.7	1.8	1.7	1.7	3.1	3.0	3.1	3.0	3.0	5.6	5.5	5.6	5.5	5.4
MAY4	1987	1.5	1.5	1.5	1.5	1.5	3.4	3.1	3.5	3.6	3.6	6.4	6.1	6.5	6.5	6.5
JUN1	1987	1.4	1.3	1.4	1.4	1.4	1.9	1.8	1.9	2.2	2.1	5.4	5.3	5.4	5.6	5.6
JUN2	1987	1.3	1.2	1.3	1.3	1.3	1.7	1.6	1.7	1.9	1.7	4.3	4.3	4.3	4.5	4.4
JUN3	1987	1.1	1.1	1.1	1.2	1.1	1.6	1.5	1.6	1.8	1.8	5.0	5.0	5.0	5.1	5.1
JUN4	1987	1.1	1.1	1.1	1.2	1.2	2.5	2.5	2.6	2.9	2.8	5.7	5.7	5.7	5.9	5.8
JUL1	1987	1.1	1.1	1.1	1.1	1.1	3.3	3.2	3.2	3.7	3.6	6.1	6.0	6.0	6.2	6.2
JUL2	1987	1.2	1.2	1.2	1.2	1.2	4.9	5.0	5.0	5.9	5.1	7.1	7.2	7.2	7.5	7.2
JUL3	1987	1.2	1.2	1.2	1.2	1.2	8.8	8.3	7.4	9.3	9.2	8.7	8.6	8.2	8.9	8.9

NA = no action, PA = proposed action, CE = cumulative effects

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
JUL4	1987	1.3	1.3	1.3	1.3	1.3	10.4	10.5	9.0	8.8	10.7	9.3	9.4	8.8	8.7	9.4
AUG1	1987	1.3	1.3	1.3	1.3	1.3	11.9	12.0	11.5	11.5	12.1	9.8	9.9	9.7	9.7	9.9
AUG2	1987	1.4	1.4	1.4	1.4	1.4	5.9	6.3	6.7	7.4	6.8	7.4	7.6	7.7	8.0	7.8
AUG3	1987	1.4	1.5	1.4	1.4	1.4	23.5	23.9	23.5	23.4	23.8	14.0	14.1	14.0	14.0	14.1
AUG4	1987	1.5	1.5	1.5	1.5	1.5	8.8	8.1	8.8	9.3	9.0	8.6	8.3	8.6	8.8	8.6
SEP1	1987	1.5	1.6	1.5	1.5	1.5	11.1	11.5	10.9	11.8	11.5	9.7	9.9	9.7	10.0	9.9
SEP2	1987	1.6	1.6	1.6	1.6	1.6	10.5	10.0	9.9	10.6	10.6	9.6	9.4	9.4	9.6	9.6
SEP3	1987	1.6	1.6	1.6	1.5	1.6	11.0	10.6	10.6	11.0	10.9	10.0	9.8	9.8	10.0	9.9
SEP4	1987	1.6	1.6	1.6	1.6	1.6	11.5	11.5	11.5	11.5	11.5	10.4	10.4	10.4	10.4	10.4
OCT1	1988	1.6	1.6	1.6	1.6	1.6	14.7	18.0	17.8	17.6	17.8	12.0	13.3	13.2	13.1	13.2
OCT2	1988	1.7	1.7	1.7	1.6	1.6	13.8	15.0	13.9	17.9	18.3	11.9	12.3	11.9	13.5	13.7
OCT3	1988	1.7	1.7	1.7	1.7	1.7	11.7	11.7	11.7	12.3	12.3	11.2	11.2	11.2	11.5	11.5
OCT4	1988	1.7	1.7	1.7	1.7	1.7	10.5	10.6	10.5	11.1	11.1	11.0	11.0	11.0	11.2	11.2
NOV1	1988	1.8	1.8	1.8	1.7	1.7	10.0	10.0	10.0	10.4	10.4	11.1	11.1	11.1	11.3	11.3
NOV2	1988	1.8	1.8	1.8	1.8	1.8	9.4	9.4	9.4	9.7	9.7	11.0	11.0	11.0	11.2	11.2
NOV3	1988	1.8	1.8	1.8	1.8	1.8	9.4	9.4	9.4	9.7	9.7	11.3	11.3	11.3	11.4	11.4
NOV4	1988	1.8	1.8	1.8	1.8	1.8	10.8	9.2	10.8	11.1	9.4	12.3	11.5	12.3	12.5	11.6
DEC1	1988	1.9	1.9	1.9	1.9	1.9	8.3	8.3	8.3	8.6	8.6	11.3	11.3	11.3	11.5	11.5
DEC2	1988	2.0	2.0	2.0	2.0	2.0	8.2	8.2	8.2	8.5	8.5	11.5	11.5	11.5	11.7	11.7
DEC3	1988	2.0	2.1	2.1	2.0	2.0	8.7	8.7	8.7	8.9	8.9	12.0	12.0	12.0	12.1	12.1
DEC4	1988	2.1	2.1	2.1	2.1	2.1	9.0	9.1	9.0	9.4	9.4	12.4	12.5	12.5	12.6	12.6
JAN1	1988	2.1	2.1	2.1	2.1	2.1	9.2	9.2	9.2	9.6	9.6	12.8	12.8	12.8	13.0	13.0
JAN2	1988	2.1	2.1	2.1	2.1	2.1	8.6	8.6	8.6	8.9	8.9	12.6	12.6	12.6	12.7	12.7
JAN3	1988	2.2	2.2	2.2	2.2	2.2	8.5	8.5	8.5	8.8	8.8	12.6	12.6	12.6	12.7	12.7
JAN4	1988	2.3	2.3	2.3	2.3	2.3	8.9	9.0	9.0	9.1	9.1	12.9	12.9	12.9	13.0	13.0
FEB1	1988	2.4	2.4	2.4	2.4	2.4	9.7	9.8	9.7	9.9	9.9	13.4	13.4	13.4	13.5	13.5
FEB2	1988	2.5	2.5	2.5	2.4	2.4	9.7	9.8	9.8	9.9	10.0	13.4	13.4	13.4	13.5	13.5
FEB3	1988	2.5	2.5	2.5	2.5	2.5	9.7	9.7	9.7	9.9	9.9	13.3	13.3	13.3	13.4	13.4
FEB4	1988	2.4	2.5	2.4	2.4	2.4	9.7	9.8	9.7	10.0	10.0	13.2	13.3	13.2	13.4	13.4
MAR1	1988	2.5	2.5	2.5	2.5	2.5	9.6	9.6	9.5	9.8	9.8	13.0	13.0	13.0	13.1	13.1
MAR2	1988	2.6	2.6	2.6	2.6	2.6	11.2	11.3	11.2	11.5	11.6	13.8	13.8	13.8	13.9	14.0
MAR3	1988	2.6	2.6	2.6	2.6	2.6	11.2	11.5	11.2	11.2	11.6	13.6	13.8	13.5	13.6	13.8
MAR4	1988	2.7	2.7	2.7	2.7	2.7	10.9	11.3	10.8	10.9	11.3	13.1	13.4	13.1	13.1	13.4
APR1	1988	2.7	2.7	2.7	2.7	2.7	11.6	11.9	11.5	11.6	12.0	13.2	13.3	13.1	13.1	13.3
APR2	1988	2.7	2.7	2.7	2.7	2.7	9.7	9.6	9.6	9.7	9.7	11.8	11.8	11.8	11.8	11.8
APR3	1988	2.7	2.7	2.7	2.7	2.7	9.6	9.8	9.6	9.7	9.9	11.6	11.7	11.5	11.6	11.7
APR4	1988	2.7	2.7	2.7	2.7	2.7	11.2	12.0	11.0	11.2	12.4	12.1	12.5	12.0	12.1	12.7
MAY1	1988	2.7	2.7	2.7	2.7	2.7	13.9	14.0	13.2	13.1	14.1	13.0	13.1	12.7	12.6	13.1
MAY2	1988	2.7	2.7	2.7	2.7	2.7	12.3	12.2	12.1	12.5	12.7	12.0	11.9	11.9	12.0	12.1
MAY3	1988	2.7	2.7	2.7	2.6	2.7	6.3	6.2	6.3	6.8	6.6	8.6	8.6	8.6	8.9	8.7
MAY4	1988	2.6	2.6	2.6	2.6	2.6	10.1	10.2	10.1	9.8	9.6	10.4	10.5	10.4	10.2	10.1
JUN1	1988	2.5	2.5	2.5	2.4	2.4	5.4	4.6	5.3	5.3	5.0	7.8	7.3	7.7	7.6	7.5
JUN2	1988	2.2	2.2	2.2	2.1	2.1	3.8	3.5	3.6	4.3	4.2	6.2	5.9	6.0	6.6	6.6
JUN3	1988	2.1	2.0	2.0	2.0	2.0	5.4	5.2	5.6	6.7	6.6	7.6	7.5	7.7	8.2	8.1
JUN4	1988	1.9	1.8	1.9	1.9	1.9	3.6	3.4	3.6	4.0	4.0	6.2	6.1	6.2	6.4	6.4
JUL1	1988	1.8	1.8	1.8	1.9	1.9	3.3	3.3	3.3	4.2	4.1	6.1	6.1	6.1	6.5	6.5
JUL2	1988	1.9	1.8	1.8	1.9	1.9	4.6	4.4	4.4	5.1	5.1	6.8	6.7	6.7	7.0	7.0
JUL3	1988	1.9	1.9	1.9	2.0	2.0	5.6	4.9	5.1	7.0	6.6	7.4	7.1	7.2	7.9	7.8
JUL4	1988	2.1	2.0	2.1	2.1	2.0	4.1	4.0	4.3	4.9	4.8	6.5	6.4	6.6	6.8	6.7
AUG1	1988	2.1	2.1	2.1	2.1	2.1	5.8	5.8	5.8	6.1	6.1	7.1	7.0	7.0	7.2	7.2
AUG2	1988	2.1	2.1	2.1	2.1	2.1	11.4	10.8	10.3	12.1	11.1	9.6	9.3	9.1	9.8	9.4
AUG3	1988	2.2	2.2	2.2	2.2	2.2	5.6	5.7	5.5	6.3	6.3	7.3	7.3	7.2	7.5	7.5
AUG4	1988	2.2	2.2	2.3	2.2	2.2	6.4	6.5	6.3	7.1	7.1	7.7	7.7	7.7	8.0	8.0
SEP1	1988	2.3	2.3	2.3	2.3	2.3	18.9	20.3	18.4	18.3	18.4	12.7	13.2	12.5	12.5	12.5
SEP2	1988	2.3	2.3	2.3	2.3	2.3	11.7	12.1	11.6	12.2	12.2	10.1	10.3	10.1	10.3	10.3
SEP3	1988	2.3	2.3	2.3	2.3	2.3	12.3	12.3	12.2	12.6	12.6	10.5	10.5	10.5	10.6	10.6
SEP4	1988	2.3	2.3	2.4	2.3	2.3	18.0	18.2	18.0	17.5	17.7	13.0	13.1	13.0	12.8	12.8
OCT1	1989	2.4	2.4	2.4	2.4	2.4	17.9	19.1	18.0	16.6	16.5	13.3	13.7	13.3	12.8	12.7
OCT2	1989	2.4	2.4	2.4	2.4	2.4	14.3	14.3	14.4	13.5	13.9	12.1	12.1	12.1	11.7	11.9
OCT3	1989	2.5	2.5	2.5	2.4	2.4	14.9	14.9	14.9	13.9	14.2	12.7	12.7	12.7	12.2	12.3
OCT4	1989	2.5	2.5	2.5	2.5	2.5	17.3	17.3	17.3	16.9	16.8	14.0	14.0	14.0	13.8	13.8
NOV1	1989	2.5	2.5	2.5	2.5	2.5	18.1	18.1	18.1	14.6	15.2	14.8	14.8	14.8	13.3	13.5
NOV2	1989	2.6	2.6	2.6	2.5	2.5	14.6	14.6	14.6	13.5	13.6	13.6	13.6	13.6	13.0	13.1
NOV3	1989	2.6	2.6	2.6	2.6	2.6	15.9	15.9	15.9	15.6	15.6	14.6	14.6	14.6	14.4	14.4
NOV4	1989	2.8	2.8	2.8	2.7	2.7	15.9	16.9	15.9	15.5	16.3	14.9	15.4	14.9	14.7	15.1
DEC1	1989	2.8	2.9	2.9	2.8	2.8	17.3	17.3	17.3	16.9	17.0	16.0	16.0	16.0	15.8	15.8
DEC2	1989	2.9	2.9	2.9	2.9	2.9	17.5	17.6	17.5	17.1	17.1	16.5	16.5	16.5	16.2	16.3
DEC3	1989	2.9	2.9	2.9	2.9	2.9	17.8	17.9	17.8	17.4	17.4	16.9	17.0	16.9	16.7	16.7
DEC4	1989	3.0	3.0	3.0	3.0	3.0	17.6	17.7	17.6	17.2	17.3	17.1	17.1	17.1	16.9	16.9
JAN1	1989	3.1	3.1	3.1	3.1	3.1	17.4	17.5	17.4	17.1	17.1	17.3	17.4	17.4	17.2	17.2
JAN2	1989	3.2	3.2	3.2	3.1	3.1	17.3	17.3	17.3	17.0	17.0	17.5	17.5	17.5	17.3	17.3
JAN3	1989	3.2	3.2	3.2	3.2	3.2	15.8	15.8	15.8	15.6	15.6	16.8	16.8	16.8	16.7	16.7
JAN4	1989	3.3	3.3	3.3	3.2	3.2	13.9	13.9	13.9	13.9	13.9	15.9	15.9	15.9	15.8	15.8
FEB1	1989	3.3	3.3	3.3	3.2	3.2	12.7	12.7	12.7	12.8	12.8	15.2	15.2	15.2	15.2	15.2
FEB2	1989	3.3	3.3	3.3	3.3	3.2	11.7	11.7	11.7	11.8	11.8	14.6	14.6	14.6	14.6	14.6
FEB3	1989	3.3	3.3	3.4	3.3	3.3	11.4	11.4	11.4	11.4	11.4	14.3	14.3	14.3	14.3	14.3
FEB4	1989	3.4	3.4	3.5	3.4	3.4	11.8	11.8	11.8	11.8	11.8	14.4	14.4	14.4	14.4	14.4
MAR1	1989	3.4	3.4	3.4	3.4	3.3	11.0	11.0	11.0	11.1	11.1	13.8	13.8	13.8	13.8	13.8
MAR2	1989	3.3	3.3	3.3	3.3	3.2	11.5	11.6	11.6	11.6	11.7	13.9	14.0	14.0	14.0	14.0
MAR3	1989	3.2	3.2	3.2	3.2	3.2	15.3	17.4	16.4	9.3	9.3	15.8	16.9	16.4	12.4	12.4
MAR4	1989	3.2	3.2	3.2	3.2	3.2	9.8	9.8	9.7	9.8	9.9	12.5	12.5	12.5	12.5	12.6
APR1	1989	3.2	3.2	3.2	3.2	3.2	9.2	9.2	9.0	9.2	9.4	11.8	11.8	11.7	11.8	11.9
APR2	1989	3.2	3.2	3.2	3.2	3.2	9.3	9.5	9.5	9.6	9.6	11.6	11.7	11.7	11.8	11.8
APR3	1989	3.2	3.2	3.2	3.2	3.2	8.8	8.7	8.7	8.8	9.4	11.1	11.1	11.1	11.1	11.4
APR4	1989	3.2	3.2	3.2	3.2	3.2	9.7	9.3	9.6	9.9	9.8	11.4	11.1	11.3	11.4	11.4
MAY1	1989	3.0	3.0	3.1	3.1	3.1	11.5	10.9	11.0	11.3	11.4	11.9	11.6	11.6	11.8	11.8
MAY2	1989	3.0	3.0	3.0	3.0	3.0	9.4	9.7	10.2	10.0	9.8	10.6	10.7	10.9	10.8	10.7
MAY3	1989	2.9	2.9	3.0	3.0	2.9	6.8	5.8	6.9	7.2	7.2	9.0	8.3	9.0	9.1	9.1
MAY4	1989	2.8	2.8	2.8	2.8	2.8	7.1	6.3	6.7	9.2	8.3	9.0	8.6	8.8	10.0	9.5
JUN1	1989	2.6	2.5	2.6	2.6	2.6	5.0	5.0	5.1	5.8	5.8	7.6	7.6	7.7	8.0	8.0
JUN2	1989	2.5	2.4	2.5	2.5	2.5	5.7	5.7	5.7	6.5	6.5	7.7	7.7	7.7	8.1	8.1
JUN3	1989	2.2	2.1	2.2	2.3	2.3	4.1	4.1	4.1	5.3	5.2	6.9	6.9	6.9	7.5	7.4
JUN4	1989	2.2	2.1	2.1	2.3	2.3	4.2	4.3	4.2	5.0	5.1	6.9	7.0	6.9	7.2	7.3

NA = no action, PA = proposed action, CE = cumulative effects

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
JUL1	1989	2.3	2.2	2.2	2.4	2.3	3.7	3.8	3.7	4.6	4.7	6.5	6.5	6.5	6.9	6.9
JUL2	1989	2.3	2.3	2.3	2.4	2.3	3.7	3.7	3.7	5.3	5.4	5.9	5.9	5.9	6.9	7.0
JUL3	1989	2.4	2.4	2.4	2.4	2.4	5.3	5.1	5.4	5.9	5.7	7.1	7.1	7.2	7.4	7.3
JUL4	1989	2.4	2.4	2.4	2.4	2.4	4.2	4.2	4.2	4.8	4.8	6.4	6.4	6.4	6.7	6.6
AUG1	1989	2.4	2.4	2.4	2.4	2.4	5.2	5.1	5.2	5.6	5.5	6.9	6.9	7.0	7.1	7.0
AUG2	1989	2.4	2.4	2.4	2.4	2.4	6.1	5.8	6.2	6.5	6.3	7.4	7.3	7.4	7.5	7.4
AUG3	1989	2.4	2.4	2.4	2.4	2.4	10.5	10.3	10.7	13.7	13.1	9.3	9.2	9.4	10.5	10.3
AUG4	1989	2.6	2.6	2.6	2.6	2.6	12.6	13.3	12.9	14.0	12.8	10.2	10.5	10.3	10.7	10.2
SEP1	1989	2.7	2.7	2.7	2.7	2.7	13.5	13.5	13.5	15.0	13.9	10.7	10.7	10.7	11.2	10.9
SEP2	1989	2.8	2.8	2.8	2.8	2.8	14.6	14.6	14.7	15.1	14.5	11.3	11.3	11.3	11.4	11.2
SEP3	1989	2.8	2.8	2.8	2.8	2.8	20.8	21.7	20.8	19.6	19.9	13.8	14.1	13.8	13.3	13.4
SEP4	1989	2.9	2.9	2.9	2.9	2.9	20.0	21.4	21.0	19.7	20.0	13.7	14.3	14.1	13.6	13.7
OCT1	1990	2.9	2.9	3.0	2.9	2.9	24.2	24.4	24.2	21.7	22.2	15.7	15.8	15.7	14.7	14.9
OCT2	1990	3.0	3.0	3.0	3.0	3.0	15.5	15.6	15.6	14.9	15.9	12.6	12.6	12.6	12.3	12.7
OCT3	1990	3.0	3.0	3.1	3.0	3.0	16.9	16.6	16.9	15.9	16.2	13.5	13.4	13.5	13.0	13.2
OCT4	1990	3.1	3.1	3.1	3.0	3.1	17.0	16.5	17.0	16.3	16.0	13.9	13.7	13.9	13.5	13.4
NOV1	1990	3.1	3.1	3.1	3.1	3.1	15.8	15.3	15.9	15.6	15.2	13.8	13.6	13.8	13.7	13.5
NOV2	1990	3.1	3.1	3.2	3.1	3.1	16.2	16.0	16.4	15.6	15.3	14.3	14.3	14.4	14.1	13.9
NOV3	1990	3.3	3.3	3.3	3.3	3.3	16.4	16.4	16.4	16.2	16.2	14.8	14.8	14.8	14.7	14.7
NOV4	1990	3.5	3.5	3.5	3.4	3.4	16.2	16.7	16.2	16.0	16.5	15.0	15.3	15.0	15.0	15.2
DEC1	1990	3.6	3.6	3.6	3.5	3.5	17.0	17.1	17.0	16.7	16.7	15.9	15.9	15.9	15.7	15.7
DEC2	1990	3.6	3.7	3.7	3.6	3.6	17.3	17.4	17.3	16.9	17.0	16.4	16.4	16.4	16.2	16.2
DEC3	1990	3.7	3.8	3.8	3.7	3.7	19.7	19.8	19.7	19.0	19.1	17.9	17.9	17.9	17.5	17.5
DEC4	1990	3.8	3.9	3.9	3.8	3.8	14.7	14.8	14.7	14.6	14.7	15.6	15.6	15.6	15.5	15.6
JAN1	1990	4.0	4.0	4.0	3.9	3.9	18.0	18.0	18.0	17.6	17.6	17.6	17.7	17.6	17.4	17.4
JAN2	1990	4.2	4.4	4.3	4.2	4.3	18.1	18.1	18.1	17.7	17.7	17.9	17.9	17.9	17.7	17.7
JAN3	1990	4.5	4.7	4.6	4.5	4.6	16.7	16.8	16.7	16.5	16.5	17.3	17.3	17.3	17.1	17.2
JAN4	1990	4.5	4.7	4.6	4.6	4.6	15.9	16.0	16.0	15.8	15.8	16.9	17.0	17.0	16.9	16.9
FEB1	1990	4.5	4.7	4.6	4.6	4.6	14.7	14.8	14.7	14.6	14.7	16.3	16.4	16.3	16.3	16.3
FEB2	1990	4.6	4.8	4.7	4.7	4.7	14.4	14.6	14.5	14.4	14.4	16.1	16.2	16.1	16.1	16.1
FEB3	1990	4.7	4.9	4.8	4.8	4.9	13.0	13.2	13.1	13.1	13.2	15.2	15.3	15.3	15.2	15.3
FEB4	1990	4.6	4.7	4.7	4.6	4.7	13.5	13.7	13.6	13.5	13.6	15.4	15.5	15.4	15.4	15.4
MAR1	1990	4.5	4.5	4.5	4.4	4.5	12.0	12.1	12.1	11.9	12.0	14.3	14.4	14.3	14.3	14.3
MAR2	1990	4.5	4.6	4.6	4.4	4.4	13.2	13.4	13.2	13.0	13.3	14.8	15.0	14.8	14.8	14.9
MAR3	1990	4.5	4.5	4.6	4.4	4.4	18.9	20.2	18.7	16.4	15.6	17.6	18.3	17.5	16.4	15.9
MAR4	1990	4.5	4.5	4.5	4.4	4.4	18.2	19.4	18.2	15.6	14.7	17.0	17.5	16.9	15.6	15.2
APR1	1990	4.5	4.4	4.5	4.4	4.3	16.5	17.9	16.6	12.7	12.3	15.7	16.3	15.7	13.7	13.5
APR2	1990	4.4	4.4	4.5	4.4	4.3	16.9	15.6	16.9	13.8	13.0	15.5	14.9	15.5	14.0	13.6
APR3	1990	4.4	4.3	4.5	4.4	4.3	16.3	12.2	16.5	12.4	12.2	14.9	12.9	15.0	13.0	12.9
APR4	1990	4.3	4.3	4.4	4.4	4.2	14.1	12.5	12.4	12.5	12.6	13.5	12.7	12.7	12.7	12.7
MAY1	1990	4.2	4.1	4.3	4.2	4.0	8.8	8.8	9.0	8.9	8.8	10.3	10.3	10.4	10.3	10.3
MAY2	1990	4.1	4.0	4.1	4.1	3.9	10.7	10.8	10.5	10.5	11.0	11.1	11.2	11.0	11.0	11.2
MAY3	1990	4.1	4.0	4.2	4.1	4.0	16.5	14.9	16.3	14.2	16.7	13.5	12.8	13.4	12.4	13.6
MAY4	1990	4.0	4.0	4.1	4.1	3.9	8.7	7.9	9.0	8.6	8.3	9.4	8.9	9.6	9.3	9.2
JUN1	1990	3.3	2.9	3.3	3.1	3.0	6.2	5.6	6.1	6.4	6.2	7.9	7.7	7.9	8.1	8.0
JUN2	1990	2.2	1.7	2.0	2.0	1.8	2.6	1.7	2.3	2.4	2.1	5.0	4.5	4.9	4.9	4.8
JUN3	1990	1.9	1.8	1.8	1.8	1.8	3.0	2.8	3.0	3.8	3.7	6.3	6.2	6.3	6.7	6.6
JUN4	1990	2.3	2.3	2.4	2.3	2.3	4.0	4.1	4.2	4.9	4.7	6.7	6.7	6.8	7.2	7.0
JUL1	1990	2.3	2.4	2.4	2.4	2.4	5.1	5.1	5.2	5.4	5.3	7.1	7.0	7.1	7.1	7.1
JUL2	1990	2.1	2.1	2.2	2.2	2.2	5.1	5.0	5.1	5.3	5.2	6.8	6.8	6.8	6.9	6.9
JUL3	1990	2.2	2.2	2.2	2.2	2.2	4.6	4.5	4.7	4.9	4.7	6.5	6.5	6.5	6.6	6.5
JUL4	1990	2.3	2.4	2.3	2.3	2.4	5.8	5.7	5.9	6.1	5.9	7.2	7.1	7.2	7.3	7.2
AUG1	1990	2.3	2.4	2.4	2.4	2.4	8.5	8.0	8.6	8.6	8.1	8.4	8.2	8.4	8.4	8.2
AUG2	1990	2.3	2.4	2.4	2.4	2.4	16.4	14.1	14.0	13.2	13.3	11.4	10.6	10.6	10.2	10.3
AUG3	1990	2.4	2.5	2.5	2.5	2.5	6.9	6.6	7.3	7.6	7.1	7.7	7.6	7.9	8.0	7.8
AUG4	1990	2.6	2.8	2.7	2.7	2.8	9.8	9.0	9.9	10.9	9.9	9.1	8.8	9.1	9.5	9.1
SEP1	1990	2.8	3.0	2.9	3.0	3.0	12.2	11.4	12.3	13.9	12.7	10.2	9.9	10.3	10.8	10.4
SEP2	1990	3.0	3.2	3.1	3.1	3.2	16.4	15.4	16.6	17.5	15.8	12.0	11.6	12.0	12.3	11.7
SEP3	1990	3.1	3.2	3.2	3.2	3.2	19.9	20.3	20.0	19.7	19.2	13.5	13.6	13.5	13.4	13.2
SEP4	1990	3.1	3.3	3.2	3.2	3.3	13.7	13.8	14.8	15.7	14.3	11.3	11.3	11.7	12.1	11.5
OCT1	1991	3.1	3.3	3.2	3.2	3.3	12.3	12.6	12.4	13.1	12.9	11.0	11.1	11.0	11.3	11.2
OCT2	1991	3.1	3.3	3.2	3.2	3.3	12.5	12.8	12.6	12.1	12.9	11.3	11.4	11.4	11.1	11.5
OCT3	1991	3.1	3.2	3.2	3.2	3.2	11.0	11.1	11.1	11.3	11.2	10.9	11.0	10.9	11.0	11.0
OCT4	1991	3.1	3.2	3.1	3.2	3.2	10.6	10.8	10.7	10.9	10.8	11.0	11.1	11.0	11.1	11.0
NOV1	1991	3.0	3.1	3.1	3.1	3.1	10.1	10.2	10.1	10.4	10.2	11.1	11.1	11.1	11.2	11.2
NOV2	1991	3.1	3.2	3.1	3.1	3.2	9.8	9.8	9.8	9.9	9.8	11.2	11.2	11.2	11.2	11.2
NOV3	1991	3.2	3.2	3.2	3.2	3.3	15.3	15.4	15.4	15.2	15.2	14.3	14.3	14.3	14.2	14.2
NOV4	1991	3.3	3.4	3.4	3.4	3.4	16.6	17.0	16.6	16.2	16.6	15.2	15.4	15.2	15.0	15.2
DEC1	1991	3.4	3.5	3.5	3.5	3.5	19.9	20.0	19.9	19.1	19.2	17.2	17.3	17.3	16.9	16.9
DEC2	1991	3.6	3.8	3.7	3.7	3.8	19.9	20.0	19.9	19.2	19.2	17.6	17.7	17.6	17.2	17.3
DEC3	1991	3.9	4.1	4.0	4.0	4.1	21.1	21.2	21.1	20.2	20.2	18.5	18.6	18.5	18.1	18.1
DEC4	1991	4.2	4.5	4.4	4.4	4.5	17.7	17.8	17.7	17.3	17.4	17.1	17.2	17.2	16.9	17.0
JAN1	1991	5.2	7.0	5.9	6.4	9.1	12.5	13.4	13.0	13.1	14.1	14.6	15.1	14.9	14.9	15.5
JAN2	1991	6.5	8.9	7.5	8.3	10.1	14.2	15.6	14.9	15.1	15.9	15.7	16.4	16.1	16.2	16.6
JAN3	1991	6.8	8.5	7.6	8.1	9.0	15.0	16.3	15.7	15.9	16.5	16.3	17.0	16.7	16.7	17.0
JAN4	1991	6.7	7.7	7.3	7.6	7.8	15.0	15.7	15.5	15.5	15.6	16.4	16.8	16.6	16.6	16.7
FEB1	1991	6.5	7.3	6.9	7.2	7.8	16.2	16.7	16.5	16.3	16.7	17.1	17.4	17.2	17.1	17.3
FEB2	1991	6.4	7.1	6.7	7.0	7.6	15.3	15.9	15.6	15.5	16.0	16.6	16.9	16.7	16.7	16.9
FEB3	1991	6.1	6.3	6.4	6.6	6.1	15.6	15.8	15.8	15.7	15.4	16.7	16.8	16.8	16.7	16.6
FEB4	1991	5.5	5.4	6.1	6.2	5.0	16.8	16.8	17.2	16.8	16.2	17.2	17.2	17.4	17.2	16.8
MAR1	1991	5.0	4.9	5.4	5.3	4.7	16.8	16.8	17.0	16.6	16.3	17.0	17.0	17.1	16.9	16.8
MAR2	1991	4.9	4.8	5.1	4.9	4.7	18.1	19.1	18.6	18.1	18.5	17.5	18.0	17.8	17.5	17.7
MAR3	1991	4.8	4.7	5.0	4.9	4.6	19.5	22.4	20.1	13.6	12.9	17.9	19.3	18.2	14.8	14.4
MAR4	1991	4.8	4.7	4.9	4.8	4.5	18.9	22.4	19.7	13.4	12.5	17.3	19.0	17.7	14.5	14.0
APR1	1991	4.7	4.6	4.8	4.7	4.4	19.0	12.3	14.9	13.1	12.1	16.9	13.5	14.8	13.9	13.4
APR2	1991	4.7	4.6	4.8	4.7	4.4	12.6	12.3	13.3	12.4	12.2	13.4	13.2	13.7	13.3	13.2
APR3	1991	4.7	4.6	4.8	4.7	4.4	13.9	14.3	13.8	13.7	14.2	13.7	13.9	13.6	13.6	13.9
APR4	1991	4.7	4.6	4.8	4.7	4.5	15.6	16.8	15.6	15.4	16.5	14.2	14.7	14.2	14.1	14.6
MAY1	1991	4.7	4.6	4.8	4.7	4.5	11.4	11.3	12.8	12.2	11.3	11.7	11.7	12.4	12.1	11.7
MAY2	1991	4.6	4.4	4.7	4.6	4.2	12.1	13.0	12.9	13.0	13.5	11.8	12.3	12.2	12.2	12.5
MAY3	1991	4.5	4.3	4.6	4.4	4.0	17.9	13.3	16.1	13.7	11.9	14.1	12.1	13.3	12.3	11.4
MAY4	1991	3.4	2.6	3.1	2.3	1.7	6.5	4.8	5.8	5.2	4.3	8.5	7.7	8.2	7.9	7.5
JUN1	1991	2.5	1.8	2.1	1.8	1.5	6.0	5.1	5.5	5.7	5.4	7.9	7.5	7.7	7.8	7.7

NA = no action, PA = proposed action, CE = cumulative effects

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
JUN2	1991	2.3	2.1	2.2	1.9	1.9	3.0	2.7	2.8	2.8	2.8	5.3	5.2	5.2	5.5	5.5
JUN3	1991	2.2	1.9	2.1	1.9	1.9	3.5	3.1	3.4	3.6	3.5	6.2	6.0	6.2	6.3	6.3
JUN4	1991	2.1	2.0	2.1	2.2	2.2	3.7	3.5	3.7	4.7	4.7	6.5	6.4	6.5	7.0	7.0
JUL1	1991	2.4	2.5	2.5	2.6	2.6	4.2	4.3	4.4	5.2	5.0	6.6	6.7	6.7	7.0	6.9
JUL2	1991	2.8	2.9	2.9	2.9	3.0	5.2	5.3	5.4	5.8	5.8	6.9	7.0	7.0	7.2	7.2
JUL3	1991	3.1	3.1	3.2	3.1	3.1	6.4	6.4	6.5	6.8	6.7	7.3	7.4	7.4	7.5	7.5
JUL4	1991	3.1	3.0	3.1	3.0	2.9	5.8	5.8	5.9	6.0	5.8	7.0	7.0	7.0	7.1	7.0
AUG1	1991	2.9	2.8	2.9	2.8	2.6	7.6	7.2	7.6	7.4	7.0	7.8	7.6	7.8	7.7	7.5
AUG2	1991	2.4	2.0	2.2	2.1	1.8	6.7	5.8	6.4	6.3	5.6	7.5	7.1	7.4	7.3	7.0
AUG3	1991	2.3	2.3	2.2	2.2	2.3	7.6	7.1	7.6	8.0	7.7	8.0	7.8	8.0	8.2	8.0
AUG4	1991	2.6	2.9	2.7	2.7	2.9	10.4	10.1	10.6	11.2	10.6	9.3	9.2	9.4	9.6	9.4
SEP1	1991	3.0	3.4	3.1	3.2	3.6	10.6	10.6	10.8	11.5	11.2	9.5	9.5	9.6	9.8	9.7
SEP2	1991	3.3	3.5	3.4	3.5	3.6	12.8	12.8	13.0	14.4	13.5	10.6	10.5	10.6	11.2	10.8
SEP3	1991	3.5	3.7	3.5	3.6	3.8	14.8	15.8	14.9	16.4	15.4	11.5	11.9	11.6	12.1	11.7
SEP4	1991	3.6	3.8	3.6	3.9	4.1	23.2	27.0	23.2	21.4	21.8	14.9	16.3	14.9	14.2	14.4
OCT1	1992	3.6	3.9	3.7	3.9	4.2	20.0	21.6	19.8	19.2	19.8	14.1	14.7	14.0	13.8	14.0
OCT2	1992	3.7	4.0	3.8	4.0	4.2	17.4	17.3	17.5	16.0	16.2	13.4	13.3	13.4	12.8	12.9
OCT3	1992	3.7	4.0	3.8	4.0	4.3	18.6	18.4	18.6	16.6	16.8	14.2	14.1	14.2	13.3	13.4
OCT4	1992	3.8	4.0	3.9	4.0	4.3	21.5	21.4	20.8	18.1	18.3	15.7	15.7	15.4	14.3	14.4
NOV1	1992	3.8	3.9	3.8	4.0	4.2	12.9	13.0	13.1	12.5	12.8	12.4	12.5	12.5	12.2	12.4
NOV2	1992	3.7	3.8	3.7	3.9	4.0	15.8	15.7	15.9	14.5	14.8	14.1	14.0	14.1	13.5	13.6
NOV3	1992	3.8	4.0	3.8	4.0	4.4	15.0	15.1	15.0	14.8	14.9	14.0	14.1	14.1	13.9	14.0
NOV4	1992	4.2	4.8	4.5	4.5	4.8	15.3	15.9	15.4	15.2	15.7	14.6	14.9	14.6	14.5	14.7
DEC1	1992	4.7	5.4	5.0	5.2	6.0	18.0	18.3	18.1	17.6	17.9	16.3	16.5	16.4	16.1	16.3
DEC2	1992	4.7	5.2	5.0	5.1	5.5	19.6	19.8	19.6	19.0	19.1	17.4	17.6	17.5	17.1	17.2
DEC3	1992	4.7	5.1	4.9	5.1	5.3	19.5	19.7	19.5	18.9	19.0	17.7	17.8	17.8	17.4	17.5
DEC4	1992	4.7	4.8	4.9	5.0	4.7	17.3	17.4	17.4	17.1	17.0	16.9	17.0	17.0	16.8	16.7
JAN1	1992	4.6	4.6	4.9	5.0	4.6	14.9	15.0	15.2	15.0	14.8	16.0	16.0	16.1	16.0	15.9
JAN2	1992	4.6	4.8	4.9	5.0	4.8	13.8	13.9	14.1	14.0	13.9	15.5	15.6	15.7	15.6	15.6
JAN3	1992	4.5	4.6	4.8	4.8	4.5	13.8	13.9	14.0	13.9	13.7	15.7	15.7	15.8	15.7	15.6
JAN4	1992	4.5	4.5	4.7	4.7	4.5	13.6	13.6	13.8	13.7	13.5	15.6	15.6	15.7	15.6	15.6
FEB1	1992	4.4	4.5	4.6	4.6	4.5	13.2	13.2	13.3	13.2	13.1	15.4	15.4	15.5	15.4	15.4
FEB2	1992	4.4	4.5	4.6	4.7	4.6	13.5	13.6	13.7	13.6	13.5	15.5	15.6	15.7	15.6	15.6
FEB3	1992	4.4	4.4	4.5	4.6	4.5	13.5	13.5	13.6	13.5	13.5	15.5	15.5	15.6	15.5	15.5
FEB4	1992	4.2	4.2	4.3	4.3	4.3	14.3	14.3	14.4	14.2	14.2	15.8	15.8	15.9	15.8	15.7
MAR1	1992	4.1	4.1	4.2	4.2	4.2	14.4	14.4	14.5	14.2	14.2	15.7	15.7	15.7	15.6	15.5
MAR2	1992	4.1	4.1	4.2	4.2	4.2	17.5	17.9	17.6	17.0	17.4	17.1	17.3	17.1	16.8	17.0
MAR3	1992	4.0	4.0	4.1	4.1	4.0	19.1	20.3	18.8	13.8	13.1	17.6	18.2	17.5	14.9	14.5
MAR4	1992	3.9	3.9	4.0	4.0	3.9	17.8	18.9	17.6	13.2	12.3	16.7	17.3	16.6	14.3	13.8
APR1	1992	3.8	3.7	3.8	3.8	3.7	12.3	10.3	12.7	10.9	10.3	13.4	12.3	13.6	12.7	12.3
APR2	1992	3.9	4.0	4.0	4.1	4.3	12.7	12.0	13.3	12.8	12.2	13.3	13.0	13.6	13.4	13.1
APR3	1992	4.2	4.4	4.4	4.8	4.6	9.5	9.6	9.6	9.9	9.7	11.2	11.3	11.3	11.4	11.3
APR4	1992	4.1	4.0	4.2	4.3	4.0	9.8	10.1	9.8	10.3	10.3	11.3	11.4	11.2	11.5	11.5
MAY1	1992	3.7	3.3	3.6	3.5	3.0	10.1	9.3	9.8	9.5	9.3	11.1	10.7	11.0	10.8	10.7
MAY2	1992	3.3	2.8	3.1	2.9	2.6	9.8	8.7	9.6	9.4	8.7	10.7	10.2	10.6	10.5	10.2
MAY3	1992	2.9	2.2	2.6	2.2	1.7	7.5	5.1	7.1	6.3	5.4	9.4	8.2	9.2	8.7	8.4
MAY4	1992	2.5	2.1	2.2	1.9	1.8	5.1	4.5	4.7	5.3	5.2	7.7	7.4	7.6	7.9	7.8
JUN1	1992	2.5	2.2	2.4	2.2	2.1	6.8	6.4	6.7	7.9	7.8	8.4	8.2	8.4	8.9	8.9
JUN2	1992	2.1	1.8	1.9	1.9	1.9	3.7	2.9	3.3	3.7	3.6	6.5	6.1	6.3	6.6	6.5
JUN3	1992	1.9	1.8	1.8	1.9	1.9	4.4	4.1	4.2	5.5	5.3	7.0	6.9	6.9	7.6	7.5
JUN4	1992	1.9	1.8	1.8	1.9	1.9	3.7	3.4	3.6	4.2	4.0	6.2	6.1	6.1	6.4	6.4
JUL1	1992	1.9	1.9	1.9	2.0	1.9	4.4	4.4	4.5	5.2	4.8	6.8	6.8	6.9	7.1	6.9
JUL2	1992	2.2	2.3	2.2	2.3	2.4	4.3	4.4	4.4	4.9	4.9	6.6	6.6	6.6	6.8	6.8
JUL3	1992	2.4	2.5	2.5	2.5	2.6	6.1	5.8	6.2	6.6	6.5	7.5	7.4	7.5	7.7	7.6
JUL4	1992	2.5	2.5	2.5	2.5	2.5	5.8	5.7	5.8	6.5	6.4	7.3	7.2	7.3	7.6	7.5
AUG1	1992	2.6	2.6	2.6	2.6	2.7	5.6	5.4	5.6	6.2	6.0	7.2	7.1	7.2	7.4	7.3
AUG2	1992	2.5	2.4	2.5	2.5	2.3	9.0	8.0	9.0	9.1	8.2	8.7	8.3	8.6	8.7	8.3
AUG3	1992	2.5	2.6	2.5	2.5	2.6	7.3	7.0	7.2	7.5	7.6	7.9	7.8	7.9	8.0	8.0
AUG4	1992	2.6	2.7	2.7	2.6	2.5	4.2	4.3	4.3	4.7	4.8	5.8	5.8	5.9	6.3	6.4
SEP1	1992	2.7	2.6	2.6	2.6	2.5	7.1	7.2	7.3	8.5	8.1	8.1	8.1	8.1	8.6	8.5
SEP2	1992	2.8	2.8	2.7	2.7	2.8	7.3	7.5	7.3	8.5	8.2	8.3	8.4	8.3	8.8	8.6
SEP3	1992	2.9	3.0	2.9	3.0	3.1	9.5	9.9	9.4	10.8	10.4	9.4	9.5	9.3	9.9	9.8
SEP4	1992	3.1	3.2	3.1	3.2	3.3	14.3	15.3	14.6	15.5	15.6	11.6	11.9	11.7	12.0	12.0
OCT1	1993	3.3	3.6	3.4	3.5	3.8	16.7	18.1	16.9	18.1	17.4	12.9	13.4	12.9	13.4	13.1
OCT2	1993	3.4	3.7	3.5	3.6	3.9	20.4	22.2	20.5	18.8	18.9	14.6	15.3	14.6	13.9	14.0
OCT3	1993	3.4	3.6	3.5	3.6	3.7	17.5	17.9	17.6	16.4	16.5	13.8	13.9	13.8	13.3	13.3
OCT4	1993	3.5	3.7	3.6	3.6	3.7	14.7	14.8	14.8	14.3	14.4	12.9	12.9	12.9	12.7	12.7
NOV1	1993	3.8	4.4	4.1	4.3	5.1	13.1	13.6	13.3	13.1	13.6	12.6	12.8	12.7	12.6	12.8
NOV2	1993	4.1	5.4	4.8	5.3	6.3	11.6	12.7	12.2	12.3	13.0	12.1	12.6	12.4	12.4	12.8
NOV3	1993	4.3	4.7	4.7	4.8	5.0	13.8	14.0	14.0	13.8	13.8	13.6	13.7	13.7	13.5	13.5
NOV4	1993	4.1	4.3	4.2	4.2	4.3	15.3	17.2	15.4	14.9	14.9	14.6	15.5	14.7	14.4	14.4
DEC1	1993	4.0	4.2	4.1	4.1	4.1	17.0	17.0	17.0	16.4	16.3	15.9	15.9	15.9	15.6	15.5
DEC2	1993	4.0	4.1	4.1	4.0	4.0	18.4	18.4	18.4	17.8	17.4	16.9	16.9	16.9	16.6	16.4
DEC3	1993	4.0	4.1	4.0	4.0	4.1	19.6	19.7	19.7	18.9	18.9	17.9	17.9	17.9	17.5	17.5
DEC4	1993	3.9	3.9	3.9	3.9	3.7	16.8	16.8	16.8	16.2	16.1	16.7	16.7	16.7	16.4	16.4
JAN1	1993	3.8	3.8	3.8	3.8	3.7	14.1	14.1	14.1	13.9	13.8	15.6	15.6	15.6	15.4	15.4
JAN2	1993	4.2	4.8	4.4	4.6	5.5	13.1	13.4	13.2	13.2	13.7	15.2	15.3	15.2	15.2	15.5
JAN3	1993	4.9	6.0	5.3	5.7	7.0	15.1	15.7	15.3	15.2	15.8	16.4	16.7	16.5	16.4	16.8
JAN4	1993	5.7	7.4	6.4	7.0	8.5	15.0	15.8	15.3	15.3	16.0	16.4	16.9	16.6	16.6	16.9
FEB1	1993	6.3	8.1	7.1	7.7	9.3	14.6	15.6	15.1	15.1	15.8	16.2	16.7	16.5	16.4	16.8
FEB2	1993	6.4	7.9	7.1	7.6	8.6	15.0	15.8	15.4	15.3	15.8	16.4	16.8	16.6	16.5	16.8
FEB3	1993	5.8	6.4	6.2	6.4	6.2	14.8	15.1	15.0	14.8	14.7	16.2	16.4	16.3	16.2	16.1
FEB4	1993	5.1	5.0	5.2	5.2	4.4	15.0	15.0	15.0	14.7	14.3	16.2	16.2	16.2	16.0	15.8
MAR1	1993	4.8	4.9	5.1	4.9	4.9	14.9	14.9	15.0	14.6	14.6	15.9	16.0	16.0	15.8	15.8
MAR2	1993	4.9	5.0	5.1	5.0	5.0	15.8	18.5	15.9	15.4	16.6	16.3	17.6	16.3	16.0	16.6
MAR3	1993	4.9	4.9	5.0	4.9	4.8	14.9	15.0	14.8	10.6	10.3	15.5	15.6	15.4	13.1	12.9
MAR4	1993	4.8	4.8	4.9	4.8	4.6	17.9	18.4	17.9	14.3	13.3	16.8	17.0	16.8	14.9	14.3
APR1	1993	4.7	4.7	4.8	4.7	4.5	14.3	12.2	13.8	12.5	11.9	14.5	13.4	14.2	13.5	13.2
APR2	1993	4.6	4.6	4.7	4.6	4.5	11.1	10.7	11.3	10.9	10.6	12.5	12.3	12.6	12.4	12.2
APR3	1993	4.7	4.7	4.8	4.7	4.6	10.8	10.5	10.7	10.6	10.4	12.1	11.9	12.0	12.0	11.9
APR4	1993	4.7	4.7	4.8	4.7	4.6	10.3	10.2	10.5	10.4	10.2	11.5	11.5	11.6	11.6	11.4
MAY1	1993	4.5	4.3	4.5	4.3	4.0	9.2	9.0	9.5	9.4	8.9	10.6	10.6	10.8	10.7	10.5
MAY2	1993	4.3	4.0	4.3	4.1	3.6	8.8	8.6	8.9	8.4	8.8	10.1	10.1	10.2	10.0	10.2

NA = no action, PA = proposed action, CE = cumulative effects

Selenium Model - Quarter Monthly Concentration (ug/L)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	**Water Year**	**1 - Existing**	**2 - NA**	**3 - PA**	**4 - PA CE**	**5 - NA CE**	**1 - Existing**	**2 - NA**	**3 - PA**	**4 - PA CE**	**5 - NA CE**	**1 - Existing**	**2 - NA**	**3 - PA**	**4 - PA CE**	**5 - NA CE**
MAY3	1993	3.8	2.8	3.3	2.8	2.1	5.1	4.0	4.7	4.2	3.4	7.8	7.3	7.6	7.3	6.9
MAY4	1993	2.4	2.2	2.2	1.8	1.7	3.1	2.6	2.7	2.1	2.0	5.9	5.5	5.7	5.3	5.2
JUN1	1993	2.3	1.8	2.1	1.7	1.6	3.2	2.4	2.9	2.4	2.2	6.0	5.6	5.8	5.6	5.5
JUN2	1993	2.1	1.7	2.0	1.9	1.6	3.3	2.8	3.0	3.5	3.0	6.5	6.2	6.3	6.6	6.4
JUN3	1993	1.5	1.3	1.4	1.4	1.4	2.0	1.4	1.7	1.9	1.9	4.6	4.3	4.5	4.5	4.5
JUN4	1993	1.2	1.2	1.2	1.3	1.3	1.1	1.1	1.2	1.6	1.4	4.6	4.6	4.7	4.8	4.7
JUL1	1993	1.2	1.1	1.2	1.2	1.1	1.7	1.5	1.6	2.1	2.0	5.3	5.3	5.3	5.5	5.5
JUL2	1993	1.3	1.4	1.4	1.3	1.4	2.1	2.1	2.2	2.1	2.1	5.5	5.5	5.5	5.5	5.5
JUL3	1993	1.5	1.6	1.6	1.6	1.6	3.1	3.2	3.2	3.0	3.0	6.0	6.0	6.0	6.0	6.0
JUL4	1993	1.7	1.8	1.8	1.8	1.9	5.3	5.6	5.3	5.9	6.2	7.2	7.3	7.2	7.4	7.5
AUG1	1993	2.1	2.3	2.2	2.3	2.5	7.2	7.7	7.4	8.2	8.7	7.9	8.1	8.0	8.3	8.5
AUG2	1993	2.4	2.7	2.6	2.6	2.9	5.3	5.6	5.6	6.2	6.5	7.1	7.2	7.2	7.4	7.5
AUG3	1993	2.7	3.0	2.9	2.9	3.3	6.0	6.4	6.4	7.1	7.6	7.4	7.6	7.5	7.8	8.0
AUG4	1993	2.9	3.2	3.1	3.1	3.4	8.0	7.9	8.3	8.2	9.2	8.3	8.3	8.5	8.4	8.8
SEP1	1993	2.9	3.1	3.1	3.1	3.2	14.0	13.4	14.2	15.2	14.5	10.9	10.7	10.9	11.3	11.1
SEP2	1993	2.9	3.1	3.1	3.1	3.4	8.8	8.7	9.0	9.6	9.6	8.9	8.9	9.0	9.2	9.2
SEP3	1993	3.0	3.2	3.2	3.2	3.5	12.8	12.4	13.0	13.3	13.0	10.8	10.6	10.8	10.9	10.8
SEP4	1993	3.1	3.3	3.2	3.2	3.6	16.5	16.5	16.7	16.3	16.5	12.4	12.4	12.5	12.4	12.4
OCT1	1994	3.1	3.4	3.3	3.3	3.7	13.1	13.4	13.3	13.6	13.9	11.4	11.5	11.5	11.6	11.7
OCT2	1994	3.2	3.4	3.4	3.4	3.6	15.8	16.0	15.9	15.8	16.0	12.8	12.8	12.8	12.7	12.8
OCT3	1994	3.2	3.3	3.3	3.4	3.4	13.5	13.6	13.6	13.4	13.4	12.0	12.1	12.1	12.0	12.0
OCT4	1994	3.2	3.3	3.3	3.3	3.4	12.5	12.7	12.7	12.3	12.4	11.9	12.0	12.0	11.8	11.9
NOV1	1994	3.2	3.3	3.3	3.3	3.3	12.5	12.7	12.6	12.4	12.4	12.3	12.4	12.4	12.2	12.2
NOV2	1994	3.2	3.3	3.3	3.2	3.2	13.2	13.3	13.3	12.9	12.9	13.0	13.0	13.0	12.8	12.8
NOV3	1994	3.2	3.3	3.3	3.2	3.3	16.0	16.0	16.0	15.8	15.8	14.6	14.6	14.6	14.5	14.5
NOV4	1994	3.4	3.7	3.5	3.5	4.0	16.3	17.4	16.3	15.9	17.0	15.1	15.7	15.1	14.9	15.4
DEC1	1994	3.5	3.8	3.6	3.7	4.0	17.9	18.0	17.9	17.5	17.6	16.3	16.4	16.4	16.1	16.2
DEC2	1994	3.5	3.8	3.7	3.7	3.9	17.5	17.7	17.6	17.1	17.2	16.5	16.6	16.5	16.3	16.3
DEC3	1994	3.5	3.6	3.6	3.7	3.6	17.7	17.8	17.8	17.4	17.4	16.9	17.0	16.9	16.7	16.7
DEC4	1994	4.1	5.1	4.5	4.8	6.1	15.3	15.8	15.5	15.4	16.1	15.9	16.2	16.0	16.0	16.3
JAN1	1994	4.7	5.7	5.2	5.4	6.1	18.9	19.3	19.1	18.6	18.8	18.2	18.3	18.2	18.0	18.1
JAN2	1994	4.9	5.7	5.3	5.5	6.1	19.8	20.1	20.0	19.3	19.5	18.8	18.9	18.9	18.5	18.6
JAN3	1994	5.3	6.1	5.7	6.0	6.6	18.5	18.7	18.6	18.1	18.3	18.2	18.4	18.3	18.0	18.1
JAN4	1994	5.6	6.5	6.1	6.3	7.0	16.5	16.9	16.7	16.4	16.7	17.3	17.4	17.4	17.2	17.3
FEB1	1994	5.5	6.0	5.9	6.0	6.2	16.4	16.6	16.5	16.2	16.3	17.2	17.3	17.3	17.1	17.1
FEB2	1994	5.1	5.3	5.3	5.4	5.4	16.3	16.4	16.3	16.0	16.1	17.1	17.2	17.1	16.9	17.0
FEB3	1994	4.7	4.8	4.8	5.0	4.8	15.2	15.2	15.2	15.0	15.0	16.4	16.5	16.4	16.3	16.3
FEB4	1994	4.5	4.8	4.7	4.9	5.0	15.5	15.7	15.6	15.4	15.5	16.5	16.6	16.5	16.4	16.4
MAR1	1994	4.6	4.9	4.7	5.0	5.2	15.1	15.3	15.2	15.0	15.2	16.1	16.2	16.1	16.0	16.1
MAR2	1994	4.6	4.9	4.8	5.1	5.2	15.9	16.2	16.0	15.7	15.9	16.3	16.4	16.3	16.2	16.3
MAR3	1994	4.7	4.9	4.8	5.1	5.2	18.4	20.4	19.3	13.6	13.1	17.3	18.3	17.7	14.8	14.5
MAR4	1994	4.6	4.8	4.8	4.9	4.9	18.6	16.9	18.6	13.5	12.7	17.1	16.3	17.1	14.4	14.0
APR1	1994	4.6	4.8	4.8	5.0	5.0	11.9	11.3	11.6	11.6	11.5	13.2	12.9	13.1	13.0	12.9
APR2	1994	4.6	4.7	4.7	4.9	4.8	10.1	10.0	10.2	10.3	10.1	11.9	11.8	11.9	12.0	11.9
APR3	1994	4.7	4.9	4.8	5.0	5.0	9.6	9.6	9.4	9.6	9.8	11.4	11.4	11.3	11.4	11.5
APR4	1994	4.6	4.6	4.6	4.7	4.4	8.4	8.4	8.5	8.6	8.3	10.3	10.4	10.4	10.5	10.3
MAY1	1994	4.4	4.1	4.3	4.2	4.1	7.9	7.6	8.0	8.0	7.6	9.7	9.6	9.8	9.8	9.6
MAY2	1994	4.2	4.2	4.2	4.3	4.3	5.7	5.7	5.7	5.7	5.7	7.2	7.2	7.2	7.2	7.2
MAY3	1994	2.8	2.1	2.5	2.1	1.6	4.4	3.4	4.1	3.4	2.6	7.0	6.5	6.9	6.4	5.9
MAY4	1994	1.9	1.7	1.8	1.5	1.4	3.6	3.1	3.4	2.8	2.6	6.5	6.1	6.4	5.9	5.8
JUN1	1994	2.4	2.4	2.4	2.3	2.4	3.5	3.4	3.4	3.3	3.4	5.1	4.9	5.0	4.8	4.9
JUN2	1994	2.0	1.9	2.0	2.1	2.1	2.7	2.4	2.6	2.8	2.9	5.4	5.3	5.4	5.5	5.5
JUN3	1994	1.8	1.7	1.8	1.9	1.8	2.7	2.6	2.7	3.3	3.2	5.7	5.7	5.7	6.0	6.0
JUN4	1994	1.8	1.8	1.8	1.9	2.0	2.9	3.0	2.8	3.5	3.5	6.0	6.0	5.9	6.3	6.2
JUL1	1994	2.3	2.7	2.5	2.7	2.9	5.7	6.4	5.9	6.8	7.3	7.5	7.7	7.6	7.9	8.1
JUL2	1994	2.8	3.1	3.0	3.1	3.2	12.1	12.1	10.6	12.0	14.0	10.1	10.1	9.5	10.0	10.7
JUL3	1994	3.0	3.1	3.1	3.2	3.1	14.5	14.6	13.9	15.4	15.3	10.9	10.9	10.7	11.2	11.1
JUL4	1994	3.0	2.9	3.0	2.9	2.8	11.7	12.4	12.0	12.4	12.7	9.8	10.0	9.9	10.0	10.1
AUG1	1994	2.9	2.8	2.9	2.9	2.8	17.6	18.7	17.6	16.8	18.6	11.9	12.2	11.9	11.6	12.2
AUG2	1994	3.0	3.1	3.1	3.1	3.1	16.5	17.8	16.6	16.5	18.7	11.5	11.9	11.5	11.5	12.3
AUG3	1994	3.2	3.4	3.3	3.3	3.3	8.3	8.0	8.4	9.8	9.5	8.4	8.3	8.5	9.0	8.9
AUG4	1994	3.4	3.7	3.5	3.5	3.6	10.5	10.4	10.6	11.4	12.2	9.3	9.3	9.4	9.7	10.0
SEP1	1994	3.5	3.7	3.6	3.6	3.6	11.5	11.4	11.6	12.3	11.7	9.8	9.8	9.8	10.1	9.9
SEP2	1994	3.6	3.8	3.7	3.6	3.7	9.7	9.6	9.8	10.9	10.7	9.3	9.2	9.3	9.8	9.7
SEP3	1994	3.7	3.8	3.8	3.6	3.7	10.2	10.0	10.3	10.6	10.4	9.7	9.6	9.7	9.8	9.7
SEP4	1994	3.8	4.0	3.9	3.8	4.0	13.1	13.3	13.3	13.3	13.4	11.1	11.2	11.1	11.1	11.2
OCT1	1995	3.9	4.1	4.0	3.9	4.0	13.4	13.5	13.5	13.2	13.6	11.4	11.4	11.4	11.3	11.5
OCT2	1995	3.8	3.8	3.9	3.8	3.7	12.9	12.9	12.9	12.6	12.8	11.5	11.5	11.5	11.4	11.5
OCT3	1995	3.7	3.6	3.7	3.6	3.5	11.7	11.6	11.6	11.6	11.6	11.2	11.2	11.2	11.2	11.2
OCT4	1995	3.7	3.6	3.6	3.6	3.6	11.7	11.7	11.7	11.7	11.7	11.5	11.5	11.5	11.5	11.5
NOV1	1995	3.7	3.6	3.6	3.6	3.5	11.6	11.6	11.6	12.1	12.1	11.9	11.9	11.9	12.1	12.1
NOV2	1995	3.8	3.8	3.8	3.7	3.7	13.1	13.1	13.1	12.7	12.8	12.9	12.9	12.9	12.7	12.7
NOV3	1995	3.9	4.1	4.1	3.9	4.1	15.8	15.9	15.9	15.4	15.4	14.5	14.6	14.6	14.3	14.4
NOV4	1995	4.1	4.4	4.2	4.2	4.4	14.2	15.0	14.3	14.0	14.8	14.1	14.5	14.1	14.0	14.4
DEC1	1995	4.2	4.4	4.3	4.3	4.5	12.3	12.5	12.4	12.3	12.5	13.5	13.6	13.6	13.5	13.6
DEC2	1995	4.2	4.5	4.4	4.3	4.6	11.3	11.6	11.5	11.5	11.6	13.3	13.4	13.3	13.3	13.4
DEC3	1995	4.2	4.5	4.4	4.4	4.6	13.5	13.6	13.5	13.3	13.5	14.7	14.8	14.7	14.6	14.7
DEC4	1995	4.4	4.9	4.7	4.7	5.3	17.5	17.7	17.6	17.1	17.3	17.0	17.1	17.1	16.8	16.9
JAN1	1995	4.7	5.2	4.9	5.0	5.4	17.7	17.8	17.7	17.3	17.4	17.5	17.6	17.5	17.3	17.3
JAN2	1995	4.9	5.5	5.2	5.3	5.9	17.8	18.0	17.9	17.4	17.5	17.7	17.8	17.8	17.5	17.6
JAN3	1995	5.4	6.5	5.9	6.1	7.5	18.1	18.4	18.2	17.7	18.1	18.0	18.2	18.1	17.8	18.0
JAN4	1995	6.0	7.3	6.7	6.9	8.1	17.8	18.2	18.0	17.5	17.8	18.0	18.2	18.1	17.8	17.9
FEB1	1995	6.4	7.8	7.2	7.3	8.6	18.6	19.0	18.8	18.0	18.4	18.4	18.6	18.5	18.1	18.3
FEB2	1995	6.1	7.0	6.6	6.6	7.0	18.9	19.3	19.1	18.2	18.3	18.5	18.7	18.6	18.1	18.2
FEB3	1995	5.8	6.4	6.2	6.2	6.5	17.0	17.2	17.1	16.5	16.6	17.4	17.5	17.5	17.1	17.2
FEB4	1995	5.8	6.6	6.2	6.5	7.4	15.8	16.3	16.0	15.7	16.2	16.6	16.9	16.8	16.6	16.8
MAR1	1995	6.4	7.0	7.1	7.4	7.7	14.6	15.0	15.0	14.9	15.0	15.8	16.0	16.0	15.9	16.0
MAR2	1995	6.1	6.2	6.5	6.8	6.8	14.4	14.6	14.7	14.6	14.7	15.5	15.6	15.6	15.5	15.6
MAR3	1995	5.7	6.1	6.0	6.5	6.6	19.6	20.7	19.7	13.6	13.3	17.9	18.5	18.0	14.7	14.6
MAR4	1995	5.6	5.9	5.8	6.2	6.2	14.2	16.2	16.1	13.0	12.5	14.8	15.9	15.8	14.2	13.9
APR1	1995	5.4	5.6	5.6	5.9	5.9	12.7	12.6	12.9	13.0	12.7	13.7	13.5	13.7	13.8	13.6
APR2	1995	5.3	5.4	5.5	5.7	5.1	12.2	12.0	12.2	12.0	11.6	13.1	12.9	13.0	12.9	12.7
APR3	1995	5.2	5.3	5.4	5.5	5.1	10.6	10.6	10.6	10.6	10.4	11.8	11.8	11.8	11.8	11.7

Selenium Model - Quarter Monthly Concentration (ug/L)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
APR4	1995	5.2	5.3	5.3	5.4	5.2	9.4	9.5	9.5	9.5	9.4	10.8	10.8	10.8	10.8	10.8
MAY1	1995	5.1	5.1	5.2	5.2	4.9	8.9	9.0	9.0	9.0	8.8	10.2	10.2	10.2	10.2	10.1
MAY2	1995	5.0	5.0	5.1	5.0	4.7	10.1	10.1	10.1	10.0	9.9	10.6	10.7	10.7	10.6	10.5
MAY3	1995	4.4	3.4	4.1	3.3	2.6	5.2	4.5	5.0	4.5	3.9	6.9	6.6	6.9	6.6	6.3
MAY4	1995	2.7	2.0	2.4	2.1	1.8	4.5	3.8	4.2	4.0	3.8	6.5	6.1	6.4	6.3	6.1
JUN1	1995	2.2	1.9	2.0	1.9	1.8	4.2	3.9	4.1	3.7	3.5	6.0	5.9	6.0	5.7	5.6
JUN2	1995	2.1	2.1	2.0	1.6	1.6	3.0	2.9	2.9	2.3	2.2	5.0	4.8	4.9	4.5	4.4
JUN3	1995	1.3	0.9	1.1	0.9	1.3	1.0	0.2	0.6	0.5	1.3	3.4	3.1	3.3	3.0	3.4
JUN4	1995	1.0	0.9	1.0	0.9	0.9	1.0	0.6	0.9	0.8	0.8	3.6	3.3	3.4	3.4	3.4
JUL1	1995	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.3	1.1	1.0	3.5	3.6	3.5	3.5	3.4
JUL2	1995	0.8	0.7	0.7	0.7	0.7	-0.1	-0.6	-0.3	-0.6	-0.4	2.9	2.7	2.7	2.7	2.7
JUL3	1995	0.8	0.8	0.8	0.8	0.8	-0.6	-0.6	-0.6	-0.5	-0.5	2.7	2.7	2.8	3.1	3.0
JUL4	1995	1.0	1.0	1.0	1.0	1.0	0.7	0.9	0.8	0.7	0.8	4.3	4.4	4.4	4.4	4.4
AUG1	1995	1.2	1.2	1.2	1.2	1.2	1.5	1.6	1.7	1.7	1.7	5.1	5.2	5.2	5.2	5.2
AUG2	1995	1.4	1.4	1.4	1.4	1.4	9.3	10.0	9.4	9.8	10.4	8.8	9.1	8.9	9.0	9.3
AUG3	1995	1.5	1.5	1.5	1.5	1.5	10.8	10.5	10.7	10.4	10.5	9.4	9.3	9.3	9.2	9.3
AUG4	1995	1.5	1.4	1.4	1.4	1.4	4.6	4.7	4.6	4.6	4.7	6.8	6.9	6.8	6.8	6.9
SEP1	1995	1.6	1.7	1.7	1.7	1.8	14.8	15.5	14.9	14.9	15.6	11.2	11.5	11.2	11.2	11.5
SEP2	1995	1.8	1.9	1.9	1.9	1.8	16.9	18.8	16.9	16.9	19.0	12.1	12.8	12.1	12.1	12.9
SEP3	1995	2.0	2.0	2.1	2.0	2.0	17.0	18.1	17.1	17.0	18.0	12.4	12.8	12.4	12.4	12.7
SEP4	1995	2.2	2.2	2.3	2.2	2.2	15.4	15.6	15.4	15.3	15.5	11.9	12.0	12.0	11.9	12.0
OCT1	1996	2.4	2.4	2.4	2.4	2.5	12.8	12.9	12.9	12.6	12.8	11.2	11.2	11.2	11.1	11.2
OCT2	1996	2.5	2.7	2.6	2.6	2.8	12.9	13.0	12.9	12.8	12.9	11.5	11.6	11.5	11.4	11.5
OCT3	1996	2.6	2.9	2.8	2.8	3.0	15.5	15.6	15.6	14.6	14.8	12.9	13.0	12.9	12.5	12.6
OCT4	1996	2.6	2.6	2.7	2.7	2.6	16.4	15.7	16.5	11.3	11.8	13.6	13.3	13.6	11.3	11.5
NOV1	1996	2.6	2.6	2.7	2.6	2.7	17.0	17.0	17.0	16.2	16.3	14.4	14.4	14.4	14.0	14.0
NOV2	1996	2.5	2.7	2.7	2.6	2.8	13.6	15.5	15.9	14.4	14.5	13.2	14.0	14.2	13.5	13.6
NOV3	1996	2.5	2.9	2.8	2.7	3.0	8.3	15.7	15.7	15.2	15.4	10.8	14.5	14.5	14.2	14.3
NOV4	1996	2.6	3.1	3.0	2.9	3.3	9.8	18.0	14.5	14.2	17.4	11.9	15.9	14.3	14.1	15.7
DEC1	1996	2.7	3.0	3.0	2.9	3.0	8.8	13.2	11.6	13.0	13.4	11.7	14.0	13.2	13.9	14.1
DEC2	1996	2.4	2.7	2.7	2.6	2.6	9.5	13.8	9.7	13.4	13.4	12.3	14.6	12.4	14.4	14.4
DEC3	1996	2.5	2.8	2.8	2.6	3.0	10.0	15.5	10.2	15.0	15.1	12.8	15.8	12.9	15.5	15.6
DEC4	1996	2.7	3.1	3.0	2.8	3.1	10.6	15.2	10.8	15.2	15.3	13.3	15.9	13.5	15.8	15.9
JAN1	1996	2.6	2.9	2.8	2.6	2.7	9.6	9.9	9.8	15.2	15.2	13.0	13.1	13.1	16.1	16.1
JAN2	1996	2.6	2.7	2.7	2.5	2.6	9.6	9.8	9.8	15.1	15.1	13.2	13.2	13.2	16.3	16.3
JAN3	1996	2.6	2.7	2.7	2.5	2.6	10.3	10.4	10.4	14.7	14.8	13.7	13.7	13.7	16.2	16.2
JAN4	1996	2.6	2.7	2.7	2.5	2.6	10.1	10.2	10.2	12.1	12.2	13.6	13.7	13.6	14.8	14.8
FEB1	1996	2.6	2.7	2.7	2.5	2.6	10.0	10.1	10.1	10.7	10.8	13.6	13.6	13.6	14.0	14.0
FEB2	1996	2.6	2.7	2.7	2.5	2.6	10.3	10.3	10.3	10.7	10.7	13.7	13.8	13.7	13.9	14.0
FEB3	1996	2.7	2.8	2.8	2.6	2.7	10.0	10.1	10.0	12.2	12.3	13.5	13.5	13.5	14.8	14.8
FEB4	1996	2.7	2.8	2.8	2.7	2.7	8.9	9.0	9.0	8.9	8.9	12.7	12.7	12.7	12.7	12.7
MAR1	1996	2.8	2.8	2.9	2.7	2.8	9.7	9.7	9.7	9.6	9.7	13.0	13.1	13.1	13.0	13.0
MAR2	1996	2.8	2.8	2.9	2.7	2.8	12.2	12.3	12.2	12.4	17.9	14.2	14.3	14.3	14.4	17.3
MAR3	1996	2.8	2.9	2.9	2.8	2.8	11.0	11.0	11.0	16.4	16.4	13.4	13.4	13.4	16.2	16.2
MAR4	1996	2.8	2.9	2.9	2.8	2.8	10.6	10.6	10.6	10.8	10.8	12.9	12.9	12.9	13.0	13.0
APR1	1996	2.8	2.9	2.9	2.8	2.9	8.5	8.6	8.6	8.5	8.6	11.4	11.4	11.4	11.4	11.4
APR2	1996	2.8	2.9	2.9	2.8	2.9	7.7	7.8	7.8	8.0	8.2	10.7	10.7	10.7	10.8	11.0
APR3	1996	2.8	2.8	2.8	2.8	2.9	10.6	10.9	10.9	15.3	14.0	12.0	12.1	12.1	14.3	13.6
APR4	1996	2.8	2.8	2.8	2.8	2.9	9.7	10.8	9.9	12.9	11.0	11.3	11.8	11.4	12.8	11.9
MAY1	1996	2.8	2.8	2.8	2.9	3.0	9.2	10.1	9.0	11.4	10.4	10.7	11.1	10.6	11.7	11.3
MAY2	1996	2.8	2.8	2.8	2.8	2.9	6.3	7.9	6.3	6.9	7.1	9.0	9.8	9.0	9.3	9.3
MAY3	1996	2.6	2.6	2.6	2.5	2.6	3.1	3.1	3.2	3.0	3.2	6.5	6.4	6.5	6.2	6.3
MAY4	1996	2.2	2.2	2.2	2.2	2.2	3.9	3.8	4.1	3.8	3.9	6.6	6.4	6.8	6.5	6.5
JUN1	1996	2.1	2.1	2.1	2.1	2.1	2.5	2.5	2.6	3.3	3.4	6.1	6.1	6.1	6.6	6.6
JUN2	1996	1.8	1.8	1.8	1.8	1.8	1.7	1.7	1.7	2.1	2.1	5.0	5.0	5.0	5.5	5.5
JUN3	1996	1.5	1.5	1.5	1.6	1.6	1.1	1.1	1.1	1.3	1.3	4.9	4.9	4.9	5.0	4.9
JUN4	1996	1.4	1.4	1.4	1.5	1.5	1.2	1.1	1.2	1.2	1.2	5.0	4.9	5.0	5.0	4.9
JUL1	1996	1.5	1.5	1.5	1.5	1.5	4.5	4.5	4.4	4.4	4.4	7.0	7.0	7.0	7.0	6.9
JUL2	1996	1.6	1.6	1.6	1.6	1.6	5.2	5.0	5.2	5.2	5.1	6.6	6.5	6.6	6.6	6.5
JUL3	1996	1.7	1.7	1.7	1.7	1.7	10.2	12.4	9.9	14.3	17.5	9.1	10.0	9.0	10.7	11.9
JUL4	1996	1.8	1.8	1.8	1.8	1.8	5.5	5.6	5.8	5.8	5.7	7.1	7.1	7.2	7.2	7.1
AUG1	1996	1.9	1.9	1.9	1.9	1.8	19.4	21.2	19.4	19.1	20.2	12.5	13.1	12.5	12.4	12.8
AUG2	1996	2.0	2.0	2.0	1.9	1.9	5.1	5.1	5.2	5.0	4.9	7.0	7.0	7.0	6.9	6.8
AUG3	1996	2.1	2.1	2.1	2.0	2.0	8.0	8.2	8.3	7.8	8.1	8.2	8.3	8.3	8.1	8.2
AUG4	1996	2.2	2.2	2.2	2.1	2.1	10.2	10.1	10.2	10.2	10.3	9.2	9.1	9.1	9.2	9.2
SEP1	1996	2.3	2.3	2.3	2.2	2.2	9.6	8.4	9.4	11.9	11.3	9.1	8.6	9.0	10.0	9.8
SEP2	1996	2.4	2.4	2.4	2.3	2.2	13.0	13.3	13.6	12.5	12.7	10.7	10.7	10.9	10.4	10.5
SEP3	1996	2.4	2.5	2.5	2.3	2.3	15.2	15.0	15.1	14.7	14.3	11.7	11.6	11.6	11.5	11.3
SEP4	1996	2.4	2.4	2.4	2.3	2.3	15.7	15.8	15.7	16.1	16.2	12.1	12.1	12.1	12.3	12.3
OCT1	1997	2.4	2.4	2.4	2.4	2.3	17.3	17.3	17.3	16.9	16.9	13.1	13.1	13.1	12.9	12.9
OCT2	1997	2.5	2.5	2.5	2.4	2.4	17.3	17.3	17.3	17.6	17.6	13.4	13.4	13.4	13.5	13.5
OCT3	1997	2.5	2.5	2.6	2.5	2.5	18.8	18.8	18.8	18.3	18.3	14.3	14.3	14.3	14.1	14.1
OCT4	1997	2.6	2.6	2.6	2.5	2.5	15.4	15.4	15.4	12.3	12.5	13.2	13.2	13.2	11.8	11.9
NOV1	1997	2.6	2.6	2.6	2.6	2.6	17.0	17.0	17.1	14.6	14.6	14.4	14.4	14.5	13.3	13.3
NOV2	1997	2.7	2.7	2.7	2.6	2.6	16.9	16.9	17.0	15.9	15.9	14.7	14.7	14.8	14.2	14.2
NOV3	1997	2.7	2.7	2.7	2.6	2.6	16.2	16.2	16.2	15.8	15.8	14.8	14.8	14.8	14.6	14.6
NOV4	1997	2.7	2.7	2.7	2.7	2.7	16.0	16.8	16.0	15.6	18.0	15.0	15.4	15.0	14.8	16.0
DEC1	1997	2.8	2.8	2.8	2.7	2.7	16.5	16.6	16.6	16.1	16.1	15.7	15.7	15.7	15.5	15.5
DEC2	1997	2.8	2.8	2.8	2.8	2.8	16.2	16.3	16.2	15.9	15.9	15.9	15.9	15.9	15.7	15.7
DEC3	1997	3.0	3.1	3.1	2.9	3.0	16.2	16.2	16.2	15.8	15.9	16.1	16.2	16.1	16.0	16.0
DEC4	1997	3.2	3.2	3.2	3.1	3.1	16.6	16.6	16.6	16.2	16.2	16.6	16.6	16.6	16.4	16.4
JAN1	1997	3.1	3.1	3.1	3.0	3.0	16.4	16.5	16.4	16.1	16.2	16.9	16.9	16.9	16.7	16.7
JAN2	1997	3.1	3.1	3.1	3.0	3.0	16.0	16.0	16.0	15.7	15.7	16.8	16.8	16.8	16.6	16.6
JAN3	1997	3.2	3.3	3.3	3.1	3.1	14.6	15.5	13.6	16.5	16.5	16.2	16.7	15.6	17.2	17.2
JAN4	1997	3.4	3.4	3.4	3.2	3.2	11.3	11.3	11.3	14.8	14.8	14.3	14.3	14.3	16.3	16.3
FEB1	1997	3.3	3.4	3.4	3.2	3.2	12.7	12.7	12.7	12.8	15.2	15.1	15.2	15.2	15.2	16.6
FEB2	1997	3.3	3.3	3.3	3.2	3.2	13.9	13.9	13.9	14.0	15.4	15.8	15.8	15.8	15.8	16.6
FEB3	1997	3.4	3.4	3.4	3.3	3.2	12.3	12.3	12.3	12.4	16.6	14.8	14.8	14.8	14.9	17.2
FEB4	1997	3.4	3.4	3.4	3.3	3.3	13.4	13.4	13.4	13.5	16.3	15.3	15.3	15.3	15.4	16.9
MAR1	1997	3.4	3.4	3.4	3.3	3.3	12.6	12.6	12.6	12.3	12.3	14.7	14.7	14.7	14.5	14.5
MAR2	1997	3.5	3.5	3.5	3.4	3.4	12.0	12.1	12.0	12.2	12.3	14.1	14.2	14.1	14.3	14.3
MAR3	1997	3.5	3.5	3.5	3.4	3.4	10.0	10.1	10.0	9.9	10.0	12.8	12.9	12.8	12.7	12.8
MAR4	1997	3.5	3.5	3.5	3.4	3.4	8.3	8.3	8.3	8.3	8.5	11.6	11.6	11.6	11.5	11.6

NA = no action, PA = proposed action, CE = cumulative effects

Selenium Model - Quarter Monthly Concentration (ug/L)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
APR1	1997	3.4	3.5	3.5	3.4	3.4	7.8	7.9	7.7	8.2	8.0	10.9	11.0	10.9	11.2	11.0
APR2	1997	3.4	3.4	3.4	3.3	3.4	10.0	9.1	9.1	9.1	9.2	12.0	11.5	11.5	11.4	11.5
APR3	1997	3.3	3.4	3.4	3.3	3.4	8.2	8.4	8.5	8.1	8.6	10.7	10.8	10.9	10.6	11.0
APR4	1997	3.3	3.4	3.4	3.3	3.4	10.3	10.9	10.6	10.1	10.5	11.3	11.6	11.5	11.2	11.4
MAY1	1997	3.3	3.4	3.4	3.3	3.4	10.5	10.8	10.7	10.6	10.5	11.2	11.3	11.3	11.2	11.2
MAY2	1997	3.3	3.3	3.3	3.3	3.4	9.3	9.4	8.7	8.7	8.9	10.3	10.3	10.0	9.9	10.1
MAY3	1997	3.3	3.3	3.3	3.3	3.3	5.9	5.7	5.9	5.4	5.5	8.0	7.9	8.1	7.7	7.7
MAY4	1997	3.1	3.1	3.1	3.0	3.1	5.1	4.7	5.1	4.8	4.8	7.4	7.0	7.4	7.1	7.1
JUN1	1997	2.5	2.5	2.5	2.5	2.5	3.6	3.5	3.7	3.7	3.7	5.8	5.7	5.9	5.8	5.8
JUN2	1997	1.7	1.7	1.8	1.7	1.8	1.9	2.0	1.9	2.1	2.1	3.5	3.8	3.5	4.0	4.0
JUN3	1997	1.4	1.3	1.3	1.4	1.4	0.9	0.8	0.9	1.1	1.1	3.5	3.5	3.5	3.6	3.6
JUN4	1997	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.8	1.7	4.6	4.6	4.6	4.7	4.6
JUL1	1997	1.4	1.4	1.4	1.5	1.5	2.6	2.6	2.6	2.8	2.8	5.7	5.8	5.7	5.8	5.8
JUL2	1997	1.5	1.5	1.5	1.6	1.6	4.3	4.4	4.3	4.2	4.2	6.7	6.8	6.7	6.7	6.7
JUL3	1997	1.6	1.6	1.6	1.7	1.6	5.7	6.0	5.7	5.6	5.6	7.4	7.5	7.4	7.3	7.3
JUL4	1997	1.7	1.7	1.7	1.7	1.7	8.9	8.9	8.5	8.5	9.0	8.5	8.5	8.4	8.4	8.6
AUG1	1997	1.7	1.7	1.7	1.7	1.7	5.3	5.3	5.4	5.5	5.3	6.7	6.7	6.8	6.8	6.7
AUG2	1997	1.8	1.7	1.8	1.8	1.7	4.4	4.4	4.4	4.4	4.4	6.3	6.3	6.3	6.3	6.3
AUG3	1997	1.8	1.8	1.8	1.8	1.8	6.8	6.8	6.8	6.8	6.7	7.7	7.7	7.7	7.6	7.6
AUG4	1997	1.9	1.9	2.0	1.9	1.9	9.1	9.3	9.1	8.9	9.1	8.7	8.8	8.7	8.6	8.7
SEP1	1997	2.1	2.1	2.1	2.0	2.0	7.9	7.6	7.9	7.9	8.1	8.4	8.2	8.4	8.3	8.4
SEP2	1997	2.2	2.2	2.2	2.1	2.1	13.7	13.0	13.7	13.1	14.1	10.9	10.6	10.9	10.7	11.1
SEP3	1997	2.3	2.3	2.3	2.2	2.2	11.5	11.5	11.6	11.0	12.1	10.2	10.2	10.3	10.0	10.5
SEP4	1997	2.3	2.3	2.4	2.2	2.2	8.2	8.1	8.2	8.3	8.5	9.0	9.0	9.0	9.0	9.1
OCT1	1998	2.4	2.4	2.4	2.3	2.2	18.4	19.8	18.3	17.5	20.2	13.5	14.1	13.5	13.2	14.2
OCT2	1998	2.4	2.4	2.4	2.3	2.3	18.1	16.7	18.1	17.1	17.2	13.7	13.2	13.7	13.3	13.3
OCT3	1998	2.4	2.5	2.5	2.4	2.3	10.8	10.9	10.9	11.2	11.5	10.9	10.9	10.9	11.1	11.2
OCT4	1998	2.5	2.5	2.5	2.4	2.4	10.5	10.5	10.6	10.4	10.6	10.9	10.9	10.9	10.9	11.0
NOV1	1998	2.5	2.6	2.6	2.5	2.5	12.7	15.0	12.7	11.0	10.3	12.4	13.5	12.4	11.6	11.3
NOV2	1998	2.6	2.6	2.6	2.5	2.5	10.4	10.7	10.4	10.3	10.3	11.6	11.8	11.6	11.6	11.6
NOV3	1998	2.6	2.6	2.6	2.5	2.5	10.5	10.5	10.5	10.4	10.4	11.9	11.9	11.9	11.9	11.9
NOV4	1998	2.7	2.7	2.7	2.6	2.6	10.9	12.0	10.9	10.8	11.8	12.4	13.0	12.4	12.4	12.9
DEC1	1998	2.8	2.8	2.9	2.8	2.8	9.8	9.9	9.8	9.8	9.9	12.2	12.2	12.2	12.1	12.2
DEC2	1998	3.0	3.0	3.0	2.9	2.9	10.4	10.5	10.5	10.4	10.4	12.8	12.8	12.8	12.8	12.8
DEC3	1998	3.2	3.2	3.2	3.1	3.1	15.5	15.5	15.5	15.1	15.2	15.8	15.8	15.8	15.6	15.6
DEC4	1998	3.2	3.2	3.2	3.1	3.1	10.6	10.5	15.6	15.2	15.2	13.3	13.3	16.1	15.9	15.9
JAN1	1998	3.3	3.3	3.3	3.2	3.2	10.2	10.2	10.2	15.4	15.4	13.4	13.4	13.4	16.3	16.3
JAN2	1998	3.4	3.4	3.4	3.3	3.3	11.2	11.2	11.2	12.5	12.5	14.1	14.1	14.1	14.8	14.8
JAN3	1998	3.4	3.5	3.5	3.3	3.3	10.8	10.8	10.8	10.7	12.0	13.9	13.9	13.9	13.9	14.7
JAN4	1998	3.5	3.5	3.5	3.3	3.3	11.5	11.6	11.6	11.6	13.0	14.5	14.5	14.5	14.4	15.3
FEB1	1998	3.5	3.5	3.5	3.4	3.3	11.2	11.2	11.2	11.2	11.2	14.3	14.3	14.3	14.3	14.2
FEB2	1998	3.5	3.5	3.5	3.4	3.4	11.2	11.2	11.2	11.2	11.2	14.2	14.2	14.2	14.2	14.2
FEB3	1998	3.7	3.7	3.7	3.5	3.5	10.9	10.9	10.9	10.9	10.9	13.9	14.0	14.0	13.9	13.9
FEB4	1998	3.6	3.7	3.7	3.5	3.5	11.8	11.8	11.8	11.8	11.9	14.4	14.4	14.4	14.4	14.4
MAR1	1998	3.6	3.6	3.6	3.5	3.5	12.5	12.5	12.5	12.6	12.6	14.6	14.6	14.6	14.7	14.7
MAR2	1998	3.6	3.6	3.7	3.6	3.5	12.8	12.9	12.8	13.0	13.0	14.6	14.6	14.6	14.6	14.7
MAR3	1998	3.6	3.6	3.6	3.6	3.6	6.5	6.5	6.5	7.6	7.6	10.3	10.3	10.3	11.1	11.1
MAR4	1998	3.5	3.6	3.6	3.6	3.6	5.7	5.8	5.8	6.7	6.6	9.6	9.6	9.6	10.3	10.3
APR1	1998	3.6	3.6	3.6	3.7	3.7	6.8	6.8	6.9	8.1	8.0	10.1	10.1	10.1	10.9	10.9
APR2	1998	3.6	3.6	3.6	3.7	3.7	6.2	6.0	6.2	7.0	7.0	9.3	9.2	9.3	9.9	9.9
APR3	1998	3.6	3.6	3.6	3.6	3.7	6.2	6.0	6.2	6.9	7.0	9.1	9.0	9.1	9.6	9.7
APR4	1998	3.7	3.7	3.7	3.7	3.7	5.0	5.0	5.1	5.5	5.5	7.8	7.9	7.8	8.3	8.3
MAY1	1998	3.7	3.7	3.7	3.7	3.7	5.2	5.1	5.2	5.6	5.6	7.8	7.7	7.8	8.1	8.1
MAY2	1998	3.7	3.6	3.7	3.7	3.7	6.0	6.1	6.0	6.9	7.0	8.3	8.5	8.4	8.9	9.0
MAY3	1998	3.6	3.6	3.7	3.7	3.7	11.1	11.2	10.9	9.9	11.3	11.0	11.1	10.9	10.4	11.1
MAY4	1998	3.5	3.5	3.6	3.5	3.6	7.8	7.8	7.8	8.0	8.1	9.2	9.2	9.2	9.2	9.3
JUN1	1998	3.3	3.3	3.4	3.3	3.4	6.9	6.6	7.2	6.3	6.0	8.4	8.2	8.6	8.0	7.9
JUN2	1998	3.2	3.1	3.2	3.2	3.2	18.8	19.6	18.8	18.3	18.3	13.3	13.6	13.3	13.1	13.1
JUN3	1998	3.1	3.0	3.2	3.1	3.1	21.2	22.4	21.2	19.8	20.8	13.9	14.4	13.9	13.4	13.8
JUN4	1998	3.1	3.0	3.1	3.1	3.1	18.5	18.5	18.5	18.0	18.1	12.7	12.7	12.7	12.6	12.6
JUL1	1998	3.0	2.9	3.0	3.0	3.0	17.7	17.9	17.7	17.1	17.2	12.2	12.3	12.2	12.0	12.0
JUL2	1998	2.7	2.7	2.8	2.8	2.8	13.1	13.2	13.1	13.2	13.5	10.4	10.4	10.4	10.4	10.5
JUL3	1998	2.6	2.6	2.7	2.7	2.7	16.1	16.5	16.1	13.3	15.9	11.4	11.6	11.4	10.4	11.3
JUL4	1998	2.6	2.5	2.6	2.7	2.7	12.9	10.8	13.0	9.8	9.4	10.1	9.3	10.1	8.8	8.7
AUG1	1998	2.5	2.5	2.5	2.6	2.6	7.8	7.9	7.8	7.9	8.3	8.0	8.1	8.0	8.1	8.2
AUG2	1998	2.5	2.5	2.5	2.6	2.6	10.1	7.6	9.5	8.4	7.7	9.0	7.9	8.7	8.3	8.0
AUG3	1998	2.6	2.6	2.6	2.7	2.7	11.2	11.0	10.8	10.6	10.8	9.5	9.5	9.4	9.3	9.4
AUG4	1998	2.7	2.7	2.7	2.8	2.8	10.1	10.1	10.1	10.0	10.2	9.1	9.1	9.1	9.1	9.2
SEP1	1998	2.8	2.8	2.8	2.9	2.9	8.9	8.7	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.8
SEP2	1998	2.9	2.9	3.0	3.0	3.0	14.6	14.0	14.7	12.9	14.0	11.3	11.0	11.3	10.6	11.0
SEP3	1998	3.0	3.0	3.0	3.0	3.0	16.2	16.2	14.4	14.2	15.7	12.1	12.1	11.4	11.3	11.9
SEP4	1998	3.1	3.0	3.1	3.1	3.1	17.1	17.3	17.1	17.1	17.2	12.7	12.8	12.7	12.7	12.7
OCT1	1999	3.1	3.1	3.1	3.1	3.1	17.9	17.9	17.8	16.9	17.6	13.3	13.3	13.3	12.9	13.2
OCT2	1999	3.2	3.2	3.2	3.2	3.2	16.7	17.8	17.7	16.4	17.5	13.1	13.6	13.6	13.0	13.5
OCT3	1999	3.2	3.2	3.2	3.2	3.2	17.0	17.1	17.1	16.1	16.8	13.6	13.6	13.6	13.2	13.5
OCT4	1999	3.3	3.2	3.3	3.3	3.3	16.0	16.0	16.0	15.7	15.7	13.5	13.5	13.5	13.4	13.4
NOV1	1999	3.3	3.3	3.3	3.3	3.3	14.3	14.3	14.3	12.6	12.1	13.2	13.2	13.2	12.4	12.1
NOV2	1999	3.3	3.3	3.3	3.3	3.3	15.0	14.0	15.1	13.3	13.3	13.8	13.4	13.9	13.0	13.0
NOV3	1999	3.4	3.4	3.4	3.4	3.4	15.4	15.4	15.4	15.1	15.1	14.4	14.4	14.4	14.2	14.2
NOV4	1999	3.4	3.4	3.4	3.4	3.4	15.4	16.2	15.4	15.1	15.8	14.7	15.1	14.7	14.6	14.9
DEC1	1999	3.5	3.5	3.5	3.5	3.5	16.0	16.1	16.0	15.7	15.7	15.4	15.5	15.4	15.3	15.3
DEC2	1999	3.6	3.6	3.6	3.6	3.6	15.9	16.0	15.9	15.6	15.6	15.7	15.7	15.7	15.5	15.5
DEC3	1999	3.6	3.6	3.7	3.6	3.6	16.1	16.2	16.1	15.8	15.8	16.1	16.1	16.1	15.9	15.9
DEC4	1999	3.7	3.7	3.8	3.7	3.7	15.8	15.8	15.8	15.4	15.5	16.2	16.2	16.2	16.0	16.0
JAN1	1999	3.8	3.8	3.8	3.7	3.7	14.5	14.5	14.5	14.2	14.2	15.8	15.8	15.8	15.6	15.6
JAN2	1999	3.8	3.8	3.8	3.8	3.8	15.1	15.1	15.1	11.7	12.0	16.3	16.3	16.3	14.4	14.5
JAN3	1999	3.8	3.8	3.8	3.8	3.8	16.7	16.7	16.7	12.9	12.9	17.3	17.3	17.3	15.2	15.2
JAN4	1999	3.8	3.8	3.8	3.8	3.8	16.2	16.2	16.2	12.3	12.3	17.1	17.1	17.1	14.9	14.9
FEB1	1999	3.8	3.8	3.8	3.8	3.8	16.3	16.3	16.3	12.6	12.6	17.2	17.2	17.2	15.1	15.1
FEB2	1999	3.9	3.9	3.9	3.9	3.9	16.7	16.7	16.7	12.1	12.1	17.3	17.4	17.3	14.7	14.7
FEB3	1999	4.0	4.0	4.0	4.0	4.0	12.1	16.5	16.4	11.9	12.0	14.7	17.1	17.1	14.6	14.6
FEB4	1999	4.1	4.1	4.1	4.1	4.1	12.1	12.4	12.1	12.2	12.3	14.6	14.7	14.5	14.6	14.6
MAR1	1999	4.1	4.1	4.1	4.2	4.2	12.7	12.7	12.7	12.7	12.7	14.8	14.8	14.8	14.7	14.7

NA = no action, PA = proposed action, CE = cumulative effects

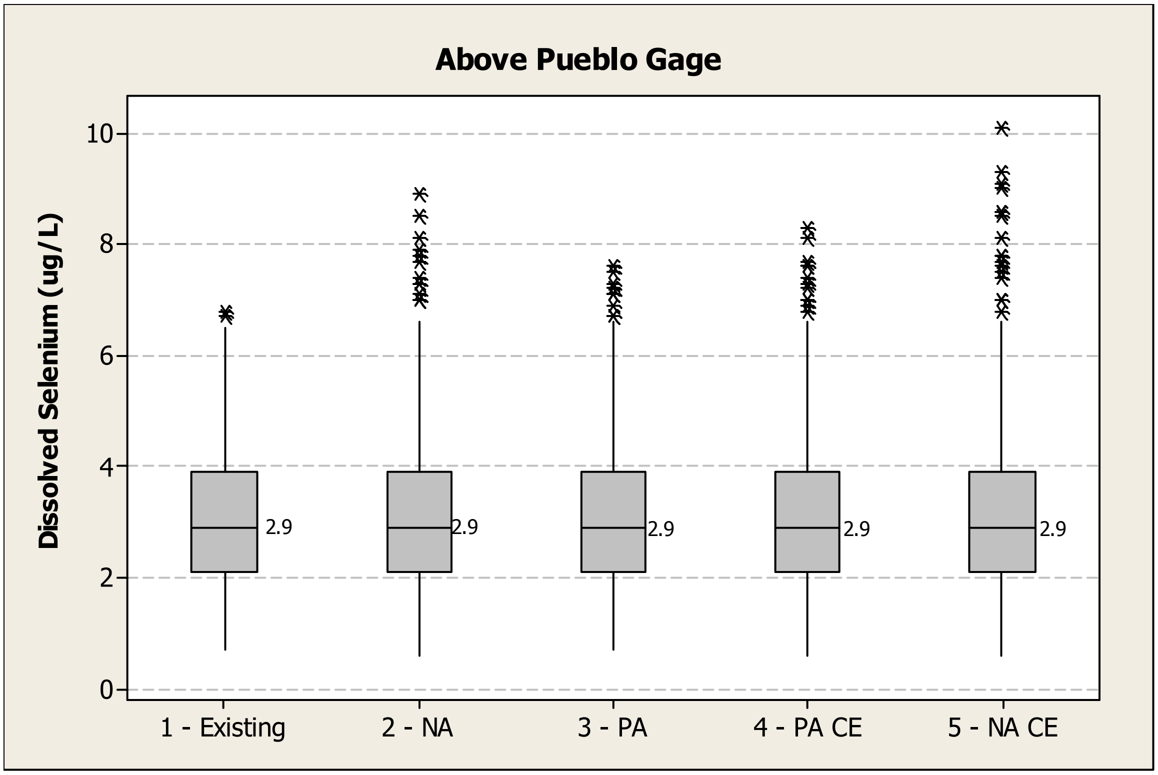
		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
MAR2	1999	4.1	4.1	4.1	4.2	4.2	13.9	14.1	13.9	14.2	14.3	15.2	15.3	15.2	15.3	15.4
MAR3	1999	4.2	4.1	4.2	4.2	4.2	17.2	18.0	17.3	16.8	17.5	16.7	17.0	16.7	16.5	16.8
MAR4	1999	4.2	4.2	4.2	4.2	4.2	16.8	16.7	16.3	15.8	16.5	16.1	16.1	15.9	15.7	16.0
APR1	1999	4.2	4.2	4.2	4.2	4.2	18.1	19.4	18.2	14.4	15.2	16.3	16.9	16.3	14.5	14.9
APR2	1999	4.2	4.2	4.2	4.2	4.2	8.8	8.9	8.8	9.0	9.2	11.2	11.3	11.2	11.3	11.5
APR3	1999	4.1	4.1	4.1	4.1	4.2	11.9	12.3	11.9	11.7	12.2	12.6	12.8	12.5	12.5	12.7
APR4	1999	4.1	4.1	4.1	4.1	4.1	4.6	4.5	4.6	4.5	4.5	7.1	7.1	7.1	7.1	7.1
MAY1	1999	3.7	3.7	3.7	3.7	3.7	3.8	3.8	3.8	3.9	3.9	4.8	4.8	4.8	5.1	5.1
MAY2	1999	3.7	3.8	3.8	3.7	3.7	5.3	5.3	5.3	5.3	5.2	7.2	7.1	7.2	7.2	7.2
MAY3	1999	4.0	4.0	4.0	3.8	3.8	6.5	6.5	6.4	6.3	6.2	8.1	8.1	8.0	8.0	7.9
MAY4	1999	4.0	4.0	4.0	3.8	3.8	5.4	5.5	5.4	5.1	5.1	7.0	7.0	7.0	6.7	6.6
JUN1	1999	3.9	3.9	3.9	3.7	3.7	6.1	6.0	6.1	5.6	5.5	7.5	7.4	7.5	7.1	7.0
JUN2	1999	3.6	3.5	3.6	3.4	3.4	5.2	5.0	5.4	4.9	4.9	6.6	6.5	6.8	6.5	6.4
JUN3	1999	2.7	2.6	2.7	2.7	2.7	3.2	3.1	3.3	3.4	3.4	5.3	5.2	5.3	5.5	5.4
JUN4	1999	2.2	2.2	2.2	2.3	2.3	2.3	2.2	2.3	2.6	2.5	4.7	4.6	4.7	4.9	4.7
JUL1	1999	1.9	1.9	1.9	2.0	2.0	4.9	5.0	4.9	5.1	5.2	6.9	7.0	7.0	7.0	7.1
JUL2	1999	1.9	1.9	1.9	2.0	2.0	10.5	10.8	10.5	10.8	11.1	9.3	9.4	9.3	9.4	9.6
JUL3	1999	1.9	1.9	2.0	2.0	2.0	7.2	6.7	7.4	7.6	6.8	7.7	7.5	7.9	7.9	7.6
JUL4	1999	1.9	1.9	2.0	2.0	2.0	12.4	12.8	12.4	12.6	13.1	9.9	10.1	9.9	10.0	10.2
AUG1	1999	2.4	2.4	2.4	2.4	2.3	4.9	4.8	5.0	4.4	4.8	6.3	6.2	6.3	5.9	6.2
AUG2	1999	2.7	2.7	2.7	2.6	2.6	6.2	6.0	6.1	5.9	6.0	7.0	6.9	7.0	6.9	6.9
AUG3	1999	2.6	2.5	2.6	2.5	2.5	9.9	12.7	12.6	8.5	8.5	8.9	10.1	10.0	8.3	8.3
AUG4	1999	2.5	2.5	2.5	2.5	2.5	8.1	16.6	8.2	8.5	8.2	8.3	11.7	8.3	8.4	8.3
SEP1	1999	2.5	2.5	2.5	2.5	2.5	15.6	15.8	14.5	14.0	15.9	11.5	11.6	11.0	10.8	11.6
SEP2	1999	2.6	2.6	2.6	2.6	2.6	15.5	16.2	15.5	15.5	16.2	11.6	11.9	11.6	11.6	11.9
SEP3	1999	2.7	2.6	2.7	2.6	2.6	13.2	13.6	13.8	15.2	13.8	10.9	11.0	11.1	11.7	11.1
SEP4	1999	2.7	2.6	2.7	2.7	2.6	13.8	14.9	14.8	14.8	15.3	11.3	11.8	11.8	11.7	11.9
OCT1	2000	2.7	2.7	2.7	2.7	2.7	15.4	15.4	15.4	14.9	15.4	12.3	12.3	12.3	12.1	12.3
OCT2	2000	2.8	2.7	2.8	2.7	2.7	15.4	15.8	15.1	15.5	15.4	12.6	12.7	12.4	12.6	12.6
OCT3	2000	2.8	2.8	2.8	2.8	2.8	12.6	13.0	12.6	13.2	13.3	11.7	11.8	11.6	11.9	11.9
OCT4	2000	2.9	2.8	2.9	2.8	2.8	12.6	13.3	13.3	13.3	13.5	11.9	12.3	12.3	12.3	12.3
NOV1	2000	2.9	2.9	2.9	2.9	2.8	13.9	13.2	13.2	13.2	13.2	13.0	12.7	12.7	12.6	12.6
NOV2	2000	2.9	2.9	2.9	2.9	2.9	13.2	13.2	13.2	13.2	13.2	13.0	13.0	13.0	13.0	13.0
NOV3	2000	3.0	2.9	3.0	2.9	2.9	12.4	12.4	12.4	12.4	12.4	12.9	12.9	12.9	12.9	12.9
NOV4	2000	3.1	3.0	3.1	3.0	3.0	11.2	9.9	11.2	11.3	10.0	12.6	11.9	12.6	12.6	11.9
DEC1	2000	3.1	3.1	3.2	3.1	3.1	10.8	10.8	10.8	10.9	10.9	12.7	12.7	12.7	12.8	12.8
DEC2	2000	3.2	3.1	3.2	3.1	3.1	12.4	12.4	12.4	12.5	12.5	13.9	13.9	13.9	13.9	13.9
DEC3	2000	3.2	3.2	3.2	3.2	3.2	12.1	12.0	12.1	12.1	12.1	13.9	13.9	13.9	13.9	13.9
DEC4	2000	3.3	3.2	3.3	3.2	3.2	10.8	10.7	10.8	10.8	10.8	13.4	13.4	13.4	13.4	13.4
JAN1	2000	3.5	3.4	3.5	3.4	3.4	11.0	11.0	11.0	11.0	11.0	13.8	13.8	13.8	13.8	13.8
JAN2	2000	3.7	3.7	3.7	3.6	3.6	11.5	11.5	11.5	11.5	11.5	14.3	14.2	14.3	14.3	14.2
JAN3	2000	3.9	3.9	3.9	3.8	3.7	11.3	11.3	11.3	11.3	11.3	14.3	14.2	14.3	14.2	14.2
JAN4	2000	4.1	4.1	4.1	3.9	3.9	11.2	11.1	11.2	11.1	11.1	14.2	14.2	14.2	14.2	14.1
FEB1	2000	4.2	4.2	4.3	4.0	4.0	11.2	11.2	11.2	11.2	11.2	14.3	14.2	14.3	14.2	14.2
FEB2	2000	4.3	4.3	4.3	4.1	4.0	11.8	11.8	11.8	11.8	11.8	14.6	14.6	14.6	14.5	14.5
FEB3	2000	4.3	4.3	4.3	4.0	4.0	11.5	11.6	11.6	11.5	11.5	14.3	14.3	14.3	14.3	14.3
FEB4	2000	4.2	4.1	4.2	4.1	4.0	11.7	11.7	11.7	11.7	11.7	14.3	14.3	14.3	14.3	14.3
MAR1	2000	4.2	4.2	4.2	4.2	4.1	11.3	11.4	11.4	11.5	11.5	13.9	13.9	13.9	13.9	14.0
MAR2	2000	4.3	4.3	4.3	4.3	4.3	13.4	13.8	13.4	13.4	13.8	14.8	15.1	14.8	14.8	15.0
MAR3	2000	4.4	4.4	4.4	4.3	4.3	10.0	10.2	10.0	9.9	10.1	12.6	12.7	12.6	12.5	12.7
MAR4	2000	4.4	4.3	4.4	4.3	4.3	10.7	10.9	10.6	10.6	10.8	12.8	12.9	12.8	12.7	12.9
APR1	2000	4.3	4.3	4.3	4.3	4.3	6.1	5.9	6.0	7.2	7.1	9.2	9.1	9.1	10.2	10.1
APR2	2000	4.2	4.2	4.2	4.2	4.2	6.5	6.3	6.4	7.0	7.1	9.5	9.4	9.4	9.9	10.0
APR3	2000	4.2	4.1	4.2	4.2	4.2	11.3	11.5	11.5	11.4	11.4	12.2	12.3	12.3	12.2	12.3
APR4	2000	4.1	4.1	4.1	4.1	4.1	10.9	10.8	10.9	10.9	10.8	11.8	11.7	11.7	11.7	11.7
MAY1	2000	4.0	4.0	4.0	4.1	4.0	11.6	11.2	11.0	11.1	10.6	11.7	11.6	11.5	11.5	11.2
MAY2	2000	4.0	3.9	4.0	4.0	4.0	8.7	9.1	9.4	8.8	9.0	10.0	10.2	10.3	10.0	10.1
MAY3	2000	3.8	3.8	3.8	3.9	3.9	13.7	13.2	13.2	11.5	11.6	12.1	11.9	11.9	11.1	11.2
MAY4	2000	3.5	3.4	3.5	3.5	3.5	5.4	4.6	5.3	5.2	5.1	7.8	7.3	7.8	7.6	7.5
JUN1	2000	3.0	2.9	3.0	3.1	3.1	3.9	3.5	3.8	4.3	4.1	6.8	6.5	6.7	6.9	6.9
JUN2	2000	2.8	2.6	2.7	2.9	2.9	14.8	14.7	13.3	13.8	15.2	11.7	11.7	11.1	11.3	11.9
JUN3	2000	2.8	2.7	2.8	2.9	2.9	5.8	5.9	6.1	7.5	6.7	7.8	7.8	7.9	8.5	8.1
JUN4	2000	2.9	2.8	2.9	2.9	2.9	8.0	8.1	7.9	8.4	8.5	8.5	8.6	8.5	8.7	8.7
JUL1	2000	2.9	2.8	2.9	3.0	2.9	11.4	10.2	9.8	10.4	10.9	9.8	9.4	9.2	9.4	9.6
JUL2	2000	2.9	2.9	2.9	3.0	3.0	8.0	7.7	7.8	8.5	8.4	8.4	8.2	8.3	8.5	8.5
JUL3	2000	3.0	2.9	3.0	3.0	3.0	6.7	6.7	6.7	7.0	7.1	7.6	7.6	7.6	7.7	7.7
JUL4	2000	3.0	3.0	3.0	3.0	3.0	15.0	13.5	12.5	12.8	13.9	11.0	10.4	10.1	10.1	10.5
AUG1	2000	3.0	3.0	3.0	3.1	3.0	15.9	14.8	14.7	14.7	14.9	11.3	10.9	10.8	10.8	10.9
AUG2	2000	3.1	3.1	3.1	3.1	3.1	5.9	5.5	5.8	6.1	5.6	7.3	7.2	7.3	7.4	7.2
AUG3	2000	3.2	3.2	3.2	3.2	3.2	8.0	7.5	7.5	7.8	7.7	8.2	8.0	8.0	8.1	8.1
AUG4	2000	3.3	3.3	3.3	3.3	3.3	11.1	10.5	9.8	10.3	10.4	9.5	9.3	9.0	9.2	9.2
SEP1	2000	3.4	3.4	3.4	3.4	3.4	18.5	18.6	17.7	17.6	18.5	12.6	12.6	12.3	12.3	12.6
SEP2	2000	3.5	3.5	3.5	3.5	3.5	17.5	14.4	13.3	16.9	17.1	12.4	11.2	10.8	12.2	12.2
SEP3	2000	3.6	3.6	3.6	3.6	3.5	19.0	19.2	19.0	18.7	19.2	13.2	13.3	13.2	13.1	13.3
SEP4	2000	3.7	3.6	3.7	3.6	3.6	15.5	15.5	15.5	17.1	17.2	12.1	12.1	12.1	12.7	12.7
OCT1	2001	3.7	3.7	3.7	3.7	3.7	19.1	19.3	19.1	18.7	18.9	13.9	13.9	13.9	13.7	13.8
OCT2	2001	3.8	3.7	3.8	3.7	3.7	17.5	17.6	17.5	17.3	17.3	13.5	13.6	13.5	13.4	13.5
OCT3	2001	3.8	3.8	3.8	3.8	3.8	17.2	17.2	17.2	16.9	17.0	13.7	13.7	13.7	13.6	13.6
OCT4	2001	3.9	3.8	3.9	3.8	3.8	15.3	15.3	15.3	15.1	15.2	13.2	13.2	13.2	13.1	13.1
NOV1	2001	3.9	3.9	3.9	3.9	3.8	16.5	16.6	16.5	15.8	16.2	14.3	14.3	14.3	13.9	14.1
NOV2	2001	3.9	3.9	3.9	3.9	3.9	16.6	16.6	16.6	16.0	16.2	14.6	14.6	14.6	14.4	14.4
NOV3	2001	4.0	3.9	4.0	3.9	3.9	15.3	15.3	15.3	15.4	15.4	14.4	14.4	14.4	14.4	14.4
NOV4	2001	4.0	4.0	4.0	4.0	3.9	15.3	15.6	15.3	15.2	15.3	14.7	14.9	14.7	14.6	14.7
DEC1	2001	4.0	4.0	4.0	4.0	3.9	16.8	16.8	16.8	16.4	16.4	15.9	15.9	15.9	15.7	15.7
DEC2	2001	4.1	4.1	4.1	4.0	4.0	16.9	16.9	16.9	16.4	16.4	16.2	16.3	16.2	16.0	16.0
DEC3	2001	4.2	4.1	4.2	4.1	4.1	16.6	16.6	16.6	16.2	16.2	16.4	16.4	16.4	16.2	16.2
DEC4	2001	4.2	4.2	4.2	4.1	4.1	15.8	15.8	15.8	15.4	15.5	16.2	16.2	16.2	16.0	16.1
JAN1	2001	4.2	4.2	4.3	4.2	4.2	15.8	15.9	15.8	15.5	15.5	16.6	16.6	16.6	16.4	16.4
JAN2	2001	4.3	4.4	4.4	4.3	4.3	15.8	15.8	15.8	15.5	15.4	16.7	16.7	16.7	16.5	16.5
JAN3	2001	4.4	4.4	4.4	4.4	4.4	16.1	16.1	16.1	15.7	15.7	17.0	17.0	17.0	16.8	16.8
JAN4	2001	4.5	4.6	4.6	4.6	4.6	16.0	16.0	16.0	15.7	15.6	17.0	17.0	17.0	16.8	16.8
FEB1	2001	4.7	4.8	4.8	4.7	4.7	16.1	16.2	16.2	15.7	15.7	17.1	17.1	17.1	16.8	16.8
FEB2	2001	4.7	4.8	4.8	4.7	4.7	15.4	15.4	15.4	15.1	15.1	16.6	16.6	16.6	16.4	16.4

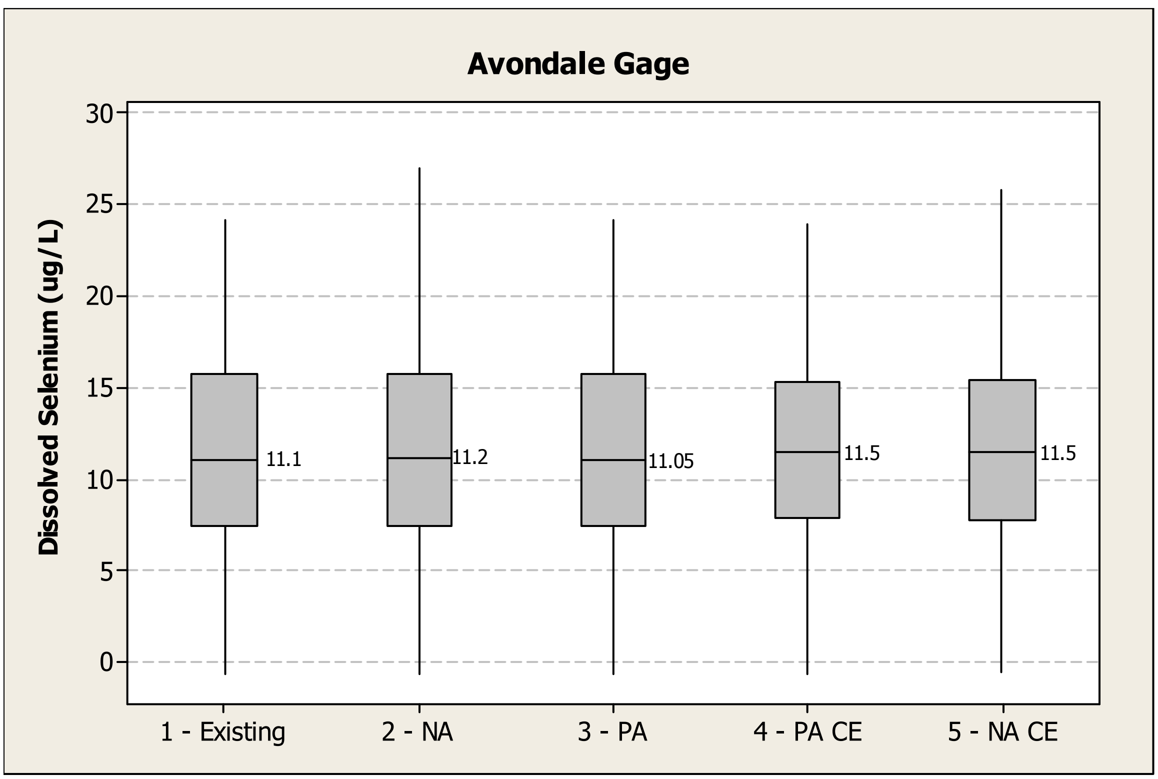
NA = no action, PA = proposed action, CE = cumulative effects

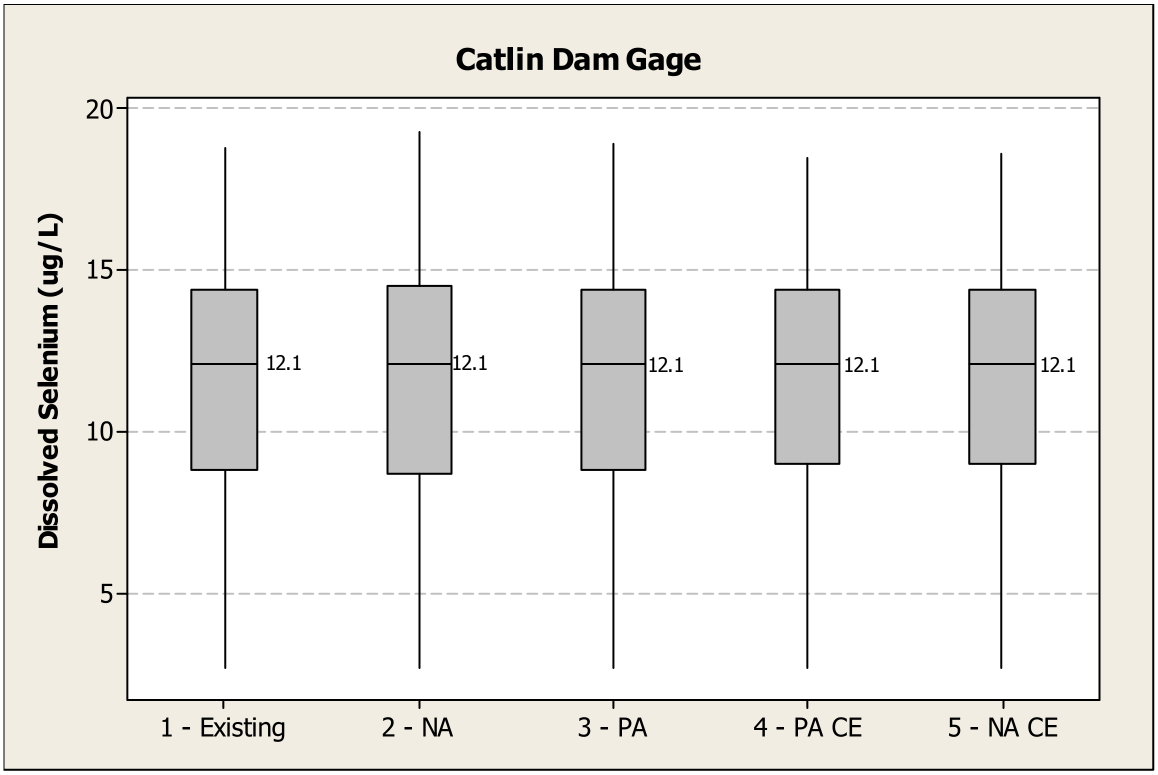
Selenium Model - Quarter Monthly Concentration (ug/L)

		Above Pueblo Gage					Avondale Gage					Catlin Dam Gage				
Qtr-Mo	Water Year	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE	1 - Existing	2 - NA	3 - PA	4 - PA CE	5 - NA CE
FEB3	2001	4.7	4.8	4.8	4.7	4.7	16.0	16.1	16.0	15.6	15.7	16.8	16.9	16.8	16.6	16.6
FEB4	2001	4.6	4.7	4.7	4.7	4.6	15.2	15.3	15.3	14.9	15.0	16.3	16.3	16.3	16.1	16.1
MAR1	2001	4.6	4.6	4.7	4.6	4.6	13.0	13.0	13.0	12.9	12.9	14.8	14.9	14.9	14.8	14.8
MAR2	2001	4.5	4.5	4.6	4.5	4.5	16.9	17.2	16.9	16.4	16.7	16.7	16.8	16.7	16.5	16.6
MAR3	2001	4.4	4.4	4.4	4.4	4.3	19.1	20.1	19.2	17.8	13.6	17.6	18.1	17.6	16.9	14.7
MAR4	2001	4.4	4.4	4.4	4.4	4.3	14.6	14.8	16.0	12.6	12.7	15.0	15.1	15.7	13.9	14.0
APR1	2001	4.4	4.4	4.4	4.4	4.3	12.7	12.4	13.2	11.8	12.4	13.6	13.4	13.8	13.1	13.4
APR2	2001	4.4	4.4	4.4	4.4	4.3	10.6	10.2	10.9	10.7	10.2	12.2	12.0	12.3	12.2	12.0
APR3	2001	4.4	4.4	4.4	4.4	4.3	9.8	9.4	9.9	10.0	9.5	11.5	11.3	11.6	11.6	11.3
APR4	2001	4.4	4.4	4.4	4.4	4.3	9.8	9.7	9.7	9.7	9.9	11.2	11.2	11.2	11.2	11.3
MAY1	2001	4.4	4.4	4.4	4.4	4.3	11.7	12.3	12.2	11.6	12.0	11.7	12.0	11.9	11.6	11.9
MAY2	2001	4.2	4.1	4.2	4.0	3.9	17.6	15.5	15.4	12.9	11.2	14.1	13.2	13.2	12.0	11.2
MAY3	2001	3.5	3.2	3.4	3.1	2.9	4.6	3.9	4.3	3.8	3.5	7.1	6.7	7.0	6.6	6.4
MAY4	2001	2.7	2.6	2.7	2.4	2.4	2.8	2.3	2.5	2.4	2.3	6.1	5.6	5.8	5.7	5.7
JUN1	2001	3.0	3.0	3.1	3.0	3.0	3.2	3.2	3.3	3.4	3.4	6.0	6.0	6.1	6.2	6.1
JUN2	2001	2.5	2.4	2.4	2.6	2.5	3.8	3.5	3.7	4.4	4.4	6.8	6.7	6.7	7.1	7.1
JUN3	2001	2.5	2.5	2.5	2.6	2.6	6.1	6.0	6.1	8.0	8.2	7.9	7.8	7.8	8.7	8.8
JUN4	2001	2.7	2.7	2.7	2.8	2.8	3.6	3.7	3.7	4.3	4.2	6.5	6.6	6.6	6.8	6.8
JUL1	2001	2.8	2.9	2.9	2.9	2.9	5.2	5.2	5.2	6.1	6.1	7.2	7.3	7.3	7.6	7.6
JUL2	2001	3.0	3.0	3.0	3.0	3.0	6.4	6.2	6.2	6.5	6.5	7.5	7.4	7.4	7.5	7.5
JUL3	2001	3.0	3.0	3.0	3.0	3.0	13.3	13.4	13.3	13.7	13.9	10.4	10.5	10.4	10.5	10.6
JUL4	2001	3.0	3.0	3.0	3.0	3.0	19.1	17.6	17.4	15.9	16.0	12.4	11.9	11.8	11.3	11.3
AUG1	2001	3.0	3.0	3.0	3.0	3.0	19.9	18.4	18.2	17.8	18.1	12.7	12.1	12.1	11.9	12.0
AUG2	2001	3.1	3.1	3.1	3.1	3.1	6.5	6.1	6.2	7.8	7.3	7.6	7.4	7.5	8.1	7.9
AUG3	2001	3.3	3.3	3.4	3.3	3.3	7.4	7.7	8.3	10.5	10.6	8.1	8.2	8.5	9.3	9.4
AUG4	2001	3.4	3.5	3.5	3.5	3.5	8.3	8.4	8.9	9.4	9.6	8.5	8.5	8.7	8.9	9.0
SEP1	2001	3.6	3.6	3.7	3.6	3.6	17.2	16.8	15.9	15.8	17.1	12.1	12.0	11.6	11.6	12.1
SEP2	2001	3.7	3.8	3.8	3.8	3.8	18.8	19.1	18.6	17.6	18.0	12.9	13.0	12.8	12.4	12.6
SEP3	2001	3.8	3.9	3.9	3.9	3.9	17.1	17.3	17.1	16.4	16.5	12.5	12.5	12.5	12.2	12.2
SEP4	2001	3.9	4.0	4.0	3.9	3.9	19.4	20.0	19.8	18.3	18.7	13.6	13.9	13.7	13.2	13.3
OCT1	2002	4.0	4.1	4.1	4.0	4.0	22.6	22.9	22.6	20.5	22.0	15.2	15.3	15.2	14.4	15.0
OCT2	2002	4.1	4.2	4.2	4.2	4.2	18.0	19.7	19.5	17.3	19.3	13.7	14.4	14.3	13.5	14.2
OCT3	2002	4.2	4.3	4.3	4.2	4.2	20.0	20.2	20.0	19.6	19.7	14.9	15.0	14.9	14.7	14.8
OCT4	2002	4.3	4.4	4.4	4.3	4.3	19.0	19.1	19.0	17.9	18.6	14.8	14.9	14.8	14.4	14.7
NOV1	2002	4.3	4.4	4.4	4.4	4.3	20.3	20.4	20.3	19.2	19.6	15.9	16.0	15.9	15.4	15.6
NOV2	2002	4.3	4.4	4.4	4.4	4.4	18.8	18.8	18.7	17.8	18.2	15.6	15.7	15.6	15.1	15.3
NOV3	2002	4.4	4.5	4.5	4.4	4.4	17.5	17.6	17.6	17.3	17.3	15.4	15.5	15.5	15.3	15.3
NOV4	2002	4.4	4.5	4.5	4.5	4.5	16.7	17.2	16.8	16.3	16.7	15.4	15.6	15.4	15.2	15.4
DEC1	2002	4.5	4.6	4.6	4.5	4.5	18.5	18.6	18.5	17.8	17.9	16.7	16.8	16.7	16.4	16.4
DEC2	2002	4.6	4.8	4.7	4.7	4.7	18.3	18.4	18.4	17.8	17.8	17.0	17.0	17.0	16.7	16.7
DEC3	2002	4.8	5.0	5.0	4.9	4.9	18.3	18.4	18.3	17.7	17.8	17.3	17.3	17.3	17.0	17.0
DEC4	2002	5.0	5.3	5.3	5.2	5.2	18.5	18.6	18.5	17.9	18.0	17.6	17.7	17.7	17.3	17.4
JAN1	2002	5.4	6.4	6.0	6.4	6.5	18.2	18.5	18.4	17.9	18.0	17.8	18.0	17.9	17.7	17.7
JAN2	2002	5.4	5.9	5.9	5.9	5.8	17.8	18.0	18.0	17.4	17.4	17.8	17.9	17.9	17.6	17.6
JAN3	2002	5.3	5.5	5.6	5.5	5.4	16.0	16.0	16.1	15.8	15.7	16.9	17.0	17.0	16.8	16.8
JAN4	2002	5.2	5.3	5.4	5.3	5.3	15.7	15.7	15.8	15.5	15.5	16.8	16.9	16.9	16.7	16.7
FEB1	2002	5.2	5.3	5.3	5.3	5.5	15.7	15.7	15.7	15.4	15.5	16.8	16.8	16.8	16.7	16.7
FEB2	2002	5.2	5.3	5.3	5.3	5.3	16.4	16.5	16.4	16.1	16.1	17.2	17.2	17.2	17.0	17.0
FEB3	2002	5.3	5.5	5.4	5.5	5.6	14.7	14.8	14.8	14.6	14.7	16.1	16.2	16.2	16.1	16.1
FEB4	2002	5.2	5.3	5.4	5.4	5.1	15.2	15.3	15.3	15.0	15.0	16.3	16.3	16.3	16.2	16.1
MAR1	2002	5.1	5.1	5.4	5.4	5.0	15.4	15.4	15.4	15.2	15.1	16.2	16.2	16.2	16.1	16.0
MAR2	2002	5.1	5.2	5.4	5.3	5.1	16.0	16.3	16.1	15.8	15.9	16.3	16.4	16.3	16.1	16.2
MAR3	2002	5.0	5.1	5.3	5.2	5.1	18.6	19.7	18.8	16.8	15.8	17.3	17.9	17.4	16.4	15.9
MAR4	2002	5.0	5.0	5.2	5.2	5.0	19.5	20.6	19.7	18.8	17.3	17.4	18.0	17.5	17.1	16.4
APR1	2002	4.9	5.0	5.2	5.1	4.9	18.4	18.4	17.7	17.5	15.8	16.4	16.4	16.1	16.0	15.1
APR2	2002	4.9	5.0	5.2	5.1	5.0	18.0	16.6	17.9	17.0	16.1	15.9	15.2	15.8	15.4	15.0
APR3	2002	5.0	5.0	5.2	5.3	5.0	19.3	22.3	19.3	18.9	20.5	16.1	17.5	16.1	15.9	16.6
APR4	2002	5.0	5.0	5.3	5.3	5.0	19.3	21.7	20.6	19.0	21.1	15.7	16.8	16.3	15.6	16.5
MAY1	2002	5.0	5.0	5.2	5.2	5.0	14.3	13.2	14.4	14.5	13.6	13.0	12.6	13.1	13.1	12.7
MAY2	2002	5.0	5.0	5.1	5.1	5.0	18.3	16.1	18.4	16.8	17.4	14.5	13.5	14.5	13.8	14.1
MAY3	2002	4.8	4.5	4.8	4.5	4.4	22.3	18.4	22.2	19.5	19.5	15.7	14.1	15.7	14.6	14.6
MAY4	2002	4.8	4.8	4.9	4.9	4.8	18.3	18.2	18.3	12.5	12.6	13.8	13.7	13.8	11.4	11.4
JUN1	2002	4.4	3.3	3.8	3.3	2.7	22.2	9.7	23.9	14.1	11.4	14.8	9.9	15.5	11.7	10.6
JUN2	2002	3.9	3.7	3.6	3.7	3.6	9.8	8.8	10.2	11.8	10.3	9.7	9.3	9.9	10.5	9.9
JUN3	2002	4.1	4.5	4.4	4.6	4.6	17.7	16.0	17.8	23.3	17.5	12.6	12.0	12.7	14.7	12.6
JUN4	2002	4.4	4.8	4.8	4.8	4.8	14.9	14.2	15.1	19.0	16.6	11.4	11.1	11.5	12.9	12.0
JUL1	2002	4.3	3.5	3.9	3.4	3.4	12.4	11.0	12.1	11.5	10.7	10.2	9.6	10.1	9.8	9.5
JUL2	2002	3.8	3.5	3.4	3.5	3.6	12.7	11.3	12.5	12.4	11.5	10.3	9.7	10.2	10.1	9.8
JUL3	2002	4.2	5.1	4.7	5.2	5.3	19.8	20.4	20.1	19.8	19.9	12.7	13.0	12.9	12.7	12.8
JUL4	2002	4.7	5.3	5.3	5.4	5.4	22.6	23.5	22.6	20.8	19.8	13.7	13.9	13.7	13.0	12.7
AUG1	2002	5.0	5.7	5.6	5.8	5.8	21.5	22.3	21.8	20.2	20.6	13.3	13.5	13.3	12.8	12.9
AUG2	2002	5.1	5.5	5.7	5.8	5.5	21.9	22.5	22.2	20.6	22.4	13.4	13.6	13.5	12.9	13.6
AUG3	2002	5.2	6.1	6.0	6.2	6.3	23.5	24.4	23.9	24.0	24.5	14.1	14.4	14.2	14.2	14.4
AUG4	2002	5.5	6.4	6.3	6.5	6.5	20.9	21.6	21.2	21.3	21.6	13.2	13.5	13.4	13.4	13.5
SEP1	2002	5.6	6.5	6.4	6.5	6.5	23.1	23.9	23.4	23.4	23.8	14.2	14.5	14.4	14.4	14.5
SEP2	2002	5.7	6.2	6.2	6.3	6.2	20.0	20.4	20.2	20.2	20.4	13.4	13.5	13.4	13.4	13.5
SEP3	2002	5.7	6.3	6.3	6.4	6.3	18.2	18.6	18.4	18.4	18.6	12.9	13.1	13.0	13.0	13.1
SEP4	2002	5.8	6.3	6.2	6.3	6.3	19.5	19.9	19.6	19.7	19.9	13.7	13.8	13.7	13.7	13.8
85th Percentile		4.4	4.4	4.4	4.4	4.4	17.0	17.2	17.0	16.4	16.5	16.0	16.2	16.1	15.7	15.9
% Quarter-Months Greater than 18.4		0.0%	0.0%	0.0%	0.0%	0.0%	7.1%	8.1%	7.1%	4.0%	5.1%	0.5%	0.9%	0.5%	0.1%	0.1%

NA = no action, PA = proposed action, CE = cumulative effects


Above Pueblo Gage
Dissolved Selenium (ug/L)
0
2
4
6
8
10
2.9
2.9
2.9
2.9
2.9
1 - Existing
2 - NA
3 - PA
4 - PA CE
5 - NA CE


Avondale Gage
Dissolved Selenium (ug/L)
0
5
10
15
20
25
30
11.1
11.2
11.05
11.5
11.5
1 - Existing
2 - NA
3 - PA
4 - PA CE
5 - NA CE



Catlin Dam Gage
Dissolved Selenium (ug/L)
20
15
10
5
12.1
12.1
12.1
12.1
12.1
1 - Existing
2 - NA
3 - PA
4 - PA CE
5 - NA CE